River Red Gums diameter growth at Woohlpooer from 1977-2002

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Introduction:
This is an assessment of the initial and final year's data collected by Forest Officer Roger Edwards over the 25-year period from 1977 to 2002. The objective has been to use this study to establish an approximate value for the annual growth of tree diameter at Woohlpooer, a site that might represent the wider landscapes in SW Victoria and South Australia where the River Red Gum (*Eucalyptus camaldulensis*) is a dominant species on laterised tablelands and stream sides of other landscapes.

Of interest is the question of age of the remnant giant River Red Gums (RRG) that still stand in Vic and SA, or the trees that were milled on the Dundas Tableland from 1880-1960 (Nathan 1998). It is possible to see some growth rings on a sawn RRG stump but this species does not always exhibit an annual growth ring – that makes it an unreliable way of gauging RRG age. Carbon-dating would provide a better estimate, provided that a sample of the wood laid down in the early years could be obtained that was not contaminated (e.g. through decay processes) by modern carbon.

If one has some idea of the likely growth in diameter then, from the current diameter at breast height (DBH) of a tree, one might provide an estimate of its age. Oddly, except for some data from the Murray River, there is little published information on the cyclic growth of RRG (Colloff 2014).

Any estimate of age obtained by the process pursued here will be very approximate, conditioned by the lack of detailed knowledge of the factors that would/could have affected growth of old trees over their life time (or at particular phases within): availability of water (rainfall, flooding events, access to groundwater), site fertility, soil type, competition and impact of storm, fire, disease and pests.

Results:

Table 1. Woohlpooer RRG Plots – base data and mean diameter growth (mm/year) from 1977-2002

	Tree Measurement Plots 1997-2002						
Plot attributes and tree data	1	2	3	4	5	1-4	1-5
Stocking (trees/ha) in 1997	149	130	172	124	162	143	147
Trees/ha after thinning in 1978	67	79	77	74	162	74	(92)
Number of trees/plot assessed	67	78	76	71	152	293	445
Mean DBH in 1977 (cm)	38.45	40.00	39.45	41.90	35.05	39.96	38.28
Mean DBH in 2002 (cm)	46.68	48.27	47.52	48.27	39.14	47.71	44.78
Mean DBH growth (mm/yr)	3.29	3.31	3.23	2.55	1.64	3.10	2.60
Std Deviation growth (mm/yr)*	1.08	1.50	1.42	1.43	1.28	1.40	1.53

* F-tests show no significant differences in diameter growth among any pairs/groups of plots.

While Plot 5 had trees stocked at least twice the density of those in Plots 1-4 there was no significant difference between them in terms of mean diameter growth (1.64 mm/yr v. 2.5-3.3 mm/yr). The standard deviation values indicate that there was a considerable variability in the data, possibly due to factors such as age, health of the trees, site variability and errors of measurement or recording.

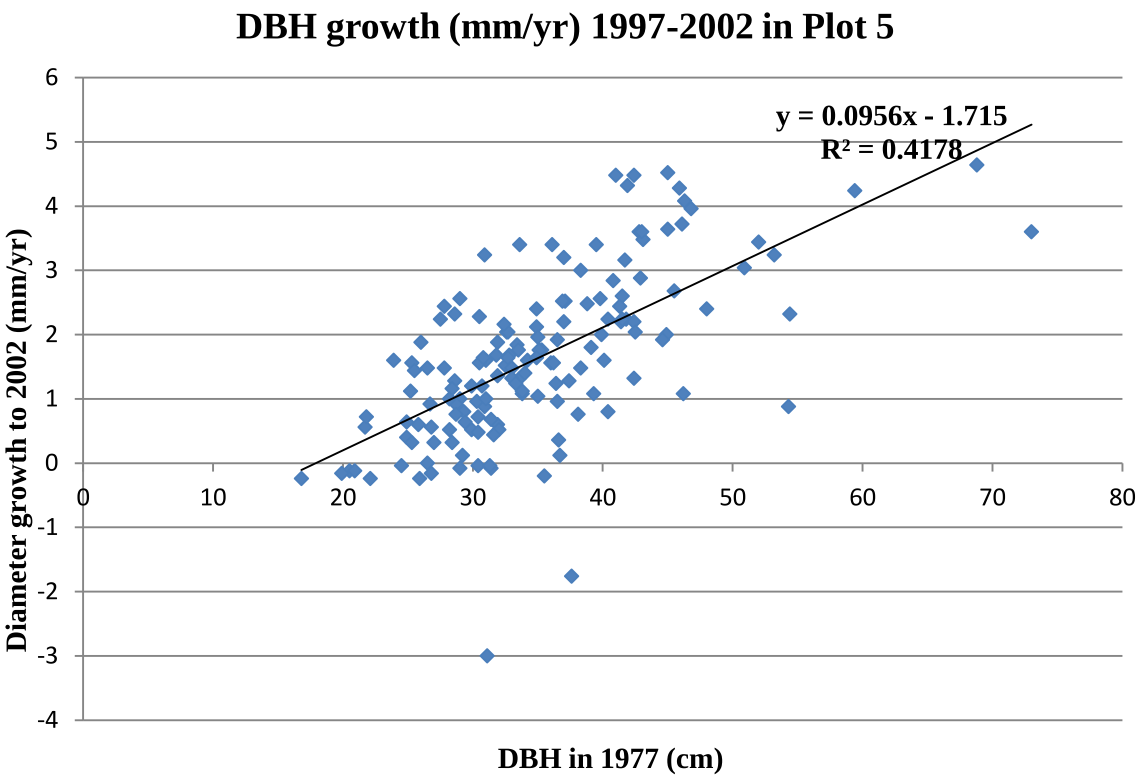
We might consider the proposition that the growth in DBH over time is greatly influenced by how large the tree is. One way to test that proposition is to plot the initial DBH against the mean annual diameter growth (mm/yr) over the subsequent period of 25 years (1977-2002).

The first set of data examined was that from **Plot 5**, where there was a wider range of DBH and higher initial stocking (162 tree/ha) than in Plots 1-4 (67-77 trees/ha after thinning). From Figure 1, the significant regression ($p<0.001$) indicates that some 42% of the growth in diameter over 25 years could be explained by the initial DBH. There were 2 data points that might be errors ('outliers').

$$\text{Diameter growth (mm/yr)} = 0.0956 \text{ initial DBH} - 1.715\ (r^2 = 0.413)\ (p<0.001)$$

For DBH 20, 40 or 60 cm the predicted diameter growth would be 0.20, 2.11 & 4.02 mm/year.

Figure 1:

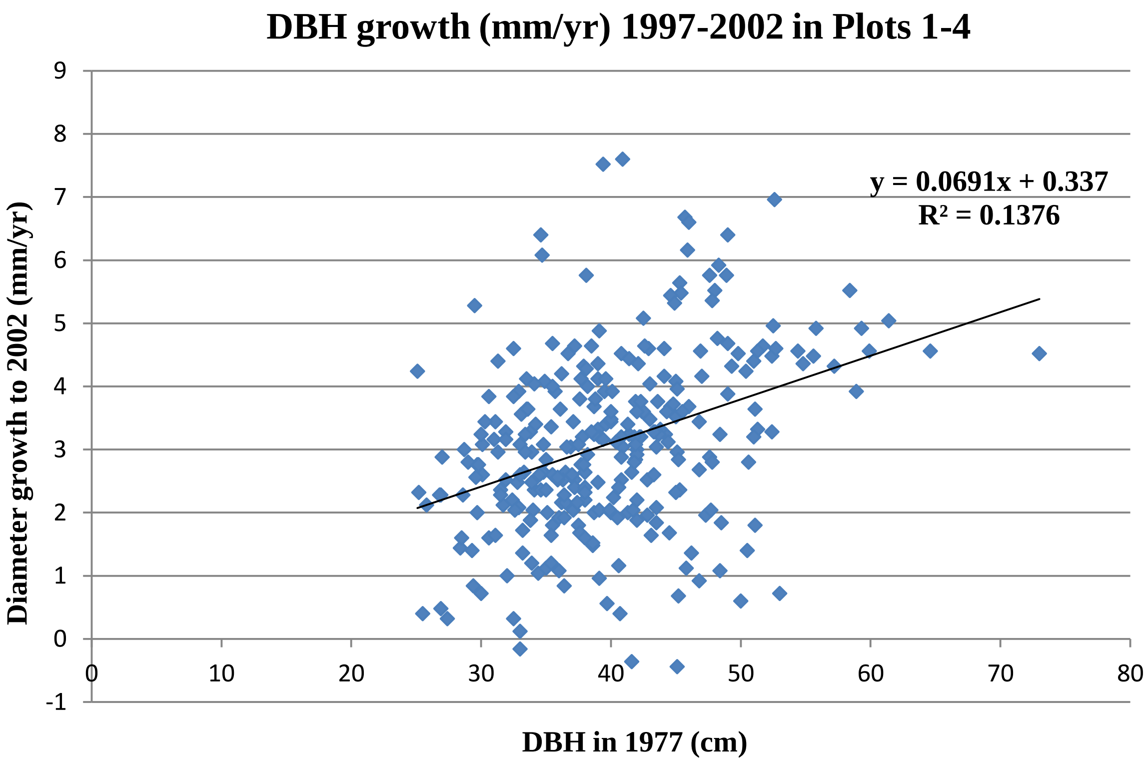


The second set of data was from **Plots 1-4**. About 14% of the variability in diameter growth was accounted for by the initial DBH. The regression was statistically significant. We have not excluded any 'outlier' data because there was no objective basis for doing so.

Diameter growth (mm/yr) = 0.0691 initial DBH + 0.337 ($r^2 = 0.14$) ($p<0.001$)

For DBH 20, 40 or 60 cm the predicted diameter growth would be 1.71, 3.10 & 4.48 mm/year.

Figure 2:

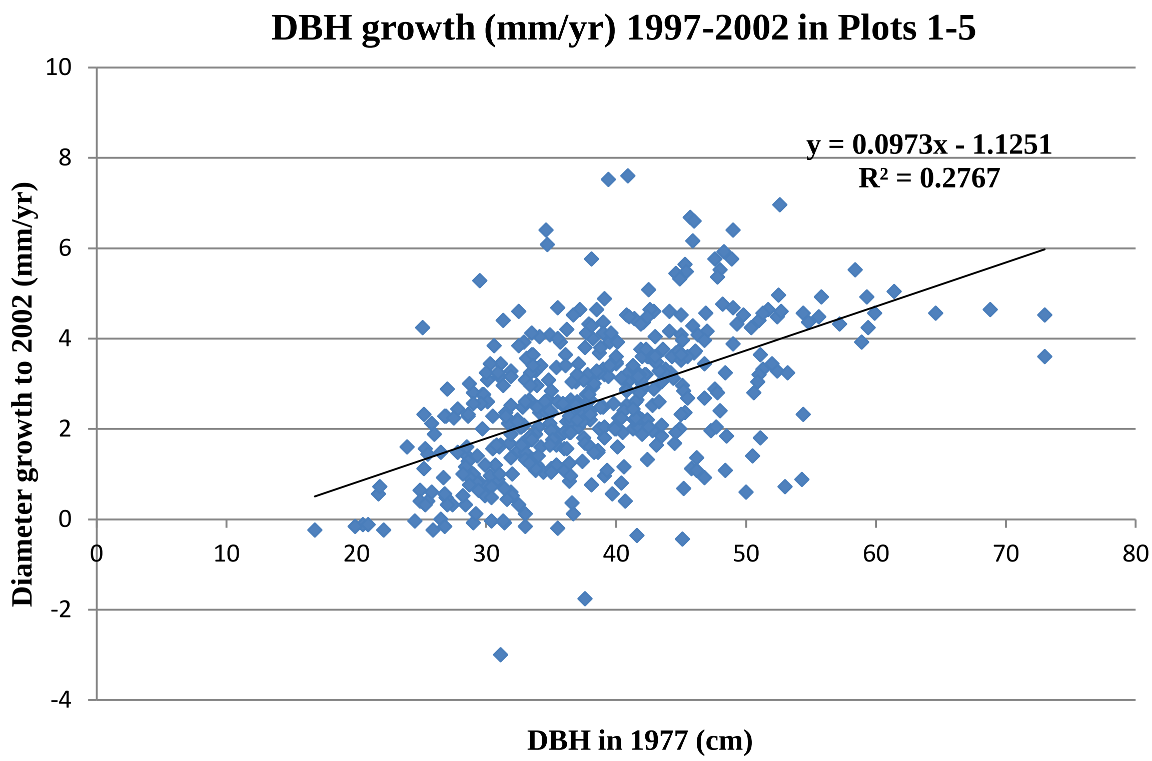


Putting all the data from **Plots 1-5** together (445 trees) (Figure 3), the regression was statistically significant (p<0.001), accounting for 28% of the variance.

Diameter growth (mm/yr) = 0.097 initial DBH - 1.125 (r^2 = 0.28) (p<0.001)

For trees DBH 20, 40 or 60 cm the predicted diameter growth would be 0.82, 2.77 & 4.71 mm/year.

Figure 3:



The major difference between these models is that small trees in Plot 5 are predicted to have a slower growth than similar trees in Plots 1-4. That might be due to greater competition among the smaller trees in Plot 5. Thinning of the stand in Plots 1-4 may have reduced that impediment.

The effect of initial DBH on subsequent growth in DBH was also examined by allocating the trees to 5 diameter classes, as done for the Millewa Forest by the NSW Forestry Commission 1955-95 (see Colloff 2014, p.70); the results are presented in Table 2.

Table 2
Diameter growth of River Red Gums in relation to one of five initial DBH classes

		Diameter classes in 1977					Number of trees
		15-25 cm	26-35 mm	36-45 cm	46-55 cm	56-75 cm	
Plot 1	Number	0	26	32	7	2	67
	Mean mm/yr	-	2.88	3.45	3.59	4.40	
Plot 2	Number	0	27	36	14	2	79
	Mean mm/yr	-	2.63	3.28	4.48	4.80	
Plot 3	Number	2	19	40	14	1	76
	Mean mm/yr	3.28	2.47	3.16	4.32	4.92	
Plot 4	Number	1	16	36	13	5	71
	Mean mm/yr	0.40	2.19	2.44	2.63	4.69	
Plot 5	Number	14	76	48	11	3	152
	Mean mm/yr	0.43	1.17	2.27	2.95	4.16	
Plots 1-4	Number	3	88	144	48	10	293
	Mean mm/yr	2.32	2.59	3.07	3.80	4.68	
Plots 1-5	Number	17	164	192	59	13	445
	Mean mm/yr	0.76	1.93	2.87	3.64	4.56	

There is a statistically non-significant trend for greater DBH growth as the initial DBH class increases. That is most evident in Plot 5. The trend is consistent with that cited by Colloff (2014) for the Millewa RRGs where the diameter growth response was separated into several DBH classes:

≤ 10 cm (1 mm/yr), 10-20 cm (1.7 mm), 20-30 cm (3.5 mm), 30-40 cm (4.2 mm), 40-65 cm (4 mm)

Comparing the two methods of looking at the RRG growth data, for trees with DBH of 30, 40 and 50 cm (or 26-35 cm, 36-45cm & 46-55 cm range) – the effect is as follows (Table 3):

Table 3. Modelled effect of DBH (cm) on subsequent diameter growth (mm/yr)

Method of estimation	Estimated diameter growth (mm/year)		
	30 cm & 26-35 cm	40 cm & 36-45 cm	50 cm & 46-55 cm
Regression (Plots 1-5)	1.79	2.77	3.74
DBH classes (Plots 1-5)	1.93	2.87	3.64

The regression analysis indicates that there is a statistically significant effect of initial diameter on subsequent diameter growth rate. The effect is expected to hold for trees younger than 100 years and possibly for trees to 100 cm DBH. Trees that differ here by 20 cm in DBH (from 30 to 50 cm DBH) will, on average, differ by approximately 50% in their subsequent growth rate.

How one can use that information to estimate the age of our ancient RRGs is the question. While we know that trees in their youth grow at slightly different rates, depending upon their DBH and other factors (such as competition with adjacent trees), it is not clear how fast the RRGs grow when they pass 100 years. The best estimate may be about 5-6 mm/year, from the data collected from 3 old trees at Bryan Swamp (see Bird 2011) and estimates from the Murray River (see Colloff 2014).

Roger Edward's notes on the history of the Woohlpooer State Forest indicate that the RRG forest had been selected for farming in the 1860s and selectively ring-barked to leave about 10-15 trees/ha before reverting to the State in the 1890s. In 1913 it was described as '*an open stand of mature Red Gum that had been heavily ring-barked, with a vast crop of regeneration occupying the site'*. The 10-15 year old regeneration was lightly thinned in 1914, with some further ring-barking of '*valueless trees*'. Further extensive thinning was carried out in 1925/6 and 1934/35. A sawmill operated from 1933and dominant trees were cut. In 1925/6 the forest was leased for grazing by sheep and this curtailed any regeneration. That regime continued until 1981-1994 when leases were cancelled to allow regeneration of RRG and the gradual restoration of an uneven-aged stand of RRG.

One might think that the trees that were measured in this survey most likely arose from seedlings before 1925 (when grazing resumed), certainly as early as 1900 when the major regeneration appears to have begun, with perhaps a few from about 1890. That suggests that most of the trees in 2002 would be expected to be about 75 to 110 years old, with a few later germinants much younger.

The mean DBH of trees in the Plots 1-5 in 1977 ranged from 35-42 cm. The overall range of DBH was 16.2-84.3 cm. Some idea of the spread of diameters in the various plots can be seen in Table 2. The majority of trees were in the 30, 40 and 50 cm DBH categories, with a few at 20 and 70 cm. We might use the overall value of 2.6 m/year for diameter growth to estimate the age of trees in this survey. A number of other approaches were also applied (Table 4).

Table 4
Prediction of the age of River Red Gums at Woohlpooer

DBH range in 2002 (cm)		20	30	40	50	60	70
From regression model (Plot 1-5)	mm/yr	0.82	1.79	2.77	3.74	4.71	5.69
	predicted age	245	165	145	135	125	125
From diameter classes (Plots 1-5)	mm/yr	0.76	1.93	2.87	3.64	4.56	
	predicted age	260	170	140	140	130	
From overall average (Plots 1-5)	mm/yr	2.6	2.6	2.6	2.6	2.6	2.6
	predicted age	75	115	155	190	230	270
From an alternative source	mm/yr	5.5	5.5	5.5	5.5	5.5	5.5
	predicted age	35	55	70	90	110	130

Clearly, from Table 4, most of the predicted ages of Woohlpooer RRGs that are based on the regression model do not match expectations based on the notes provided by Roger Edwards on the history of the stand. The main problem is the small diameter trees. The age of trees above 50 cm DBH appear to be adequately predicted. A similar outcome arises from use of diameter classes.

Using the overall mean for DBH growth of 445 trees (2.6 mm/yr) also inflates the age of the small diameter trees and probably also that of the larger trees. A more realistic prediction across the range of DBH classes appears to come from the use of a mean annual growth of 5.5 mm (Bird 2011).

It appears that the estimates of age of trees at Woohlpooer that is based on the data from 1977-2002 cannot be reliably used to represent growth in earlier decades. That could be due to a reduction in the rainfall during much of the 25 year period of the survey, resulting in slow growth. The average annual rainfall over successive 25-year periods at Cavendish (23 km SW from Woohlpooer and perhaps slightly higher rainfall) was as follows:

1885-01 (655 mm); 1902-26 (643 mm); 1927-51 (648 mm); 1952-76 (658 mm); 1977-2001 (596 mm)

The average annual rainfall for the period 1977-2001 was 47-62 mm less than in the 3 previous 25-year periods and fourth 17-year period. That difference could have a substantial impact on tree growth – particularly on young trees that are densely stocked.

Conclusions

The Woohlpooer RRG growth data from 1997-2002 provides some interesting results. It was possible to show statistically significant relationship between the DBH in 1977 and subsequent yearly diameter growth.

Diameter growth (mm/yr) = 0.0973 initial DBH -1.1251 ($r^2 = 0.28$) (N = 445) ($p<0.001$)

From that relationship, for trees of DBH 20, 40 or 60 cm the predicted diameter growth would be 0.82, 2.77 & 4.71 mm/year during that 25 year period. Since about 70% of the variance is not accounted for by the relationship, other factors have a large part to play in determining the diameter growth rate of individual RRGs. Those factors would include the degree of competition with other trees, impact of disease or pests and site factors (access to water, soil type, etc).

The overall mean diameter growth rate of 2.6 mm/yr (obtained from 445 trees) must be considered as a minimum estimate, since the growth has been over a period of lower than usual rainfall. The rainfall data from Cavendish indicates a mean annual deficit of about 54 mm for that 25-year period, compared with the previous 92 years. Accordingly, it would seem unwise to rely on a value for diameter growth of 2.6 mm/year to make an estimate of the age of the old RRGs in our landscapes. To do so would probably give unrealistic ages to those veterans. The estimates must be considered as a possible lower end of range.

Estimates using a value of around 5-6 mm/year (e.g. from trees in the largest diameter class in the model) would appear to provide a more conservative estimate of age based on the diameter of a tree that flourished in wetter times. If we use that value, rather than the 14 mm/yr adopted by Nathan (1998), we would have to disagree with her conclusion that RRGs of 60 and 90 cm DBH milled in the 1920s germinated after the arrival there of the European squatters and their flocks of sheep in 1840.

For individual trees, some of the factors that affect the growth response may be known (or be presumed) and could help in deciding an appropriate average diameter growth value to use. Those local factors include rainfall, position in the landscape, flooding frequency, access to groundwater, soil type and fertility, competition from adjacent trees, impacts of fire, disease and pests.

References

Bird, Rod (2011) *River Red Gums at Bryans Swamp and other sites in SW Victoria and in South Australia: Photographs & measurement of significant ancient trees*. (https://hamilton-field-naturalists-club-victoria.org.au).

Colloff , Mathew J (2014*) Flooded Forest and Desert Creek: Ecology and history of the River Red Gum.* (CSIRO Publishing). pp. 325.

Nathan, Erica (1998) '*Dryland salinity on the Dundas Tableland: a historical appraisal*'. Australian Geographer **30**: 295-310.

Figure 4. Roger Edwards in the unthinned Plot 5 in the Woohlpooer State Forest in Oct. 2019.

Appendix

The data sheets are presented below for diameter at breast height (DBH) over time & growth over 25 years (mm/year)

PLOT 1

Tree no	1977	1987	1989	1991	1993	1996	1999	2002	mm/yr
2	36	38.8	40	39.2	40.4	40.5	41.3	40.8	1.92
5	38.2	41.2	42.5	43.5	44.6	46.1	47	48.2	4
7	44.2	47.3	48	48.6	50.6	51.8	52.3	52.3	3.24
9	39	42.6	44.5	45	46	46.7	47.5	47.3	3.32
10	29.7	31.4	32	32.5	33.8	33.8	34.4	34.7	2
11	44.6	48.1	50	49.8	51.1	52.2	54.2	53.8	3.68
13	39.6	42.3	44.5	45.6	47.3	48	48.9	48.1	3.4
14	32.9	36.3	38	38.2	39	40	42	42.7	3.92
18	33.3	36.5	37.5	38.5	38.9	39.5	40.1	39.9	2.64
19	29.3	31.3	31	31.2	31.7	32.1	33.1	32.8	1.4
20	43.6	47.6	49	50.1	51	52	53.1	53	3.76
22	49.8	54.7	54	56	56.6	58.8	60.5	61.1	4.52
26	36.2	43.9	45	45.8	47.3	47.8	47.8	46.7	4.2
27	35.5	40.6	42	42.7	44.3	45.7	47.1	47.2	4.68
30	26.9	29.2	30	30.4	31.3	31.7	32.5	32.6	2.28
31	29.7	32	33	33.5	34.4	35.1	36.3	36.6	2.76
34	33.8	37	39	39.2	40.2	40.7	42	42	3.28
35	45							55.2	4.08
37	33.5	38.2	39.5	39.9	40.8	41.3	42.4	42.6	3.64
39	46.8	50.1	51.5	52.2	54	54.2	55.1	55.4	3.44
41	32.8	37.3	38	38.9	39.5	39.8	40.1	39	2.48
43	32.5	33.1	33	33	33.4	33.5	33.7	33.3	0.32
45	42.8	46.1	46	46.9	47.8	48	49	47.7	1.96
46	34.8	36.5	37.5	38.5	39.3	40.1	41.4	41.4	2.64
47	38.1	43.6	45.5	46.3	47.2	49.3	51.5	52.5	5.76
51	36.9	41.8	42	42.5	43.1	43.8	45	44.5	3.04
53	31.1	33.4	34.5	34.9	36	36.6	38.4	39.7	3.44
56	36.1	38.6	40.5	41.6	42.5	42.9	44.4	45.2	3.64
58	34.2	38.2	40	39.7	41	41.9	42.7	42.7	3.4
62	31	35.7	36	37.1	38.4	38.6	39.5	38.9	3.16
64	45.3	52.5	54	55.6	56.5	57.8	59.3	59.4	5.64
67	40.8	45.5	46.3	47.4	48.7	51.1	52.1	52.1	4.52
71	38.5	43.5	45	46	47.4	48.8	50	50.1	4.64
72	31.3	35	36	38	38.8	39.8	41.3	42.3	4.4
74	36.6	40.3	41.5	42.1	43.5	43.9	45.1	44.2	3.04
76	31.5	34.4	35.5	36.1	36.8	37.6	37.6	37.4	2.36
78	34.9	39.7	41.5	41.8	43.8	45.1	45.5	45.1	4.08
85	39.1	44	45.5	46.9	48.1	49.3	51.3	51.3	4.88
86	57.2	60	62	63.6	65.3	66.3	67.9	68	4.32
88	29	30.3	31	31.3	33	33.7	34.8	36	2.8
92	40.2	42	43.5	44.2	45.8	46.3	47	45.8	2.24
94	30.1	32.8	34	34.5	35.7	36.4	37.8	37.8	3.08
96	30.6	32.6	33.5	34.1	34.5	34.8	35.2	34.6	1.6
97	42.9	48	49.5	50.1	51.1	52.9	54.2	54.4	4.6
102	34.1	39.3	41.5	42.5	43.2	44.4	44.6	44.2	4.04
103	30.6	35.3	36.5	37.1	38.1	38.9	40	40.2	3.84
104	37.7	41.5	42.5	42.3	43.5	44.4	45.1	44.6	2.76
106	49.3	54.2	56	56.8	57.8	59	59.7	60.1	4.32
109	50.6	54.4	55.5	56.2	56.9	57.4	57.6	57.6	2.8
110	42	45.3	46	46.2	47.1	48	48.2	47.5	2.2
111	38.6	39.3	39.5	39.9	40.8	41.7	42.2	42.3	1.48
113	43.8	47.5	49	49.8	51	52.3	52.7	52.1	3.32
115	39.5	43.7	43	45.7	46.7	47.7	48.8	49.3	3.92
120	39.1	42.2	43.5	44.6	45.1	46.7	47.5	47.1	3.2
122	41.6	44.6	45.5	46.1	46.9	47.8	48.5	48.2	2.64
126	38.6	39.9	40.5	40.8	41.6	41.9	42.5	42.4	1.52
129	55.6	60.2	62	63.4	64.1	65.4	66.4	66.8	4.48
130	34.7	37.7	40	39.8	41	41.3	42	41.3	2.64
132	49	53.5	55.5	56.9	58	59	59.7	58.7	3.88
133	29.4	31.4	31.5	31.7	32	32.1	32.5	31.5	0.84
135	36.5	39.6	41	40.2	42	42.6	43.2	43.1	2.64
137	31.9	35	36.5	37.3	38.2	39.5	39.8	40.1	3.28
138	42.5	48.7	50	51	51.9	53.4	54.9	55.2	5.08
143	41.9	46.7	48.5	49	49.5	50.9	52.3	51.3	3.76
146	44.3	48.1	49.5	50.3	51	51.8	52.7	53.3	3.6
148	47.6	49.7	49.5	50.5	51.8	52.8	54.5	54.8	2.88
149	51.3	55.2	56	56.6	57.5	58.6	59.9	59.6	3.32
67	38.449	41.924	43.058	43.753	44.791	45.665	46.632	46.682	3.2931

PLOT 2

Tree No	1977	1987	1989	1991	1993	1996	1999	2002	mm/y
2	37.1	39	40.5	40	41.2	41.5	42.2	42.2	2.04
3	38.7	39.2	40.5	41.3	42.3	42.9	43.8	43.7	2
4	37.2	38.8	40	39.9	41.3	42.7	43.4	43.5	2.52
6	42	44.5	47	46.9	48.1	48.4	49.5	49.5	3
7	27.4	27.6	27.5	28	28.2	28.2	28.6	28.2	0.32
8	45.4	51.1	53	54.5	56.4	57.9	59.1	59.1	5.48
11	37	39.7	41.5	41.7	42.4	43	43.7	43.5	2.6
12	35.5	38	38.5	39.5	40.3	41	42	42	2.6
13	31.9	34.2	35.5	35.7	37.1	37.3	38.1	38.2	2.52
15	44.1	48.2	50	51	52.5	53.3	55.1	55.6	4.6
17	41.9	43.4	45	45.2	46.9	47.7	48.5	49	2.84
18	44.8	49.5	52	52	52.9	53.5	54.5	54.1	3.72
19	37.1	40.2	41.5	42.5	44.3	45	45.6	45.7	3.44
22	37.9	42.5	44.5	44.7	45.8	47.2	48.2	48.7	4.32
23	35.1	37.3	38.5	38.5	39.5	40	40.3	40.1	2
24	40	42.1	43	42.9	44.5	44.1	44.8	45	2
25	51	54.8	56	56.9	58.7	59.2	60.2	59	3.2
27	36.2	38.1	39	38.8	40.3	41	41.9	41.6	2.16
30	34.8	38.3	39.5	40.2	41.5	42.4	43	42.5	3.08
33	33.1	37	39	39.9	39.9	40.9	41.8	42	3.56
34	33.9	36.6	37.5	38.6	39.9	40.1	41.5	41.3	2.96
36	48.9	54.6	57	57.8	60.9	61	62.1	63.3	5.76
37	34.7	43	45.5	46.4	47.7	49.7	50.3	49.9	6.08
39	32.5	35.6	37.5	38	39.8	41.7	43.1	44	4.6
41	48	53.9	56.5	57.9	58.5	60.1	61.6	61.8	5.52
44	38	40.9	42	42.8	43.6	44.6	45.4	44.6	2.64
45	46	49.5	51.5	52.1	53.5	54.8	55.7	55.2	3.68
46	45.1	48.4	49	50.2	50.9	51.9	52.3	52.5	2.96
48	41.4	44.3	46	47.2	47.7	49.9	49.8	49.5	3.24
50	40.5	42.1	43	43.8	45.3	45.7	45.9	45.3	1.92
51	32.4	34.7	36	36.4	37.1	37.4	37.8	37.9	2.2
52	35	37.8	39.5	39.6	40.9	41.5	42.3	42.1	2.84
53	42.1	46.2	47.5	48.8	50	50.9	52.3	53	4.36
55	34.4	35.8	37	36.7	37.3	37.4	37.4	37	1.04
56	39.4	42.7	44	44.5	45.8	46.7	47.2	47.3	3.16
58	39.1	41.2	42.5	42.6	43.8	43.9	44.2	44.2	2.04
59	47	51.1	52.5	53	54.8	55.8	57.2	57.4	4.16
61	45.2	48	48.5	49.1	50.1	51.1	51.6	52.3	2.84
63	39.4	47.2	49.5	51.3	52.8	54.3	56.4	58.2	7.52
65	33.4	37.5	39	39.9	40	40.7	42.1	41.5	3.24
67	36.4	38.7	39	40.3	41.4	41.7	41.7	41.2	1.92
68	40.8	43.1	44.5	44.7	46.1	46.6	47.5	47.1	2.52
69	42.4	46.1	48	40.3	49.7	50.3	51.4	51.4	3.6
71	33.9	35.3	37	36.5	37.2	37.4	37.5	36.9	1.2
72	42.5	46.1	47	48	49.2	50.8	50.8	51.5	3.6
74	64.6	70.2	72	72.2	73.4	74.4	75.2	76	4.56
75	34.5	38.4	39.5	40.2	41.3	41.5	41.8	41	2.6
76	42.3	45	46.5	47.6	48.7	49.8	50	50.3	3.2
78	42.2	45.5	47	47.1	47.4	48.5	49.5	50.2	3.2
80	43.4	47.1	48.5	49.3	49.8	51	51.8	51.6	3.28
81	49	56.2	58.5	59.7	61.2	62.8	64.3	65	6.4
84	33	34.3	34.5	34.5	35.4	36	33.3	33.3	0.12
86	35.7	39.2	40	41	42.5	43.3	44.5	45.5	3.92
89	31.1	32.6	31	33.7	34.4	34.9	34.7	35.2	1.64
90	54.8	59.2	61	62.4	63.4	63.8	65.3	65.7	4.36
92	51.7	56.8	56	60	60.5	61.8	62.8	63.3	4.64
94	37.7	42.3	44.5	45.6	47	47.6	48.2	48	4.12
95	48.4	51.2	53	54	55.2	56.5	56.2	56.5	3.24
97	28.7	31.6	32.5	33	34.3	34.8	35.9	36.2	3
100	34.1	38.3	**42**	39.5	40.5	40.8	41.1	40	2.36
101	25.8	27.9	28.5	29.6	29.9	30.6	31	31.1	2.12
104	54.4	59.8	62.5	63.1	64.8	66	66.9	65.8	4.56
105	52.4	53.3	54.5	55.4	58.2	58.8	60.5	60.6	3.28
107	45.9	51.7	54	55.1	56.8	58.2	59.8	61.3	6.16
108	34.6	37.1	38.5	38.4	39.9	40.9	40.9	40.5	2.36
110	29.8	32.3	33.5	33.8	34.4	35.1	36.5	36.7	2.76
114	31.3	35.1	36	36	37.4	38	38.9	38.7	2.96
116	45.7	54	56	57	59	60.8	61.8	62.4	6.68
117	39	45.1	47	48.1	49.4	49.8	50.1	49.9	4.36
118	40.8	44.2	46	46.5	47	47.9	49.4	48.8	3.2
119	43.5	44.1	45	45.9	47.4	47.6	48.6	48.1	1.84
120	32	32.7	34	33.5	34.4	34.8	35.8	34.5	1
121	33.2	33.8	34.5	34.9	35.2	36.1	36	36.6	1.36
124	34.6	39.5	42	44	44.9	47	48.7	50.6	6.4
125	33.5	36.6	38.5	39.4	40.5	41.9	43.5	43.8	4.12
126	61.4	67.8	69.5	71.2	71.8	73.3	73.4	74	5.04
127	44.6	50.5	53	54.4	55.6	56.6	58	58.2	5.44
129	37.2	39.7	39.7	41	41.5	42.2	43	43.2	2.4
130	48.4	49.1	49.1	50.5	51.4	51.7	52.3	51.1	1.08
79	39.999	43.368	44.776	45.37	46.615	47.443	48.216	48.27	3.30835

PLOT 3

Tree no	1977	1987	1989	1991	1993	1996	1999	2002	mm/yr
1	37.5	39.4	40	41.2	41.8	42.3	41.8	42	1.8
2	47.6	53.6	57	57.3	59.2	60.5	61.8	62	5.76
4	36	36.6	37	37.4	38	38.4	39.2	38.7	1.08
6	43.7	45.9	47	47.6	48.6	49.2	50.6	51.8	3.24
7	41.3	42.9	44	44.5	45.5	46.4	46.8	46.3	2
9	36.5	38.8	40	40.6			42.5	41.9	2.16
14	28.6	30.1	31	31.8	32.6	33.1	33.9	34.3	2.28
15	42.6	46.2	47.5	48.9	50.5	51.5	53.1	54.2	4.64
16	27	30.2	31	31.5	32.6	33.3	34.3	34.2	2.88
18	48.5	50	51	51.1	51.7	52.5	53.6	53.1	1.84
22	37.2	41.3	43	43.1	45	46.1	48.2	48.8	4.64
23	37.8	40.7	41	41	42.8	44.2	45	45.8	3.2
25	39	43.1	44.5	45.6	45.9	47.1	48.5	49.3	4.12
30	44.9	50.6	53	54.6	55	56.4	57.8	58.2	5.32
33	35.4	39.1	41	41.8	42.7	43.5	44.2	43.8	3.36
35	40.1	44.9	46	46.8	48.4	49.1	50	49.9	3.92
36	31.7	34.8	36	36.3	36.5	37.3	37.7	37	2.12
37	46.2	47	48	48	49.5	49.8	50.3	49.6	1.36
38	35.5	36.2	37.5	37.8	39.5	39.7	40.7	40	1.8
41	33.9	36.5	37.5	38	38.7	39.8	40.3	40.1	2.48
44	40	42.2	43.5	44.5	45.7	46.9	48.3	48.6	3.44
46	52.6	59.1	61.5	63.1	64.6	66	67.3	70	6.96
49	32.9	36	36.5	36.8	37.6	38	38.8	38.1	2.08
52	28.4	29.7	30.5	30.9	31.3	32	32.5	32	1.44
53	34	36.8	38.5	39.8	39.5	40.4	40.3	39.1	2.04
54	43	45.5	46.5	47.7	48.9	50.5	51.5	53.1	4.04
55	40.9	44	46.8	45.8	47.1	47.4	48.5	48.5	3.04
56	31.5	34.9	35.5	36.3	36.8	37.5	38	37.2	2.28
60	30	**34**	31	31.5	31.4	31.7	31.8	31.8	0.72
63	38.1	42.6	43.5	44.9	46.8	47.8	48.9	48.8	4.28
65	40.9	54.1	55.5	57.8	57.7	59.2	60	59.9	7.6
67	46	52.6	55	57.4	58.9	60.1	61.7	62.5	6.6
71	48.3	52.8	56.5	56.6	58.7	60.2	61.9	63.1	5.92
73	38	40.7	41.5	41.9	45	44.2	44.6	44	2.4
74	37.6	38.1	38.5	39.4	40.4	40.9	41.7	41.8	1.68
75	51.1	53.5	54.5	55	56.3	57.5	57.6	55.6	1.8
77	45.3	47	49	50.3	51.2	51.8	52	51.2	2.36
79	43.5	47.7	46	46.1	46.9	47.3	48.3	48.7	2.08
80	45.1	49.7	51.5	52.5	53.5	53.6	54.8	55	3.96
82	48.2	52.4	54	55.1	56.7	57.7	59.4	60.1	4.76
84	39.9	41.4	42	43.1	44.1	44.7	45.3	45	2.04
86	38	41.4	42	42.5	43.8	45	44.7	43.5	2.2
88	38.7	42.3	44	44.9	46	47.1	47.8	47.9	3.68
89	47.8	50.5	51	52	53.4	54.2	54.9	54.8	2.8
91	36.7	42.5	44	45.8	46.7	47.2	48	48	4.52
95	41.8	45.1	46.5	46.9	48.1	49	49.3	49.8	3.2
100	47.8	53.1	55.5	56.4	57.9	59.4	60.3	61.2	5.36
101	40.6	43.5	44.5	45.2	45.5	46.1	46.6	46.6	2.4
103	55.8	62.1	64	65.2	66.6	67.66	68.1	68.1	4.92
106	33.8	35.4	36	36.6	37	37.4	38.4	38.5	1.88
107	42.8	46.5	47.5	48.1	48.9	49.6	49.9	49.1	2.52
110	40	43.6	45	46.4	47	47.9	48.8	48.7	3.48
112	33	35.7	36.5	37.5	38.2	39.1	40.1	40.7	3.08
114	36.4	38.7	39.5	40	40.8	41.3	41.9	42.1	2.28
115	32.5	37.1	38.5	39.2	40.7	41.5	42.3	42.1	3.84
121	49	53.6	55	55.9	57.7	59.3	60.3	60.7	4.68
123	38.8	42.5	43.6	45	46	47.2	48.3	48.3	3.8
127	31.9	35.3	36	37.1	38.2	38.9	39.8	39.8	3.16
128	40.4	45.5	46	46.2	47.2	48	48.6	48.2	3.12
130	38	38.4	39	39.6	40.5	41.5	42.2	42	1.6
131	32.6	34.5	35	36.1	36.8	37.4	37.8	37.7	2.04
132	43.5	46	47	48.8	49.5	50.5	51.3	51.1	3.04
133	39.1	39.4	39.5	40.4	40.6	40.8	41.5	41.5	0.96
135	25.2	27.5	28	28.7	29.5	30.5	31	31	2.32
141	40	43.3	44.5	45.2	46.1	47.4	48.2	49	3.6
142	39.6	44.6	46	47	48.3	49.2	50.2	49.9	4.12
144	26.8	28.4	26	30.1	31.1	31.8	32.9	32.5	2.28
149	36.3	38	38.5	39.6	40.7	41.5	42.3	42.6	2.52
150	30.3	34.1	35.5	36.7	37.1	38.5	38.8	38.9	3.44
153	46.9	49.9	51	52	53.8	55.3	57.6	58.3	4.56
155	41.7	43.4	44	45.7	46.9	47.6	47.8	46.8	2.04
161	44.1	49	50	51.1	52.2	53.4	54.4	54.5	4.16
162	51.1	53.6	54.5	54.9	56.4	57.8	58.9	60.2	3.64
164	25.1	29.7	30.5	32.4	33.2	34.6	35.8	35.7	4.24
168	33.6	39.2	40.5	41.1	43.2	43.7	43.2	42.7	3.64
171	52.4	57.5	58.5	59.5	61	62.8	63.4	63.6	4.48
76	39.453	42.811	43.867	44.753	45.8693	46.743	47.486	47.5158	3.22526

PLOT 4

Tree no	1977	1987	1989	1991	1993	1996	1999	2002	mm/yr
1	33.2	35.1	36	36.5	37	37.4	37.9	37.5	1.72
2	35.9	37.1	38.5	39.6	40.4	41.7	42.6	42.2	2.52
4	44.4	45.8	47.5	48.5	50.1	50.9	52.5	52.2	3.12
5	40.7	41	41.5	42.2	42.2	42.5	42.5	41.7	0.4
7	45.2	45.3	45.5	46.3	47	47.4	47.8	46.9	0.68
8	58.9	63.2	64.5	66	67.1	68	69.4	68.7	3.92
9	52.5	57.8	56	60.8	62.2	64	65.5	64.9	4.96
10	36.4	37	37.5	37.8	38.2	38.3	39	38.5	0.84
12	41.6	40.6	41	41.3	41.8	41.8	42	40.7	-0.36
15	37.6	41	42.5	43.8	45.1	46.2	47	47.1	3.8
16	50.4	55.2	57	58.4	59.1	59.8	61.5	61	4.24
19	28.5	29.6	31	31.1	32.2	32.5	33	32.5	1.6
21	45.8	47.1	47	47.8	48.5	49	49.7	48.6	1.12
22	33.8	35.3	36	36.7	38	38.5	38.5	38.5	1.88
24	38.2	41.5	43	43.5	44.4	45	45.7	45.5	2.92
25	73	77.6	78.5	79.4	81.3	82.2	83.5	84.3	4.52
27	53	53.9	54.5	54	54.9	55.2	55.7	54.8	0.72
28	46.8	49.8	50.5	51.1	53	53.1	53.9	53.5	2.68
29	39.7	39.2	40	39.9	40.7	41.1	41.6	41.1	0.56
30	37.9	38.4	39.5	40.4	41.7	42.5	44.4	44.8	2.76
32	39	42.2	43	44.4	44.8	46	46	45.2	2.48
33	29.5	30.4	35	40.5	42.3	43.3	43.2	42.7	5.28
34	45	48.8	50	51.5	52.6	53.4	54.3	53.8	3.52
37	35.5	39.7	41	42.3	44.1	44.4	45.2	45.5	4
39	42	43.5	45	45.1	46.4	46.9	47.2	46.7	1.88
41	42	44.2	45	46	46.6	47.2	48.6	49.3	2.92
42	35	36.33	36.5	37.1	37.9	38	38.2	37.8	1.12
44	35	37.1	38.5	38.8	39.8	40.6	40.8	40.9	2.36
46	59.3	64.6	66.5	68.6	69.9	71.7	72.3	71.6	4.92
48	30	33.7	35	35.9	37.8	37.7	37.7	38.1	3.24
49	47.3	51	51	51.8	51.9	52.5	52.8	52.2	1.96
52	37.4	39.6	39.5	40.5	42.1	42.4	42.8	42.8	2.16
54	30.1	33.2	35.5	36.4	36.3	36.3	37.1	36.6	2.6
56	33.4	36.1	37	38.2	39.5	40	40.7	40.8	2.96
58	33	35	36	36.3	37.3	38.5	39.3	39.5	2.6
60	50.5	53.1	54	54.2	54.9	54.9	54.9	54	1.4
62	44.5	44.9	46	46.6	47.2	47.5	48	48.7	1.68
63	33	32.9	33.5	33.5	34	34.4	34.2	32.6	-0.16
65	43.1	44.5	45.5	46.2	46.6	47.3	47.9	47.2	1.64
66	38.7	41.7	43	44.3	45.2	45.8	47.2	46.8	3.24
68	40.6	41	41.5	41.8	42.5	42.9	43.7	43.5	1.16
69	58.4	65	67	68.9	70.4	71.7	72.7	72.2	5.52
71	43.3	45.3	47	47.4	48.6	49.5	49.9	49.8	2.6
73	45	45.8	47.5	47.7	49	49.1	50	50.8	2.32
75	42	45.8	47.5	48	49.5	49.6	50.4	51	3.6
78	42.3	44.6	46	47	48.2	49.1	50.8	51.7	3.76
82	37.5	43	44	44.9	45.5	47.1	46.8	45.2	3.08
85	51	54.5	56	57.2	58	59.8	60.6	62	4.4
87	47.7	49.8	50.5	50.9	51.4	51.9	52.8	52.8	2.04
88	40.8	43.7	45.5	45.9	47.1	47.5	48.3	48	2.88
89	41.3	45.5	46.5	46.7	47.5	48.3	49.2	49.8	3.4
91	46.8	47.4	48	48.4	48.5	49	49.4	49.1	0.92
92	43	46.5	48	48.5	50	50.9	51.8	51.7	3.48
93	52.7	57.7	60	60.7	62.3	63.9	64.1	64.2	4.6
96	50	50.5	50.5	51	51.3	51.7	52.1	51.5	0.6
97	43.3	46.6	45.5	48.6	49.3	50.3	51.4	51.5	3.28
100	29.6	31.5	32.5	33.9	34.8	35.4	36	36	2.56
101	35.4	35.4	36	36.8	37.2	37.5	38	38.4	1.2
102	35.4	37.3	38	38.5	39.1	39.5	39.9	39.5	1.64
104	38.5	41.6	42.5	44	45.3	45.8	46.8	46.7	3.28
106	59.9	64	65.5	66.9	68.1	69.7	70.6	71.3	4.56
107	51.3	55.5	57	58.6	59.6	61.2	62.2	62.7	4.56
109	45.1	45.7	46	43.8	44.2	44.5	44.7	44	-0.44
110	35.9	38.5	39.5	40.8	41	41.8	42.2	42.3	2.56
112	26.9	27.5	28	28.3	28.8	28.6	28.6	28.1	0.48
115	45.5	49.2	51	51.8	54	54.6	55	54.5	3.6
116	38	40.7	42	42.2	42.9	43.4	44.3	43.8	2.32
117	41.4	46.6	48	49.1	50.7	51.5	52.2	52.5	4.44
120	41.9	45.4	46.5	47.5	48.3	49.1	49.9	49.6	3.08
121	41.8	48.3	49	49.4	49.9	50.8	50.1	48.8	2.8
122	25.5	25.8	26	26.3	26.6	27.2	27.1	26.5	0.4
71	41.9	44.36	45.39	46.26	47.21	47.87	48.5	48.2718	2.5504

PLOT 5

Tree no	1977	1987	1989	1991	1993	1996	1999	2002	mm/yr
1	30.7	31.6	32	32.2	33.8	33.1	33.5	33.7	1.2
2	42.8	46.9	48.5	48.9	49.7	50.7	51.4	51.8	3.6
3	40.1	41.7	42	42.5	43.2	43.6	43.9	44.1	1.6
4	30.9	31.8	32	32.1	32.5	32.8	33.1	33.1	0.88
5	27.8	30.4	31	32	32.6	32.9	33.5	33.9	2.44
6	41.8	44.2	48	45.3	46.3	46.6	47	47.4	2.24
7	46.1	49.5	51	51.5	52.7	53.4	54.4	55.4	3.72
9	43.1	48.9	49	49.9	50.5	51.3	51.6	51.8	3.48
10	41.4	43.7	45	45.5	46.1	46.5	46.7	46.9	2.2
11	32.5	34.2	34	34.6	34.8	35.4	35.5	36.3	1.52
12	27.5	30	31	31.3	32	32.3	33.1	33.1	2.24
13	40.8	43.2	44.5	44.8	45.9	47.1	47.5	47.9	2.84
14	36.5	38.6	39.5	40.4	50.4	41.3	41.2	41.3	1.92
15	32.8	34.4	35	35.4	35.9	36.4	36.6	37	1.68
16	31.8	33.5	34.5	34.8	35.6	36.2	35.9	36	1.68
17	26.5	28.7	26	29.4	29.8	29.9	30	30.2	1.48
18	32.6	34.7	35.5	35.8	36.7	37	37.5	37.7	2.04
19	41.7	44.1	45	46	46.9	47.5	48.8	49.6	3.16
20	34.2	35.7	37	37	37	37.6	37.6	38.2	1.6
21	41.5	44.3	45	45.5	46.4	47.1	47.6	48	2.6
22	20.5	20.9	20.5	20.6	20.7	20.4	20.4	20.2	-0.12
23	42.4	45.4	46	46.4	47.2	47.5	47.9	47.9	2.2
24	25.9	26.1	26.5	26.5	26.5	26.6	25.9	25.3	-0.24
25	35.3	38	28.5	38.7	39.1	39.2	39.4	39.7	1.76
26	29.3	30.3	31	31.5	31.4	31.4	31.5	31.3	0.8
27	21.7	22.2	23	23.2	23.5	23.3	23.1	23.1	0.56
28	33.6	38	39	40	41.3	42.1	42.6	42.1	3.4
29	36.5	37.2	38	37.8	38.3	38.5	38.9	38.9	0.96
30	27	27.7	27.5	27.7	47.7	27.5	27.5	27.8	0.32
31	32.7	34.3	35	35	36	36.7	37.4	37.8	2.04
33	41.9	48.6	49.5	50.1	51	51.7	52.3	52.7	4.32
35	30.4	30.6	30.5	30.7	30.8	31	30.5	30.3	-0.04
36	25.8	26.5	27	26.9	27.4	27.4	27.3	27.3	0.6
37	46.2	45.3	46.5	47.5	48.3	48.5	49.2	48.9	1.08
38	41.5	44.1	44.5	45.6	46	46.6	47.1	47.1	2.24
39	28.6	30.3	31	31.3	31.4	31.6	31.8	31.8	1.28
40	33.8	35.4	36	35.6	36.2	36.5	36.6	36.5	1.08
41	29	32.1	32.5	32.8	34.1	34.2	35	35.4	2.56
42	39.3	40.4	41	40.9	41.2	41.8	42.1	42	1.08
43	28.4	29.8	30	30.3	30.6	30.6	29.3	29.2	0.32
44	26.5	26.8	27	27.1	27.3	27.3	27	26.5	0
45	31.9	33.4	34	34.3	34.5	34.9	35	35.3	1.36
46	35	37.3	37	37.7	37.7	38.1	38	37.6	1.04
47	26	28.2	29	29.5	30.4	30.8	31	30.7	1.88
48	46.3	50.6	51.5	52.7	53.6	54.5	56	56.5	4.08
49	25.3	27	27	27.4	28.2	28.9	29.1	29.2	1.56
50	31	33.1	33.5	33.7	34.2	34.6	34.9	35	1.6
51	40.4	42.5	42	42.4	42.5	42.5	42.5	42.4	0.8
52	43	45.5	46.5	46.7	47.6	48.2	49.9	52	3.6
53	36.1	39.7	40	41.2	42.5	43.1	44	44.6	3.4
54	34.9	37.2	38	39.1	39.9	40.7	40.7	40.9	2.4
57	33.6	35.6	35.5	36	36.3	36.3	37.4	36.9	1.32
58	42.4	47	48.5	50.1	50.7	51.8	52.6	53.6	4.48
59	24.9	25.2	25.5	25.2	25.8	25.7	26.1	26.5	0.64
60	34.9	37.5	38	38.6	39.6	40.2	40.4	40.2	2.12
61	39.8	42.3	43	43.9	45	45.5	46.5	46.2	2.56
62	38.1	39.7	39.5	39.8	40.3	40.7	39.9	40	0.76
63	26.8	27.7	27.5	27.7	28.2	28.2	28.3	28.2	0.56
64	33.4	35.7	36	36.7	37.7	37.9	38.6	38	1.84
65	50.9	54	55	56.3	56.9	57.2	57.5	58.5	3.04
66	29	29.7	31	30.9	31.1	31.7	32.2	31.5	1
67	16.8	16.8	16.5	16.8	16.8	16.8	16.3	16.2	-0.24
68	44.9	47.3	48	48.8	49.9	50.1	50.4	49.9	2
69	37	40.9	41.5	42.1	43.6	44.5	44.9	45	3.2
70	29.9	31	31.5	31.6	32.9	32.3	32.2	31.2	0.52
71	59.4	63.1	64.5	65.4	66.6	67.8	68.8	70	4.24
72	26.7	27.9	28	28.3	28.6	29	29.1	29	0.92
73	24.9	25.5	26	26	26.3	26.1	26.1	25.9	0.4
74	23.9	25.8	26.5	27.1	27.6	27.7	28.2	27.9	1.6
75	53.2	55.4	57	57.6	58	59.4	61	61.3	3.24
76	35	38	38.5	39	39.7	40.1	40.9	39.9	1.96
77	24.5	25.2	25	25.5	25.7	25.4	25.2	24.4	-0.04
78	33	34.6	35.5	35.7	36.3	36.3	36.7	36.7	1.48
79	37	39.1	40	41	42.5	42.2	42.9	42.5	2.2
80	37.6	29.8	30	31.2	32	32.2	33.3	33.2	-1.76
81	48	51.7	42.5	52.5	52.9	52.9	54	54	2.4
82	36.7	38	38	38.1	38.1	37.9	37.7	37	0.12
83	32.4	34.6	35	35.5	36.3	37	37.7	37.8	2.16
84	33	33.9	34.5	34.7	35.1	35.4	35.9	36.3	1.32

85	35.1	36.6	37.5	38.8	39.2	39.2	39.7	39.5	1.76
86	33.5	35.8	36.5	36.7	37.3	38	38.5	37.9	1.76
87	30.3	32.3	32.5	32.3	33.1	33.1	33.5	32.7	0.96
88	26.8	26.2	26.5	26.9	27.1	26.9	27.1	26.4	-0.16
89	31.4	30.7	31.5	30.9	31.4	31.2	31.7	31.2	-0.08
90	37.1	39.7	40.5	41.1	42.7	43	43.6	43.4	2.52
91	30.5	32.8	33.5	33.5	34.7	34.8	35.3	34.4	1.56
92	20.9	21.1	21	20.9	21	21	21.1	20.6	-0.12
93	29.4	30.2	30.5	30.7	31.3	31.3	31.7	31	0.64
94	45.5	48.5	46.5	50.3	50.8	51.2	51.9	52.2	2.68
95	41.3	43.3	44.5	45.3	46.3	46.6	46.9	47.4	2.44
96	34.9	36.5	37.5	37.8	38.3	38.3	39.3	39	1.64
97	31.9	32.7	33.5	33.3	33.5	33.5	33.7	33.4	0.6
98	27.8	29.4	30	30.2	31.4	31.6	31.9	31.5	1.48
100	19.9	19.8	20	19.7	19.8	19.6	19.5	19.5	-0.16
101	45.9	50.6	52	52.4	53.6	54.7	56	56.6	4.28
102	45	52.6	53	54.1	55.2	55.6	56.5	56.3	4.52
103	31.1	34.5	24.5	24.5	24.7	24.3	23.9	23.6	-3
104	36	37.6	38	38.1	38.5	39.3	39.7	39.9	1.56
105	22.1	21.8	22	21.7	21.8	21.8	21.6	21.5	-0.24
106	35.5	34.8	35	35.3	35.7	35.4	35.6	35	-0.2
107	36.9	39.3	40	40.6	41	41.8	42.4	43.2	2.52
108	31	32.8	33	33.5	33.8	33.9	34.1	33.5	1
109	42.5	44.8	46.5	46.6	47.3	47.4	48	47.6	2.04
110	28.2	29.1	26	28.8	29.4	29.5	29.8	29.5	0.52
111	33.8	35.1	36	35.9	36.5	36.5	37.3	36.6	1.12
112	31.3	31.7	31.5	31.8	31.6	31.6	31.6	31.2	-0.04
113	28.4	30.9	31	31.3	31.5	31.9	31.8	31.3	1.16
114	29	29.3	29.5	29.7	26.6	29.7	29.5	28.8	-0.08
115	52	56.2	51.5	57.8	58.8	59.4	60.2	60.6	3.44
116	36.6	37.6	38	37.9	38.3	38.3	38.3	37.5	0.36
117	33.3	35	36	36.4	37.4	36.3	36.6	36.4	1.24
118	36.4	37.9	39	38.6	39.3	39.3	39.9	39.5	1.24
119	39.5	42.9	44.5	44.5	45.7	46.3	47.8	48	3.4
120	25.3	26	26.5	26.1	26.5	26.6	26.6	26.1	0.32
121	37.4	39.2	39.5	39.9	40.3	40.5	40.8	40.6	1.28
122	31.4	32.5	33	33	33.2	33.5	33.4	33.1	0.68
124	42.4	44	45	45.1	45.7	45.7	46	45.7	1.32
125	32	32.4	33	33.1	33.5	33.7	33.9	33.3	0.52
126	38.8	40.9	42	42.3	43.3	43.6	44.8	45	2.48
127	28.7	29.7	30	30.3	30.8	31.6	31.4	31	0.92
128	31.9	34.1	25	34.9	36	36.1	36.6	36.6	1.88
129	29.9	31.4	32.5	32.9	33.6	33.6	33.6	32.9	1.2
130	29.2	29.3	29.5	29.5	29.7	29.7	29.8	29.5	0.12
131	31.6	31.7	32.5	32.3	33.2	32.9	33	32.7	0.44
132	73	77.1	77.5	78	80.1	81	81.9	82	3.6
133	54.4	57.9	58.5	58.8	59.8	60.2	61.8	60.2	2.32
134	32.7	34.6	35.5	35.9	36.4	36.9	37.4	36.8	1.64
135	38.3	39.8	39	39.8	40.3	40.7	41.3	42	1.48
136	54.3	57	56	57.2	58	57.4	57.9	56.5	0.88
137	28.6	31.8	32	32.6	33.5	33.5	34.4	34.4	2.32
138	68.8	71.7	72.8	74.1	75.4	77.2	78.6	80.4	4.64
139	46.8	50.7	52	53	54.2	55.6	56	56.7	3.96
140	44.6	47	48	47.5	48.4	49.1	49.8	49.4	1.92
142	30.5	32.3	33.5	33.6	35.5	35.8	36.7	36.2	2.28
143	36.2	38	39	39.3	39.6	40.2	40.6	40.1	1.56
144	41	45.6	46.5	47.5	49.2	50.8	51.9	52.2	4.48
145	28.7	29.7	30	30.5	30.7	31.2	31.5	30.6	0.76
146	42.9	45.5	46.5	47.4	48.9	49.8	50.2	50.1	2.88
147	30.9	34.3	35.5	36.3	37.5	38.5	39.3	39	3.24
148	25.2	26.3	27	27.7	28.2	28.4	28.5	28	1.12
149	39.1	40.5	42	42	42.6	43.4	44	43.6	1.8
150	38.3	40.8	41.5	42.2	43.3	44	45.5	45.8	3
151	34	35.5	36	36.1	36.6	37.1	37.6	37.5	1.4
152	45	50.7	52	52.8	53.9	54.5	55.2	54.1	3.64
153	21.8	22.4	22.5	23	23.3	23.4	23.5	23.6	0.72
154	30.8	32.5	33.5	33.7	34.6	35	35.4	34.9	1.64
155	28.2	29.2	30	30.1	30.7	31	31.4	30.7	1
156	25.5	27.3	28	28.1	28.8	29	29.4	29.1	1.44
157	40.4	42.4	43	43.3	44.3	44.7	45.5	46	2.24
159	30.4	31.7	32	32.2	32.4	32.5	32.4	32.2	0.72
161	30.4	30.7	31	31.1	31.3	31.3	31.6	31.6	0.48
162	39.9	42.6	43.5	44.2	44.5	45.3	45.4	44.9	2
152	35.05	36.938	37.199	37.85	38.676	38.822	39.222	39.138	1.6366