A SURVEY OF KOA REGENERATION IN HUMUULA

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Hawaii Department of Natural Resources
Division of Forestry and Wildlife

Humuula Tract Pre-Harvest Regeneration Survey

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May 11, 2007

Introduction

This survey was performed on a parcel of land on the Hanakea district of the island of Hawaii, known as the Humuula tract, consisting of approximately 200 acres. This parcel is primarily senescent koa forest with considerable mortality. In order to rejuvenate this forest the Division of Forestry and Wildlife has scheduled a salvage harvest of dead and dying trees. This is to be followed by ground scarification where necessary. This survey was carried out prior to the salvage operation in order to clearly demonstrate the pre-harvest state of the forest. This is especially important with regards to regeneration and ground cover. Continued surveys in the future will enable us to accurately assess the success of the project.

Methods

Plots were selected by overlaying the stand with a systematic grid, placing a plot every 410 feet. This resulted in a total of 38 points being selected for sampling. Due to time constraints and field conditions only 28 of these 40 points were eventually measured and used in this report. Plot locations are shown in figure 2 of this report. The pre-survey plan is included in Appendix 2.

Plots consisted of a one twentieth acre subplot nested within and centered on a one fifth acre main plot. Diameter (dbh), height, height to first fork or crook, and vigor were recorded for all live trees four inches or larger on the main plot. Dbh only was measured for dead trees, since they will be removed and scaled at the time of harvest. On the subplot, trees and seedlings less than four inches, including seedlings less than 4.5 feet in height were tallied according to diameter class. Dominant ground cover was recorded for each plot. This was not intended as a comprehensive botanical survey and ground cover detail was primarily concerned with the extent that it may impede Koa regeneration. Photos were taken of the view due north of each plot as well as the ground cover at plot center in order to preserve a visual record of both the forest canopy and the ground cover.

Results and Analysis

Approximately 94% of all trees greater than 4 inches in diameter are koa with the exception of some planted stands of eucalyptus, tropical ash, and miscellaneous conifers which were excluded from the survey. For the purposes of this report we will focus on the koa trees. Table 1 below shows the number of stems per diameter class for koa four inches in diameter and greater.

Table 1. Trees 4 inches or greater dbh

Size Class (inches DBH)	Mid-point	Per Plot			Per Acre		
		Mean # live Koa	Standard Error	95% Confidence Interval	Mean # live Koa	Standard Error	95% Confidence Interval
4-11.9	8	3.79	0.80	2.14 – 5.43	18.95	4.00	10.70– 27.15
12-19.9	16	0.96	0.27	0.42 – 1.51	4.80	4.80	2.10– 7.55
20-27.9	24	0.46	0.16	0.15 – 0.78	2.30	0.80	0.75 – 3.90
28-35.9	32	0.32	0.12	0.07 – 0.57	1.60	0.60	0.35 – 2.85
36-43.9	40	0.21	0.10	0.01 – 0.42	1.05	0.50	0.05 – 2.10
44+		0.29	0.12	0.04 – 0.53	1.45	0.60	0.20 – 2.65
Total		**6.04**	**0.93**	**4.14 – 7.93**	**30.20**	**4.65**	**20.70 – 39.65**

Very little information exists regarding the optimum stocking of Koa species. However, comparison with data from three other stands and a plantation taken in 1981 (table 2) give us some idea of the relative stem density of the forest in question. We can conclude from this comparison that the stand is severely under-stocked. This is visually demonstrated by the pictures of the stand included in appendix 1 at the end of this report.

Table 2. Comparison of stocking levels of the study area with three other natural stands and one planted stand.

Location	Annual Rainfall (in)	Age (yrs)	Stocking (stems/ acre)	Dominants	
				Dbh (in)	Height (ft)
Humuula	No data	No data	30	14.5	38.7
Natural stand 1	150	8	1400	5.0	19.6
Natural stand 2	200	17	320	9.1	57.0
Natural stand 3	100	15	1100	7.3	43.0
Plantation	150	27	160	12.2	47.0

Data for comparable stands taken from: Ching, Wayne F. 1981. Growth of koa at selected sites on the island of Hawaii. Unpublished report. HI Department of Land and Natural Resources, Division of Forestry and Wildlife, Honolulu, HI. l0p. as presented in *High Value Hardwoods in Hawaii volume 1* State of Hawaii Department of Land and Natural Resources Division of Wildlife Publication December, 1991

Looking at regeneration in the stand we can draw a similar conclusion. For the purposes of this report we are defining regeneration as stems less than 4 inches dbh, including seedlings less than 4.5 feet in height. The number of stems per acre and size distribution are shown in Table 3 and Figure 1 respectively.

Table 3. Number of stems less than 4.0 in dbh by size class

Size Class*	Mean # koa stems/ plot	Standard Error	95% Confidence Interval		Mean # koa stems/ acre	Standard Error	95% Confidence Intervals	
A	1.36	0.56	0.21	2.51	27.14	11.20	4.16	50.13
B	0.50	0.19	0.11	0.89	10.00	3.79	2.22	17.78
C	0.18	0.08	0.02	0.34	3.57	1.55	0.40	6.74
D	0.39	0.17	0.04	0.75	7.86	3.47	0.73	14.98
E	0.14	0.07	0.00	0.29	2.86	1.42	-0.05	5.77
Total	**2.57**	**0.68**	1.19	3.96	**51.43**	**13.50**	23.72	79.14

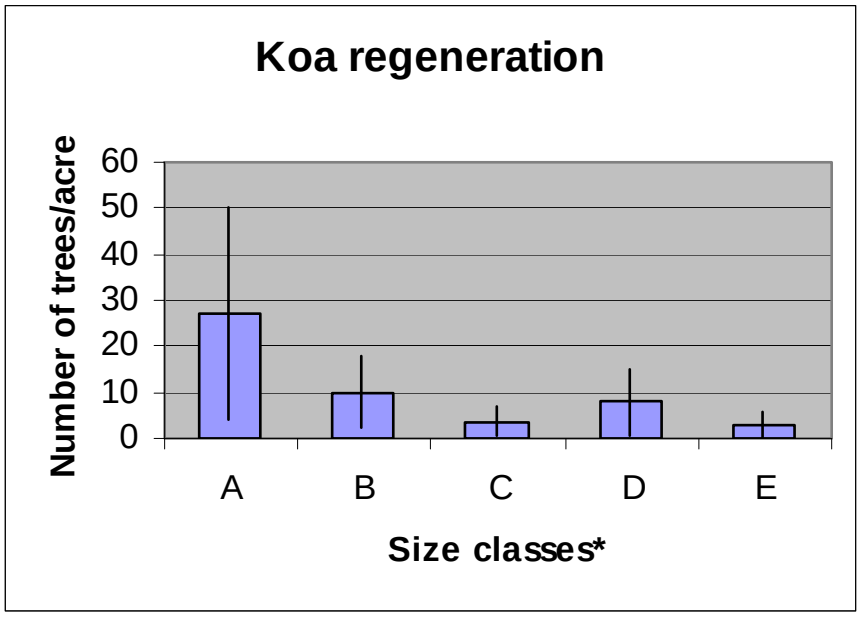


Figure 1. Relative abundance of stems by size class and confidence intervals

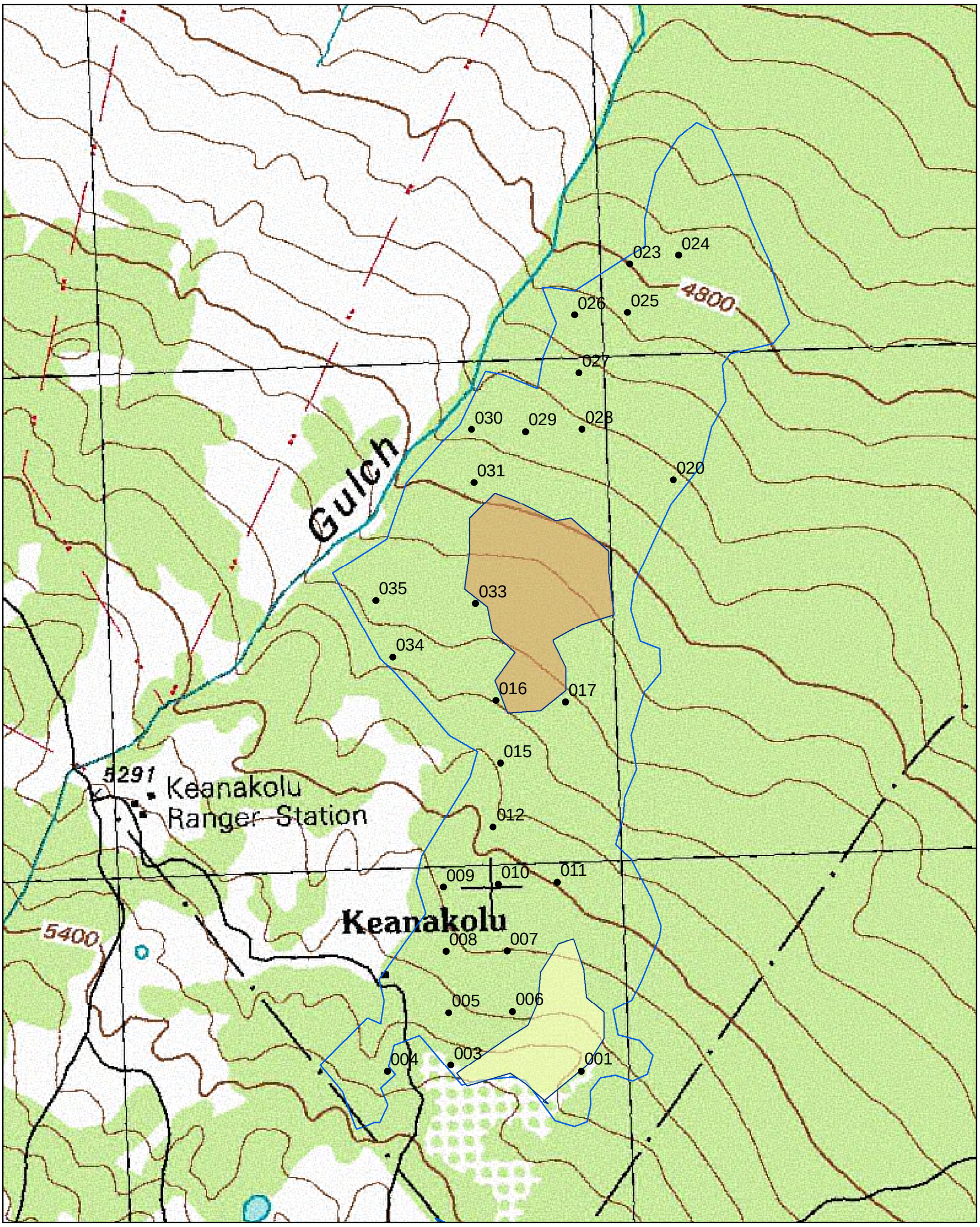
As we can see in table 2 and figure 1, very few seedlings are becoming established in this stand. Of the few seedlings that do get started, there is significant mortality in the early stages, resulting in very few stems surviving to reach 4 inches in diameter. This slow rate of regeneration is likely due to the thick ground cover of grass, rubus, and to a lesser extent, banana poka found on all plots. This is again visually demonstrated in the pictures following this report.

Conclusion

This stand is in a severe state of decline. Regeneration of the stand is being drastically impeded by thick ground cover of rubus and various grasses. Without measures to create an environment suitable for the establishment of koa seedlings, it is unlikely that this stand will re-establish itself in a timely manner. This increases the likelihood of further invasion by poka and other invasive species.

**Description of size classes: A= stems less than 4.5 ft in height, B = 0 to .9 in. dbh, C = 1.0 to 1.9 in dbh, D = 2.0 to 2.9 in. dbh, E = 3.0 to 3.9 in. dbh*

Humuula Tract Pre Harvest Survey Plot Locations

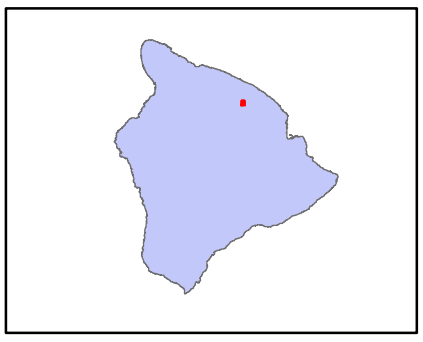


Humuula Pre-Harvest Regeneration Survey
Sample Plot Locations

- Sample Point Location
- Study Area
- Eucalyptus/ Ash (excluded)
- Misc Conifers (excluded)

0 400 800 1,200 1,600 Feet

Created by David Joughin
May 12, 2007
Map No. 20070512.humuula.pdf



Appendix 1

Pictures demonstrate the senescent and under-stocked nature of the stand as well as the thick ground cover of grass and rubus impeding regeneration.

Grass vegetation on plot center

Missy Sprecher takes a well deserved break

Broken log near plot center

Rubus and grass, grass and rubus

Grass and rubus ground cover

Dead trees near the plot

A nest of Turkey eggs hidden in the grass

A Hawaiian Hawk takes a break in a broken treetop.

Banana polka growing on a young koa

A typical view of the stand

Thick patches of rubus and poka often made walking difficult.

View from the plot shows on of the few saplings we counted.

Appendix 2: Pre-Harvest Survey Plan

Humuula Pre-harvest Regeneration Survey Plan

David Joughin

March 30, 2007

Statement of Need:

This survey will cover a portion the tract of land on the Hilo Forest Reserve on the Island of Hawaii known as Humuula (see attached map). There is a plan to perform a salvage logging operation of dead and dying koa (*Acacia koa*) followed by ground scarification by bulldozer in order to stimulate Koa regeneration. Prior to treatments, this survey will quantify the current species composition and density of the existing forest with a focus on regeneration and the effect on it by ground cover. Because much of the current regeneration will probably be damaged by the scarification process it is important to evaluate the amount and condition of regeneration before the treatment is applied. Comparisons of the regeneration found in this survey with the regeneration found in future (post-treatment) surveys will provide a means of evaluating the success of the regeneration practices.

Methods:

The stand was identified on satellite imagery and calculated to be approximately 200 acres. Of this 200 acres approximately 20 acres was identified as planted stands of eucalyptus and ash. Another ten acres was identified as miscellaneous conifers. These areas are identified on the map and were excluded from the survey bringing the total study area to approximately 170 acres. A north-south grid with a point every 410 feet was then generated in *Arcmap* and placed over the study area to determine sample plot locations.

The survey will consist of approximately one 0.2 acre (52.67 ft radius) plot per five acres of stand area. This results in a total of 38 sample plots. Trees four inches and greater will be tallied on the 0.2 acre plot. Data collected will include: species, dbh, total height, height to first fork, and vigor. Vigor will be assessed by crown class according to the following table.

Crown category	Description
1	Vigorous, full crown with little or no branch dieback
2	Crown average, with some to medium size branch dieback
3	Sparse or clumpy crown, with major branch dieback

Table taken from Specification and guidelines for koa canoe log cruising and inventory February 2006.

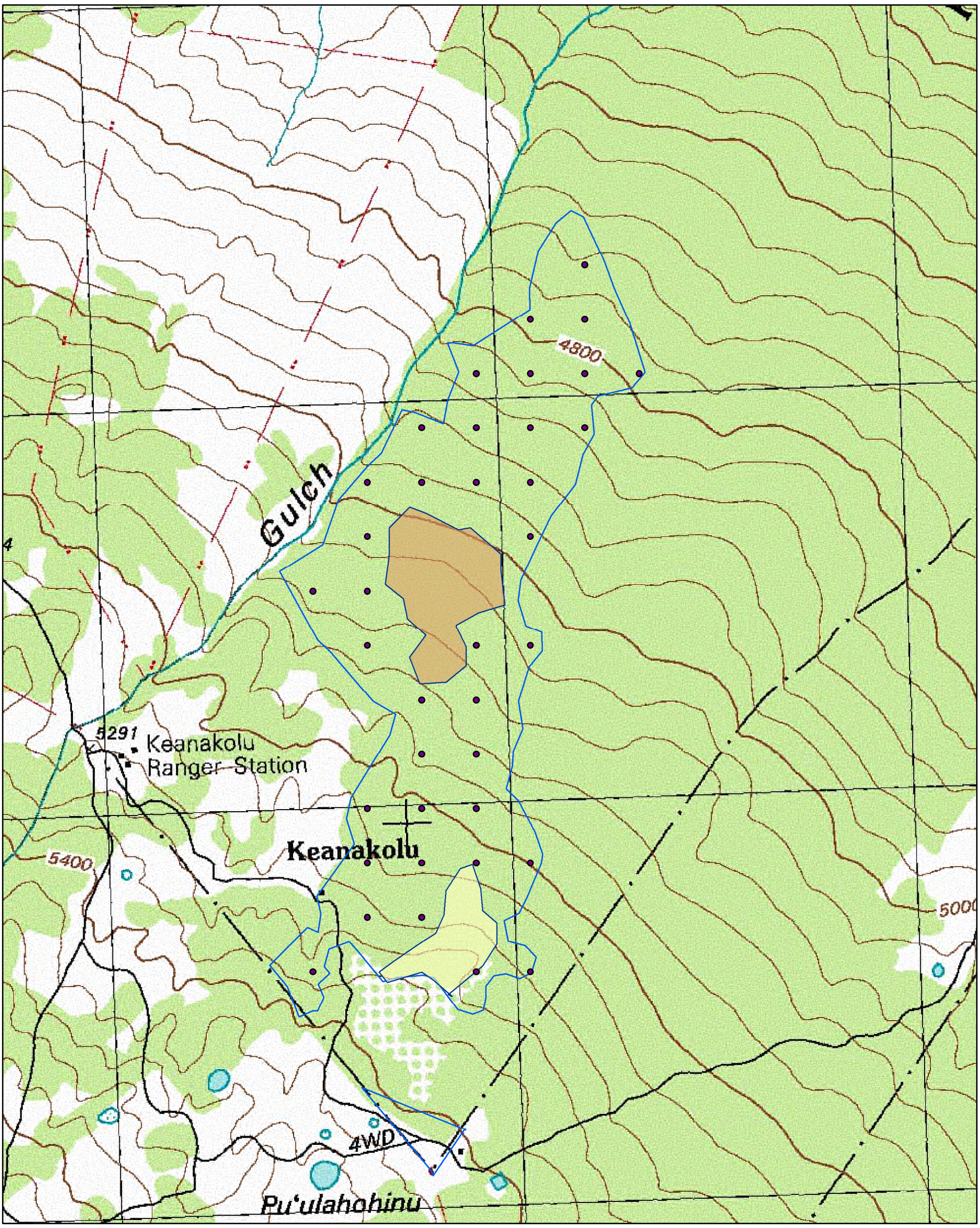
Centered within each 0.2 acre plot there will be a 0.05 acre subplot, on which seedlings and trees less than 4 inches will be recorded according to the following diameter classes:

A – seedlings less than 4.5 feet in height
B – trees 0.1 to 0.9 inches dbh
C – trees 1.0 to 1.9 inches dbh
D – trees 2.0 to 2.9 inches dbh
E – trees 3.0 to 3.9 inches dbh

Composition and density of the dominant ground cover will be noted on each 0.05 acre plot with special attention paid to invasive species. A digital photo will be taken facing due (true) north from each plot center. In the event that the view to the north is not representative of, or faces out of the stand, an additional photo may be taken and the azimuth will be recorded. An additional photo of the ground will be taken from the edge (location to be chosen to give the best representative view of ground cover) of the .05 acre plot and centered on the plot center.

Plots need not be permanently marked as the scarification will probably disturb any plot markers. In addition such a significant disturbance would make trend data meaningless. It is recommended that in the next survey plots sould be permanently marked and periodically re-measured. This would give valuable growth and survival data.

Humuula Tract Survey Plan

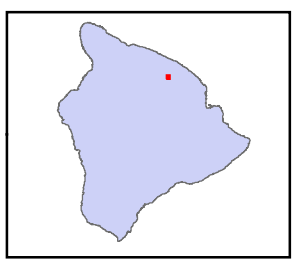


Survey Plan for Humuula Parcel

- proposed sample points
- Study Area
- Eucalyptus/Ash (Excluded)
- Misc conifers (excluded)

1:10,000

Created by David Joughin
February 23, 2007
Map no. 20070223.humuula.pdf



Summary of plots

Main plot is 1/5 acre. For pe acre values multiply by 5

Main plot data												
	koa only								all species			
Size Class	Mean live koa/plot	SE	95% CI		mean dead	SE	mean tot koa/plot	SE	Mean # live trees	SE	Mean # all trees	SE
4-11.9	3.79	0.79	2.16	5.42	0.00	0.00	3.82	0.80	4.04	0.82	4.36	0.80
12-19.9	0.96	0.26	0.44	1.49	0.07	0.05	1.07	0.27	1.00	0.25	1.07	0.27
20-27.9	0.46	0.15	0.16	0.77	0.07	0.05	0.54	0.16	0.46	0.15	0.54	0.16
28-35.9	0.32	0.11	0.09	0.56	0.11	0.08	0.43	0.13	0.39	0.12	0.50	0.13
36-43.9	0.21	0.09	0.02	0.40	0.07	0.05	0.29	0.11	0.21	0.09	0.29	0.11
44+	0.29	0.11	0.06	0.52	0.04	0.04	0.32	0.11	0.29	0.11	0.32	0.11
total	6.04	0.97	4.04	8.03	0.36	0.12	6.46	1.05	6.39	1.04	7.07	1.08
Mean DBH	14.54				27.46		15.33		14.33		14.97	
Stand. Dev	13.13421											
mean Heig	38.72											
stand dev	22.09441											

Subplot is 1/20 acre.

Subplot												
Size Class	Mean # koa stems /plot	Stand Dev	Variance	SE	95% CI		Mean # stems per acre	standev	variance	SE	95% CI	
a	1.32	2.93	8.57	0.53	0.24	2.40	26.43	58.56	171.48	10.55	4.78	48.08
b	0.50	0.99	0.98	0.18	0.13	0.87	10.00	19.78	19.57	3.59	2.64	17.36
c	0.18	0.40	0.16	0.07	0.03	0.33	3.57	8.04	3.23	1.45	0.59	6.55
d	0.32	0.85	0.72	0.16	-0.01	0.66	6.43	16.92	14.31	3.26	-0.26	13.12
e	0.07	0.27	0.07	0.07	-0.06	0.21	1.43	5.43	1.48	1.33	-1.30	4.15
total	2.39	3.62	13.13	0.65	1.05	3.74	47.86	72.48	262.68	13.08	21.01	74.70

Plot #	1	crew	Missy Sprecher and David Joughin
Date	4/12/2007		

Main Plot Data

Size Class	# live koa trees	# dead koa trees	tot # koa trees	# live trees*	total # of Trees**
4-11.9	14	0	14	14	14
12-19.9	2	0	2	2	2
20-27.9	1	0	1	1	1
28-35.9	0	0	0	0	0
36-43.9	0	0	0	0	0
44+	0	0	0	0	0
total	17	0	17	17	17

	Koa only			All species	
	live	dead	live + dead	live	live + dead
mean dbh	9.1	0.0	9.1	9.1	9.1
stan dev	4.8	0.0	4.8	4.8	4.8
variance	23.4	0.0	23.4	23.4	23.4

Mean Ht	31.0
stan dev	5.5

*Includes trees of all species
** Includes all trees of all species, live and dead

Subplot (koa only)

Size Class	stem count
A	7
B	0
C	0
D	0
E	0
total	7

Definition of size classes
A =seedlings less than 4.5ft tall
B = stems 0.1 to 0.9 inches dbh
C= stems 1.0 to 1.9 inches dbh
D = stems 2.0 to 2.9 inches dbh
E = stems 3.0 to 3.9 inches dbh

Plot #	gps	tree #	Species		dbh	tot height	height to fork	vigor	diameter cl	#of trees	ground cov	%cover	comments
1	1	1	koa	live	23	40	7	1	A	7	kikuyu gras	90%	photo #s 101-0535/0536
1	1	2	koa	live	17.2	34	14	1					Plot intersected by trail
1	1	3	koa	live	4.4	21	7	1					
1	1	4	koa	live	11.5	37	7	2					
1	1	5	koa	live	8.4	24	8	1					
1	1	6	koa	live	6.6	22	12	1					
1	1	7	koa	live	7.6	33	16	1					
1	1	8	koa	live	7.8	33	10	1					
1	1	9	koa	live	12.7	38	7	1					
1	1	10	koa	live	7	34	18	1					
1	1	11	koa	live	4	27	6	1					
1	1	12	koa	live	8.7	27	10	1					
1	1	13	koa	live	4.1	28	10	1					
1	1	14	koa	live	8	30	12	1					
1	1	15	koa	live	7.1	33	4	1					
1	1	16	koa	live	7.1	33	4	1					

1	1	17	koa	live	9.4	33	4	1

Plot # 3 crew Missy Sprecher and David Joughin

Date 4/12/2007

Main Plot Data					
Size Class	**# live koa trees**	**# dead koa trees**	**tot # koa trees**	**# live trees***	**total # of Trees****
4-11.9	5	0	6	5	6
12-19.9	5	0	5	5	5
20-27.9	0	0	0	0	0
28-35.9	0	0	0	0	0
36-43.9	0	0	0	0	0
44+	0	0	0	0	0
total	10	0	11	10	11

	Koa only			All species	
	live	dead	live + dead	live	live + dead
mean dbh	10.7	0.0	10.1	10.7	10.1
stan dev	4.8	0.0	5.0	4.8	5.0
variance	23.0	0.0	24.8	23.0	24.8

Mean Ht	27.9
stan dev	11.5

*Includes trees of all species
** Includes all trees of all species, live and dead

Subplot (koa only)	
Size Class	**stem count**
A	5
B	0
C	0
D	1
E	0
total	6

Definition of size classes
A =seedlings less than 4.5ft tall
B = stems 0.1 to 0.9 inches dbh
C= stems 1.0 to 1.9 inches dbh
D = stems 2.0 to 2.9 inches dbh
E = stems 3.0 to 3.9 inches dbh

Plot numbe	gps point	tree #	Species		dbh	tot height	height to fork	vigor	diameter cl	#of trees	ground cov	%cover	comments
3	3	1	koa	live	13.1	46	12	1	a	5	Grass	85	photo # 101-0542/0543
3	3	2	koa	live	5.8	35	10	2	d	1	rubus hawa	5	
3	3	3	koa	live	7.7	30	5	1	d pine	1			
3	3	4	koa	live	18.7	34	7	1					
3	3	5	koa	live	4.7	18	8	3					dead top
3	3	6	koa	dead	4	0	0	0					
3	3	7	koa	live	13.9	35	7	1					
3	3	8	koa	live	9.3	7	21	1					
3	3	9	koa	live	5.7	16	7	1					
3	3	10	koa	live	12.3	24	10	2					leaning
3	3	11	koa	live	16	34	11	2					

Plot # 4 crew Missy Sprecher and David Joughin

Date 4/12/2007

Main Plot Data					
Size Class	**# live koa trees**	**# dead koa trees**	**tot # koa trees**	**# live trees***	**total # of Trees****
4-11.9	10	0	10	13	13
12-19.9	3	0	3	3	3
20-27.9	1	0	1	1	1
28-35.9	2	0	2	2	2
36-43.9	0	0	0	0	0
44+	0	0	0	0	0
total	16	0	16	19	19

	Koa only			All species	
	live	dead	live + dead	live	live + dead
mean dbh	11.6	0.0	11.6	10.6	10.6
stan dev	9.5	0.0	9.5	9.0	9.0
variance	90.5	0.0	90.5	81.1	81.1

Mean Ht	44.7
stan dev	26.3

*Includes trees of all species
** Includes all trees of all species, live and dead

Subplot (koa only)	
Size Class	**stem count**
A	8
B	1
C	0
D	0
E	1
total	10

Definition of size classes
A =seedlings less than 4.5ft tall
B = stems 0.1 to 0.9 inches dbh
C= stems 1.0 to 1.9 inches dbh
D = stems 2.0 to 2.9 inches dbh
E = stems 3.0 to 3.9 inches dbh

Plot	gps	tree #	Species		dbh	tot height	height to fork	vigor	diameter cl	#of trees	ground cov	%cover	comments
4	4	1	koa	live	21	63	7	2	a	8	Grass	60	
4	4	2	koa	live	7.1	22	6	3	b	1	rubus hawa	25	
4	4	3	koa	live	33	70	12	2	c	0	banana pol	10	
4	4	4	koa	live	4	30	20	22	d	0			
4	4	5	koa	live	4.3	30	9	2	e	1			
4	4	6	koa	live	5.4	33	23	2					
4	4	7	koa	live	13	55	30	1					
4	4	8	koa	live	4.7	15	11	3					
4	4	9	koa	live	5.4	33	12	2					
4	4	10	koa	live	6.9	33	18	2					
4	4	11	koa	live	5.5	35	22	2					
4	4	12	koa	live	9.8	40	9	1					
4	4	13	koa	live	4.2	30	10	1					
4	4	14	plum	live	5.5	25	0	1					One tree branch
4	4	15	plum	live	5.3	25	0	1					
4	4	16	koa	live	31	108	20	2					

4	4	17	koa	live	19	93	45	2	
4	4	18	koa	live	13	25	5	3	laying over/ covered in banana polka
4	4	19	plum	live	5	20	0	2	

Plot # 5 crew Missy Sprecher and David Joughin

Date 4/12/2007

Main Plot Data					
Size Class	**# live koa trees**	**# dead koa trees**	**tot # koa trees**	**# live trees***	**total # of Trees****
4-11.9	8	0	8	8	8
12-19.9	1	0	1	1	1
20-27.9	1	0	1	1	1
28-35.9	0	0	0	0	0
36-43.9	0	1	1	0	1
44+	0	1	1	0	1
total	10	2	12	10	12

	Koa only			All species	
	live	dead	live + dead	live	live + dead
mean dbh	9.8	40.8	15.0	9.8	15.0
stan dev	4.5	4.6	12.8	4.5	12.8
variance	20.0	21.1	163.5	20.0	163.5

Mean Ht	26.8
stan dev	8.2

*Includes trees of all species
** Includes all trees of all species, live and dead

Subplot (koa only)	
Size Class	**stem count**
A	0
B	1
C	0
D	0
E	0
total	1

Definition of size classes
A =seedlings less than 4.5ft tall
B = stems 0.1 to 0.9 inches dbh
C= stems 1.0 to 1.9 inches dbh
D = stems 2.0 to 2.9 inches dbh
E = stems 3.0 to 3.9 inches dbh

Plot num	gps poin	tree #	Species		dbh	tot height	height to fork	vigor	diameter cl	#of trees	ground cov	%cover	comments
5	5	1	koa	live	8.7	27	10	1	b	1	grass	75	photo 0548
5	5	2	koa	dead	37.5	0	0	3			rubus hawa	15	
5	5	3	koa	live	8.4	26	6	1					
5	5	5	koa	live	10.4	17	6	1					
5	5	6	koa	dead	44	0	0	3					
5	5	7	koa	live	8.8	21	8	1					
5	5	8	koa	live	7	22	5	1					
5	5	9	koa	live	5.5	22	5	1					
5	5	10	koa	live	5.2	30	6	1					
5	5	11	koa	live	12.1	30	8	1					
5	5	12	koa	live	20.8	47	9	1					
5	5	13	koa	live	11	26	?	?					

Plot # 6 crew Missy Sprecher and David Joughin

Date 4/12/2007

Main Plot Data					
Size Class	**# live koa trees**	**# dead koa trees**	**tot # koa trees**	**# live trees***	**total # of Trees****
4-11.9	2	0	2	2	2
12-19.9	0	0	0	0	0
20-27.9	0	0	0	0	0
28-35.9	1	0	1	1	1
36-43.9	0	0	0	0	0
44+	1	0	1	1	1
total	4	0	4	4	4

	Koa only			All species	
	live	dead	live + dead	live	live + dead
mean dbh	27.8	0.0	27.8	27.8	27.8
stan dev	25.3	0.0	25.3	25.3	25.3
variance	637.8	0.0	637.8	637.8	637.8

Mean Ht	55.5
stan dev	37.7

*Includes trees of all species
** Includes all trees of all species, live and dead

Subplot (koa only)	
Size Class	**stem count**
A	1
B	0
C	1
D	0
E	0
total	2

Definition of size classes
A =seedlings less than 4.5ft tall
B = stems 0.1 to 0.9 inches dbh
C= stems 1.0 to 1.9 inches dbh
D = stems 2.0 to 2.9 inches dbh
E = stems 3.0 to 3.9 inches dbh

Plot numbe	gps point	tree #	Species		dbh	tot height	height to fork	vigor	diameter cl	#of trees	ground cov	%cover	comments
6	6	1	koa	live	63	107	37	2	a	1			
6	6	2	koa	live	29.3	60	9	3	c	1			
6	6	3	koa	live	8.4	25	7	1					
6	6	4	koa	live	10.6	30	9	1					

Plot # 7 crew Missy Sprecher and David Joughin

Date 4/12/2007

Main Plot Data					
Size Class	**# live koa trees**	**# dead koa trees**	**tot # koa trees**	**# live trees***	**total # of Trees****
4-11.9	6	0	6	6	6
12-19.9	1	0	1	1	1
20-27.9	0	0	0	0	0
28-35.9	1	0	1	1	1
36-43.9	0	0	0	0	0
44+	0	0	0	0	0
total	8	0	8	8	8

	Koa only			All species	
	live	dead	live + dead	live	live + dead
mean dbh	12.1	0.0	12.1	12.1	12.1
stan dev	9.7	0.0	9.7	9.7	9.7
variance	93.7	0.0	93.7	93.7	93.7

Mean Ht	34.4
stan dev	21.6

*Includes trees of all species
** Includes all trees of all species, live and dead

Subplot (koa only)	
Size Class	**stem count**
A	1
B	0
C	0
D	0
E	0
total	1

Definition of size classes
A =seedlings less than 4.5ft tall
B = stems 0.1 to 0.9 inches dbh
C= stems 1.0 to 1.9 inches dbh
D = stems 2.0 to 2.9 inches dbh
E = stems 3.0 to 3.9 inches dbh

Plot numbe	gps point	tree #	Species		dbh	tot height	height to fork	vigor	diameter cl	#of trees	ground cov	%cover	comments
7	7	1	koa	live	35.2	87	9	3	a	1	grass	85	
7	7	2	koa	live	10.2	31	15	1					
7	7	3	koa	live	13.5	32	8	1					
7	7	4	koa	live	7.5	25	8	1					
7	7	5	koa	live	7.7	29	9	1					
7	7	6	koa	live	8	25	5	1					
7	7	7	koa	live	9.4	25	5	1					
7	7	8	koa	live	4.9	21	5	1					

Plot # 8 crew Missy Sprecher and David Joughin

Date 4/12/2007

Main Plot Data					
Size Class	**# live koa trees**	**# dead koa trees**	**tot # koa trees**	**# live trees***	**total # of Trees****
4-11.9	0	0	0	0	1
12-19.9	1	0	1	1	1
20-27.9	0	0	0	0	0
28-35.9	0	0	0	0	0
36-43.9	1	0	1	1	1
44+	0	0	0	0	0
total	2	0	2	2	3

	Koa only			All species	
	live	dead	live + dead	live	live + dead
mean dbh	29.3	0.0	29.3	29.3	19.5
stan dev	18.2	0.0	18.2	18.2	21.3
variance	332.8	0.0	332.8	332.8	452.6

Mean Ht	43.0
stan dev	24.0

*Includes trees of all species
** Includes all trees of all species, live and dead

Subplot (koa only)	
Size Class	**stem count**
A	0
B	0
C	0
D	0
E	0
total	0

Definition of size classes
A =seedlings less than 4.5ft tall
B = stems 0.1 to 0.9 inches dbh
C= stems 1.0 to 1.9 inches dbh
D = stems 2.0 to 2.9 inches dbh
E = stems 3.0 to 3.9 inches dbh

Plot numbe	gps point	tree #	Species		dbh	tot height	height to fork	vigor	diameter cl	#of trees	ground cov	%cover	comments
8	8	1	koa	live	42.2	60	23	3	none		grass	60	
8	8	2	koa	live	16.4	26	0	0			rubus hawa	30	
					0	0	0				banana pol	10	

Plot # 9 crew Missy Sprecher and David Joughin

Date 4/12/2007

Main Plot Data					
Size Class	**# live koa trees**	**# dead koa trees**	**tot # koa trees**	**# live trees***	**total # of Trees****
4-11.9	3	0	3	3	3
12-19.9	0	0	0	0	0
20-27.9	0	1	1	0	1
28-35.9	1	0	1	1	1
36-43.9	1	0	1	1	1
44+	0	0	0	0	0
total	5	1	6	5	6

	Koa only			All species	
	live	dead	live + dead	live	live + dead
mean dbh	18.0	24.8	19.2	18.0	19.2
stan dev	15.4	0.0	14.0	15.4	14.0
variance	236.1	0.0	196.5	236.1	196.5

Mean Ht	57.8
stan dev	45.6

*Includes trees of all species
** Includes all trees of all species, live and dead

Subplot (koa only)	
Size Class	**stem count**
A	0
B	0
C	0
D	1
E	0
total	1

Definition of size classes
A =seedlings less than 4.5ft tall
B = stems 0.1 to 0.9 inches dbh
C= stems 1.0 to 1.9 inches dbh
D = stems 2.0 to 2.9 inches dbh
E = stems 3.0 to 3.9 inches dbh

Plot numbe	gps point	tree #	Species		dbh	tot height	height to fork	v	diameter cl	#of trees	ground cov	%cover	comments
9	9	1	koa	dead	24.8	0	0	0					Dead standing
9	9	2	koa	live	10.6	31	8	1	d	1	grass	60	photo 101-0556/0557
9	9	3	koa	live	7	23	7	1			rubus hawa	30	
9	9	4	koa	live	28.7	105	45	2			banana pol	10	
9	9	5	koa	live	39.6	110	40	2					
9	9	6	koa	live	4.3	20	8	1					

Plot # 10 crew Missy Sprecher and David Joughin

Date 4/12/2007

Main Plot Data					
Size Class	**# live koa trees**	**# dead koa trees**	**tot # koa trees**	**# live trees***	**total # of Trees****
4-11.9	3	0	3	3	3
12-19.9	2	0	2	2	2
20-27.9	0	0	0	0	0
28-35.9	0	0	0	1	1
36-43.9	0	0	0	0	0
44+	0	0	0	0	0
total	5	0	5	6	6

	Koa only			All species	
	live	dead	live + dead	live	live + dead
mean dbh	10.4	0.0	10.4	13.4	13.4
stan dev	4.5	0.0	4.5	8.5	8.5
variance	20.3	0.0	20.3	72.1	72.1

Mean Ht	26.6
stan dev	4.3

*Includes trees of all species
** Includes all trees of all species, live and dead

Subplot (koa only)	
Size Class	**stem count**
A	0
B	1
C	0
D	0
E	0
total	1

Definition of size classes
A =seedlings less than 4.5ft tall
B = stems 0.1 to 0.9 inches dbh
C= stems 1.0 to 1.9 inches dbh
D = stems 2.0 to 2.9 inches dbh
E = stems 3.0 to 3.9 inches dbh

Plot numbe	gps point	tree #	Species		dbh	tot height	height to fork	vigor	diameter cl	#of trees	ground cov	%cover	comments
10	10	1	ohia	live	28.7	80	40	1					
10	10	2	koa	live	15	34	7	2	b	1	grass	70	
10	10	3	koa	live	7.3	24	8	1			rubus hawa	20	
10	10	4	koa	live	15.5	27	5	1					
10	10	5	koa	live	6.1	24	5	1					
10	10	6	koa	live	8	24	5	1					

Plot # 11 crew Missy Sprecher and David Joughin

Date 4/12/2007

Main Plot Data					
Size Class	**# live koa trees**	**# dead koa trees**	**tot # koa trees**	**# live trees***	**total # of Trees****
4-11.9	4	0	4	4	4
12-19.9	0	0	0	0	0
20-27.9	0	0	0	0	0
28-35.9	0	0	0	0	0
36-43.9	0	0	0	0	0
44+	1	0	1	1	1
total	5	0	5	5	5

	Koa only			All species	
	live	dead	live + dead	live	live + dead
mean dbh	17.3	0.0	17.3	17.3	17.3
stan dev	22.6	0.0	22.6	22.6	22.6
variance	511.1	0.0	511.1	511.1	511.1

Mean Ht	32.5
stan dev	26.8

*Includes trees of all species
** Includes all trees of all species, live and dead

Subplot (koa only)	
Size Class	**stem count**
A	0
B	2
C	1
D	1
E	0
total	4

Definition of size classes
A =seedlings less than 4.5ft tall
B = stems 0.1 to 0.9 inches dbh
C= stems 1.0 to 1.9 inches dbh
D = stems 2.0 to 2.9 inches dbh
E = stems 3.0 to 3.9 inches dbh

Plot numbe	gps point	tree #	Species		dbh	tot height	height to fork	v	diameter cl	#of trees	ground cov	%cover	comments
11	11	1	koa	live	7.2	23.5	6.5	1	d	1	grass	60	photo # 101-0560/0562
11	11	2	koa	live	5.4	20	5	3	b	2	rubus haw	40	
11	11	3	koa	live	5.1	15	8	1	c	1			
11	11	4	koa	live	57.5	80	15	2					hollow base
11	11	5	koa	live	11.3	24	9	1					

Plot # 12 crew Missy Sprecher and David Joughin

Date 4/12/2007

Main Plot Data					
Size Class	**# live koa trees**	**# dead koa trees**	**tot # koa trees**	**# live trees***	**total # of Trees****
4-11.9	2	0	2	2	2
12-19.9	1	0	1	1	1
20-27.9	0	0	0	0	0
28-35.9	0	0	0	0	0
36-43.9	0	0	0	0	0
44+	0	0	0	0	0
total	3	0	3	3	3

	Koa only			All species	
	live	dead	live + dead	live	live + dead
mean dbh	8.7	0.0	8.7	8.7	8.7
stan dev	4.1	0.0	4.1	4.1	4.1
variance	17.2	0.0	17.2	17.2	17.2

Mean Ht	18.7
stan dev	2.3

*Includes trees of all species
** Includes all trees of all species, live and dead

Subplot (koa only)	
Size Class	**stem count**
A	0
B	1
C	0
D	1
E	0
total	2

Definition of size classes
A =seedlings less than 4.5ft tall
B = stems 0.1 to 0.9 inches dbh
C= stems 1.0 to 1.9 inches dbh
D = stems 2.0 to 2.9 inches dbh
E = stems 3.0 to 3.9 inches dbh

Plot numbe	gps point	tree #	Species		dbh	tot height	height to fork	vigor	diameter cl	#of trees	ground cov	%cover	comments
12	12	1	koa	live	13.2	20	5	2	b	1	grass	40	photo # 102-0569/0570
12	12	2	koa	live	8	16	8	1	d	1	polka	20	
12	12	3	koa	live	5	20	10	1			rubus hawa	30	

Plot # 15 crew Missy Sprecher and David Joughin

Date 4/12/2007

Main Plot Data					
Size Class	**# live koa trees**	**# dead koa trees**	**tot # koa trees**	**# live trees***	**total # of Trees****
4-11.9	2	0	2	4	7
12-19.9	3	0	3	3	3
20-27.9	2	0	2	2	2
28-35.9	0	0	0	1	1
36-43.9	0	0	0	0	0
44+	0	0	0	0	0
total	7	0	7	10	13

	Koa only			All species	
	live	dead	live + dead	live	live + dead
mean dbh	15.3	0.0	15.3	14.7	13.0
stan dev	5.6	0.0	5.6	7.7	7.5
variance	31.9	0.0	31.9	59.2	56.1

Mean Ht	48.7
stan dev	10.6

*Includes trees of all species
** Includes all trees of all species, live and dead

Subplot (koa only)	
Size Class	**stem count**
A	0
B	0
C	0
D	0
E	0
total	0

Definition of size classes
A =seedlings less than 4.5ft tall
B = stems 0.1 to 0.9 inches dbh
C= stems 1.0 to 1.9 inches dbh
D = stems 2.0 to 2.9 inches dbh
E = stems 3.0 to 3.9 inches dbh

Plot numbe	gps point	tree #	Species		dbh	tot height	height to fo	vigor	diameter cl	#of trees	ground cov	%cover	comments
15	15	1	ohia	live	28.1	77	8	1					
15	15	2	plum	live	4.7	22	0	3	none		grass	95	
15	15	3	plum	live	7	20	0	3			rubus hawa	5	
15	15	4	koa	live	13.8	34	5	1					
15	15	5	ohia	dead	10.8	0	0	0					
15	15	6	ohia	dead	7	0	0	0					
15	15	7	ohia	dead	4.6	0	0	0					
15	15	8	koa	live	10.2	50	5	2					
15	15	9	koa	live	14.8	50	16	2					
15	15	10	koa	live	7	35	8	2					
15	15	11	koa	live	17.3	60	10	1					
15	15	12	koa	live	22.4	60	12	1					
15	15	13	koa	live	21.6	52	8	1					

Plot # 16 crew Missy Sprecher and David Joughin

Date 4/12/2007

Main Plot Data					
Size Class	**# live koa trees**	**# dead koa trees**	**tot # koa trees**	**# live trees***	**total # of Trees****
4-11.9	0	0	0	2	2
12-19.9	0	0	0	0	0
20-27.9	1	1	2	1	2
28-35.9	0	0	0	0	0
36-43.9	2	0	2	2	2
44+	2	0	2	2	2
total	5	1	6	7	8

	Koa only			All species	
	live	dead	live + dead	live	live + dead
mean dbh	44.5	24.8	41.2	33.1	32.0
stan dev	12.5	0.0	13.7	22.0	20.6
variance	155.3	0.0	188.9	485.5	424.6

Mean Ht	85.6
stan dev	8.8

*Includes trees of all species
** Includes all trees of all species, live and dead

Subplot (koa only)	
Size Class	**stem count**
A	2
B	4
C	1
D	1
E	0
total	8

Definition of size classes
A =seedlings less than 4.5ft tall
B = stems 0.1 to 0.9 inches dbh
C= stems 1.0 to 1.9 inches dbh
D = stems 2.0 to 2.9 inches dbh
E = stems 3.0 to 3.9 inches dbh

Plot numbe	gps point	tree #	Species		dbh	tot height	height to fo	vigor	diameter cl	#of trees	ground cov	%cover	comments
16	16	1	koa	dead	25	0	0	0			Grass	90	photos 0580/0581
16	16	2	eucalypt	live	4.2	30	0	1	a	2	rubus hawa	10	
16	16	3	eucalypt	live	4.7	30	0	1	b	4			
16	16	4	koa	live	44	85	12	3	c	1			
16	16	5	koa	live	57	72	8	3	d	1			
16	16	6	koa	live	56	96	13	2					
16	16	7	koa	live	28	90	30	2					
16	16	8	koa	live	38	85	40	2					

Plot # 17 crew Missy Sprecher and David Joughin

Date 4/12/2007

Main Plot Data					
Size Class	**# live koa trees**	**# dead koa trees**	**tot # koa trees**	**# live trees***	**total # of Trees****
4-11.9	3	0	3	3	3
12-19.9	0	0	0	0	0
20-27.9	0	0	0	0	0
28-35.9	0	0	0	0	0
36-43.9	0	0	0	0	0
44+	0	0	0	0	0
total	3	0	3	3	3

	Koa only			All species	
	live	dead	live + dead	live	live + dead
mean dbh	7.5	0.0	7.5	7.5	7.5
stan dev	2.8	0.0	2.8	2.8	2.8
variance	7.6	0.0	7.6	7.6	7.6

Mean Ht	23.7
stan dev	5.1

*Includes trees of all species
** Includes all trees of all species, live and dead

Subplot (koa only)	
Size Class	**stem count**
A	0
B	0
C	0
D	0
E	0
total	0

Definition of size classes
A =seedlings less than 4.5ft tall
B = stems 0.1 to 0.9 inches dbh
C= stems 1.0 to 1.9 inches dbh
D = stems 2.0 to 2.9 inches dbh
E = stems 3.0 to 3.9 inches dbh

Plot numbe	gps point	tree #	Species		dbh	tot height	height to fork	vigor	diameter cl	#of trees	ground cov	%cover	comments
17	17	1	koa	live	9.7	28	6	1	none				
17	17	2	koa	live	4.4	18	10	1					
17	17	3	koa	live	8.4	25	6	1					

Plot # 20 crew Missy Sprecher and David Joughin

Date 4/12/2007

Main Plot Data					
Size Class	**# live koa trees**	**# dead koa trees**	**tot # koa trees**	**# live trees***	**total # of Trees****
4-11.9	2	0	2	2	2
12-19.9	0	0	0	0	0
20-27.9	0	0	0	0	0
28-35.9	1	0	1	1	1
36-43.9	0	0	0	0	0
44+	0	0	0	0	0
total	3	0	3	3	3

	Koa only			All species	
	live	dead	live + dead	live	live + dead
mean dbh	17.6	0.0	17.6	17.6	17.6
stan dev	15.6	0.0	15.6	15.6	15.6
variance	243.0	0.0	243.0	243.0	243.0

Mean Ht	37.3
stan dev	32.8

*Includes trees of all species
** Includes all trees of all species, live and dead

Subplot (koa only)	
Size Class	**stem count**
A	0
B	0
C	0
D	0
E	0
total	0

Definition of size classes
A =seedlings less than 4.5ft tall
B = stems 0.1 to 0.9 inches dbh
C= stems 1.0 to 1.9 inches dbh
D = stems 2.0 to 2.9 inches dbh
E = stems 3.0 to 3.9 inches dbh

Plot numbe	gps point	tree #	Species		dbh	tot height	height to fork	vigor	diameter cl	#of trees	ground cov	%cover	comments
20	20	1	koa	live	8.7	22	6		none		grass	90	
20	20	2	koa	live	35.6	75	22				rubus hawa	10	
20	20	3	koa	live	8.5	15	5						

Plot # 23 crew Missy Sprecher and David Joughin

Date 4/12/2007

Main Plot Data					
Size Class	**# live koa trees**	**# dead koa trees**	**tot # koa trees**	**# live trees***	**total # of Trees****
4-11.9	1	0	1	1	1
12-19.9	0	1	1	0	1
20-27.9	3	0	3	3	3
28-35.9	2	0	2	2	2
36-43.9	0	0	0	0	0
44+	1	0	1	1	1
total	7	1	8	7	8

	Koa only			All species	
	live	dead	live + dead	live	live + dead
mean dbh	29.0	15.5	27.3	29.0	27.3
stan dev	15.1	0.0	14.8	15.1	14.8
variance	229.1	0.0	219.2	229.1	219.2

Mean Ht	52.6
stan dev	14.1

*Includes trees of all species
** Includes all trees of all species, live and dead

Subplot (koa only)	
Size Class	**stem count**
A	11
B	0
C	1
D	0
E	0
total	12

Definition of size classes
A =seedlings less than 4.5ft tall
B = stems 0.1 to 0.9 inches dbh
C= stems 1.0 to 1.9 inches dbh
D = stems 2.0 to 2.9 inches dbh

E = stems 3.0 to 3.9 inches dbh

Plot number	gps point	tree #	Species		dbh	tot height	height to fork	vigor	diameter class	#of trees	ground cov	%cover	comments
23	23	1	koa	live	25	70	8	3	a	11	grass	80	pic 103-0600/0601
23	23	2	koa	live	27	55	7	3	c	1	rubus hawa	20	
23	23	3	koa	live	60	30	10	3					fallen down height is of a branch taken over
23	23	4	koa	live	25	61	30	2					hole in tree
23	23	5	koa	dead	16	0	0	0					dead standing
23	23	6	koa	live	28	55	6	3					
23	23	7	koa	live	28	60	27	2					
23	23	8	koa	live	9.6	37	15	1					

Plot # 24 crew Missy Sprecher and David Joughin

Date 4/12/2007

Main Plot Data					
Size Class	**# live koa trees**	**# dead koa trees**	**tot # koa trees**	**# live trees***	**total # of Trees****
4-11.9	2	0	2	2	2
12-19.9	0	0	0	0	0
20-27.9	0	0	0	0	0
28-35.9	0	1	1	0	1
36-43.9	0	0	0	0	0
44+	0	0	0	0	0
total	2	1	3	2	3

	Koa only			All species	
	live	dead	live + dead	live	live + dead
mean dbh	8.1	31.0	15.7	8.1	15.7
stan dev	3.4	0.0	13.4	3.4	13.4
variance	11.5	0.0	180.6	11.5	180.6

Mean Ht	22.5
stan dev	3.5

*Includes trees of all species
** Includes all trees of all species, live and dead

Subplot (koa only)	
Size Class	**stem count**
A	0
B	0
C	0
D	0
E	0
total	0

Definition of size classes
A =seedlings less than 4.5ft tall
B = stems 0.1 to 0.9 inches dbh
C= stems 1.0 to 1.9 inches dbh
D = stems 2.0 to 2.9 inches dbh
E = stems 3.0 to 3.9 inches dbh

Plot numbe	gps point	tree #	Species		dbh	tot height	height to fork	vigor	diameter cl	#of trees	ground cov	%cover	comments
24	24	1	koa	dead	31	0	0	0	none		grass	95	photo 0602/0603
24	24	2	koa	live	5.7	20	6	1			rubus hawa	5	
24	24	3	koa	live	10.5	25	5	1					

Plot # 25 crew Missy Sprecher and David Joughin

Date 4/12/2007

Main Plot Data					
Size Class	**# live koa trees**	**# dead koa trees**	**tot # koa trees**	**# live trees***	**total # of Trees****
4-11.9	4	0	4	4	4
12-19.9	4	1	5	4	5
20-27.9	0	0	0	0	0
28-35.9	0	0	0	0	0
36-43.9	1	0	1	1	1
44+	2	0	2	2	2
total	11	1	12	11	12

	Koa only			All species	
	live	dead	live + dead	live	live + dead
mean dbh	22.7	19.8	22.4	22.7	22.4
stan dev	19.5	0.0	18.6	19.5	18.6
variance	379.7	0.0	345.9	379.7	345.9

Mean Ht	54.7
stan dev	29.5

*Includes trees of all species
** Includes all trees of all species, live and dead

Subplot (koa only)	
Size Class	**stem count**
A	0
B	0
C	0
D	0
E	0
total	0

Definition of size classes
A =seedlings less than 4.5ft tall
B = stems 0.1 to 0.9 inches dbh
C= stems 1.0 to 1.9 inches dbh
D = stems 2.0 to 2.9 inches dbh
E = stems 3.0 to 3.9 inches dbh

Plot numbe	gps point	tree #	Species		dbh	tot height	height to fork	vigor	diameter cl	#of trees	ground cov	%cover	comments
25	25	1	koa	live	63.4	84	25	2	a ohia	1	grass	80	photos 604/605
25	25	2	koa	live	6.8	25	10	2			rubus hawa	15	
25	25	3	koa	live	6.1	30	7	1			down trees	5	
25	25	4	koa	live	19.6	48	6	1					
25	25	5	koa	live	6.5	24	5	1					
25	25	6	koa	live	14	45	8	2					
25	25	7	koa	live	40.2	55	20	3					
25	25	8	koa	live	15.4	48	13	1					
25	25	9	koa	live	9.2	35	6	2					
25	25	10	koa	live	18.8	105	46	2					
25	25	11	koa	dead	19.8	0	0	0					
25	25	12	koa	live	49.3	103	12	2					

Plot # 26 crew Missy Sprecher and David Joughin

Date 4/12/2007

Main Plot Data					
Size Class	**# live koa trees**	**# dead koa trees**	**tot # koa trees**	**# live trees***	**total # of Trees****
4-11.9	0	0	0	0	0
12-19.9	1	0	1	1	1
20-27.9	1	0	1	1	1
28-35.9	0	0	0	0	0
36-43.9	0	0	0	0	0
44+	0	0	0	0	0
total	2	0	2	2	2

	Koa only			All species	
	live	dead	live + dead	live	live + dead
mean dbh	21.7	0.0	21.7	21.7	21.7
stan dev	5.9	0.0	5.9	5.9	5.9
variance	34.4	0.0	34.4	34.4	34.4

Mean Ht	35.5
stan dev	13.4

*Includes trees of all species
** Includes all trees of all species, live and dead

Subplot (koa only)	
Size Class	**stem count**
A	0
B	0
C	0
D	0
E	0
total	0

Definition of size classes
A =seedlings less than 4.5ft tall
B = stems 0.1 to 0.9 inches dbh
C= stems 1.0 to 1.9 inches dbh
D = stems 2.0 to 2.9 inches dbh
E = stems 3.0 to 3.9 inches dbh

Plot numbe	gps point	tree #	Species		dbh	tot height	height to fork	vigor	diameter cl	#of trees	ground cov	%cover	comments
26	26	1	koa	live	17.5	26	5	1	none		grass	90	
26	26	2	koa	live	25.8	45	5	1			rubus hawa	10	

Plot # 27 crew Missy Sprecher and David Joughin

Date 4/12/2007

Main Plot Data					
Size Class	**# live koa trees**	**# dead koa trees**	**tot # koa trees**	**# live trees***	**total # of Trees****
4-11.9	9	0	9	9	9
12-19.9	0	0	0	0	0
20-27.9	0	0	0	0	0
28-35.9	1	0	1	1	1
36-43.9	0	0	0	0	0
44+	1	0	1	1	1
total	11	0	11	11	11

	Koa only			All species	
	live	dead	live + dead	live	live + dead
mean dbh	13.3	0.0	13.3	13.3	13.3
stan dev	14.8	0.0	14.8	14.8	14.8
variance	218.1	0.0	218.1	218.1	218.1

Mean Ht	37.8
stan dev	16.8

*Includes trees of all species
** Includes all trees of all species, live and dead

Subplot (koa only)	
Size Class	**stem count**
A	1
B	2
C	1
D	0
E	0
total	4

Definition of size classes
A =seedlings less than 4.5ft tall
B = stems 0.1 to 0.9 inches dbh
C= stems 1.0 to 1.9 inches dbh
D = stems 2.0 to 2.9 inches dbh
E = stems 3.0 to 3.9 inches dbh

Plot numbe	gps point	tree #	Species		dbh	tot height	height to fork	vigor	diameter cl	#of trees	ground cov	%cover	comments
27	27	1	koa	live	10.1	35	8	2	a	1	grass	75	
27	27	2	koa	live	5.2	32	15	2	b	2	rubus haw	25	
27	27	3	koa	live	5.6	32	8	2	c	1			
27	27	4	koa	live	9.8	35	15	1					
27	27	5	koa	live	7.6	33	8	2					
27	27	6	koa	live	4.6	25	15	2					
27	27	7	koa	live	30.6	70	8	3					
27	27	8	koa	live	52	72	7	3					
27	27	9	koa	live	6.7	30	10	3					
27	27	10	koa	live	8.9	25	10	3					
27	27	11	koa	live	5.2	27	12	2					

Plot # 28 crew Missy Sprecher and David Joughin

Date 4/12/2007

Main Plot Data					
Size Class	**# live koa trees**	**# dead koa trees**	**tot # koa trees**	**# live trees***	**total # of Trees****
4-11.9	0	0	0	0	2
12-19.9	0	0	0	0	0
20-27.9	0	0	0	0	0
28-35.9	0	0	0	0	0
36-43.9	0	0	0	0	0
44+	0	0	0	0	0
total	0	0	0	0	2

	Koa only			All species	
	live	dead	live + dead	live	live + dead
mean dbh	0.0	0.0	0.0	0.0	0.0
stan dev	0.0	0.0	0.0	0.0	0.0
variance	0.0	0.0	0.0	0.0	0.0

Mean Ht	0.0
stan dev	0.0

*Includes trees of all species
** Includes all trees of all species, live and dead

Subplot (koa only)	
Size Class	**stem count**
A	0
B	0
C	0
D	0
E	0
total	0

Definition of size classes
A =seedlings less than 4.5ft tall
B = stems 0.1 to 0.9 inches dbh
C= stems 1.0 to 1.9 inches dbh
D = stems 2.0 to 2.9 inches dbh
E = stems 3.0 to 3.9 inches dbh

Plot numbe	gps point	tree #	Species	dbh	tot height	height to fork	vigor	diameter cl	#of trees	ground cov	%cover	comments
28	28	0	NO TREES	0	0	0	0		NONE	grass	60	
				0	0	0	0			rubus hawa	40	

Plot # 29 crew Missy Sprecher and David Joughin

Date 4/12/2007

Main Plot Data					
Size Class	**# live koa trees**	**# dead koa trees**	**tot # koa trees**	**# live trees***	**total # of Trees****
4-11.9	2	0	2	2	2
12-19.9	0	0	0	0	0
20-27.9	0	0	0	0	0
28-35.9	0	0	0	0	0
36-43.9	0	0	0	0	0
44+	0	0	0	0	0
total	2	0	2	2	2

	Koa only			All species	
	live	dead	live + dead	live	live + dead
mean dbh	7.5	0.0	7.5	7.5	7.5
stan dev	0.0	0.0	0.0	0.0	0.0
variance	0.0	0.0	0.0	0.0	0.0

Mean Ht	35.0
stan dev	7.1

*Includes trees of all species
** Includes all trees of all species, live and dead

Subplot (koa only)	
Size Class	**stem count**
A	0
B	0
C	0
D	0
E	0
total	0

Definition of size classes
A =seedlings less than 4.5ft tall
B = stems 0.1 to 0.9 inches dbh
C= stems 1.0 to 1.9 inches dbh
D = stems 2.0 to 2.9 inches dbh
E = stems 3.0 to 3.9 inches dbh

Plot numbe	gps point	tree #	Species		dbh	tot height	height to fork	vigor	diameter cl	#of trees	ground cov	%cover	comments
29	29	1	koa	live	7.5	40	12	2		none	grass	60	
29	29	2	koa	live	7.5	30	15	2			rubus hawa	40	

Plot # 30 crew Missy Sprecher and David Joughin

Date 4/12/2007

Main Plot Data					
Size Class	**# live koa trees**	**# dead koa trees**	**tot # koa trees**	**# live trees***	**total # of Trees****
4-11.9	0	0	0	0	2
12-19.9	0	0	0	0	0
20-27.9	0	0	0	0	0
28-35.9	0	0	0	0	0
36-43.9	0	0	0	0	0
44+	0	0	0	0	0
total	0	0	0	0	2

	Koa only			All species	
	live	dead	live + dead	live	live + dead
mean dbh	0.0	0.0	0.0	0.0	0.0
stan dev	0.0	0.0	0.0	0.0	0.0
variance	0.0	0.0	0.0	0.0	0.0

Mean Ht	0.0
stan dev	0.0

*Includes trees of all species
** Includes all trees of all species, live and dead

Subplot (koa only)	
Size Class	**stem count**
A	0
B	0
C	0
D	0
E	0
total	0

Definition of size classes
A =seedlings less than 4.5ft tall
B = stems 0.1 to 0.9 inches dbh
C= stems 1.0 to 1.9 inches dbh
D = stems 2.0 to 2.9 inches dbh
E = stems 3.0 to 3.9 inches dbh

Plot numbe	gps point	tree #	Species	dbh	tot height	height to	fork vigor	diameter cl	#of trees	ground cov	%cover	comments
30	30	0	none	0	0	0	0		none	grass	90	plot in valley
				0	0	0	0			rubus haw	10	

Plot # 32 crew Missy Sprecher and David Joughin

Date 4/12/2007

Main Plot Data					
Size Class	**# live koa trees**	**# dead koa trees**	**tot # koa trees**	**# live trees***	**total # of Trees****
4-11.9	1	0	1	1	1
12-19.9	1	0	1	1	1
20-27.9	0	0	0	0	0
28-35.9	0	0	0	0	0
36-43.9	0	0	0	0	0
44+	0	0	0	0	0
total	2	0	2	2	2

	Koa only			All species	
	live	dead	live + dead	live	live + dead
mean dbh	12.5	0.0	12.5	12.5	12.5
stan dev	4.6	0.0	4.6	4.6	4.6
variance	21.1	0.0	21.1	21.1	21.1

Mean Ht	39.0
stan dev	5.7

*Includes trees of all species
** Includes all trees of all species, live and dead

Subplot (koa only)	
Size Class	**stem count**
A	1
B	2
C	0
D	4
E	1
total	8

Definition of size classes
A =seedlings less than 4.5ft tall
B = stems 0.1 to 0.9 inches dbh
C= stems 1.0 to 1.9 inches dbh
D = stems 2.0 to 2.9 inches dbh
E = stems 3.0 to 3.9 inches dbh

Plot numbe	gps point	tree #	Species		dbh	tot height	height to fork	vigor	diameter cl	#of trees	ground cov	%cover	comments
32	32	1	koa	live	15.7	43	14	2	a	1	grass	70	
32	32	2	koa	live	9.2	35	20	1	b	2	rubus hawa	25	
32					na	0	0	0	d	4	banana pol	5	
32					na	0	0	0	e	1			

Plot # 31 crew Missy Sprecher and David Joughin

Date 4/12/2007

Main Plot Data					
Size Class	**# live koa trees**	**# dead koa trees**	**tot # koa trees**	**# live trees***	**total # of Trees****
4-11.9	0	0	0	0	0
12-19.9	0	0	0	0	0
20-27.9	0	0	0	0	0
28-35.9	0	0	0	0	0
36-43.9	0	0	0	0	0
44+	0	0	0	0	0
total	0	0	0	0	0

	Koa only			All species	
	live	dead	live + dead	live	live + dead
mean dbh	0.0	0.0	0.0	0.0	0.0
stan dev	0.0	0.0	0.0	0.0	0.0
variance	0.0	0.0	0.0	0.0	0.0

Mean Ht	0.0
stan dev	0.0

*Includes trees of all species
** Includes all trees of all species, live and dead

Subplot (koa only)	
Size Class	**stem count**
A	0
B	0
C	0
D	0
E	0
total	0

Definition of size classes
A =seedlings less than 4.5ft tall
B = stems 0.1 to 0.9 inches dbh
C= stems 1.0 to 1.9 inches dbh
D = stems 2.0 to 2.9 inches dbh
E = stems 3.0 to 3.9 inches dbh

Plot numbe	gps point	tree #	Species	dbh	tot height	height to fork	vigor	diameter cl	#of trees	ground cov	%cover	comments
31	31	0	none	na	na	na	0		none	grass	90	photo 0616/0617
				na	na	na	0			rubus haw	10	

Plot # 33 crew Missy Sprecher and David Joughin

Date 4/12/2007

Main Plot Data					
Size Class	**# live koa trees**	**# dead koa trees**	**tot # koa trees**	**# live trees***	**total # of Trees****
4-11.9	0	0	0	0	0
12-19.9	0	0	0	0	0
20-27.9	0	0	0	0	0
28-35.9	0	0	0	0	0
36-43.9	0	0	0	0	0
44+	0	0	0	0	0
total	0	0	0	0	0

	Koa only			All species	
	live	dead	live + dead	live	live + dead
mean dbh	0.0	0.0	0.0	0.0	0.0
stan dev	0.0	0.0	0.0	0.0	0.0
variance	0.0	0.0	0.0	0.0	0.0

Mean Ht	0.0
stan dev	0.0

*Includes trees of all species
** Includes all trees of all species, live and dead

Subplot (koa only)	
Size Class	**stem count**
A	0
B	0
C	0
D	0
E	0
total	0

Definition of size classes
A =seedlings less than 4.5ft tall
B = stems 0.1 to 0.9 inches dbh
C= stems 1.0 to 1.9 inches dbh
D = stems 2.0 to 2.9 inches dbh
E = stems 3.0 to 3.9 inches dbh

Plot numbe	gps point	tree #	Species	dbh	tot height	height to fork	vigor	diameter cl	#of trees	ground cov	%cover	comments
33	33	0	none	na	na	na		0	none			0620/0621

Plot # 34 crew Missy Sprecher and David Joughin

Date 4/12/2007

Main Plot Data					
Size Class	**# live koa trees**	**# dead koa trees**	**tot # koa trees**	**# live trees***	**total # of Trees****
4-11.9	16	0	16	16	16
12-19.9	0	0	1	1	1
20-27.9	2	0	2	2	2
28-35.9	0	2	2	0	2
36-43.9	0	0	0	0	0
44+	0	0	0	0	0
total	18	2	21	19	21

	Koa only			All species	
	live	dead	live + dead	live	live + dead
mean dbh	8.9	29.4	10.4	8.5	10.4
stan dev	4.9	2.0	7.8	4.9	7.8
variance	23.7	3.9	61.2	23.7	61.2

Subplot (koa only)	
Size Class	**stem count**
A	0
B	0
C	0
D	0
E	1
total	1

Definition of size classes
A =seedlings less than 4.5ft tall
B = stems 0.1 to 0.9 inches dbh
C= stems 1.0 to 1.9 inches dbh
D = stems 2.0 to 2.9 inches dbh
E = stems 3.0 to 3.9 inches dbh

Mean Ht	32.3
stan dev	11.6

*Includes trees of all species
** Includes all trees of all species, live and dead

Plot nu	gps point	tree #	Species		dbh	tot height	height to fork	vigor	diameter cl	#of trees	ground cov	%cover	comments
34	34	1	koa	dead	30.8	0	0	0					
34	34	2	koa	live	4.7	18	11	1	e	1	grass	95	
34	34	3	koa	dead	28.0	0	0	0			ferns and c	5	
34	34	4	koa	live	9.3	30	6	1					
34	34	5	koa	live	20.5	52	15	3					
34	34	6	koa	live	21.0	66	27	3					
34	34	7	koa	live	8.2	24	5	2					
34	34	8	koa	live	4.4	20	6	2					
34	34	9	koa	live	6.6	32	15	2					
34	34	10	koa	live	9.5	40	8	2					
34	34	11	koa	live	4.8	30	12	2					
34	34	12	koa	live	8.5	32	6	2					
34	34	13	koa	live	4.3	27	12	3					
34	34	14	koa	live	5.4	18	7	2					
34	34	15	koa	live	5.8	28	13	2					
34	34	16	koa	live	4.0	22	10	2					

34	34	17	koa	live	8.0	32	12	2
34	34	18	koa	live	7.9	24	6	1
34	34	19	koa	live	12.8	30	6	1
34	34	20	koa	live	7.5	27	13	1
34	34	21	koa	live	7.4	30	15	2

Plot # 35 crew Missy Sprecher and David Joughin

Date 4/12/2007

Main Plot Data					
Size Class	**# live koa trees**	**# dead koa trees**	**tot # koa trees**	**# live trees***	**total # of Trees****
4-11.9	7	0	7	7	7
12-19.9	2	0	2	2	2
20-27.9	1	0	1	1	1
28-35.9	0	0	0	0	0
36-43.9	1	1	2	1	2
44+	0	0	0	0	0
total	11	1	12	11	12

	Koa only			All species	
	live	dead	live + dead	live	live + dead
mean dbh	12.8	41.9	15.3	12.8	15.3
stan dev	10.5	#DIV/0!	13.0	10.5	13.0
variance	109.8	#DIV/0!	170.1	109.8	170.1

Mean Ht	35.1
stan dev	15.1

*Includes trees of all species
** Includes all trees of all species, live and dead

Subplot (koa only)	
Size Class	**stem count**
A	1
B	0
C	0
D	2
E	1
total	4

Definition of size classes
A =seedlings less than 4.5ft tall
B = stems 0.1 to 0.9 inches dbh
C= stems 1.0 to 1.9 inches dbh
D = stems 2.0 to 2.9 inches dbh
E = stems 3.0 to 3.9 inches dbh

Plot numbe	gps point	tree #	Species		dbh	tot height	height to fork	vigor	diameter cl	#of trees	ground cov	%cover	comments
35	35	1	koa	live	4.5	22	10	2					
35	35	2	koa	live	14.8	44	12	1	a	1	Grass	90	
35	35	3	koa	live	7	33	5	1	d	2	rubus hawa	8	
35	35	4	koa	live	9.3	28	5	2	e	1	down trees	2	
35	35	5	koa	live	7.4	28	5	2					
35	35	6	koa	live	7.5	23	12	2					
35	35	7	koa	live	4.5	25	9	3					
35	35	8	koa	live	4.4	18	6	2					
35	35	9	koa	dead	41.9	0	0	3					
35	35	10	koa	live	19.7	55	25	3					
35	35	11	koa	live	25.4	65	10	2					
35	35	12	koa	live	36.8	45	5	1					

Humuula forest survey Data

Plot number	gps point	tree #	Species		dbh	tot height	height to fork	vigor	diameter class	#of trees	subplot ground cov	%cover	comments
1	1	1	koa	live	23	40	7	1	A	7	Grass	90%	photo #s 101-0535/0536
1	1	2	koa	live	17.2	34	14	1					Plot intersected by trail
1	1	3	koa	live	4.4	21	7	1					
1	1	4	koa	live	11.5	37	7	2					
1	1	5	koa	live	8.4	24	8	1					
1	1	6	koa	live	6.6	22	12	1					
1	1	7	koa	live	7.6	33	16	1					
1	1	8	koa	live	7.8	33	10	1					
1	1	9	koa	live	12.7	38	7	1					
1	1	10	koa	live	7	34	18	1					
1	1	11	koa	live	4	27	6	1					
1	1	12	koa	live	8.7	27	10	1					
1	1	13	koa	live	4.1	28	10	1					
1	1	14	koa	live	8	30	12	1					
1	1	15	koa	live	7.1	33	4	1					
1	1	16	koa	live	7.1	33	4	1					
1	1	17	koa	live	9.4	33	4	1					
3	3	1	koa	live	13.1	46	12	1	a	5	Grass	85	photo # 101-0542/0543
3	3	2	koa	live	5.8	35	10	2	d	1	rubus ha	5	
3	3	3	koa	live	7.7	30	5	1	d pine	1			
3	3	4	koa	live	18.7	34	7	1					
3	3	5	koa	live	4.7	18	8	3					dead top
3	3	6	koa	dead	4	0	0	0					
3	3	7	koa	live	13.9	35	7	1					
3	3	8	koa	live	9.3	7	21	1					
3	3	9	koa	live	5.7	16	7	1					
3	3	10	koa	live	12.3	24	10	2					leaning
3	3	11	koa	live	16	34	11	2					
4	4	1	koa	live	20.5	63	7	2	a	8	Grass	60	
4	4	2	koa	live	7.1	22	6	3	b	1	rubus ha	25	
4	4	3	koa	live	33.2	70	12	2	c	0	banana	10	
4	4	4	koa	live	4	30	20	22	d	0			
4	4	5	koa	live	4.3	30	9	2	e	1			

4	4	6	koa	live	5.4	33	23	2					
4	4	7	koa	live	12.5	55	30	1					
4	4	8	koa	live	4.7	15	11	3					
4	4	9	koa	live	5.4	33	12	2					
4	4	10	koa	live	6.9	33	18	2					
4	4	11	koa	live	5.5	35	22	2					
4	4	12	koa	live	9.8	40	9	1					
4	4	13	koa	live	4.2	30	10	1					
4	4	14	plum	live	5.5	25	0	1					One tree branch
4	4	15	plum	live	5.3	25	0	1					
4	4	16	koa	live	31.2	108	20	2					
4	4	17	koa	live	18.8	93	45	2					
4	4	18	koa	live	12.7	25	5	3					Dead standing/ laying over/ covere
4	4	19	plum	live	5	20	0	2					
5	5	1	koa	live	8.7	27	10	1	b	1	grass	75	photo 0548
5	5	2	koa	dead	37.5	0	0	3			rubus ha	15	
5	5	3	koa	live	8.4	26	6	1					
5	5	4	koa	dead	no da	0	0	0					tree was not counted/ thrown out
5	5	5	koa	live	10.4	17	6	1					
5	5	6	koa	dead	44	0	0	3					
5	5	7	koa	live	8.8	21	8	1					
5	5	8	koa	live	7	22	5	1					
5	5	9	koa	live	5.5	22	5	1					
5	5	10	koa	live	5.2	30	6	1					
5	5	11	koa	live	12.1	30	8	1					
5	5	12	koa	live	20.8	47	9	1					
5	5	13	koa	live	11	26 ?	?						
6	6	1	koa	live	63	107	37	2	a	1			
6	6	2	koa	live	29.3	60	9	3	c	1			
6	6	3	koa	live	8.4	25	7	1					
6	6	4	koa	live	10.6	30	9	1					
7	7	1	koa	live	35.2	87	9	3	a	1	grass	85	
7	7	2	koa	live	10.2	31	15	1					
7	7	3	koa	live	13.5	32	8	1					
7	7	4	koa	live	7.5	25	8	1					
7	7	5	koa	live	7.7	29	9	1					
7	7	6	koa	live	8	25	5	1					

7	7	7	koa	live	9.4	25	5	1						
7	7	8	koa	live	4.9	21	5	1						
8	8	1	koa	live	42.2	60	23	3	none		grass	60		
8	8	2	koa	live	16.4	26	0	0			rubus ha	30		
					no da	0	0				banana	10		
9	9	1	koa	dead	24.8	0	0	0					Dead standing	
9	9	2	koa	live	10.6	31	8	1	d	1	grass	60	photo 101-0556/0557	
9	9	3	koa	live	7	23	7	1			rubus ha	30		
9	9	4	koa	live	28.7	105	45	2			banana	10		
9	9	5	koa	live	39.6	110	40	2						
9	9	6	koa	live	4.3	20	8	1						
10	10	1	ohia	live	28.7	80	40	1						
10	10	2	koa	live	15	34	7	2	b	1	grass	70		
10	10	3	koa	live	7.3	24	8	1			rubus ha	20		
10	10	4	koa	live	15.5	27	5	1						
10	10	5	koa	live	6.1	24	5	1						
10	10	6	koa	live	8	24	5	1						
11	11	1	koa	live	7.2	23.5	6.5	1	d	1	grass	60	photo # 101-0560/0562	
11	11	2	koa	live	5.4	20	5	3	b	2	rubus ha	40		
11	11	3	koa	live	5.1	15	8	1	c	1				
11	11	4	koa	live	57.5	80	15	2					hollow base	
11	11	5	koa	live	11.3	24	9	1						
12	12	1	koa	live	13.2	20	5	2	b	1	grass	40	photo # 102-0569/0570	
12	12	2	koa	live	8	16	8	1	d	1	polka	20		
12	12	3	koa	live	5	20	10	1			rubus ha	30		
14	plot is out so data not entered				no da	0	0							
					no data									
15	15	1	ohia	live	28.1	77	8	1						
15	15	2	plum	live	4.7	22	0	3	none		grass	95		
15	15	3	plum	live	7	20	0	3			rubus ha	5		
15	15	4	koa	live	13.8	34	5	1						
15	15	5	ohia	dead	10.8	0	0	0						
15	15	6	ohia	dead	7	0	0	0						
15	15	7	ohia	dead	4.6	0	0	0						
15	15	8	koa	live	10.2	50	5	2						
15	15	9	koa	live	14.8	50	16	2						
15	15	10	koa	live	7	35	8	2						

15	15	11	koa	live	17.3	60	10	1					
15	15	12	koa	live	22.4	60	12	1					
15	15	13	koa	live	21.6	52	8	1					
16	16	1	koa	dead	24.8	0	0	0			Grass	90	photos 0580/0581
16	16	2	eucalyptu	live	4.2	30	0	1	a	2	rubus ha	10	
16	16	3	eucalyptu	live	4.7	30	0	1	b	4			
16	16	4	koa	live	43.8	85	12	3	c	1			
16	16	5	koa	live	57.2	72	8	3	d	1			
16	16	6	koa	live	56	96	13	2					
16	16	7	koa	live	27.7	90	30	2					
16	16	8	koa	live	37.8	85	40	2					
17	17	1	koa	live	9.7	28	6	1	none				
17	17	2	koa	live	4.4	18	10	1					
17	17	3	koa	live	8.4	25	6	1					
18 and 19 out so data not entered					no da	0	0						
					no data								
20	20	1	koa	live	8.7	22	6		none		grass	90	
20	20	2	koa	live	35.6	75	22				rubus ha	10	
20	20	3	koa	live	8.5	15	5						
plot 21 an d22 are out so data not entered					no da	0	0						
					no data								
23	23	1	koa	live	25	70	8	3	a	11	grass	80	pic 103-0600/0601
23	23	2	koa	live	27	55	7	3	c	1	rubus ha	20	
23	23	3	koa	live	60	30	10	3					fallen down height is of a branch ta
23	23	4	koa	live	25	61	30	2					hole in tree
23	23	5	koa	dead	15.5	0	0	0					dead standing
23	23	6	koa	live	28.4	55	6	3					
23	23	7	koa	live	28.1	60	27	2					
23	23	8	koa	live	9.6	37	15	1					
24	24	1	koa	dead	31	0	0	0	none		grass	95	photo 0602/0603
24	24	2	koa	live	5.7	20	6	1			rubus ha	5	
24	24	3	koa	live	10.5	25	5	1					
25	25	1	koa	live	63.4	84	25	2	a ohia	1	grass	80	photos 604/605
25	25	2	koa	live	6.8	25	10	2			rubus ha	15	
25	25	3	koa	live	6.1	30	7	1			down tre	5	
25	25	4	koa	live	19.6	48	6	1					
25	25	5	koa	live	6.5	24	5	1					

25	25	6	koa	live	14	45	8	2					
25	25	7	koa	live	40.2	55	20	3					
25	25	8	koa	live	15.4	48	13	1					
25	25	9	koa	live	9.2	35	6	2					
25	25	10	koa	live	18.8	105	46	2					
25	25	11	koa	dead	19.8	0	0	0					
25	25	12	koa	live	49.3	103	12	2					
26	26	1	koa	live	17.5	26	5	1	none		grass	90	
26	26	2	koa	live	25.8	45	5	1			rubus ha	10	
27	27	1	koa	live	10.1	35	8	2	a	1	grass	75	
27	27	2	koa	live	5.2	32	15	2	b	2	rubus ha	25	
27	27	3	koa	live	5.6	32	8	2	c	1			
27	27	4	koa	live	9.8	35	15	1					
27	27	5	koa	live	7.6	33	8	2					
27	27	6	koa	live	4.6	25	15	2					
27	27	7	koa	live	30.6	70	8	3					
27	27	8	koa	live	52	72	7	3					
27	27	9	koa	live	6.7	30	10	3					
27	27	10	koa	live	8.9	25	10	3					
27	27	11	koa	live	5.2	27	12	2					
28	28	0	NO TREES		no da	0	0	0	NONE		grass	60	
					no da	0	0	0			rubus ha	40	
29	29	1	koa	live	7.5	40	12	2	none		grass	60	
29	29	2	koa	live	7.5	30	15	2			rubus ha	40	
30	30	0	none		no da	0	0	0	none		grass	90	plot in valley
					no da	0	0	0			rubus ha	10	
31	31	0	none		no da	0	0	0	none		grass	90	photo 0616/0617
					no da	0	0	0			rubus ha	10	
32	32	1	koa	live	15.7	43	14	2	a	1	grass	70	
32	32	2	koa	live	9.2	35	20	1	b	2	rubus ha	25	
32					no da	0	0	0	d	4	banana	5	
32					no da	0	0	0	e	1			
33	33	0	none		no da	0	0	0	none				0620/0621
34	34	1	koa	dead	30.8	0	0	0					
34	34	2	koa	live	4.7	18	11	1	e	1	grass	95	
34	34	3	koa	dead	28	0	0	0			ferns an	5	
34	34	4	koa	live	9.3	30	6	1					

34	34	5	koa	live	20.5	52	15	3				
34	34	6	koa	live	21	66	27	3				
34	34	7	koa	live	8.2	24	5	2				
34	34	8	koa	live	4.4	20	6	2				
34	34	9	koa	live	6.6	32	15	2				
34	34	10	koa	live	9.5	40	8	2				
34	34	11	koa	live	4.8	30	12	2				
34	34	12	koa	live	8.5	32	6	2				
34	34	13	koa	live	4.3	27	12	3				
34	34	14	koa	live	5.4	18	7	2				
34	34	15	koa	live	5.8	28	13	2				
34	34	16	koa	live	4	22	10	2				
34	34	17	koa	live	8	32	12	2				
34	34	18	koa	live	7.9	24	6	1				
34	34	19	koa	live	12.8	30	6	1				
34	34	20	koa	live	7.5	27	13	1				
34	34	21	koa	live	7.4	30	15	2				
35	35	1	koa	live	4.5	22	10	2				
35	35	2	koa	live	14.8	44	12	1	a	1	Grass	90
35	35	3	koa	live	7	33	5	1	d	2	rubus ha	8
35	35	4	koa	live	9.3	28	5	2	e	1	down tre	2
35	35	5	koa	live	7.4	28	5	2				
35	35	6	koa	live	7.5	23	12	2				
35	35	7	koa	live	4.5	25	9	3				
35	35	8	koa	live	4.4	18	6	2				
35	35	9	koa	dead	41.9	0	0	3				
35	35	10	koa	live	19.7	55	25	3				
35	35	11	koa	live	25.4	65	10	2				
35	35	12	koa	live	36.8	45	5	1				

	Koa		All species		
All koa	Live	Dead	Live	Dead	live and dead
181	170	11	179	14	193