

A review of VDYP versions 6 and 7 yield projections

By

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Executive Summary

Comparisons of VDYP 6 and VDYP 7 projected characteristics for the 100 Mile House analysis unit were made at three projection years, 2005, 2055, and 2105. Area-weighted summaries are provided for the three common characteristics: average age, average height, and volume (both total and per ha). Other VDYP 7 characteristics, trees per ha, quadratic mean diameter, and basal area/ha are also summarized. Summaries were made for all polygons as well as by stratification into leading species and age groups and by BEC zone.

For the overall comparison, age, height, and volume were generally within about 5% at all projection years. Total Growing stock volume for the V7 is about 4% lower in 2005. In 2055 it is 6.9% over and in 2105 it is 4.9% under V6 growing stock.

When the analysis unit was stratified into leading species and age classes, greater variation was evident.

- Age in 2005 is 21.2% higher for $FD \leq 120$, 28.4% higher for $P \leq 80$, and 7.5% higher for Oth.Conf. Average age for all strata in years 2055 and 2105 were nearly identical. The larger difference seen in 2005 are due to exclusion of polygons with no V7 TPH and some V6 polygons where $HT > 50$ m.
- V7 HT is 21% greater than V6 for $FD \leq 120$, 26% greater for $P \leq 80$, and 8% greater for Oth.Conf. Heights for $FD > 120$ and $P > 80$ are nearly the same for both versions.
- V7 shows wide variation in volume with $FD > 120$ about 20% below V6 volume and $P > 80$ about 24% higher than V6. Other strata are between these limits.

When the analysis unit was stratified into BEC zone, greater variation was evident.

- For BEC zones AT and IDF, V7 age is about 13% greater in 2005. These two zones show the greatest differences from V6 ages. In 2055 and 2105, zone AT continues to show V7 age about 10% higher than that for V6.
- Height in 2005 for all BEC zones except MS, SBPS, and SBS are 8-16% higher than V6 height. In later projection years, only AT continues to show heights about 16% higher than V6. In 2055 several BEC zones show slightly lower V7 heights than V6.
- Volume/ha in the different BEC zones show quite a range of differences. AT and BG V7 volumes are almost 30% lower than V6. ICH, MS, SBPS, and SBS show V7 volumes that are 10-15% higher in some projection years.

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Introduction

After preliminary discussions with the Timber Supply personnel, the 100 Mile House TSR 2 report was reviewed to determine criteria for creating summary data sets for comparing VDYP 6 against VDYP 7. The criteria we determined are:

For standing volume:

- Vegetated Treed land area and total volume for the two models (VDYP 6 & 7).
- For the following species strata; a) PI < 80yrs, b) PI \geq 80yrs, c) Fdi < 120yrs, d) Fdi \geq 120yrs, & e) Other species, we will have land base, basal area and total volume summaries for each model.
- For site index, we hope to create the equivalent of the TSR 2; Poor, Medium & Good site classes. Then we will summarize the basal areas, volumes & perhaps Mean Annual Increment (MAI) by model.
- For Age, we will use the existing age classes and summarize total volume and MAIs for each class by VDYP 6 & 7.
- For volume, we will create 6 to 8 volume classes, compare total land base of each volume class for VDYP 6 against that for VDYP 7
- We will use the existing BEC classifications to compare total volume for the two models.

For projection, we will do the following:

Obtain current (2005) inventory information, and project the information to 2055 and 2105 then examine how the following attributes will change over time for the two models:

- Basal area
- Trees per hectare
- Dominant height (Hdom)
- Volume (Net decay and waste only)
- Quadratic mean dbh

Methods

A paragraph will be added here to provide additional details on the VDYP projections.

Based on initial screening of the projected VDYP 6 and VDYP7 attributes for each polygon, some polygons were excluded because of incomplete or unreasonable attribute values. For VDYP7, polygons with number of trees /ha (TPH) missing were excluded from the summaries. Since TPH is not one of the attributes estimated by VDYP6, polygons with missing or unreasonable (ht > 50 m) stand height were excluded from the

summaries. Attribute totals and area-weighted averages were computed and summarized using Excel to prepare tables and charts for this report.

Two sets of summary charts, by leading species and age and by BEC zone, are included summarizing the comparison of VDYP7 and VDYP6 projections of characteristics in 2005, 2055, and 2105 for the 100 Mile House analysis unit.

Results

The results are provided in two groups of figures, first by vegetation and age class and then by BEC zone.

Appendix A is provided including both charts and the summary data table with the associated numerical values.

Projection summary by species and age strata

This section includes summary charts for the characteristics common to both versions, age, height and volume. New attributes included with V7, basal area/ha, TPH, and QMD are also summarized.

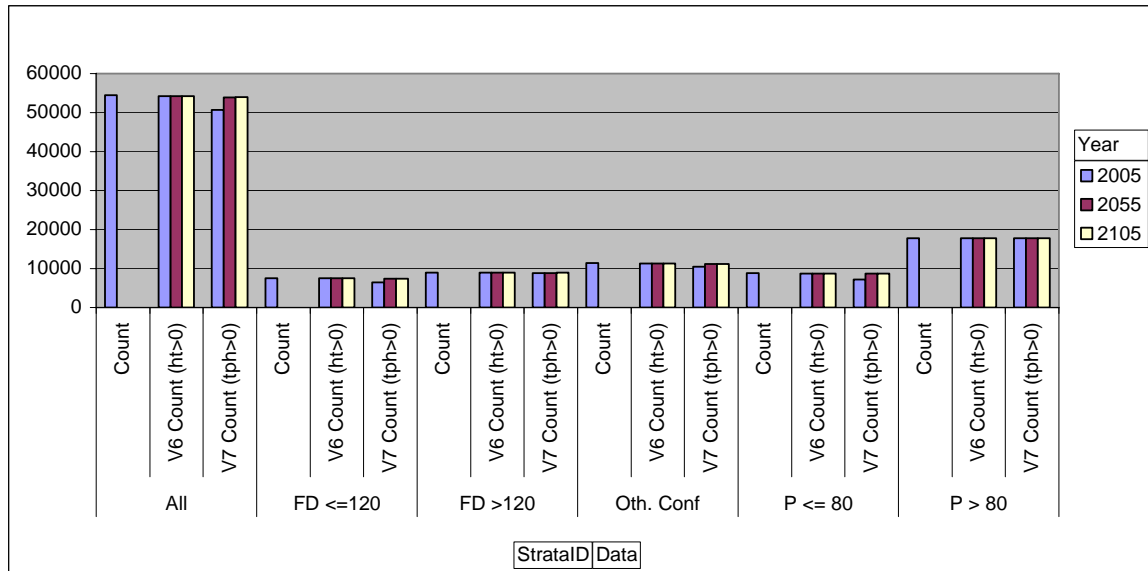


Figure 1 Total number of polygons

For V7, the initial inputs for polygons in 2005 included many polygons that were too young for V7 to show volume and other attributes. Almost 4000 polygons show no TPH for V7. This number drops to about 500 in 2055 and to less than 400 in 2105. This represents a small fraction of unusual polygons. The larger number in 2005 represents polygons where no initial densities are available, typically in polygons where age is quite small. Polygons where TPH was missing were excluded from the summary of attributes. Exclusions based on height were also implemented for V6; they are discussed below.

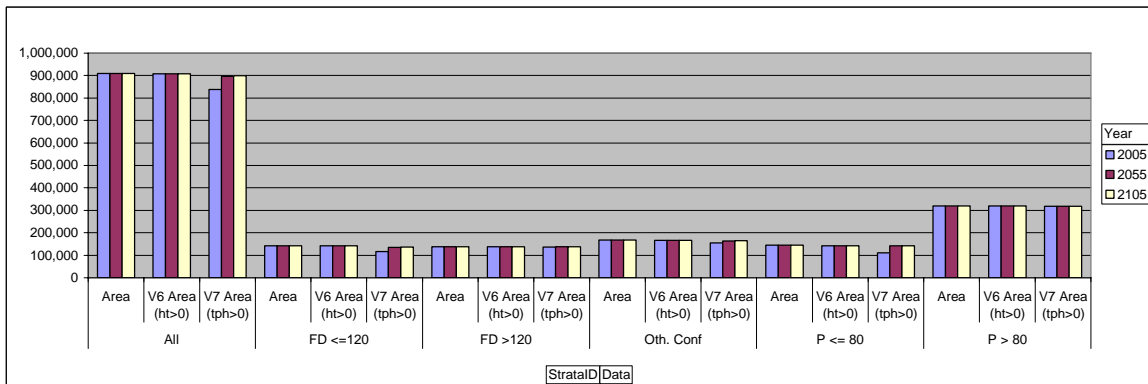


Figure 2 Total area (ha)

For V7 total area, polygons with TPH = 0 were excluded from 2005 analysis.

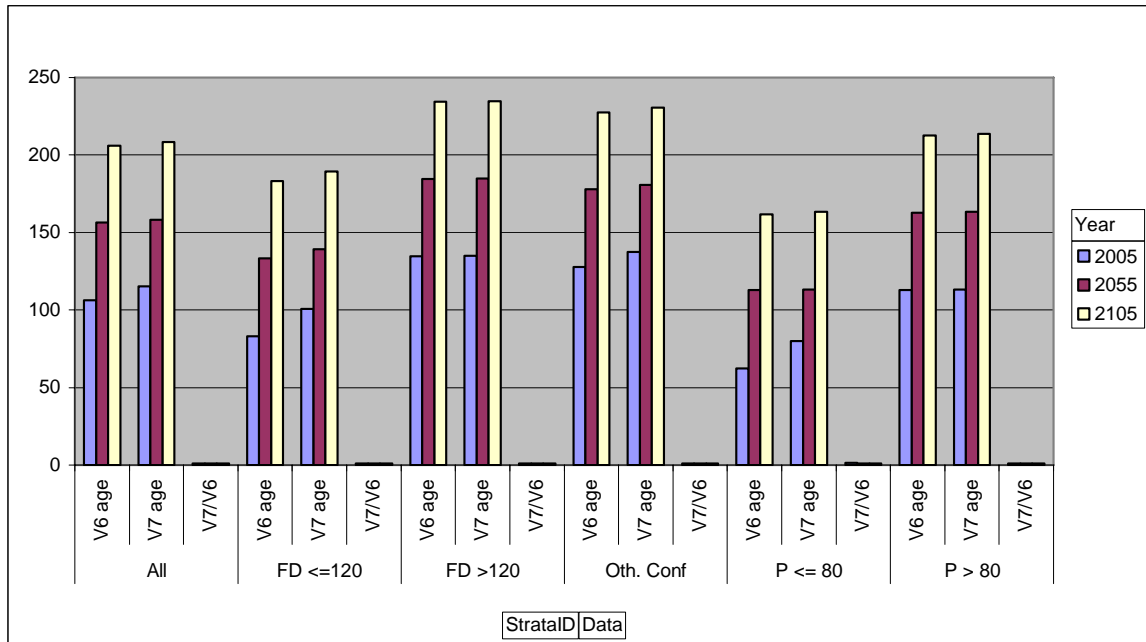


Figure 3 Area-weighted Average Age (years)

Area-weighted average age for V6 entire population reflects the 50 year projection intervals. By strata, the averages don't match up exactly but this is to be expected because of the area-weighting of averages.

Similar trends are seen for V7. All V7 ages are slightly greater than V6 ages.

Age in 2005 is 21.2% higher for FD<=120, 28.4% higher for P<=80, and 7.5% higher for Oth.Conf. Ages for all strata in years 2055 and 2105 were nearly identical. The larger differences seen in 2005 are due to exclusion of polygons with no V7 TPH. TPH is not present in 2005 for stands that are too young. In the subsequent years, 2055 and 2105, these stands have been projected and then show the full set of projected attributes including TPH.

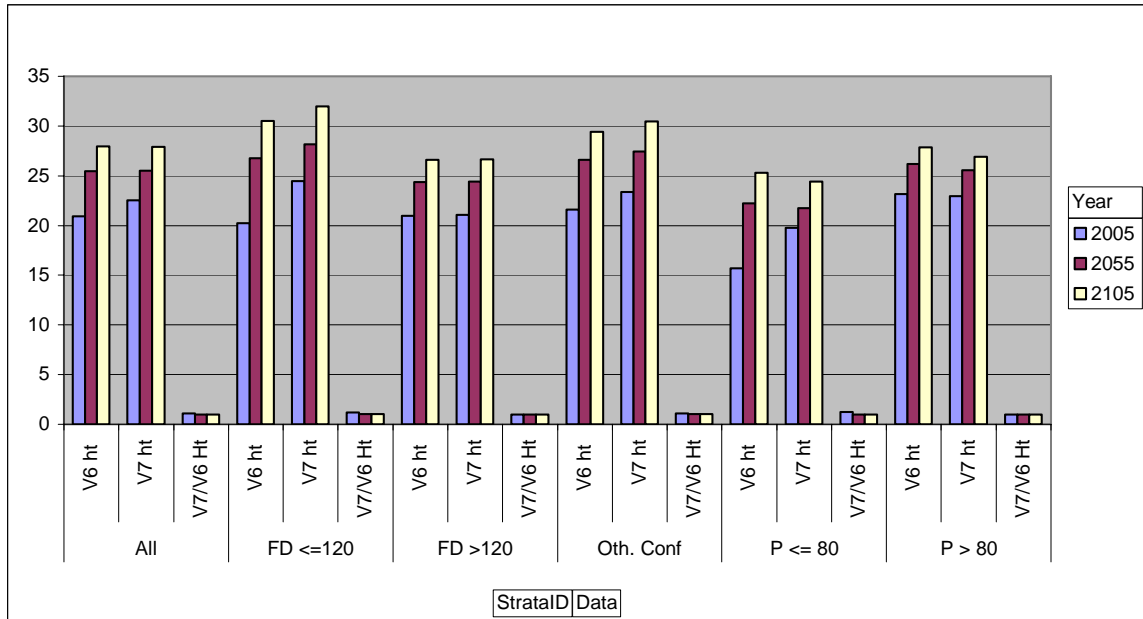


Figure 4 Area-Weighted average height (m)

Overall area-weighted average HT is 7.7% greater for V7 in 2005, but declines to less than 1% different from V6 in 2055 and 2105.

V7 HT is 21% greater than V6 for FD<=120, 26% greater for P<=80, and 8% greater for Oth.Conf. Heights for FD>120 and P>80 are nearly the same for both versions.

Special note regarding basic data for the comparison: Some observations on the V6 height data (particularly P<=80): V6 max ht 2005 36.21, 2055 max ht 329.22 (55 records), 2105 max ht 338.44 all of these showed volume=0. For FD<=120 the max ht at 2005 is 109.12 with almost 600 records showing ht > 40 m. Because of these anomalies, trees with heights greater than 50 m were excluded from V6 analyses (V6 reports volume = 0 when Ht>50m). A special filter was added to exclude area for V6 records where tree height is greater than 50 m. This exclusion was also placed into the computation of V6 average height for all projection years.

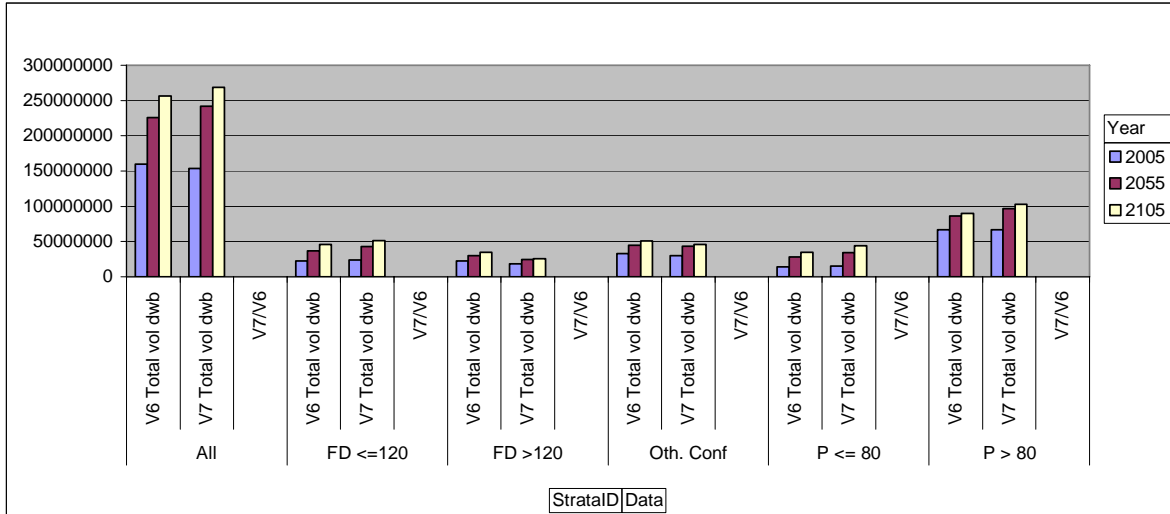


Figure 5 Total Growing Stock (m³)

Total growing stock volume increases in 2055 and 2105 for all vegetation and age classes. Even though the scale is compressed, it is evident that the growth during the first projection period (2005-2055) is greater than in the second projection period (2055-2105). Similar patterns are seen more obviously in the next figure showing weighted-average volume/ha.

Total Growing stock volume for the V7 is about 4% lower in 2005. In 2055 it is 6.9% over and in 2105 it is 4.9% under V6 growing stock.

V7 shows more volume than V6 for all strata except FD>120 and Oth.Conf.

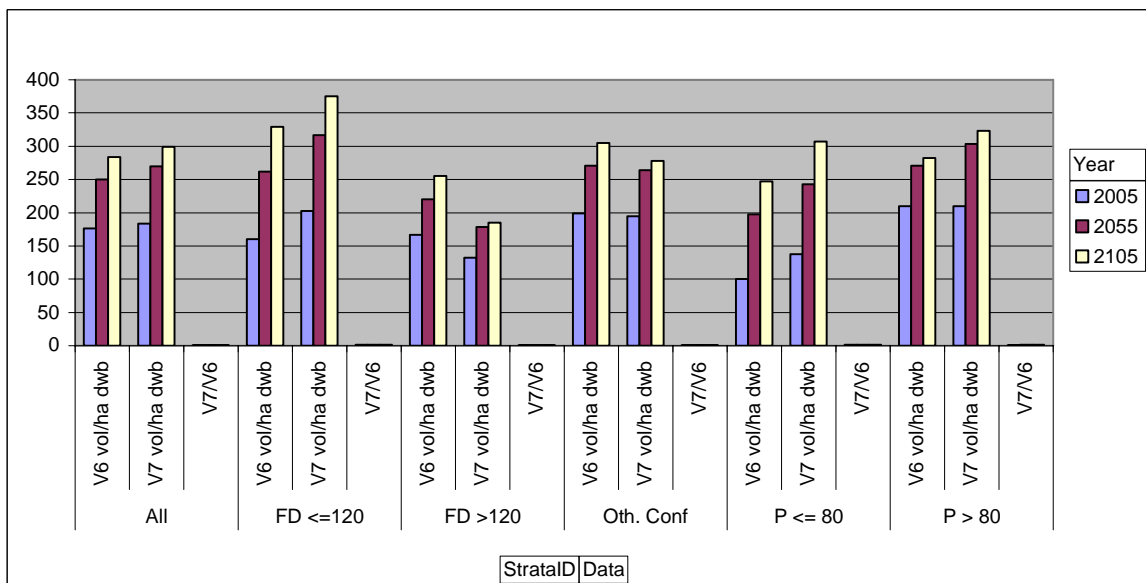


Figure 6 Area-Weighted Volume (m³/ha)

Overall area-weighted average volume/ha for V7 is 4.3% over the V6 volume/ha in 2005. The 2055 ratio V7/V6 is 1.082 and 2105 ratio is 1.058.

V7 average volume is greater (at all projection years) than V6 for $FD \leq 120$, $P \leq 80$ and $P > 80$. V7 average volume is less than V6 for $FD > 120$ and it is mixed for Oth.Conf.

Volume/ha increases in 2055 and 2105 for all vegetation and age classes. The trends for growth are more evident for volume/ha than they are for the total growing stock chart seen above. It is evident that the growth during the first projection period (2005-2055) is greater than in the second projection period (2055-2105). It also appears that the trend towards declining growth in the older stands is more evident in V7 than it is in V6.

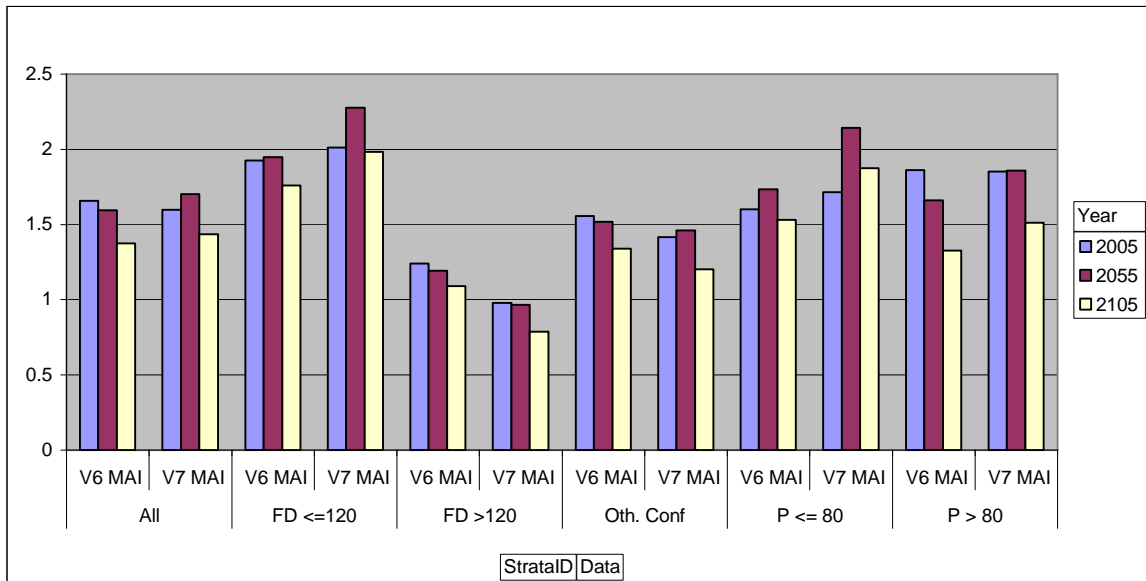


Figure 7 Area-weighted MAI

For all vegetation and age class strata, the MAI follows roughly the same trend with time for both V6 and V7. Both $FD \leq 120$ and $P \leq 80$ show an increase in MAI at 2055. All the others show MAI declining from 2005 to 2105.

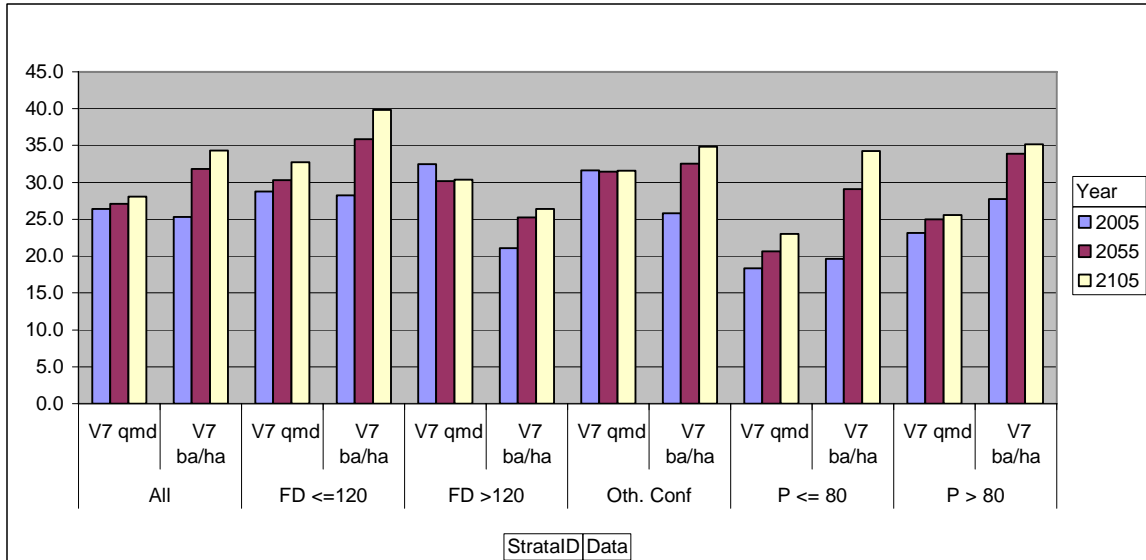


Figure 8 Area-Weighted Basal Area Growth (m²/ha)

Generally, BA growth, seen as the difference in bar heights between projection years, is greater in younger age classes (e.g. FD<=120 compared to FD>120 and P<=80 compared to P>80). BA/ha increases between growth periods for all strata; growth in the second 50-year period is generally less than in the first period.

QMD increases slightly for all strata except FD>120 and Oth.Conf.

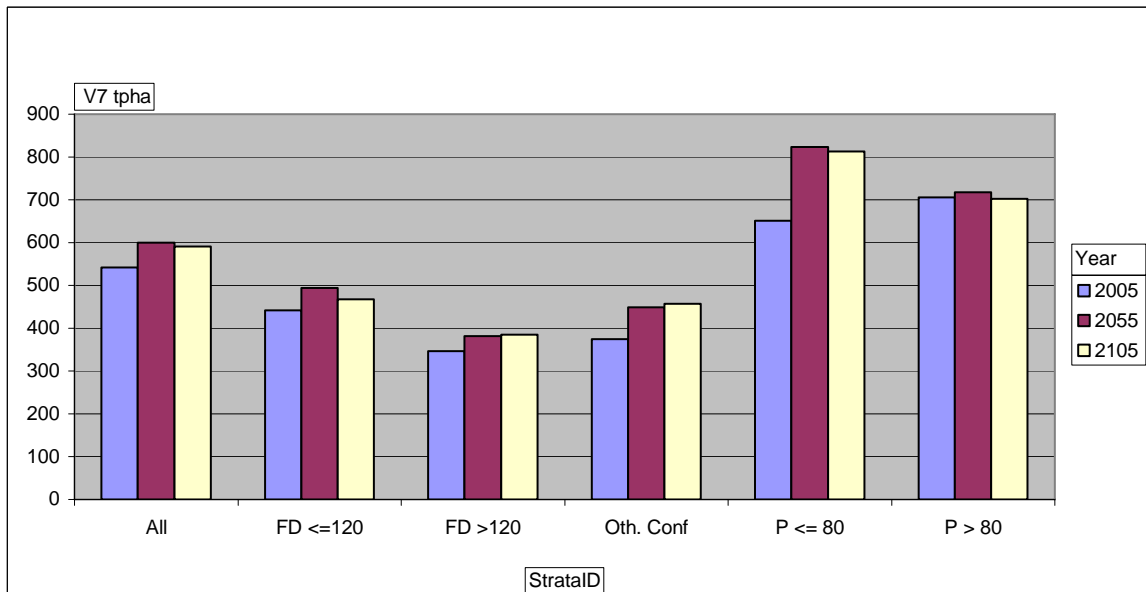


Figure 9 Area-Weighted Average Number of Trees (TPH/ha)

Number of trees per ha (TPH) shows little change for the three projection years with the exception that $P \leq 80$ density increases from 651 to 823 TPH in the first projection period.

TPH generally seems low and with only slight changes over the 100 years of projection.

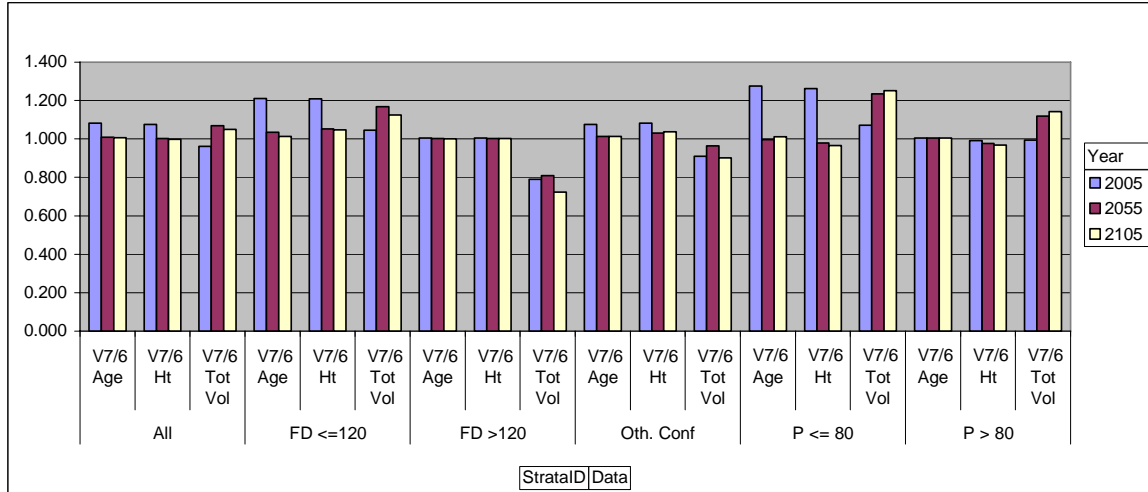


Figure 10 Ratios V7/V6 for Area-Weighted Average Age, Height, and Volume

For the combination of all strata, ratios of V7/V6 show some variation. V7 age is 8.3% higher than V6 in 2005, but decreases to less than 1% in both 2055 and 2105. V7 height is 7.7% higher in 2005 and decreases to less than 1% in both 2055 and 2105. Total V7 volume is 3.8% less than V6 volume in 2005, increases to 6.9% larger at 2055, and 4.9% higher in 2105.

For $FD > 120$, while age and height are comparable at all projection years, V7 total volume is about 20% less than V6 in 2005 and 2055 with a further decline in 2105. Ot.Conf volume is about 10% less than that for V6. V7 $FD \leq 120$ volume is 16.8% and 12.5% greater than V6 volume in 2055 and 2105. V7 $P \leq 80$ volume is 23.6% and 25.2% higher than V6 volume in 2055 and 2105. For $P > 80$ volume is 11.9% and 14.2% greater in 2055 and 2105.

BEC zone chart series

The summaries by BEC zone provide another perspective and similarities and differences between VDYP 6 and VDYP 7.

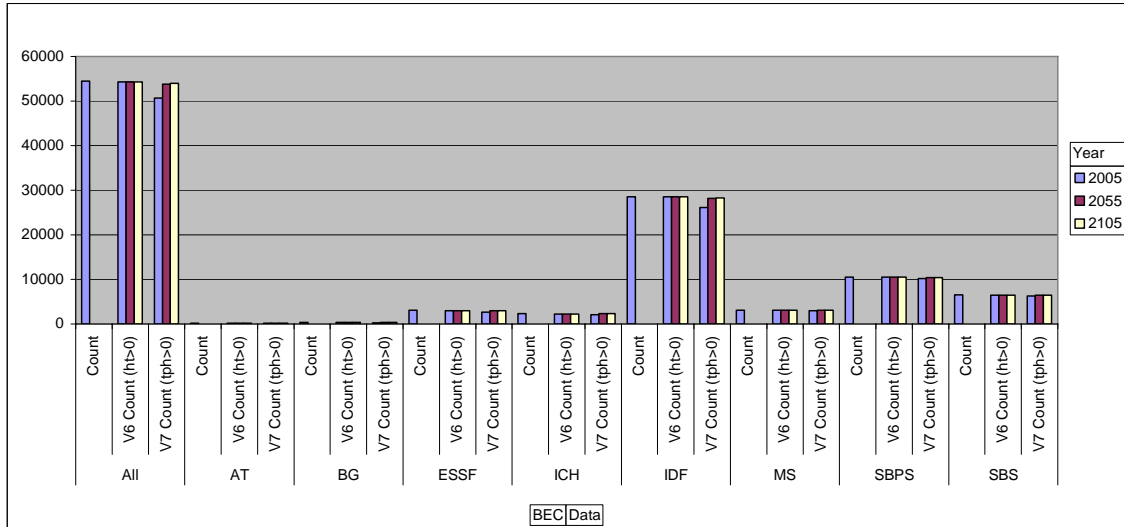


Figure 11 BEC Zone, Count of Polygons

Total count of polygons includes all records in the projection database. For V6, polygons are included when HT > 0. For V7, polygons are included where TPH > 0.

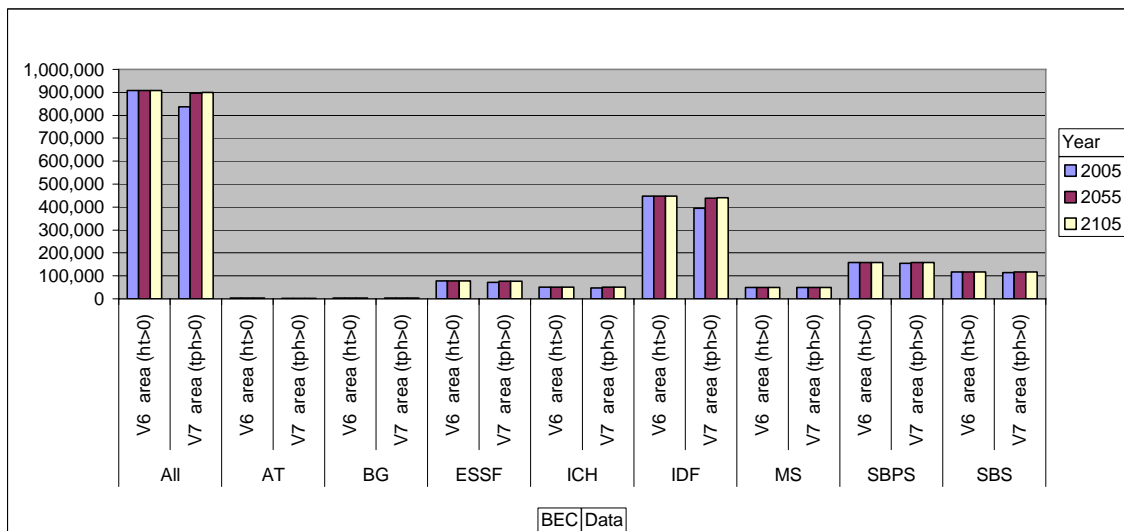


Figure 12 BEC Zone, Total Area (ha)

Total area includes records 50 > HT > 0 for V6 and TPH > 0 for V7.

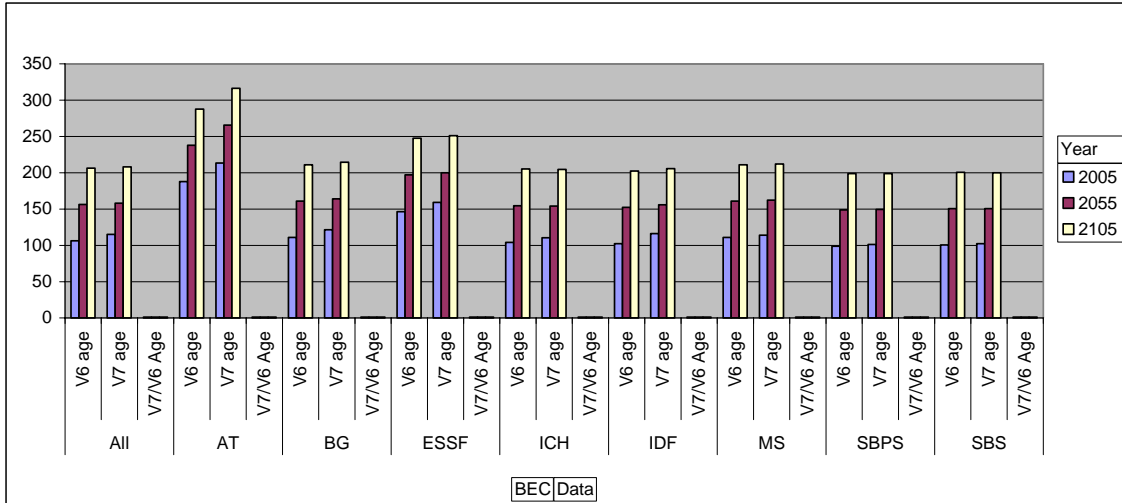


Figure 13 BEC Zone, Area-Weighted Average Age (years)

Over all BEC zones, age for V7 is 8.4% greater than V6 in 2005 and less than 1.2% greater for other projection years. As noted earlier for the vegetation and age class summary, exclusion of polygons in 2005 causes the different in those ages.

For BEC zones AT and IDF, V7 age is about 13% greater in 2005. These two zones show the greatest differences from V6 ages. In 2055 and 2105, zone AT continues to show V7 age about 10% higher than that for V6. The cause of this difference is not clear since all other BEC zones show good correspondence between V6 and V7 ages in the later projection years.

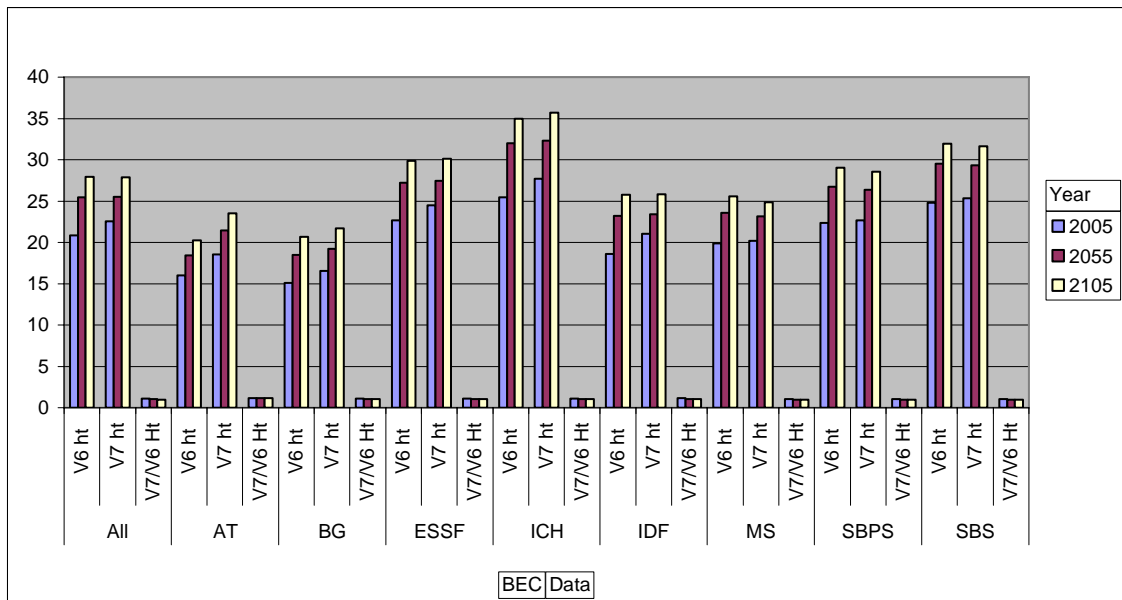


Figure 14 BEC Zone, Area-Weighted Average Height (m)

2005 Height for all BEC zones except MS, SBPS, and SBS are 8-16% higher than V6 height. In later projection years, only AT continues to show heights about 16% higher than V6. In 2055 several BEC zones show slightly lower V7 heights than V6.

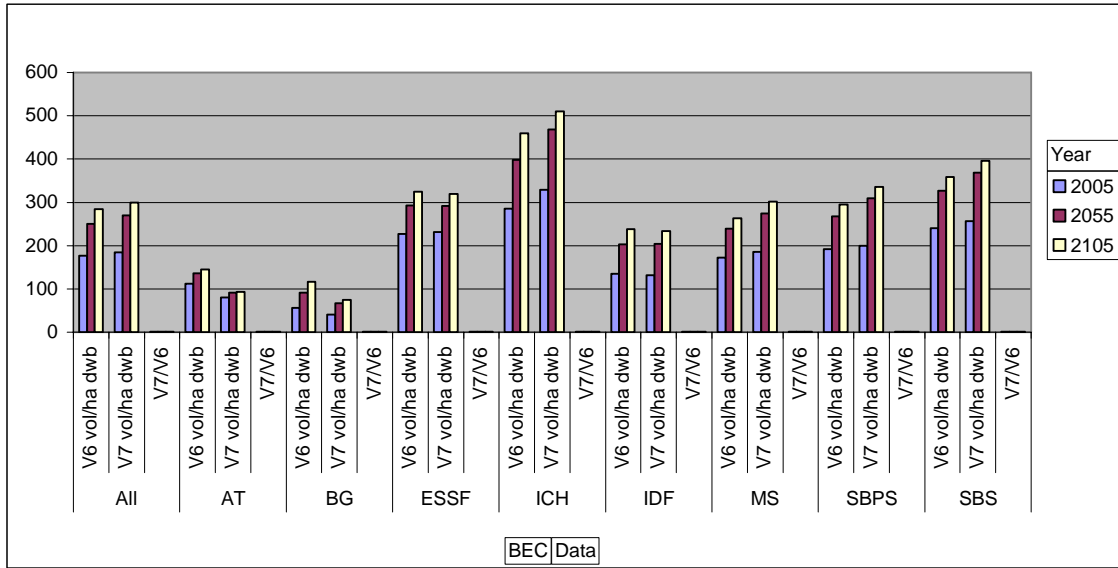


Figure 15 BEC Zone, Area-Weighted Average Volume (DWB, m3/ha)

Volume/ha in the different BEC zones show quite a range of differences. AT and BG V7 volumes are almost 30% lower than V6. ICH, MS, SBPS, and SBS show V7 volumes that are 10-15% higher in some projection years.

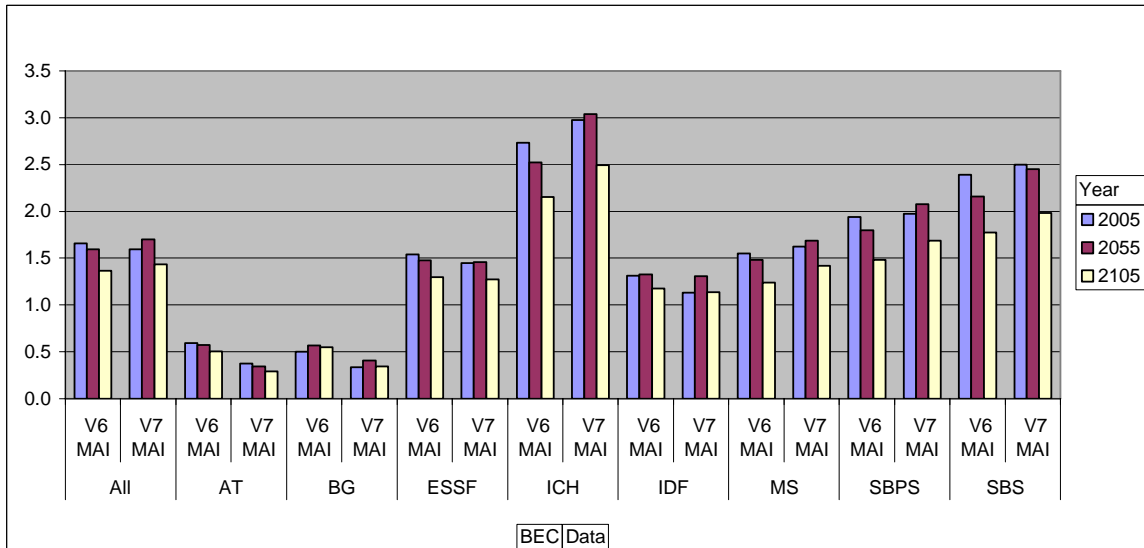


Figure 16 BEC Zone, area-weighted MAI

MAI trends over time are generally similar. V7 MAI tends to be larger than that of V6 except for zones AT and BG. ICH is the most productive zone and AT or BG are the lowest in productivity.

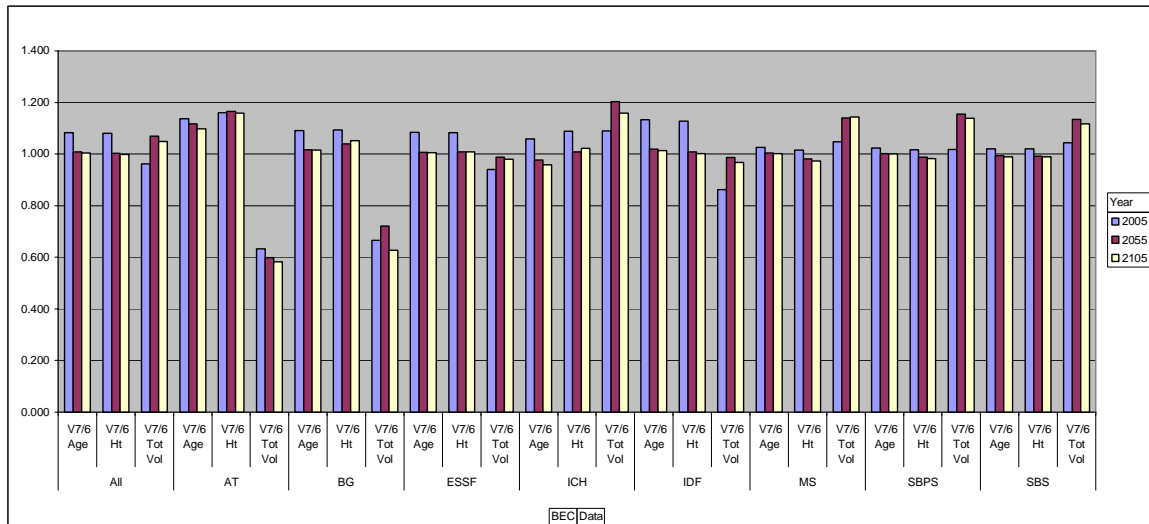


Figure 17 BEC Zone, Ratios V7/V6 for Area-Weighted Average Age, Height, and Volume

Zones AT and BG show V7/6 ratios about 40% lower than V6 volume. Most other zones show V7/6 ratios above 1.1 for volume. Zones AT and IDF show age and height ratios above 1.1 in 2005.

Conclusions and Recommendations

Volume levels are mixed with some strata above and some below. This is most obvious in the BEC zone summaries. More study to identify differences in the two models that might contribute to these differences would be desirable.

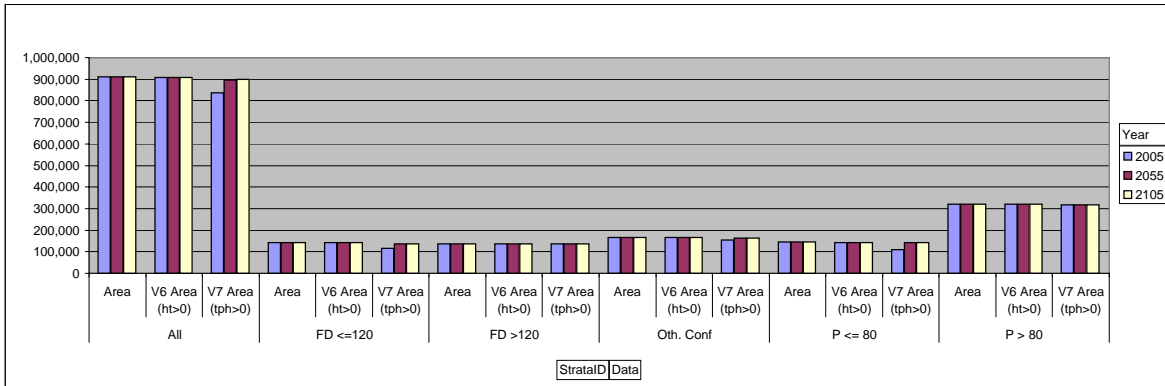
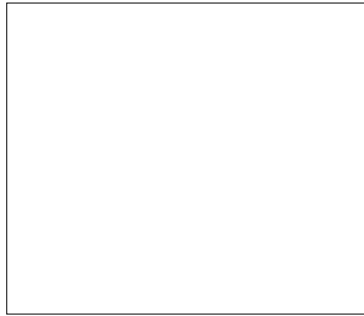
Basal area/ha and TPH are new characteristics seen in VDYP 7. The general level of basal area/ha seems reasonable, but there is little trend in the TPH over time. More experience with these attributes should give a better feeling about the nature of the polygon characteristics.

Heights seem quite comparable between the two models, particularly when viewed by BEC zone, but even in the vegetation and age class stratification the heights are generally similar.

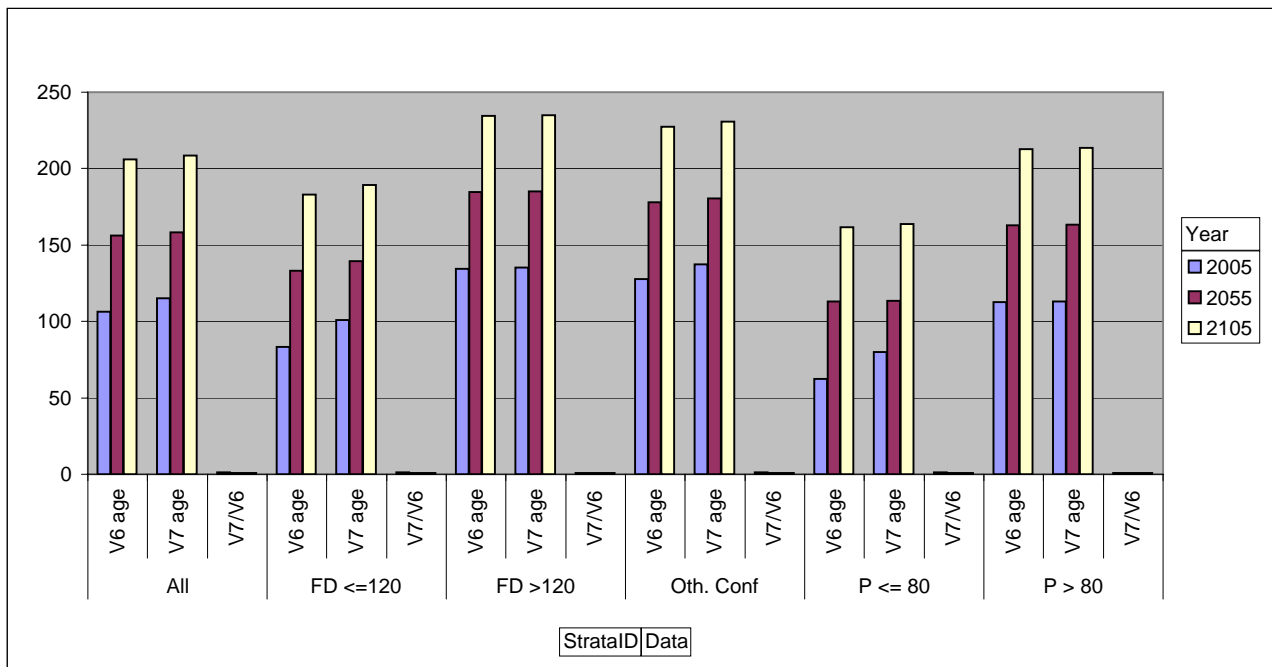
Appendix A.

**Excel Workbook Extract showing summary data tables
and charts**

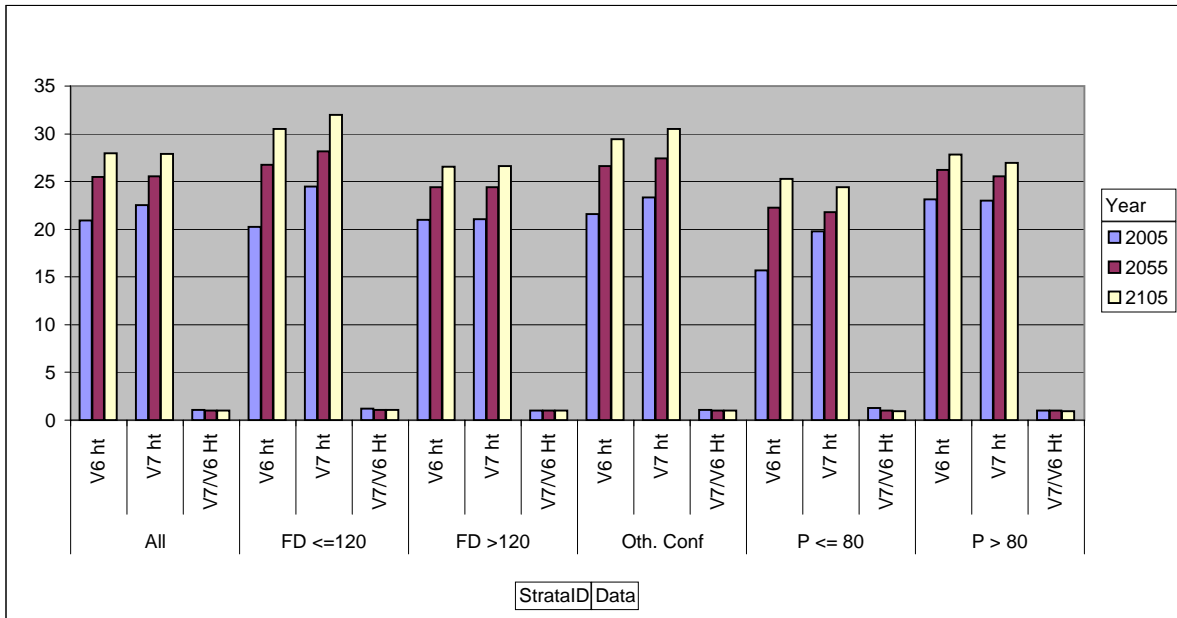
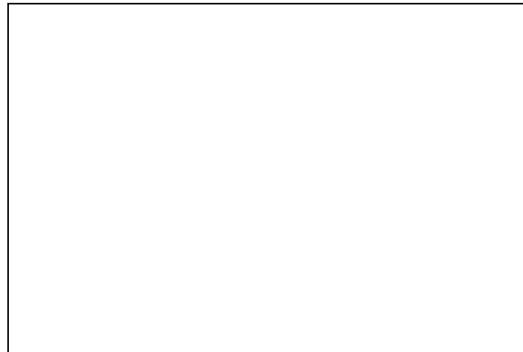
StrataID	Data	Year		
		2005	2055	2105
All	Area	909,651	909,651	909,651
	V6 Area (ht>0)	907,443	907,443	907,443
	V7 Area (tph>0)	837,425	896,670	899,480
FD <=120	Area	141,535	141,535	141,535
	V6 Area (ht>0)	141,531	141,531	141,531
	V7 Area (tph>0)	116,788	135,344	136,926
FD >120	Area	137,640	137,640	137,640
	V6 Area (ht>0)	137,640	137,640	137,640
	V7 Area (tph>0)	137,045	137,401	137,496
Oth. Conf	Area	166,941	166,941	166,941
	V6 Area (ht>0)	166,533	166,533	166,533
	V7 Area (tph>0)	154,895	163,996	164,588
P <= 80	Area	144,488	144,488	144,488
	V6 Area (ht>0)	142,694	142,694	142,694
	V7 Area (tph>0)	111,166	142,195	142,737
P > 80	Area	319,046	319,046	319,046
	V6 Area (ht>0)	319,046	319,046	319,046
	V7 Area (tph>0)	317,533	317,733	317,733



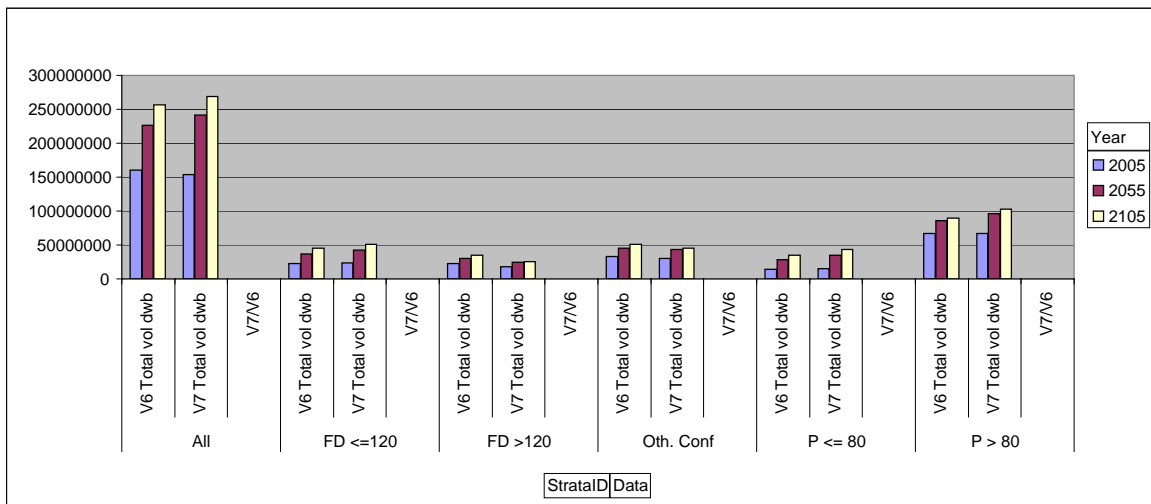
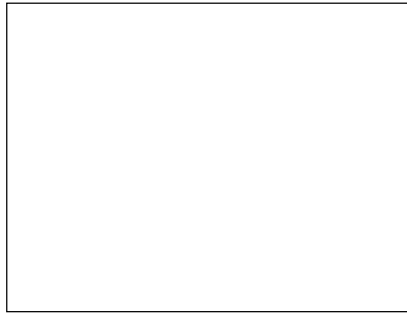
StratalID	Data	Year		
		2005	2055	2105
All	V6 age	106	156	206
	V7 age	115	158	208
	V7/V6	1.084	1.012	1.011
FD <=120	V6 age	83	133	183
	V7 age	101	139	189
	V7/V6	1.212	1.046	1.034
FD >120	V6 age	135	185	235
	V7 age	135	185	235
	V7/V6	1.004	1.002	1.001
Oth. Conf	V6 age	128	178	227
	V7 age	137	181	231
	V7/V6	1.075	1.015	1.014
P <= 80	V6 age	62	113	162
	V7 age	80	113	164
	V7/V6	1.284	1.004	1.012
P > 80	V6 age	113	163	213
	V7 age	113	163	214
	V7/V6	1.005	1.004	1.004



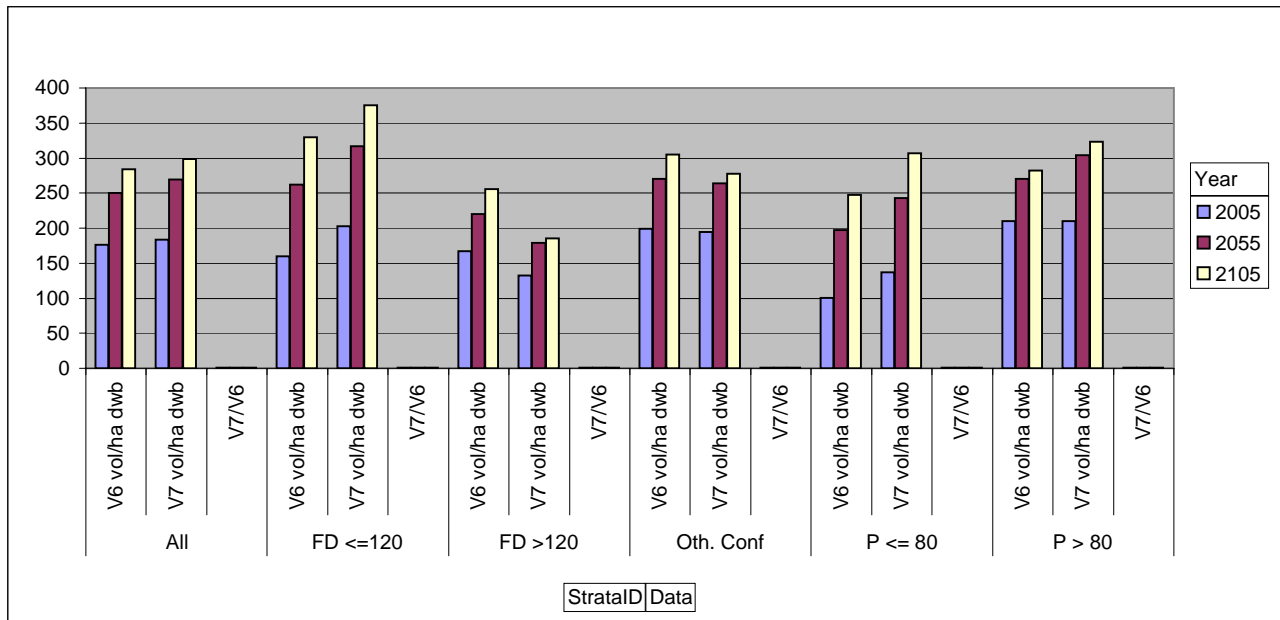
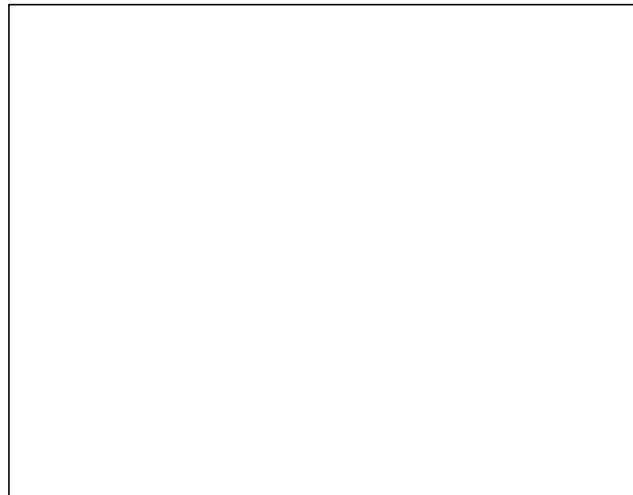
StratalID	Data	Year		
		2005	2055	2105
All	V6 ht	20.9	25.5	27.9
	V7 ht	22.5	25.5	27.9
	V7/V6 Ht	1.077	1.003	0.999
FD <=120	V6 ht	20.2	26.7	30.5
	V7 ht	24.5	28.2	32.0
	V7/V6 Ht	1.210	1.053	1.048
FD >120	V6 ht	21.0	24.4	26.6
	V7 ht	21.1	24.4	26.6
	V7/V6 Ht	1.005	1.002	1.002
Oth. Conf	V6 ht	21.6	26.6	29.4
	V7 ht	23.4	27.4	30.5
	V7/V6 Ht	1.082	1.031	1.037
P <= 80	V6 ht	15.7	22.2	25.3
	V7 ht	19.8	21.8	24.4
	V7/V6 Ht	1.262	0.978	0.966
P > 80	V6 ht	23.2	26.2	27.8
	V7 ht	23.0	25.6	26.9
	V7/V6 Ht	0.992	0.976	0.967



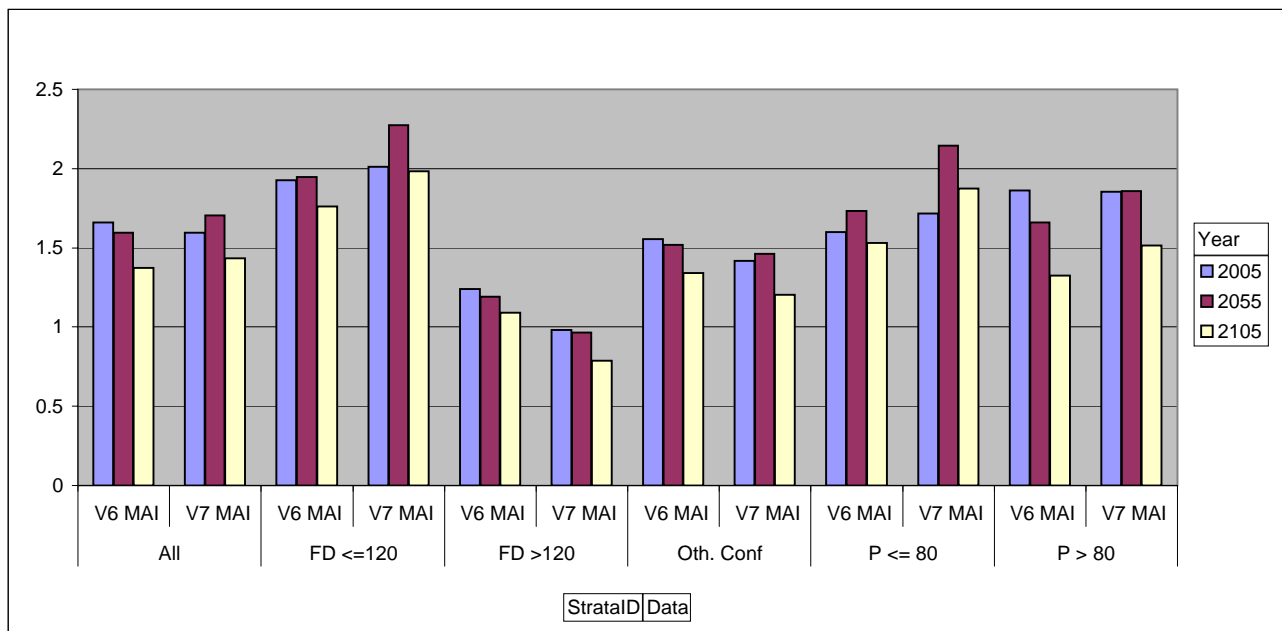
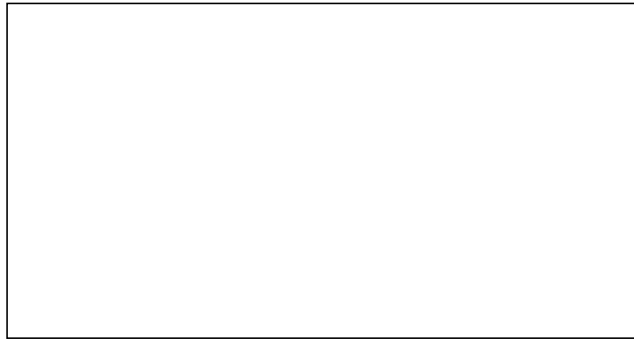
StratalID	Data	Year		
		2005	2055	2105
All	V6 Total vol dwb	159,956,985	226,178,066	256,414,232
	V7 Total vol dwb	153,918,248	241,778,076	268,971,551
	V7/V6	0.962	1.069	1.049
FD <=120	V6 Total vol dwb	22,671,783	36,725,582	45,670,098
	V7 Total vol dwb	23,687,765	42,899,639	51,384,168
	V7/V6	1.045	1.168	1.125
FD >120	V6 Total vol dwb	22,947,163	30,295,869	35,162,279
	V7 Total vol dwb	18,143,525	24,552,522	25,429,299
	V7/V6	0.791	0.810	0.723
Oth. Conf	V6 Total vol dwb	33,088,051	44,943,416	50,657,835
	V7 Total vol dwb	30,145,817	43,298,772	45,685,228
	V7/V6	0.911	0.963	0.902
P <= 80	V6 Total vol dwb	14,245,549	27,957,942	34,979,228
	V7 Total vol dwb	15,259,907	34,543,236	43,792,190
	V7/V6	1.071	1.236	1.252
P > 80	V6 Total vol dwb	67,004,438	86,255,258	89,944,792
	V7 Total vol dwb	66,681,233	96,483,908	102,680,666
	V7/V6	0.995	1.119	1.142



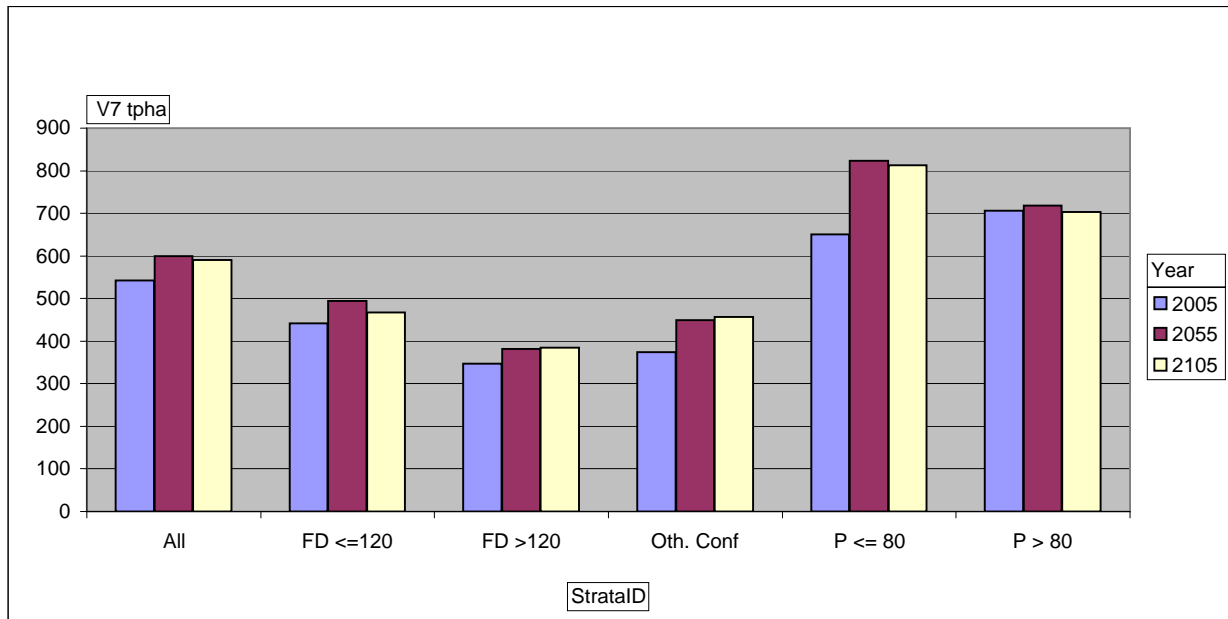
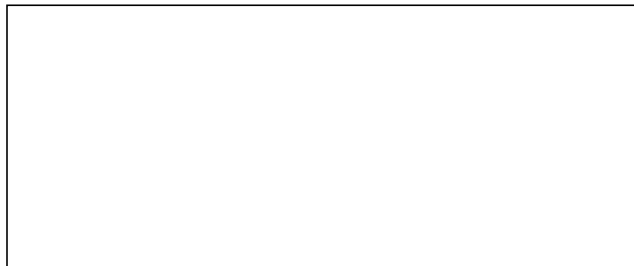
StratalID	Data	Year		
		2005	2055	2105
All	V6 vol/ha dwb	176.4	250.0	283.9
	V7 vol/ha dwb	183.8	269.6	299.0
	V7/V6	1.042	1.078	1.053
FD <=120	V6 vol/ha dwb	160.2	262.0	329.2
	V7 vol/ha dwb	202.8	317.0	375.3
	V7/V6	1.266	1.210	1.140
FD >120	V6 vol/ha dwb	166.7	220.1	255.5
	V7 vol/ha dwb	132.4	178.7	184.9
	V7/V6	0.794	0.812	0.724
Oth. Conf	V6 vol/ha dwb	198.7	270.3	304.8
	V7 vol/ha dwb	194.6	264.0	277.6
	V7/V6	0.980	0.977	0.911
P <= 80	V6 vol/ha dwb	100.4	197.5	247.4
	V7 vol/ha dwb	137.3	242.9	306.8
	V7/V6	1.367	1.230	1.240
P > 80	V6 vol/ha dwb	210.0	270.4	281.9
	V7 vol/ha dwb	210.0	303.7	323.2
	V7/V6	1.000	1.123	1.146



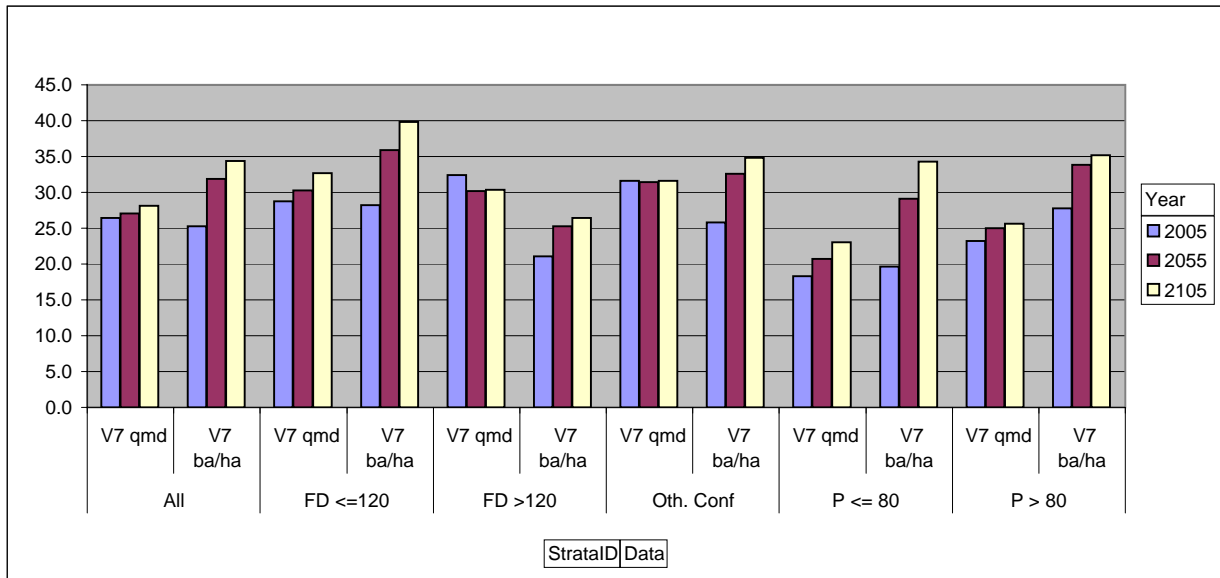
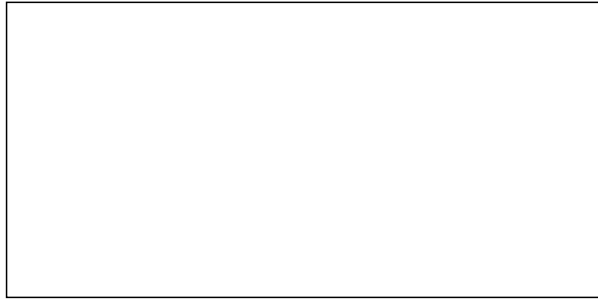
StratalID	Data	Year		
		2005	2055	2105
All	V6 MAI	1.7	1.6	1.4
	V7 MAI	1.6	1.7	1.4
FD <=120	V6 MAI	1.9	1.9	1.8
	V7 MAI	2.0	2.3	2.0
FD >120	V6 MAI	1.2	1.2	1.1
	V7 MAI	1.0	1.0	0.8
Oth. Conf	V6 MAI	1.6	1.5	1.3
	V7 MAI	1.4	1.5	1.2
P <= 80	V6 MAI	1.6	1.7	1.5
	V7 MAI	1.7	2.1	1.9
P > 80	V6 MAI	1.9	1.7	1.3
	V7 MAI	1.9	1.9	1.5



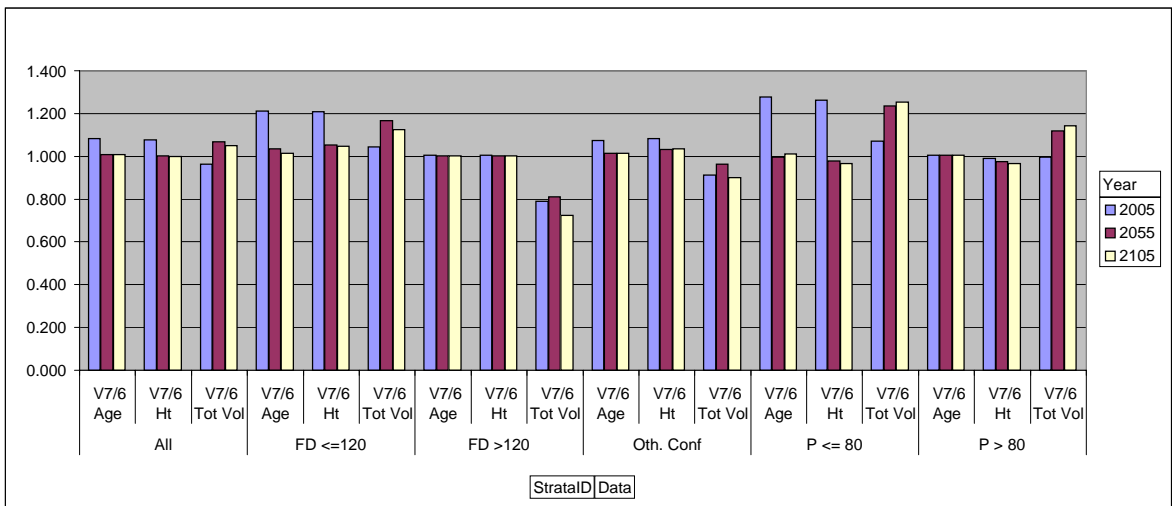
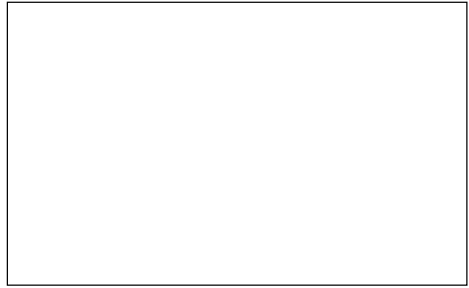
V7 tpha	Year		
StratalD	2005	2055	2105
All	542	600	591
FD <=120	442	494	467
FD >120	347	382	385
Oth. Conf	374	449	457
P <= 80	651	823	812
P > 80	706	718	703



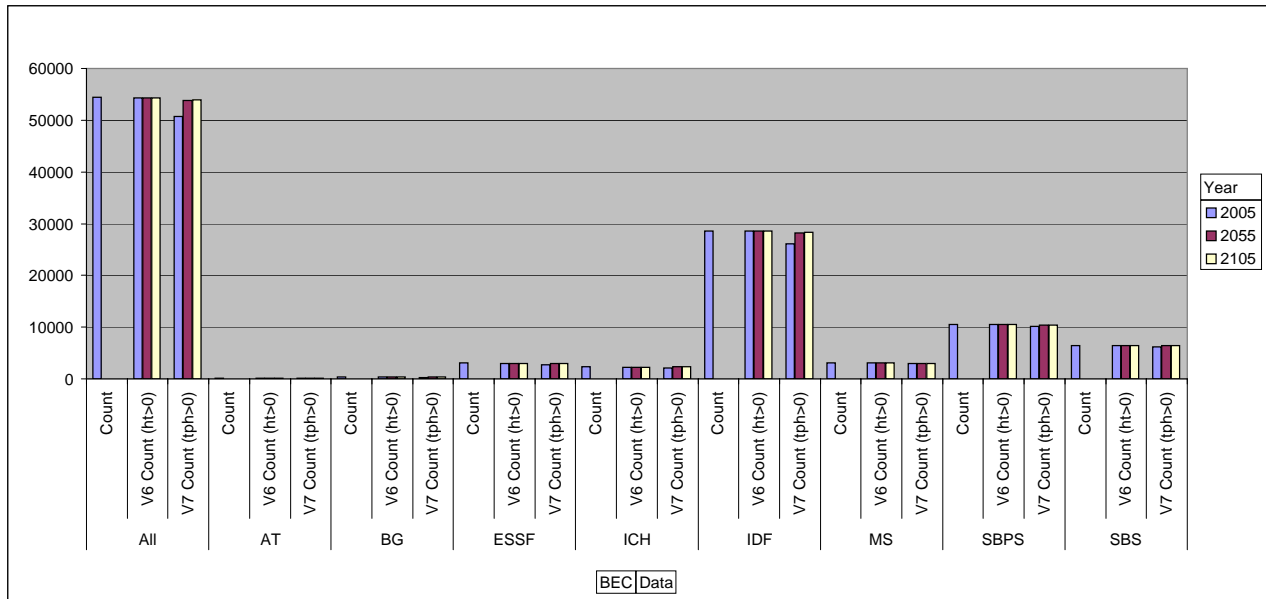
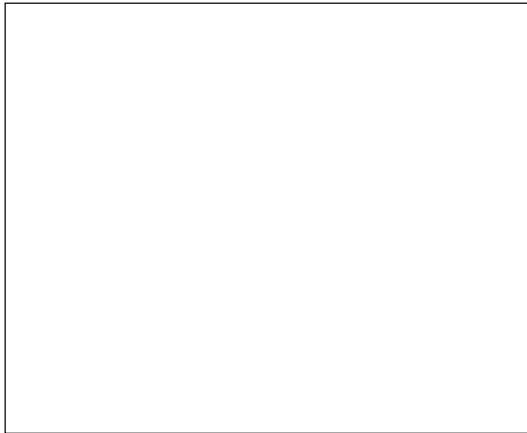
StratalD	Data	Year		
		2005	2055	2105
All	V7 qmd	26.4	27.1	28.1
	V7 ba/ha	25.3	31.9	34.3
FD <=120	V7 qmd	28.8	30.3	32.7
	V7 ba/ha	28.2	35.9	39.8
FD >120	V7 qmd	32.4	30.2	30.3
	V7 ba/ha	21.1	25.3	26.4
Oth. Conf	V7 qmd	31.6	31.5	31.6
	V7 ba/ha	25.8	32.6	34.8
P <= 80	V7 qmd	18.3	20.7	23.0
	V7 ba/ha	19.6	29.1	34.3
P > 80	V7 qmd	23.2	25.0	25.6
	V7 ba/ha	27.7	33.9	35.2



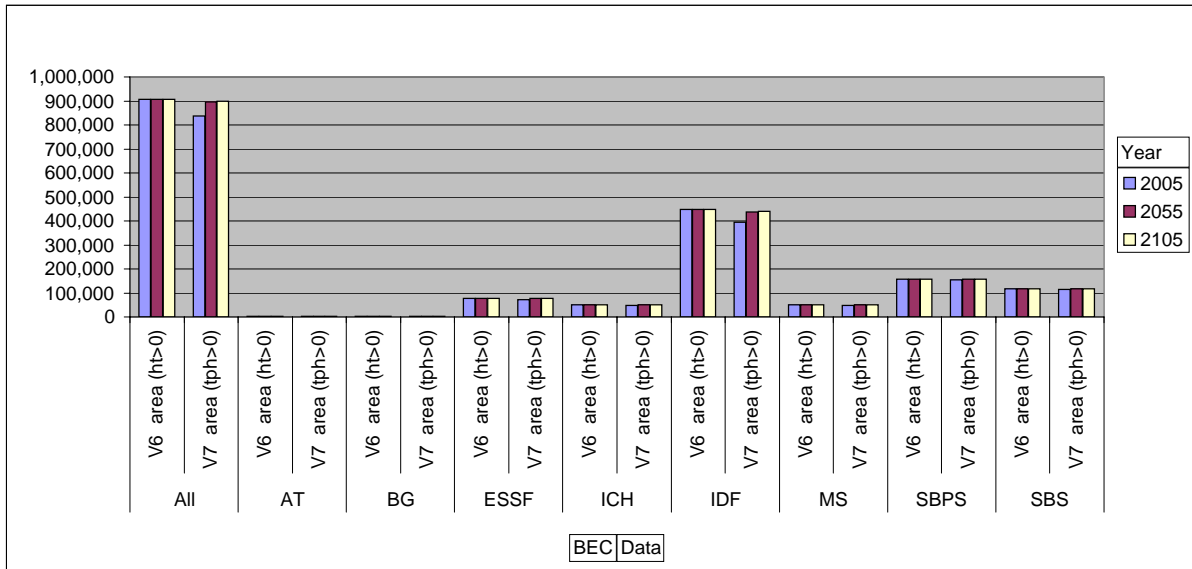
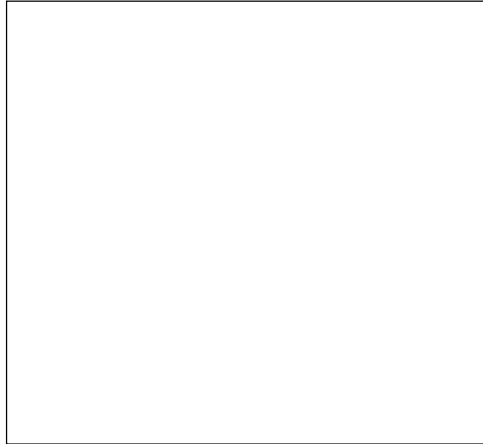
StratalID	Data	Year		
		2005	2055	2105
All	V7/6 Age	1.083	1.009	1.008
	V7/6 Ht	1.077	1.003	0.999
	V7/6 Tot Vol	0.962	1.069	1.049
FD <=120	V7/6 Age	1.212	1.035	1.013
	V7/6 Ht	1.210	1.053	1.048
	V7/6 Tot Vol	1.045	1.168	1.125
FD >120	V7/6 Age	1.004	1.002	1.001
	V7/6 Ht	1.005	1.002	1.002
	V7/6 Tot Vol	0.791	0.810	0.723
Oth. Conf	V7/6 Age	1.075	1.014	1.014
	V7/6 Ht	1.082	1.031	1.037
	V7/6 Tot Vol	0.911	0.963	0.902
P <= 80	V7/6 Age	1.276	0.996	1.012
	V7/6 Ht	1.262	0.978	0.966
	V7/6 Tot Vol	1.071	1.236	1.252
P > 80	V7/6 Age	1.005	1.004	1.004
	V7/6 Ht	0.992	0.976	0.967
	V7/6 Tot Vol	0.995	1.119	1.142



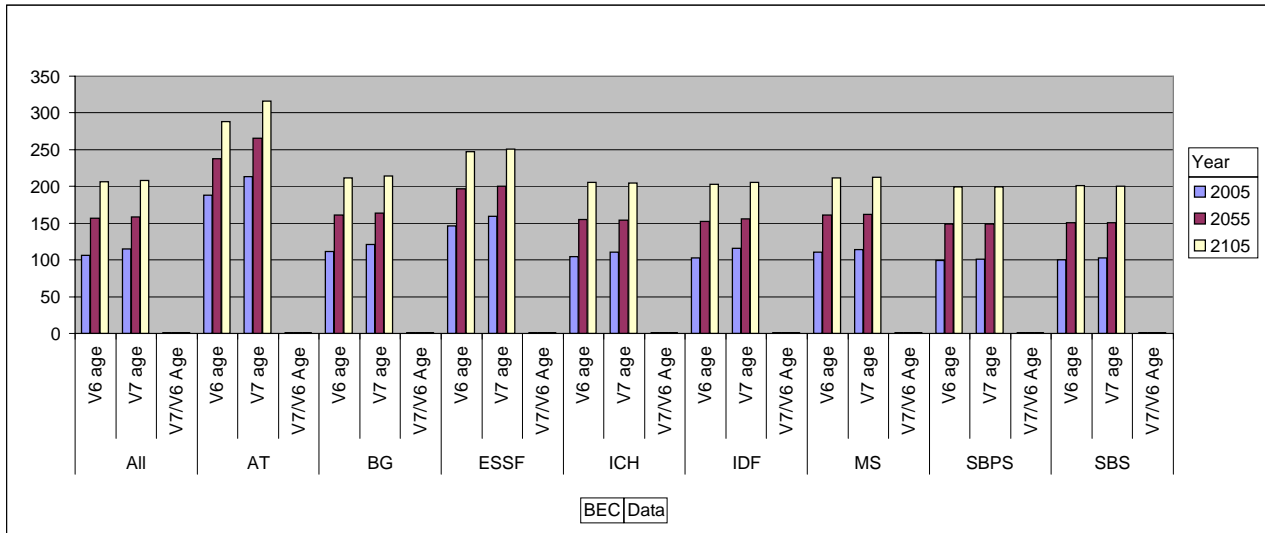
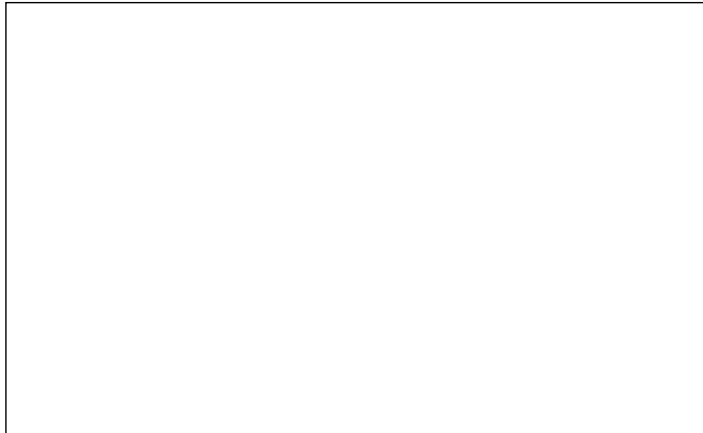
BEC	Data	Year		
		2005	2055	2105
All	Count	54451		
	V6 Count (ht>0)	54276	54276	54276
	V7 Count (tph>0)	50674	53827	53984
AT	Count	183		
	V6 Count (ht>0)	182	182	182
	V7 Count (tph>0)	155	159	162
BG	Count	316		
	V6 Count (ht>0)	316	316	316
	V7 Count (tph>0)	284	312	314
ESSF	Count	3062		
	V6 Count (ht>0)	3000	3000	3000
	V7 Count (tph>0)	2676	2989	2994
ICH	Count	2320		
	V6 Count (ht>0)	2267	2267	2267
	V7 Count (tph>0)	2045	2304	2304
IDF	Count	28550		
	V6 Count (ht>0)	28540	28540	28540
	V7 Count (tph>0)	26117	28166	28274
MS	Count	3059		
	V6 Count (ht>0)	3053	3053	3053
	V7 Count (tph>0)	2964	3023	3027
SBPS	Count	10473		
	V6 Count (ht>0)	10467	10467	10467
	V7 Count (tph>0)	10193	10431	10452
SBS	Count	6488		
	V6 Count (ht>0)	6451	6451	6451
	V7 Count (tph>0)	6240	6443	6457



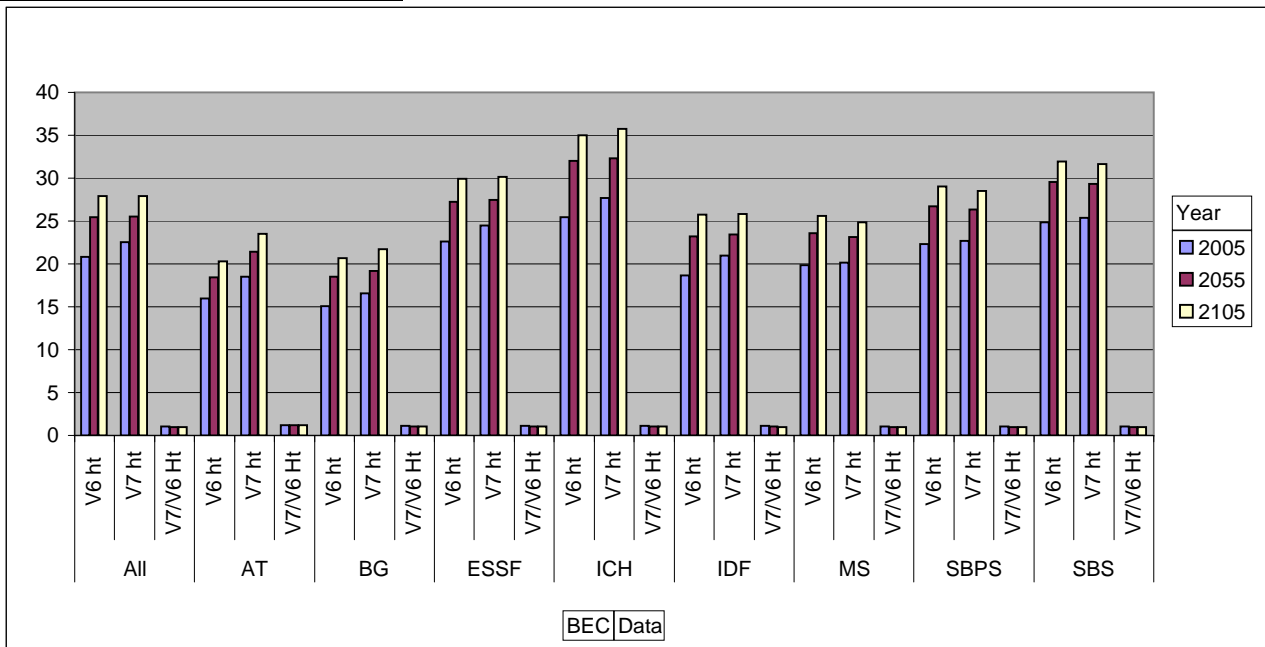
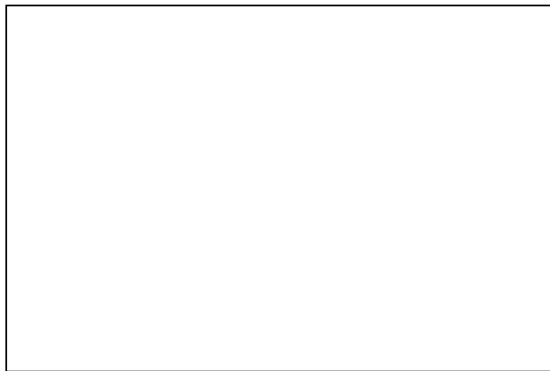
BEC	Data	Year		
		2005	2055	2105
All	V6 area (ht>0)	907,443	907,443	907,443
	V7 area (tph>0)	837,425	896,670	899,480
AT	V6 area (ht>0)	2,555	2,555	2,555
	V7 area (tph>0)	2,247	2,289	2,327
BG	V6 area (ht>0)	3,342	3,342	3,342
	V7 area (tph>0)	3,062	3,287	3,292
ESSF	V6 area (ht>0)	78,489	78,489	78,489
	V7 area (tph>0)	72,154	77,329	77,353
ICH	V6 area (ht>0)	50,885	50,885	50,885
	V7 area (tph>0)	47,975	51,100	51,100
IDF	V6 area (ht>0)	447,370	447,370	447,370
	V7 area (tph>0)	394,830	438,354	440,476
MS	V6 area (ht>0)	50,051	50,051	50,051
	V7 area (tph>0)	48,686	49,701	49,790
SBPS	V6 area (ht>0)	157,648	157,648	157,648
	V7 area (tph>0)	153,941	157,362	157,607
SBS	V6 area (ht>0)	117,102	117,102	117,102
	V7 area (tph>0)	114,530	117,248	117,535



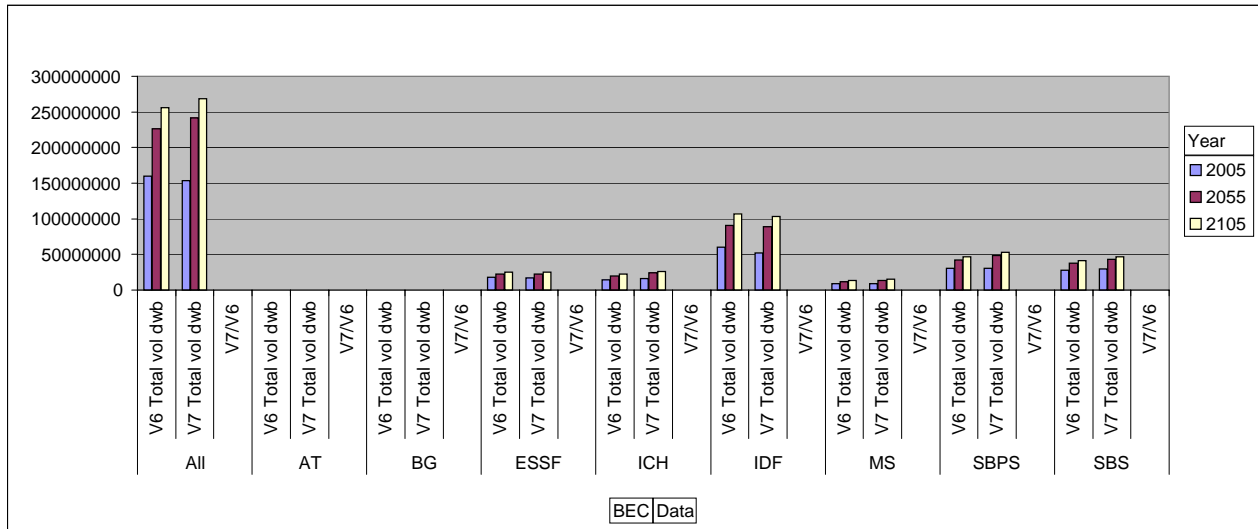
		Year		
BEC	Data	2005	2055	2105
All	V6 age	106	156	207
	V7 age	115	158	208
	V7/V6 Age	1.084	1.012	1.009
AT	V6 age	188	238	288
	V7 age	214	266	316
	V7/V6 Age	1.137	1.116	1.098
BG	V6 age	111	161	211
	V7 age	121	164	214
	V7/V6 Age	1.091	1.017	1.015
ESSF	V6 age	147	197	247
	V7 age	159	200	251
	V7/V6 Age	1.088	1.015	1.015
ICH	V6 age	104	155	205
	V7 age	111	154	205
	V7/V6 Age	1.061	0.996	0.996
IDF	V6 age	103	153	203
	V7 age	116	156	206
	V7/V6 Age	1.133	1.021	1.016
MS	V6 age	111	161	211
	V7 age	114	162	212
	V7/V6 Age	1.028	1.007	1.005
SBPS	V6 age	99	149	199
	V7 age	101	149	199
	V7/V6 Age	1.024	1.002	1.000
SBS	V6 age	100	151	201
	V7 age	103	150	200
	V7/V6 Age	1.022	0.999	0.996



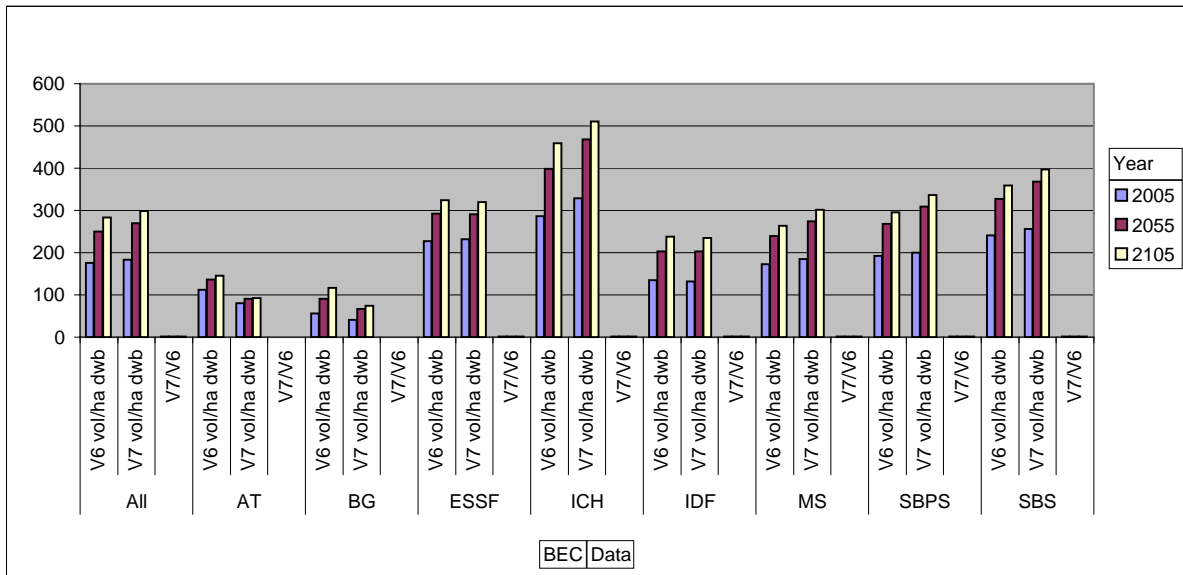
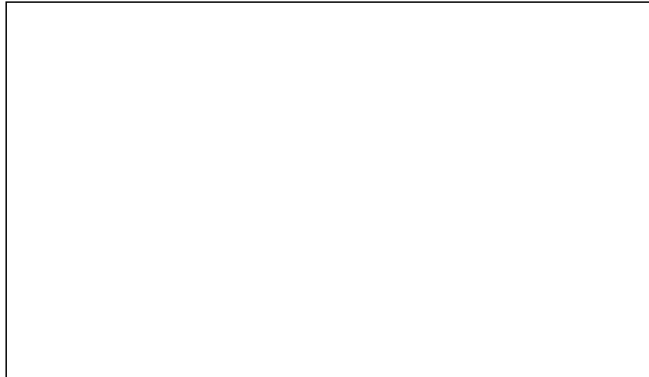
		Year		
BEC	Data	2005	2055	2105
All	V6 ht	20.8	25.5	27.9
	V7 ht	22.5	25.5	27.9
	V7/V6 Ht	1.080	1.003	0.999
AT	V6 ht	16.0	18.4	20.3
	V7 ht	18.5	21.5	23.5
	V7/V6 Ht	1.160	1.165	1.159
BG	V6 ht	15.1	18.5	20.6
	V7 ht	16.5	19.2	21.7
	V7/V6 Ht	1.094	1.039	1.052
ESSF	V6 ht	22.6	27.2	29.9
	V7 ht	24.5	27.5	30.1
	V7/V6 Ht	1.082	1.008	1.008
ICH	V6 ht	25.5	32.0	35.0
	V7 ht	27.7	32.3	35.7
	V7/V6 Ht	1.088	1.009	1.022
IDF	V6 ht	18.6	23.2	25.8
	V7 ht	21.0	23.4	25.8
	V7/V6 Ht	1.128	1.009	1.001
MS	V6 ht	19.9	23.6	25.6
	V7 ht	20.2	23.1	24.9
	V7/V6 Ht	1.015	0.981	0.973
SBPS	V6 ht	22.3	26.7	29.0
	V7 ht	22.7	26.4	28.5
	V7/V6 Ht	1.016	0.987	0.983
SBS	V6 ht	24.8	29.5	32.0
	V7 ht	25.3	29.3	31.6
	V7/V6 Ht	1.021	0.992	0.990



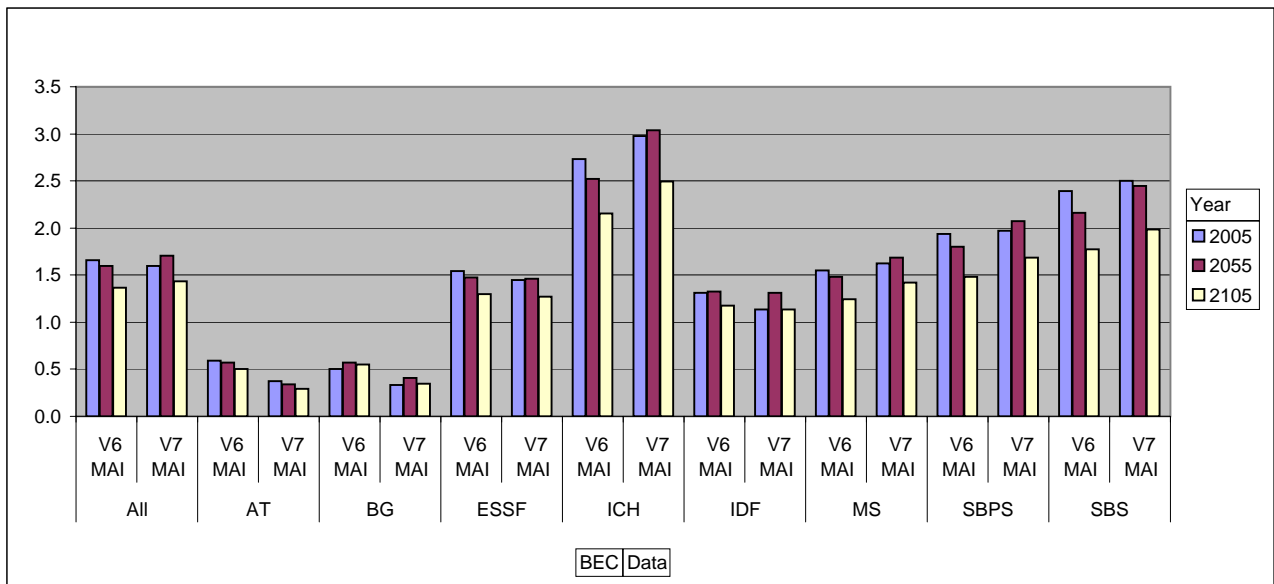
		Year		
BEC	Data	2005	2055	2105
All	V6 Total vol dwb	159,956,985	226,178,066	256,414,232
	V7 Total vol dwb	153,918,248	241,778,076	268,971,551
	V7/V6	0.962	1.069	1.049
AT	V6 Total vol dwb	284,732	347,916	370,750
	V7 Total vol dwb	180,370	208,412	215,866
	V7/V6	0.633	0.599	0.582
BG	V6 Total vol dwb	186,836	305,684	388,767
	V7 Total vol dwb	124,393	220,568	244,148
	V7/V6	0.666	0.722	0.628
ESSF	V6 Total vol dwb	17,735,883	22,819,914	25,240,800
	V7 Total vol dwb	16,675,890	22,543,587	24,724,105
	V7/V6	0.940	0.988	0.980
ICH	V6 Total vol dwb	14,502,111	19,891,412	22,480,761
	V7 Total vol dwb	15,805,130	23,935,418	26,061,079
	V7/V6	1.090	1.203	1.159
IDF	V6 Total vol dwb	60,271,667	90,549,024	106,515,830
	V7 Total vol dwb	51,989,659	89,315,857	103,141,155
	V7/V6	0.863	0.986	0.968
MS	V6 Total vol dwb	8,615,927	11,940,422	13,117,773
	V7 Total vol dwb	9,022,337	13,608,766	15,008,957
	V7/V6	1.047	1.140	1.144
SBPS	V6 Total vol dwb	30,245,713	42,241,946	46,551,034
	V7 Total vol dwb	30,769,491	48,756,265	52,977,356
	V7/V6	1.017	1.154	1.138
SBS	V6 Total vol dwb	28,114,115	38,081,749	41,748,516
	V7 Total vol dwb	29,350,977	43,189,203	46,598,885
	V7/V6	1.044	1.134	1.116



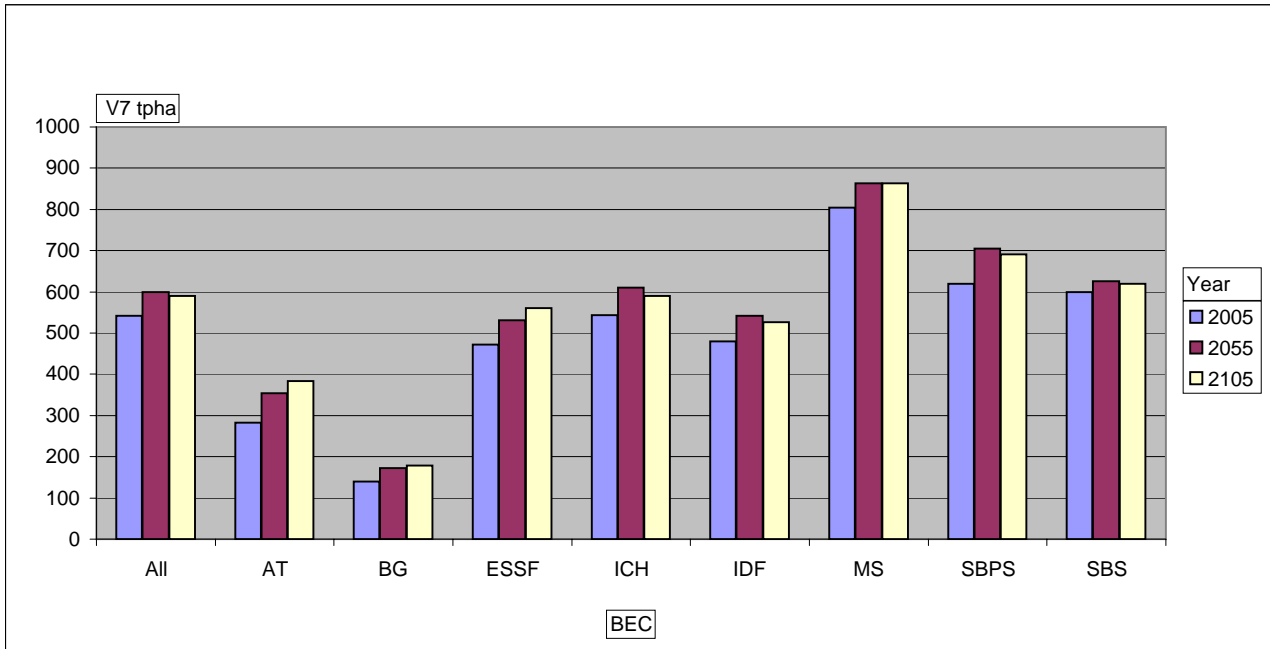
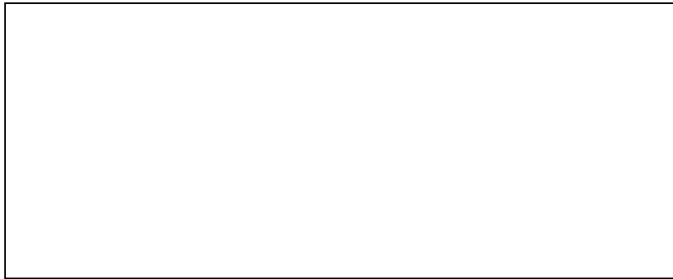
		Year		
BEC	Data	2005	2055	2105
All	V6 vol/ha dwb	176.4	250.0	283.9
	V7 vol/ha dwb	183.8	269.6	299.0
	V7/V6	1.042	1.078	1.053
AT	V6 vol/ha dwb	111.4	136.2	145.1
	V7 vol/ha dwb	80.3	91.0	92.8
	V7/V6	0.720	0.669	0.639
BG	V6 vol/ha dwb	55.9	91.5	116.3
	V7 vol/ha dwb	40.6	67.1	74.2
	V7/V6	0.727	0.734	0.638
ESSF	V6 vol/ha dwb	226.8	293.0	324.5
	V7 vol/ha dwb	231.1	291.5	319.6
	V7/V6	1.019	0.995	0.985
ICH	V6 vol/ha dwb	285.6	398.6	459.3
	V7 vol/ha dwb	329.4	468.4	510.0
	V7/V6	1.153	1.175	1.110
IDF	V6 vol/ha dwb	134.8	202.6	238.4
	V7 vol/ha dwb	131.7	203.8	234.2
	V7/V6	0.977	1.006	0.982
MS	V6 vol/ha dwb	172.4	239.2	263.0
	V7 vol/ha dwb	185.3	273.8	301.4
	V7/V6	1.075	1.145	1.146
SBPS	V6 vol/ha dwb	191.9	268.1	295.5
	V7 vol/ha dwb	199.9	309.8	336.1
	V7/V6	1.041	1.156	1.138
SBS	V6 vol/ha dwb	240.4	326.9	359.1
	V7 vol/ha dwb	256.3	368.4	396.5
	V7/V6	1.066	1.127	1.104



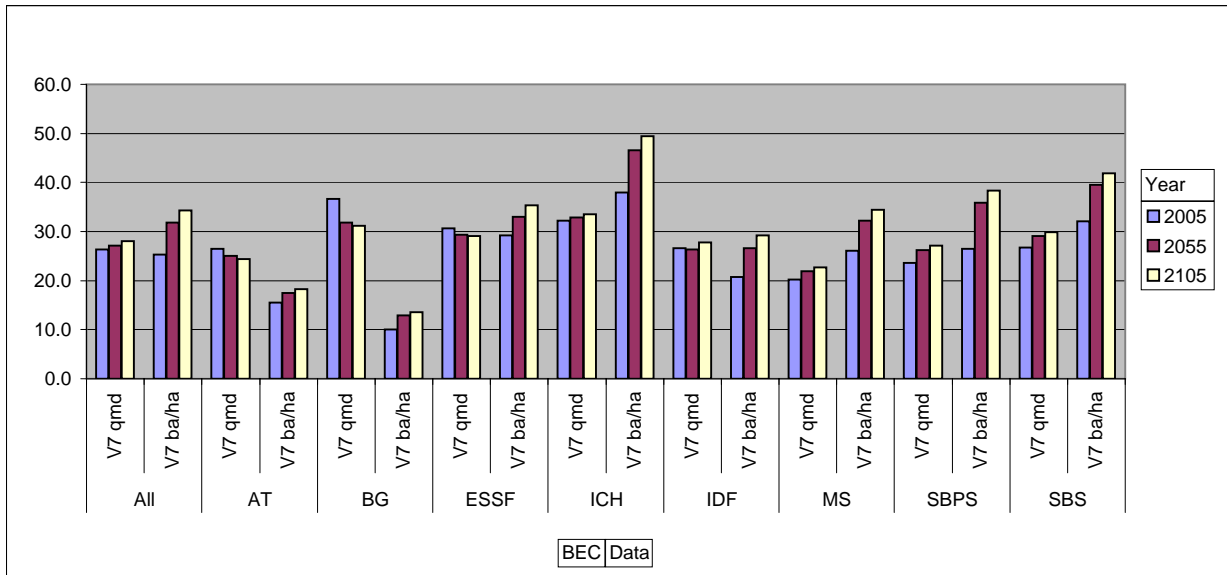
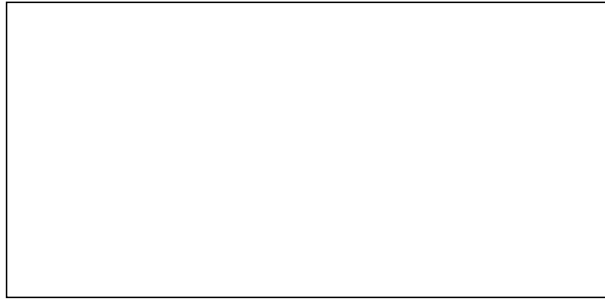
BEC	Data	Year		
		2005	2055	2105
All	V6 MAI	1.7	1.6	1.4
	V7 MAI	1.6	1.7	1.4
AT	V6 MAI	0.6	0.6	0.5
	V7 MAI	0.4	0.3	0.3
BG	V6 MAI	0.5	0.6	0.6
	V7 MAI	0.3	0.4	0.3
ESSF	V6 MAI	1.5	1.5	1.3
	V7 MAI	1.4	1.5	1.3
ICH	V6 MAI	2.7	2.5	2.2
	V7 MAI	3.0	3.0	2.5
IDF	V6 MAI	1.3	1.3	1.2
	V7 MAI	1.1	1.3	1.1
MS	V6 MAI	1.6	1.5	1.2
	V7 MAI	1.6	1.7	1.4
SBPS	V6 MAI	1.9	1.8	1.5
	V7 MAI	2.0	2.1	1.7
SBS	V6 MAI	2.4	2.2	1.8
	V7 MAI	2.5	2.4	2.0



BEC	Year		
	2005	2055	2105
All	542	600	591
AT	283	354	383
BG	139	173	179
ESSF	472	531	560
ICH	544	610	589
IDF	480	541	526
MS	805	863	863
SBPS	619	705	690
SBS	600	626	620



BEC	Data	Year		
		2005	2055	2105
All	V7 qmd	26.4	27.1	28.1
	V7 ba/ha	25.3	31.9	34.3
AT	V7 qmd	26.5	25.0	24.4
	V7 ba/ha	15.5	17.5	18.3
BG	V7 qmd	36.6	31.9	31.2
	V7 ba/ha	10.0	13.0	13.6
ESSF	V7 qmd	30.6	29.3	29.1
	V7 ba/ha	29.2	32.9	35.3
ICH	V7 qmd	32.3	32.8	33.5
	V7 ba/ha	38.0	46.5	49.4
IDF	V7 qmd	26.6	26.3	27.7
	V7 ba/ha	20.7	26.6	29.2
MS	V7 qmd	20.2	21.9	22.7
	V7 ba/ha	26.0	32.3	34.5
SBPS	V7 qmd	23.7	26.2	27.2
	V7 ba/ha	26.5	35.8	38.4
SBS	V7 qmd	26.8	29.1	29.8
	V7 ba/ha	32.1	39.6	41.8



BEC	Data	Year		
		2005	2055	2105
All	V7/6 Age	1.083	1.009	1.004
	V7/6 Ht	1.080	1.003	0.999
	V7/6 Tot Vol	0.962	1.069	1.049
AT	V7/6 Age	1.137	1.116	1.098
	V7/6 Ht	1.160	1.165	1.159
	V7/6 Tot Vol	0.633	0.599	0.582
BG	V7/6 Age	1.091	1.017	1.015
	V7/6 Ht	1.094	1.039	1.052
	V7/6 Tot Vol	0.666	0.722	0.628
ESSF	V7/6 Age	1.084	1.007	1.006
	V7/6 Ht	1.082	1.008	1.008
	V7/6 Tot Vol	0.940	0.988	0.980
ICH	V7/6 Age	1.058	0.977	0.958
	V7/6 Ht	1.088	1.009	1.022
	V7/6 Tot Vol	1.090	1.203	1.159
IDF	V7/6 Age	1.133	1.020	1.014
	V7/6 Ht	1.128	1.009	1.001
	V7/6 Tot Vol	0.863	0.986	0.968
MS	V7/6 Age	1.026	1.004	1.002
	V7/6 Ht	1.015	0.981	0.973
	V7/6 Tot Vol	1.047	1.140	1.144
SBPS	V7/6 Age	1.024	1.001	1.000
	V7/6 Ht	1.016	0.987	0.983
	V7/6 Tot Vol	1.017	1.154	1.138
SBS	V7/6 Age	1.021	0.993	0.989
	V7/6 Ht	1.021	0.992	0.990
	V7/6 Tot Vol	1.044	1.134	1.116

