SUMMARY OF RESULT OF MENTORING
OF 2 PERMANENT SAMPLE PLOTS (PSPs) IN
CHERUL FOREST CONCESSION, KEMAMAN, TERENGGANU

OCTOBER 2018

INVENTORY OF TWO PERMANENT SAMPLE PLOTS (PSPs) IN CHERUL

FOREST CONCESSION, KEMAMAN

1.0 INTRODUCTION

Forest inventory is the systematic collection of data and forest information for assessment or analysis. An estimate of the value and possible uses of timber is an important part of the broader information required to sustain ecosystems. When taking forest inventory the following are important things to measure and note: species, diameter at breast height (DBH), height, site quality, age, and defects. From the data collected one can calculate the number of trees per acre, the basal area, the volume of trees in an area, and the value of the timber. Inventories can be done for other reasons than just calculating the value. A forest can be cruised to visually assess timber and determine the Annual Allowable Cut (AAC) and silviculture treatments for the CFC. The results of this type of inventory can be used in preventative actions and also awareness. The aim of the statistical forest inventory is to provide comprehensive information about the state and dynamics of forests for strategic and management planning.

A timber inventory is a sample measurement of a stand used to estimate the amount of standing timber that the forest contains. These measurements are collected at sample locations called plots or quadrants. Each of these individual plots is one observation in a series of observations called a sample. These plots are generally laid out in some random fashion usually in the form of a line plot survey. Depending on the size of the plot and the number of plots measured, the data gathered from these plots can then be manipulated to achieve varying levels of certainty for an estimate that can be applied to the entire timber stand. This estimate of stand conditions, species composition, volume and other measured attributes of a forest system can then be used for various purposes.

Issues and topics related to monitoring of forest ecosystems are gaining growing importance. We will be using permanent sample plots for monitoring of several of these topics. These include looking at forest health, forest productivity, and services other than wood such as water and climate regulation through carbon sequestration.

2.0 AREA DESCRIPTION

Cherul Permanent Reserved Forest covering an area of approximately 20,243ha and located in the Forest District of South Terengganu. The concession area comprises fifty-nine compartments ranging in areas from 199.51ha to 486.03ha. Selective logging under the first cycle of the Selective Management System in the area was started in 1978 in Compartment 29 and ended in 2000 in Compartment 70. The soil in the area is high in acrisols, alisols, plinthosols (ac), acid soil with clay-enriched lower horizon and low saturation of bases.

In general, the composition of the mixed dipterocarp forest in Cherul Permanent Forest Reserve is made of the two main groups of trees which are the Dipterocarps and the Non-Dipterocarps. Among the Dipterocarps, the following tree species were found: Meranti *(Shorea species, e.g.* incl. Meranti seraya (Shorea *curtisii),* Meranti sarang punai (S. *parvifolia),* Meranti rambai daun, Meranti langgung, Meranti tembaga (S. *leprosula),* and Damar hitam), Keruing *(Dipterocapus species),* Balau (Heavy hardwood *Shorea* species, e.g. Balau laut merah), Merawan (Hopea *spp.),* Mersawa (Anisoptera *spp.),* and Chengal (Neobalanocarpus *heimii).* Among the non-Dipterocarps, the following families and species dominate the tree flora: Kelat (Syzygium *species),* Medang *(Lauraceae),* Kempas *(Kompassia malaccensis),* Merbau (Intsia *palembanica),* Sepetir (Sindora spp.), Rengas (Gluta & *Melanochylla* species), Bitis, Machang (Mangifera *sp.),* Mengkulang (Heritiera *sp.),* Jelutong

(Dyera *costulata),* Durian (Durio spp.), Bintangor (Callophylum *inophyllum),* Kembang semangkuk (Scaphium spp.), Melunak (Pentacme *spp.),* and Mahang *(Macaranga spp.)*

The area has a typical tropical monsoon climate with uniformly high temperatures (from 24.2 C to 29.9 C), high humidity from 70% to 98% and a relatively high rainfall of up to 4,000mm per year. As a result of the heavy and often prolonged rainy season, the proportion of productive working days in the forest may range between 30% and 40% per year.

Typical to the East Coast region of Peninsular Malaysia, rainfall in the Plan Area peaks during the northeast monsoon, in November to January. Daily hours of sunshine are usually around 6 – 7 hours, but might reach 8 – 9 hours in February through April.

The geology of the area consists of three rock types, represented by Carbonaceous Slate, Igneous Rock and Metamorphic Rock.

A total of eleven soil series were identified in the concession area which can be grouped under three soil groups, namely (1) soils developed on igneous and high-grade metamorphic rock; (2) soils which developed on sedimentary and low-grade metamorphic rocks and constitute the largest soil group in CFC; and (3) soils developed on recent riverine alluvium.

Topographically, the concession area has a very hilly topography ranging between 50 and 650 meters above sea level (a.s.l.) with majority of it lying within the range of 50 to 300 meters a.s.l., generally consisting of short and steep slopes.

An inventory of Permanent Sample Plots (PSP) in Cherul Forest Concession, Kemaman have been start in March 2012. The total number of PSPs was 25. The inventory work have been divide into two phases, which are in the first phase it will involve 11 PSPs and 14 PSPs in the second phase. Out of 25 PSPs, only one previous PSP (plot 22 of Compartment 53) was found with a

PVC poles and trees marks with a number. Others PSPs were inventoried based on the recorded GPS points.

3.0 OBJECTIVE

The objective of this inventory PSP is to collect data for calculating growth rates of the trees in the concession area as a reliable basis for the calculation of the Annual Allowable Cut (AAC) and silviculture treatments for the CFC.

4.0 PLOT DESIGN

Within the 1-hectare plot, there are 9 sub plots or quadrant of 10m x 10m to record saplings 5 -14.9 cm diameter class. Big poles quadrants 20m x 20m plot were established within the 1 hectare plot to record trees 15 – 29.9 cm class.
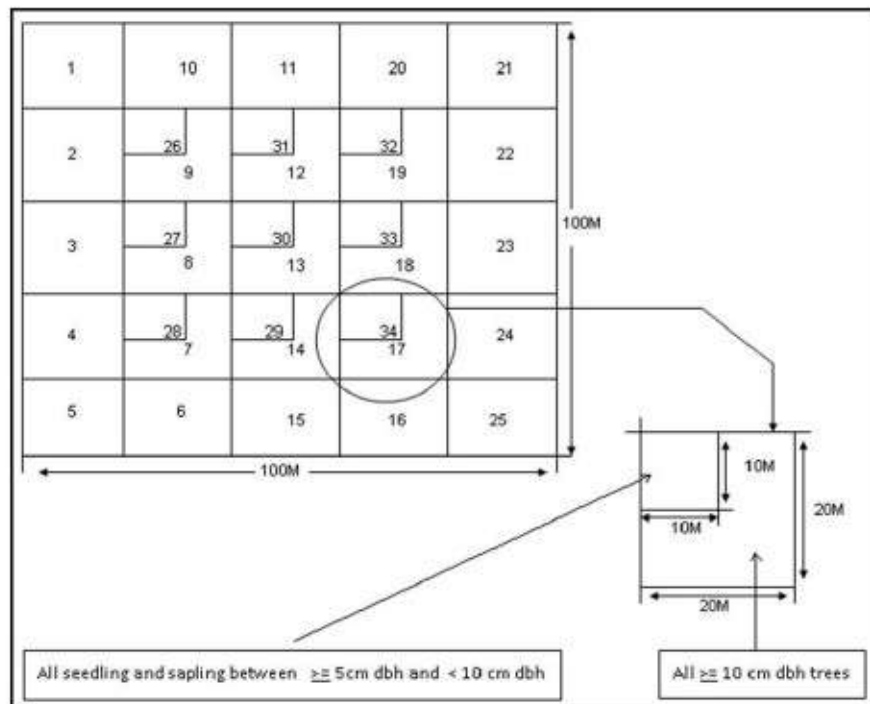
Figure 1 Design of Sample Plot for Permanent Sample Plot (PSP) in Cherul Permanent Forest Reserve.

Parameters recorded are small poles of 5 cm to 14.9 cm, big poles of 15 – 29.9 cm and trees of *diameter at breast height (dbh)* more than 30 cm. Other parameters recorded were species name, tree quality, tree height, number of logs and log quality. Rattan, bamboo, palms and herbs were also recorded.

Figure 2: Location of Permanent Sample Plots in Cherul Concession

SATELITE IMAGE OF THE CHERUL CONCESSION AREA

Table 1 show the compartments and coordinates where the re-establishment of the PSP were carried out in 2012. The coordinates shown here are the coordinates taken during field survey using Garmin GPSmap 60CSx , thus there are slight deviations from the planned coordinates due to the accuracy tolerance of the GPS.

Table 1: The GPS Coordinates for the Permanent Sample Plot in Cherul Permanent Forest Reserved by GPS

Compartment	Plot	Fel ing year	Coordinates			
			A	B	C	D
40 Previously is 44	32	1989	WA560492 WMR457705	WA560600 WMR457816	WA560537 WMR457801	WA561617 WMR457715
43	33	1984	WA560481 WMR458916	WA560546 WMR458851	WA560472 WMR458787	WA560408 WMR458858

Plot Descriptions

Compartment 40

Compartment 40 situated near to logging road with a soil texture of clay loam. The area considered as steep areas between 15 to 30%, and the area is dominated with trees that more than 30 cm DBH. The forest litter was thick and measured at 20-35cm in depth. Very dense of vegetation and the canopy openness was measured between 5-10%. In this area, Non-dipterocarp species is dominating Dipterocarp species. Total trees that being measured in this compartment is 132 compared to the previous inventory (120).

Compartment 43

Compartment 43 is located in an area that can be considered as flat land. However part of the plot is located in water logged area at about 1/5 of the plot. The soil was sandy clay loam and the thickness of forest litter was 10-20 cm. The darker soil colour shows that this area is high in acidity especially near to the swamp area. A number of small vegetation was found dead at this swampy area but a few numbers of big trees still can adapt to this condition.

The vegetation layer in this plot was consisted of five layers which some of the trees can reach more than 60cm in diameter. In this plot, a total of 101 trees being measured with Dipterocarps species contributed only 33 trees compared 101 trees of Non-Dipterocarp.

Extract From Report of Inventory 2 permanent Sample Plot (PSP s) Dated October 2017

Results

Numbers of trees per hectares

Total enumeration was conducted at Compartment 40 and 43. Based on the inventory, numbers of Dipterocarpaceae and Non-dipterocarpaceae were recorded based on diameter at breast height (DBH) classification i.e. 5 – 14.9 cm; 15 – 29.9 cm and more than 30 cm DBH respectively (Table 2).

Compartment 40

DBH	5-14.9 cm	15-29.9 cm	<30 cm	Total
Dipt	2 (1)	2 (8)	10 (24)	14 (33)
Non-Dipt	16 (3)	38 (37)	64 (47)	118 (87)
Total	18 (4)	40 (45)	74 (71)	**132 (120)**

Compartment 43

DBH	5-14.9 cm	15-29.9 cm	<30 cm	Total
Dipt	6 (8)	11 (11)	16 (16)	33 (35)
Non-Dipt	22 (59)	16 (17)	30 (31)	68 (107)
Total	28 (67)	27 (28)	46 (47)	**101 (142)**

Table 2: Numbers of trees based on DBH and species classifications at Compartment 40 and 43.
Note: Numbers in parenthesis showed numbers of Dipterocarp and Non-Dipterocarp species in 2013.

In terms of Dipterocarp and Non-dipterocarps species, Compartment 43 recorded higher number of Dipterocarps species compared to Compartment 40. However, Compartment 40 showed otherwise. Within both compartments; DBH more than 30 cm showed the most numbers of trees recorded. It may due to the sampling technique where DBH <30 cm was assessed within plot 100 m x 100 m. A total of 132 trees were assessed in Compartment 40 and 101 trees for Compartment 43 respectively. In addition, compared to 2013 data; number of Dipterocarp species in Compartment 40 decreased from 33 to 14 trees however for Non-Dipterocarp species; the numbers increased from 86 to 118 trees. For Compartment 43; numbers of Dipterocarp species were slightly decreased (35 to 33 trees) while numbers for Non-Dipterocarp species decreased from 107 to 68 trees. In conclusion, the number of trees that being

assessed in 2017 increased for Compartment 40 however decreased in Compartment 43.

Total basal area per hectares

Based on Table 3; Compartment 40 recorded higher number of basal area per ha basis at 14.963 m^2/ha compared to Compartment 43 (8.921 m^2/ha). DBH class more than 30 cm recorded higher BA compared to Class 5-14.9 cm and 15-29.9 cm for both compartments.

Compartment 40

DBH	5-14.9 cm	15-29.9 cm	<30 cm	Total
Dipt	0.021 (0.04)	0.061 (0.13)	1.985 (1.57)	2.067
Non-Dipt	0.185 (0.31)	1.405 (1.06)	11.305 (7.29)	12.896
Total	0.206 (0.35)	1.466 (1.19)	13.290 (8.855)	**14.963 (10.387)**

Compartment 43

DBH	5-14.9 cm	15-29.9 cm	<30 cm	Total
Dipt	0.028 (0.08)	0.434 (0.47)	2.682 (3.38)	3.145 (3.93)
Non-Dipt	0.156 (0.38)	0.450 (0.69)	5.169 (5.41)	5.776 (6.48)
Total	0.184 (0.460)	0.884 (1.154)	7.852 (8.791)	**8.921 (10.406)**

Table 3: Total basal area per ha for Dipterocarp and Non-Dipterocarp at Compartment 40 and 43.

Note: Numbers in parenthesis showed numbers of basal area of Dipterocarp and Non-Dipterocarp species in 2013.

Based on the previous data (2013); Compartment 40 showed slightly increased BA per ha basis however the otherwise for Compartment 43. This might due to less number of trees were assessed for Compartment 43 in 2017 compared to 2013.

Total tree volume per hectares

Tree volume per hectares basis showed both compartments gave similar results where Non-Dipterocarp species overcome Dipterocarp species. After the last inventory, a number of higher DBH and tree height trees were dead (based on observation), thus this will affect the total volume per hectares for both compartments.

Compartment 40

DBH	5-14.9 cm	15-29.9 cm	<30 cm	Total
Dipt	0.082 (0.10)	0.317 (0.65)	12.902 (28.55)	13.301(29.29)
Non-Dipt	0.602 (0.81)	6.391(6.41)	66.136 (114.39)	73.130 (121.61)
Total	0.684 (0.91)	6.709 (7.06)	79.038 (142.94)	**86.432 (150.91)**

Compartment 43

DBH	5-14.9 cm	15-29.9 cm	<30 cm	Total
Dipt	0.110 (0.21)	2.258 (2.43)	8.719 (41.49)	11.088 (44.13)
Non-Dipt	0.712 (0.99)	2.634 (3.57)	30.239 (60.76)	33.586 (65.32)
Total	0.823 (1.194)	4.892 (5.99)	38.959 (102.26)	**44.674 (109.45)**

Table 4: Total tree volume (m3) per ha for Dipterocarp and Non-Dipterocarp at Compartment 40 and 43.

Note: Numbers in parenthesis showed numbers of total volume of Dipterocarp and Non-Dipterocarp species in 2013.

Conclusion and recommendations

Based on the results, it can be concluded that both compartments showed better results in terms of growth performance. However, based on observation, quite a number of big trees were felled or dead. This will affect the total overall of basal area and tree volume per hectares basis. It is recommended that

    i.   Regular evaluation and observation should be conducted to other PSP

    ii.   Individual tree tagging should using numbered-aluminum plate for consistent measurements and detections

    iii.   Permanent signboard for each PSP should be constructed to avoid confusions

Plates:

Plate 1: Border marker was reconstructed using aluminium plate to replace old PVC pipe.

Plate 2: Both aluminium plate and PVC pipe were installed at the borders of both compartments. GPS was used to detect the points.

Appendix

Compartment 43 (swampy and water-log)

Compartment 40 (hilly area)

Raw Data

Compartment 40

No	Tree No	Family	Species	DBH1	DBH2	BA 2	BA 1	Length	Volume
1	4	Dipt	Meranti paan	8	9.9	0.008	0.005	6	0.030
2	14	Dipt	Meranti langgung	11	13	0.013	0.009	6	0.052
1	5	Dipt	Nyatoh	16	18	0.025	0.020	8	0.132
2	21	Dipt	Meranti melantai	18	21.3	0.036	0.025	8	0.185
	82	Dipt	Meranti melantai	30	30	0.071	0.071	10	0.459
1	2	Dipt	Meranti melantai	31	35.5	0.099	0.075	10	0.643
2	7	Dipt	Meranti paang	32	37	0.107	0.080	10	0.699
3	41	Dipt	Melanti melantai	32	37	0.107	0.080	10	0.699
4	81	Dipt	Meranti melantai	39	39	0.119	0.119	10	0.776
5	45	Dipt	Meranti melantai	40	43	0.145	0.126	10	0.943
6	62	Dipt	Meranti melantai	43	46	0.166	0.145	10	1.080
7	15	Dipt	Tengkawang	47	51.5	0.208	0.173	10	1.353
8	60	Dipt	Meranti melantai	55	63	0.312	0.237	10	2.025
	64	Dipt	Tengkawang	80	91	0.650	0.502	10	4.225
9	35	ND	Medang	5	8.5	0.006	0.002	5	0.018
10	13	ND	Bintangor	6	10	0.008	0.003	5	0.026
1	34	ND	Kelat	6	10	0.008	0.003	5	0.026
2	29	ND	Penarahan	10	10.9	0.009	0.008	5	0.030
	27	ND	Perah	9	11	0.009	0.006	5	0.031
3	31	ND	Penarahan	9	12	0.011	0.006	5	0.037
4	26	ND	Kelat	10	12	0.011	0.008	5	0.037
5	23	ND	Nyatoh	12	12	0.011	0.011	5	0.037
6	3	ND	Penarahan	9	12.5	0.012	0.006	5	0.040
7	37	ND	Medang	9	12.5	0.012	0.006	5	0.040
8	32	ND	Kelat	9	13	0.013	0.006	5	0.043
9	17	ND	Kepong	11	13.1	0.013	0.009	5	0.044
	33	ND	Beruas				0.006	5	0.046
10	9	ND	Ala lalat				0.008	5	0.049
11	11	ND	Penarahan				0.008	5	0.050
12	5	ND	Kelat				0.013	5	0.050
13	30	ND	Kelat	9	13.5	0.014	0.008	7	0.080
14	28	ND	Kelat	10	13.8	0.015	0.011	7	0.080
	36	ND	Jempanal	10	14	0.015	0.011	7	0.081
15	19	ND	Beruas	13	14	0.015	0.011	7	0.083
16	8	ND	Kelat	10	15	0.018	0.013	7	0.086
1	22	ND	Penarahan	12	15	0.018	0.018	7	0.086
2	24	ND	Kelat	12	15.1	0.018	0.006	7	0.087
3	25	ND	Nyatuh	12	15.2	0.018	0.009	7	0.091
4	7	ND	Kelat	13	15.5	0.019	0.013	7	0.091
5	39	ND	Kelat	15	15.5	0.019	0.015	7	0.093
6	27	ND	Kelat				0.031	7	0.143
7	2	ND	Penarahan				0.008	7	0.101
	6	ND	Kelat	9	15.6	0.019	0.015	7	0.101
8	15	ND	Penarahan	11	16	0.020	0.013	7	0.102
9	6	ND	Beruas	13	16	0.020	0.025	7	0.116
10	1	ND	Mempening	14	16.1	0.020	0.020	7	0.116
11	20	ND	Penarahan	20	20	0.031	0.013	7	0.122
				10	16.8	0.022			
12				14	16.8	0.022			
13				13	16.9	0.022			
14				18	18	0.025			
15				16	18	0.025			
16				13	18.5	0.027			
17									

ID	No	ND	Species						
18	2	ND	Bulan	17	19	0.028	0.023	7	0.129
19	4	ND	Bulan	18	21	0.035	0.025	7	0.158
20	13	ND	Perah	18	21	0.035	0.025	7	0.158
21	16	ND	Kelat	22	22	0.038	0.038	7	0.173
22	26	ND	Penarahan	17	21.5	0.036	0.023	7	0.165
	18	ND	Beruas	14	22	0.038	0.015	7	0.173
23	25	ND	Kelat	16	22	0.038	0.020	7	0.173
24	17	ND	Nyatuh	15	24	0.045	0.018	7	0.206
25	12	ND	Bintangor	22	24	0.045	0.038	7	0.206
26	9	ND	Kelat	16	24.5	0.047	0.020	7	0.214
27	23	ND	Kelat	15	25.3	0.050	0.018	7	0.229
28	34	ND	Kelat	22	26	0.053	0.038	7	0.241
	32	ND	Kelat	23	26	0.053	0.042	7	0.241
29	20	ND	Tempunai	24	27	0.057	0.045	7	0.260
30	31	ND	Keledang	24	27.5	0.059	0.045	7	0.270
31	10	ND	Dedali	22	28	0.062	0.038	7	0.280
32	24	ND	Kelat	22	28	0.062	0.038	7	0.280
33	11	ND	Mahang	25	28	0.062	0.049	7	0.280
	3	ND	Mahang	20	28.6	0.064	0.031	7	0.292
34	35	ND	Kelat	19	29	0.066	0.028	7	0.300
35	8	ND	Jakan	19	29.2	0.067	0.028	7	0.305
36	33	ND	Nyatuh	24	30.5	0.073	0.045	9	0.427
37	32	ND	Kembang semangkuk	55	55	0.237	0.237	9	1.389
38	18	ND	Keledang	29	32	0.080	0.066	9	0.470
1	21	ND	Beruas	31	32	0.080	0.075	9	0.470
2	67	ND	Keruing	32	32	0.080	0.080	9	0.470
	42	ND	Nyatuh	30	33	0.085	0.071	9	0.500
3	57	ND	Perah	30	33	0.085	0.071	9	0.500
4	38	ND	Perah	31	33.5	0.088	0.075	9	0.515
5 6	43	ND	Nyatuh	30	34	0.091	0.071	9	0.531
7	49	ND	Membatu	32	35	0.096	0.080	9	0.563
8	72	ND	Nyatuh	35	35	0.096	0.096	9	0.563
	19	ND	Nyatuh	29	35.5	0.099	0.066	9	0.579
	8	ND	Mempening	34	35.5	0.099	0.091	9	0.579
9	5	ND	Kelat	32	36	0.102	0.080	9	0.595
10	29	ND	Perah	32	36	0.102	0.080	9	0.595
11	39	ND	Kelat	33	36	0.102	0.085	9	0.595
12	59	ND	Kelat	35	37	0.107	0.096	9	0.629
13	20	ND	Nyatuh	32	37.5	0.110	0.080	9	0.646
14	6	ND	Nyatuh	33	38	0.113	0.085	9	0.663
15	30	ND	Kelat	33	38	0.113	0.085	9	0.663
16	35	ND	Kempas	35	38	0.113	0.096	9	0.663
17	76	ND	Nyatuh	38	38	0.113	0.113	9	0.663
18	36	ND	Nyatuh	24	39	0.119	0.045	9	0.698
	25	ND	Kelat	31	39	0.119	0.075	9	0.698
19	52	ND	Kelat	33	39	0.119	0.085	9	0.698
20	54	ND	Membatu	34	39	0.119	0.091	9	0.698
21	56	ND	Nyatuh	35	39	0.119	0.096	9	0.698
22	50	ND	Membatu	36	39	0.119	0.102	9	0.698
23	58	ND	Membatu	37	39	0.119	0.107	9	0.698
24	79	ND	Kelat	39	39	0.119	0.119	9	0.698
25	22	ND	Kembang semangkuk	33	40	0.126	0.085	9	0.735
26	28	ND	Kelat	34	40	0.126	0.091	9	0.735
27 28	31	ND	Bintangor	39	40.2	0.127	0.119	9	0.742
29									
30									
31 32									
33									

No									
34	4	ND	Beruas	40	40.5	0.129	0.126	9	0.753
35	70	ND	Nyatuh	40.5	40.5	0.129	0.129	9	0.753
36	40	ND	Beruas	34	41	0.132	0.091	9	0.772
37	12	ND	Kembang semangkuk	37	41	0.132	0.107	9	0.772
38	73	ND	Kembang semangkuk	41	41	0.132	0.132	9	0.772
39	9	ND	Kelat	35	41.5	0.135	0.096	9	0.791
	46	ND	Minyak beruk	38	43	0.145	0.113	9	0.849
40	53	ND	Kelat	38	43	0.145	0.113	9	0.849
41	37	ND	Nyatuh	39	43	0.145	0.119	9	0.849
42	51	ND	Kelat	43	43	0.145	0.145	9	0.849
43	10	ND	Kelat	41	44	0.152	0.132	9	0.889
44	17	ND	Nyatuh	43	46	0.166	0.145	9	0.972
45	18	ND	Kelat	40	48	0.181	0.126	9	1.058
46	63	ND	Membatu	35	51	0.204	0.096	9	1.194
47	16	ND	Nyatuh	48	52	0.212	0.181	9	1.242
48	3	ND	Kelat	51	54	0.229	0.204	9	1.339
49	19	ND	Keledang	50	55	0.237	0.196	9	1.389
50	24	ND	Kelat	49	56	0.246	0.188	9	1.440
51	48	ND	Kempas	45	57	0.255	0.159	9	1.492
52	61	ND	Kelat	21	58	0.264	0.035	9	1.545
53	11	ND	Nyatuh	49	59	0.273	0.188	9	1.599
54	66	ND	Nyatuh	50	60	0.283	0.196	9	1.653
55	44	ND	Nyatuh	55	60	0.283	0.237	9	1.653
56	65	ND	Kembang semangkuk	59	61	0.292	0.273	9	1.709
57	55	ND	Kelat	55	63	0.312	0.237	9	1.823
58	26	ND	Bulan	54	64.5	0.327	0.229	9	1.910
59	27	ND	Nyatuh	64	74	0.430	0.322	9	2.515
	74	ND	Kelat	75	75	0.442	0.442	9	2.583
	13	ND	Mersawa	70	77	0.465	0.385	9	2.723
	47	ND	Bintangor	71	81	0.515	0.396	9	3.013
60	14	ND	Perah	47	85	0.567	0.173	9	3.318
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62									
63									
64									

Compartment 43

No	Tree No	Family	Species	DBH 1	BA 1	Length	Volume
1	2	Dipt	Merawan jangkang	5	0.002	6	0.007654
2	3	Dipt	Meranti melantai	6.5	0.003	6	0.012935
3	1	Dipt	Merawan jangkang	6.7	0.004	6	0.013743
4	12	Dipt	Keruing	7.8	0.005	6	0.018626
	7	Dipt	Merawan	9.5	0.007	6	
5	13	Dipt	Keruing	9.9	0.008	6	0.02763
6	9	Dipt	Meranti kepong	16.5	0.021	8	0.030006
1	4	Dipt	Meranti	17.6	0.024	8	0.111132
2	11	Dipt	Merawan jangkang	18.4	0.027	8	0.126444
3	3	Dipt	Keruing	20.7	0.034	8	
4	4	Dipt	Keruing	21	0.035	8	0.1382
5	7	Dipt	Keruing	21.2	0.035	8	0.17491
6	2	Dipt	Keruing	21.2	0.035	8	0.180016
7	8	Dipt		22	0.038	8	0.183461
8	6	Dipt		27.2	0.058	8	0.183461
9	5	Dipt	Meranti sarang punai	28.1	0.062	8	0.197569
	12	Dipt	Meranti sarang punai	28.8	0.065	8	0.302003
	2	Dipt	Meranti melantai	33.2	0.087	10	0.322319
10	1	Dipt	Meranti melantai	36	0.102	10	0.338577
11	1	Dipt		36.1	0.102	10	0.562418
	1	Dipt	Mahang	36.2	0.103	10	0.661284
1	4	Dipt	Meranti kepong	36.4	0.104	10	0.664963
2	2	Dipt	Meranti melantai	39.6	0.123	10	0.668652
3	2	Dipt	Mahang	42.1	0.139	10	0.676061
4	1	Dipt	Keruing	44.4	0.155	10	0.800154
5	3	Dipt		45.1	0.160	10	0.904372
6	3	Dipt	Meranti melantai	45.7	0.164	10	1.005886
7	7	Dipt	Keruing	47.3	0.176	10	1.037854
8	3	Dipt	Keruing	48	0.181	10	1.065652
9	2	Dipt	Keruing	48.3	0.183	10	1.141577
	5	Dipt	Keruing	53.6	0.226	10	1.175616
	1	Dipt	Keruing	65.3	0.335	10	1.190357
10	3	Dipt	Meranti langgong	66.3	0.345	10	1.465928
11	1	ND	Meranti langgong	5.1	0.002	5	2.175752
12	5	ND	Keruing	5.6	0.002	5	2.242901
13	5	ND	Meranti langgong	5.6	0.002	5	0.006636
14	8	ND	Keruing	6.3	0.003	5	0.008001
15	2	ND	Keruing	6.5	0.003	5	0.008001
16			Kelat				0.010126
			Simpoh				0.010779
1			Kelat				
2			Mempisang				
3			kedondong				
4							
5							

#	Count		Species				
6	2	ND	Kedondong	6.6	0.003	5	0.011113
7	1	ND	Medang	7.1	0.004	5	0.012861
8	4	ND	Kelat	7.3	0.004	5	0.013596
9	3	ND	Kelat	7.6	0.005	5	0.014736
	3	ND	Minyak beruk	7.6	0.005	5	0.014736
10	4	ND	Kelat	7.8	0.005	5	0.015522
11	2	ND	Hampas tebu	9.1	0.007	5	0.021127
12	14	ND	Kelat	9.2	0.007	5	0.021594
13	1	ND	Kelat	9.4	0.007	5	0.022543
	6	ND	Kelat	9.5	0.007	5	0.023025
14	4	ND	Kelat	10.7	0.009	5	0.029209
15	5	ND	Kelat	11.4	0.010	5	0.033156
16	6	ND	Kelat	11.4	0.010	5	0.033156
17	7	ND	Merpauh	13	0.013	5	0.043116
18	6	ND	Merpauh	14	0.015	5	0.050005
19	8	ND	Kelat	14	0.015	5	0.050005
20	7	ND	Merpauh	14.8	0.017	5	0.055883
21	2	ND	Melunak	15.2	0.018	7	0.082522
22	7	ND	Sesenduk	16	0.020	7	0.091437
	2	ND	Kelat	16.9	0.022	7	0.102013
1	6	ND	Mempisang	17	0.023	7	0.103224
2	5	ND	Keledang	17	0.023	7	0.103224
3	10	ND	Kelat	17	0.023	7	0.103224
4	5	ND	Kelat	17.1	0.023	7	0.104442
5	3	ND	Penarahan	17.4	0.024	7	0.108138
6	8	ND	Mahang	18.5	0.027	7	0.122243
7	1	ND	Sepetir	18.7	0.027	7	0.124901
	1	ND	Kelat	19.1	0.029	7	0.130301
	3	ND	Kelat	19.1	0.029	7	0.130301
8	4	ND	Minyak beruk	19.2	0.029	7	0.131669
9	13	ND	Mahang	23	0.042	7	0.188946
10	2	ND	Kelat	23.4	0.043	7	0.195575
11	1	ND	Kelat	25.2	0.050	7	
12	1	ND	Bintangor	30	0.071	9	
13	3	ND	Sesenduk	30.2	0.072	9	
14	1	ND	Perah	31.5	0.078	9	
	2	ND	Mahang	32	0.080	9	
15	1	ND	Mahang	32.3	0.082	9	
16	2	ND	Mahang	34.3	0.092	9	
	2	ND	Kelat	34.5	0.093	9	0.22682
1	1	ND	Bintangor	35.1	0.097	9	0.413303
2	1	ND	Temponek	36	0.102	9	0.418832
3	1	ND	Kedondong	37	0.107	9	0.455666
4	5	ND	Medang	37.2	0.109	9	0.470246
5	1	ND	Mahang	38	0.113	9	0.479105
6							0.540274
7							0.546593
8							
9							0.56577
							0.595156
10							0.628679
11							0.635494
12							0.663121

No		ND	Species				
13	5	ND	Mahang	38.5	0.116	9	0.680686
14	2	ND	Resak	39	0.119	9	0.698481
15	1	ND	Kelat	39.2	0.121	9	0.705664
16	2	ND	Medang	42.5	0.142	9	0.829475
17	4	ND	Kelat	42.5	0.142	9	0.829475
18	4	ND	Sepetir	44.4	0.155	9	0.905298
19	7	ND	Sepetir	44.8	0.158	9	0.921683
20	2	ND	Sesenduk	44.8	0.158	9	0.921683
21	3	ND	Merbau	46.3	0.168	9	0.984436
22	8	ND	Perah	46.9	0.173	9	1.010116
23	2	ND	Ludai	48.5	0.185	9	1.080212
24	2	ND	Terap	49	0.188	9	1.102599
25	3	ND	Kelat	52	0.212	9	1.241744
26	4	ND	Terap	52.2	0.214	9	1.251315
27	6	ND	Merbau	65.7	0.339	9	
28	1	ND	Keledang	71	0.396	9	
29	6	ND	Kelat	77.1	0.467	9	
30	1	ND	Kempas	89	0.622	9	1.98224
							2.314953
							2.729822
							3.637521