Appendix 3: Yield Curve Documentation for the E8 FMU 13/07 Merchantability

Yield curve documentation for the E8 FMU
13/07 merchantability

February 28, 2007

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1.0 ..... Volume Compilation

Permanent sample plot (PSP) data had been provided by Weyerhaeuser for use in various Alberta initiatives[1]. PSPs were established using a grid-based system, and were allowed to be harvested. Plot size varied between 400 and 800 m^2, with nested subplots for capturing low-diameter trees. The company had attached additional data, such as natural subregion and elevation, to the plot headers. Alberta Vegetation Inventory (AVI) information was added at a later stage.

Data collected from mature stands with a forested inventory description were used to calculate the volumes. Stands with a clearcut or burn modifier were dropped, as were unproductive stands. Only the most recent measurement that could be tied to the AVI was used, which effectively converted these plots into single-observation TSPs. This was done to avoid adding successional inference to the static AVI attributes. Any available subplot data was not incorporated, as it would not contain information for merchantable trees.

Merchantable volumes were compiled using Huang's 1994 taper-driven stump diameter and height equations[2]. A 13 cm stump diameter outside bark and a 7cm top diameter inside bark merchantability limit were applied to both conifer and deciduous species. Stump height was assumed to be 15 cm, and a 2.44 m minimum log length was integrated into the volume compilation. Dead and non-merchantable stems were assigned a volume of 0 m^3/ha, but retained in the data.

Piece size was calculated by dividing the merchantable volume per ha by the number of merchantable stems per ha. The accuracy of both numbers were dependent on the plot expansion factor and plot size.

Further details on how to duplicate the volume calculations will be provided on request.

2.0 ..... Linking AVI attributes to plot data

Initially, Weyerhaeuser had provided a set of AVI attributes for each of the PSPs. These attributes were assigned prior to submitting the AVI to the Resource Data Branch (RDB) for approval, but had been generated from the air photos. At the time it was unclear if the attributes represented the final AVI polygon or just the area surrounding the plot.

When the approved AVI was submitted, spatial locations for the plots were also provided. This spatial location was used to assign the following variables to the plots:

- Land base status (active vs. passive, as defined in the net land base documentation).
- Approved AVI attributes.

[1] Please contact Weyerhaeuser, or consult the approved DFMP, for details on the data collection procedures.
[2] Huang, 1994. Ecologically based individual tree volume estimations for Major Alberta tree species. Report #1. Alberta Environmental Protection.

The original natural subregion assignments suggested by the spatial location were checked against the initial call, and retained without any changes.

These attributes were linked to the PSP data using the lookup information provided in the *psp_hdr.csv* file. While 278 plot locations were provided in the spatial file, only 155 records were unique records for forested PSPs on the net land base. Non-forested plots were dropped, as these have been harvested or disturbed, and were currently non-merchantable and could not be assigned to a yield stratum. Various net land base deletions, such as buffers and productivity limitations[3], would reduce this number further. See the following table for details.

Table 1: Available plots at various stages of compilation.

Stage	Plots
All PSP observations	449
Last measure, tied to AVI	271
Forested plots on NLB, all	155
Forested plots on NLB, Conifer	145

Plots were initially stratified by cover group ('C'/'CD'/'DC'/'D') and leading species. After examining the distribution of data within these strata, the following modifications were applied:

- There were enough data to separate the Pine-leading coniferous stands by density class (B[4], C+D) and by TPR class (F, M+G[4]) using a guide-curve relationship.
- There was not enough local data to develop a reasonable yield relationship for the mixedwood and deciduous cover groups. The final approach involved incorporating data from the entire FMA with data from Canfor and ANC for similar natural subregions, and fitting a regional curve. CD, DC and D curves were produced. This approach was necessary, and is low risk approach given the small amount of net area in mixedwood and deciduous strata.

3.0 Yield curve development

A final set of yield curves to reflect the new net land base was developed. This land base was the final preferred scenario selected from the iterative testing done previously. The focus for yield analysis was on the conifer curves, as this was the clear majority of the landscape, as well as the interest of the operators in the region. The base set of compiled yield estimates were used in all combinations of stratification.

3.1 Yield curves for the final NLB.

Only plots in the Active LB were allowed. This dropped the 'A' density stands as well as 'U' TPR stands. Exact stand deletion rules can be found in the net land base documentation. Only plots falling in LBTYPE = 'R' (Not horizontal or a clear cut, and the overstorey defines the stand) were allowed

[3] Please see the Net Land Base documentation for details.
[4] Stands with a density of 'A' had previously been deleted from the net land base. Stands with a TPR of 'U' had previously been deleted from the net land base.

into analysis. Individual curves for the Sb and Sw strata were fit using the following non-linear equation:

[1] $Con\_Volume = B1*age^{B2} * \exp(-B1*age)$

Where Con_Volume is the predicted merchantable 13/7 volume,
age is the stand age, calculated as cruise year – AVI origin
b1, b2 are parameters to be estimated.

The yield curves produced by the above equation did not produce the required decline for overmature stands due to the distribution of plots along the age axis. In order to force a decline, the following adjustment factor was applied to stands older than 120 years old.

[1a] if age >= 120 then Adjusted_Volume = Con_Volume * (1 - (age-120)/200);

The number and distribution along the age axis for the pine plots warranted a different approach than what was used previously. All the pine plots were pooled, and a guide curve was used to produce curves by density and TPR. A decline function as in equation 1a was then applied to all pine strata.

[2] $Con\_Volume=((b1+G1*H1+g2*H2)*Age**b2)*\exp(-b1*age)$

where Con_Volume is the predicted merchantable 13/7 volume,
age is the stand age, calculated as cruise year – AVI origin
b1, b2, h1, h2 are parameters to be estimated.
G1 describes density. G2 describes productivity.
So, when stratum = CplAbF then G1=0, G2=0
when stratum = CplAbMG: then G1=0, G2=1
when stratum = CPlCDF then G1=1 G2=0
when stratum = CPlCDMG G1=1, G2=1

More weighting was put on the biological behavior of the yield curves than the fit-statistics when selecting model forms. The decision was made to set the deciduous volumes for conifer leading strata to 0 m^3/ha[5]. The plot-level averages suggested the deciduous volumes would be unmerchantable, and produce less than 20 m3/ha for strata where the model converged. When the data was unevenly distributed within the range of sampled ages, an unrealistic exponential relationship was observed.

Table 2: Coefficients for the conifer volumes derived through equation [1] for the entire FMU. R^2 values were not a main consideration during the model selection process, and were not included in the documentation.

F_YC	Equation	Comment	G1	G2	B1	B2	H1	H2
CPlABF	[2]	capped [1a]	0	0	0.014905345	2.345419928	0.005945998	0.001874178
CPlABMG	[2]	capped [1a]	0	1	0.014905345	2.345419928	0.005945998	0.001874178
CPlCDF	[2]	capped [1a]	1	0	0.014905345	2.345419928	0.005945998	0.001874178
CPlCDMG	[2]	capped [1a]	1	1	0.014905345	2.345419928	0.005945998	0.001874178
CSbalal	[1]	capped [1a]			0.013909624	2.265960564		
CSwalal	[1]	capped [1a]			0.009070544	2.337805557		

Graphs showing the individual yield curves can be found in Reference Section 1.

[5] There is no deciduous allocation in the area, so under-estimating the amount of incidental volume is not a critical concern.

3.2 Area-weighted composite yield curves.

Area-weighted composites were also produced for all conifer-leading yield curves. Volumes per five year age class and yield stratum were weighted by the total area for the appropriate land base definition, and then summed to produce a single landscape-level curve. As the Pine-C+D-Fair stratum dominated the land base, the area-weighted curve most resembles the yields for that particular stratum. Volume tables showing the volume by five-year age periods are also available. Area-weighted deciduous estimates were not produced.

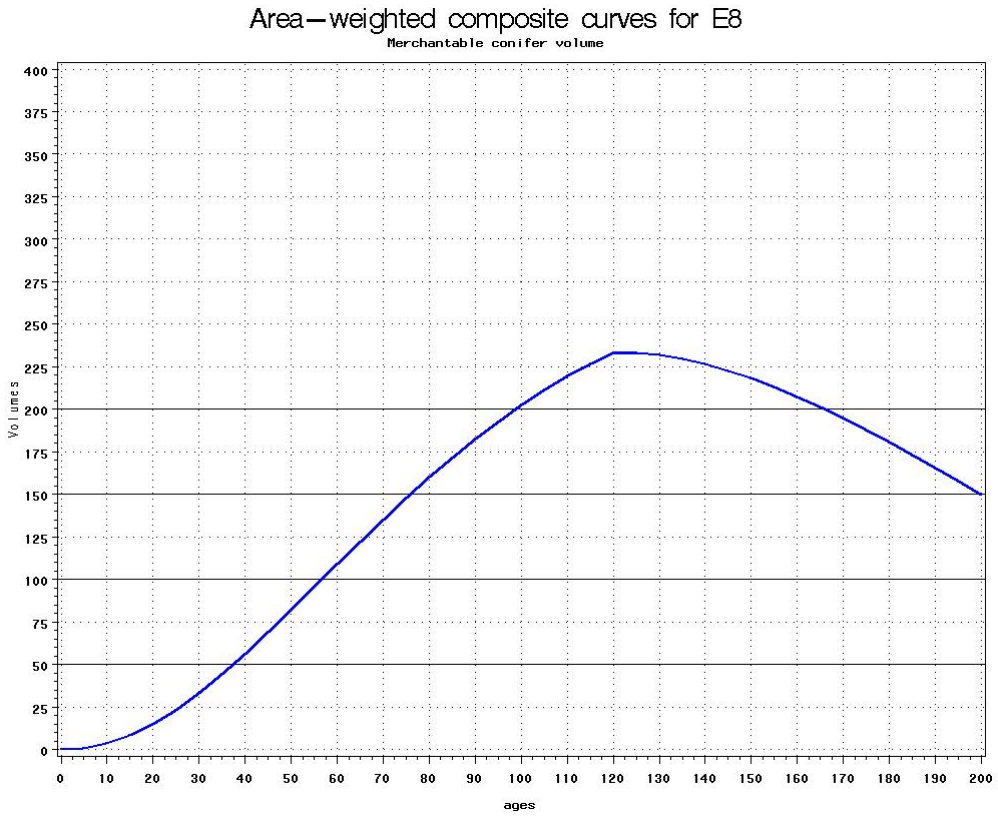


Figure 1: Area Weighted composite Yield Curve for conifer land base

3.3 Regional estimates for mixedwood and deciduous strata

Despite having a very small presence on the land base, reasonable empirical curves needed to be developed for the mixedwood (CD and DC covergroups) and deciduous strata. Using data from adjacent FMA holders for within the same natural subregion[6] allowed us to develop a regional yield estimate for use with this project. All data was compiled to 13/7 merchantability using the LFD protocols described above. Data was limited to the Upper Foothills, Subalpine and any potential montane stands, as these were the subregions present in E8. AVI attributes for the Weyerhaeuser Grande Prairie data was the original submission.

[6] Data was limited to the upper foothills subregion. There are some montane valleys in the net land base, but these were not captured in the volume sampling program.

A conifer model which forced some degree of stand decline was needed as there was no data for over-mature stands.

[3] Con_Volume = S1*(B1*age ^{B2} * exp (-age/20))
[4] Dec_Volume = S2*(C1*age ^{C2} * exp (-age/30))

Where Con_Volume is the predicted merchantable 13/7 conifer volume
Dec_Volume is the predicted merchantable 13/7 deciduous volume
age is the inventory age
B1, B2, S1, C1, C2 S2 are parameters to be estimated.

These regional curves were originally developed using volumes compiled to a 30cm stump height. A multiplier was derived to adjust these curves to represent volumes compiled to a 15cm stump height. This multiplier was developed based on all of the Mixed and D strata data in E8 compiled to both utilization standards. The resulting multipliers for conifer and deciduous, are presented in the following table as 'S1' and 'S2', respectively.

Table 3: Coefficients for the CD, DC and D strata, using equations [3] and [4].

F_YC	Yield Type	Equation	B1	B2	C1	C2	S1	S2
CDMxalal	C	[3]	3.98478E-08	5.955101993			1.029226807	
CDMxalal	D	[4]			1.49483E-06	4.580778853		1.026924954
DCMxalal	C	[3]	2.44593E-08	6.009476611			1.029226807	
DCMxalal	D	[4]			0.000204409	3.608399135		1.026924954
DAwalal	C	[3]	0.000196499	3.769595939			1.029226807	
DAwalal	D	[4]			4.85513E-06	4.509044191		1.026924954

The corresponding graphs can be found in Reference Section 2.

4.0 ..... Piece size analysis

Piece size was calculated for each PSP as the number of merchantable stems per ha divided by the merchantable volume per ha (trees per cubic meter). A best-fit relationship was developed for the piece size against the inventory age. The deciduous piece size was not calculated, as it was not going to be used in the timber supply analysis.

4.1 Piece size curves for the final NLB

For the white spruce, and black spruce strata, equation 5 was used to fit piece size.

[5] Conifer piece size=B1+(B2/standage);

Where conifer piece size is the merch stems per 13/7 merch volume
standage is the inventory age for the plot,
B1, B2 are parameters to be estimated.

The pine strata gave unrealistic relationships, so a guide curve approach was used to produce piece size curves. Equation 6 was used to fit this guide curve relationship.

[6] Conifer piece size = (B1+G1*H1+G2*H2)+(B2/standage)

Where conifer piece size is the merch stems per 13/7 merch volume
standage is the inventory age for the plot,
B1, B2, h1, h2 are parameters to be estimated.
G1 describes open (B=0) / closed (C+D=1) stands
G2 describes poor (F=0) / rich (MG=1) stands

The resulting best fit coefficients are provided in the following table.

Table 4: Coefficients for the final NLB piece size relationship for merchantable conifer.

F_YC	Equation	G1	G2	B1	B2	H1	H2
CPlABF	[6]	0	0	3.172533666	490.9504728	-0.880964418	-2.64139471
CPlABMG	[6]	0	1	3.172533666	490.9504728	-0.880964418	-2.64139471
CPlCDF	[6]	1	0	3.172533666	490.9504728	-0.880964418	-2.64139471
CPlCDMG	[6]	1	1	3.172533666	490.9504728	-0.880964418	-2.64139471
CSbalal	[5]			7.014061521	317.4964153		
CSwalal	[5]			0.359998067	501.8015507		

The corresponding graphs can be found in Reference Section 3.

4.2 Area weighted composites for piece size

The same approach used to develop area-weighted composites for the yield curves was used to develop area-weighted piece size curves. The same area files and base SAS code were used in both instances.

As there are no models or coefficients associated with an area-weighted composite curve, a piece size table is available.

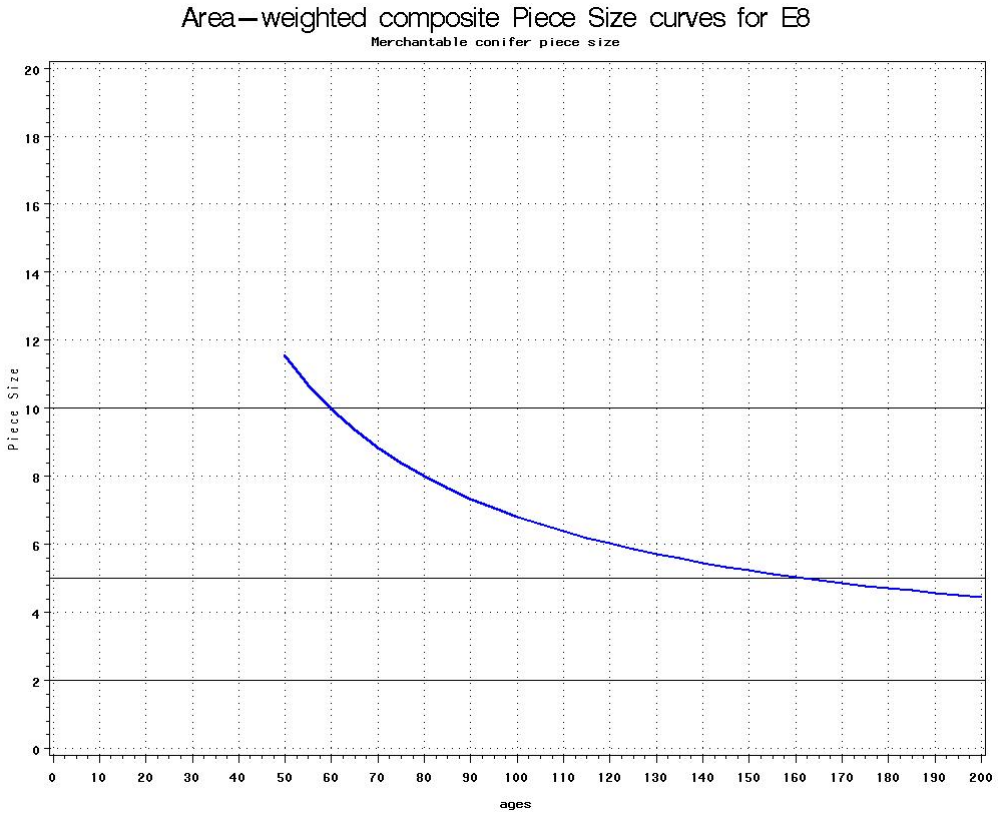


Figure 2: Area-weighted composite curve for the merchantable conifer piece size

4.3 Regional piece size curves for the mixedwood and deciduous strata

Piece size curves were developed for the CD, DC and D strata at the regional level using equations 7 and 8. A common data set was used for the yield curves and the piece size curves.

[7] Conifer piece size = S1*(B1+(B2/standage))

Where conifer piece size is the merch stems per 13/7 merch volume
standage is the inventory age for the plot,
B1, B2, S1 are parameters to be estimated.

[8] Deciduous piece size = S2*(C1+(C2/standage))

Where deciduous piece size is the merch stems per 13/7 merch volume
standage is the inventory age for the plot,
B1, B2, S2 are parameters to be estimated.

The resulting best fit coefficients are provided in the following table.

Table 5: Coefficients for the CD, Dc and D piece size curves.

F_YC	Yield Type	Equation	B1	B2	C1	C2	S1	S2
CDMxalal	C	[7]	1.452045730	273.932787310			0.988805479	
CDMxalal	D	[8]			2.907684336	152.064105291		1.004617566
DCMxalal	C	[7]	-1.318595523	534.956864089			0.988805479	
DCMxalal	D	[8]			-0.010778197	455.469167704		1.004617566
DAwalal	C	[7]	4.598741056	202.518785527			0.988805479	
DAwalal	D	[8]			-0.581209281	531.349041484		1.004617566

Graphs showing the individual piece size curves can be found in Reference Section 4.

5.0 .....Smallwood Land Base

A request was made to derive volume estimates for strata 'CSwalal' and 'CPlABMG' that have been designated as part of the 'small wood' land base. These small wood strata are defined as follows:

- 'CSwalal' – 'A' density and greater than or equal to 15m in height
- 'CPlABMG' – 'A' density, TPR of 'M' or 'G' and a height greater than or equal to 15m

There are insufficnet plots in these strata (two and six respectively) from within forest management unit E8 to derive yield estimates independent of other data. Additional data was borrowed from adjacent FMUs to derive yield estimates for these smallwood strata. The plots available in adjacent FMUs were 69 and 117 for 'CPlABMG' and 'CSwalal', respectively. A guide curve approach was used adjusting the existing 'CSwalal' and 'CPlABMG' curves to fit through the appropriate plot data. The parameter S1 acts as a simple multiplier.

[9] $Con\_Volume = S1*(B1*age^{B2} * \exp(-B1*age))$

Where Con_Volume is the predicted merchantable 13/7 volume,
age is the stand age, calculated as cruise year – AVI origin
b1, b2 are parameters to be estimated.

[10] $Con\_Volume=S1*((b1+G1*H1+g2*H2)*Age**b2)*exp(-b1*age))$

where Con_Volume is the predicted merchantable 13/7 volume,
age is the stand age, calculated as cruise year – AVI origin
b1, b2, h1, h2 are parameters to be estimated.
G1 describes density. G2 describes productivity.

Table 6: Coefficients for yield estimates for the smallwood strata.

F_YC	Equation	G1	G2	B1	B2	H1	H2	S1
CPlABMGS	[10]	0	1	0.014905345	2.345419928	0.005945998	0.001874178	0.786061195
CSwalalS	[9]			0.009070544	2.337805557	0	0	0.606994282

Piece size curves estimates were derived in the same manner. A guide curve approach was used to adjust the existing 'CSwalal' and 'CPlABMG' curves to fit through the appropriate plot data. The parameter S1 acts as a simple multiplier.

[11] Conifer piece size=S1*(B1+(B2/standage))

Where conifer piece size is the merch stems per 13/7 merch volume
standage is the inventory age for the plot,
B1, B2 are parameters to be estimated.

[12] Conifer piece size = S1*((B1+G1*H1+G2*H2)+(B2/standage))

Where conifer piece size is the merch stems per 13/7 merch volume
standage is the inventory age for the plot,
B1, B2, h1, h2 are parameters to be estimated.
G1 describes open (B=0) / closed (C+D=1) stands
G2 describes poor (F=0) / rich (MG=1) stands

Table 7: Coefficients for piece size estimates for the smallwood strata.

F_YC	Equation	G1	G2	B1	B2	H1	H2	S1
CPlABMGS	[12]	0	1	3.172533666	490.9504728	-0.880964418	-2.64139471	1.170763211
CSwalalS	[11]			0.359998067	501.8015507			0.997436003

Graphs showing the yield estimates and the individual piece size curves for the small wood land base can be found in Appendices 5 and 6.

6.0 ..... MPB Scenario Yield Estimates

A request was made to derive volume estimates for all yield strata without including pine volume. Plot data was re-compiled excluding pine volumes. A guide curve approach was used adjusting the existing yield estimates to fit the new pine free compiled data. The parameter MPB06 acts as a simple multiplier.

Table 8: MPB scenario conifer yield multipliers for yield estimates excluding pine.

F_YC	MPB06
CPlABF	0.584541577
CPlABMG	0.369164271
CPlCDF	0.166420195
CPlCDMG	0.106657201
CSbalal	0.715712291
CSwalal	0.853416109
CDMxalal	0.187228784
DCMxalal	0.30906747
DAwalal	0.493841866
CPlABMGS	0.369164271
CSwalalS	0.853416109

The corresponding graphs can be found in Reference Section 7.

6.1 Area Weighted MPB Scenario Yield Curve

Area-weighted composites were also produced for all conifer-leading yield curves for the MPB scenario yield estimates. Volumes per five year age class and yield stratum were weighted by the total area for the appropriate land base definition, and then summed to produce a single landscape-level curve.

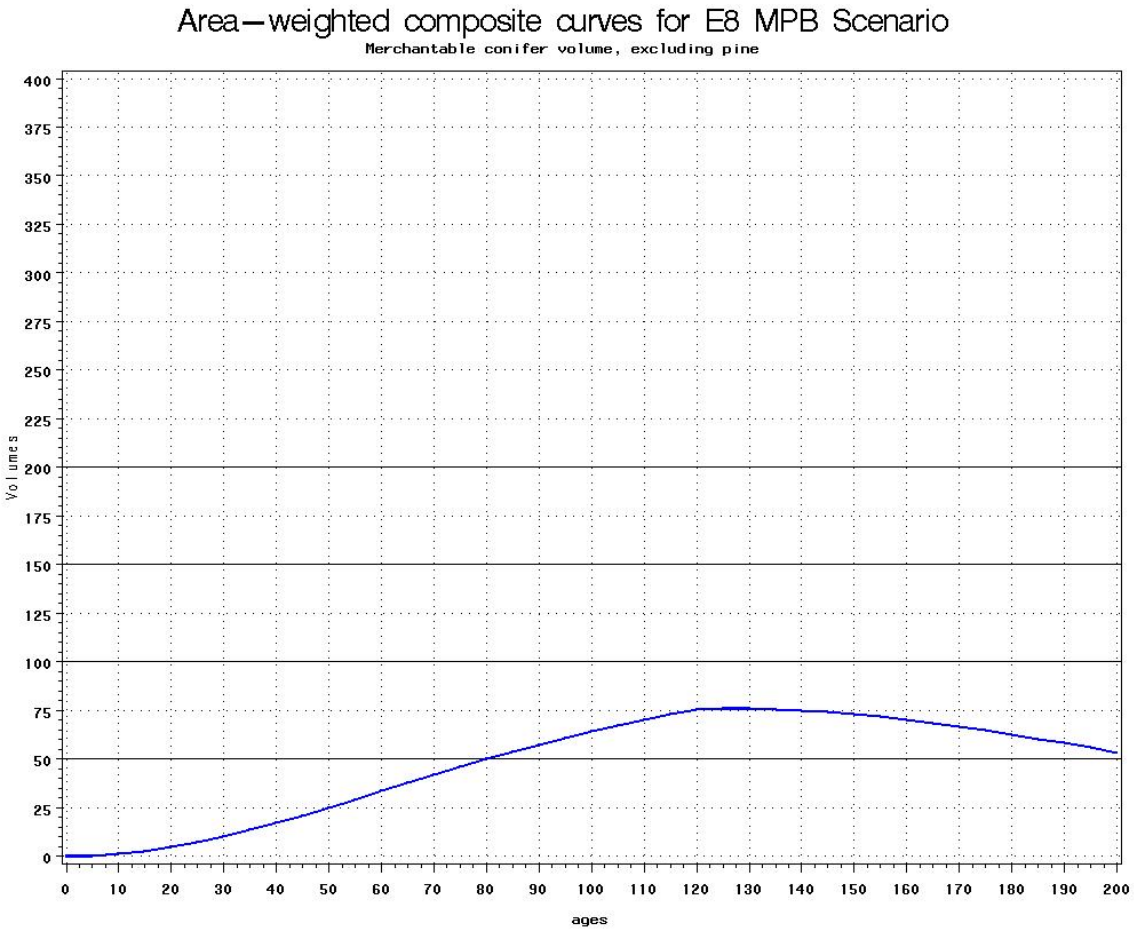


Figure 3: Area Weighted composite Yield Curve for conifer land base from MPB scenario yields.

5.0 ..... Future direction for the project:

The biggest weakness with the approach used for this project is the data used to predict the yield relationships. In many cases, there was not enough data in yield strata and age classes to develop definitive relationships. The additional changes in the net land base amplified this issue. More local data from a stratified random sampling program would improve the fit for many of these yield curves.

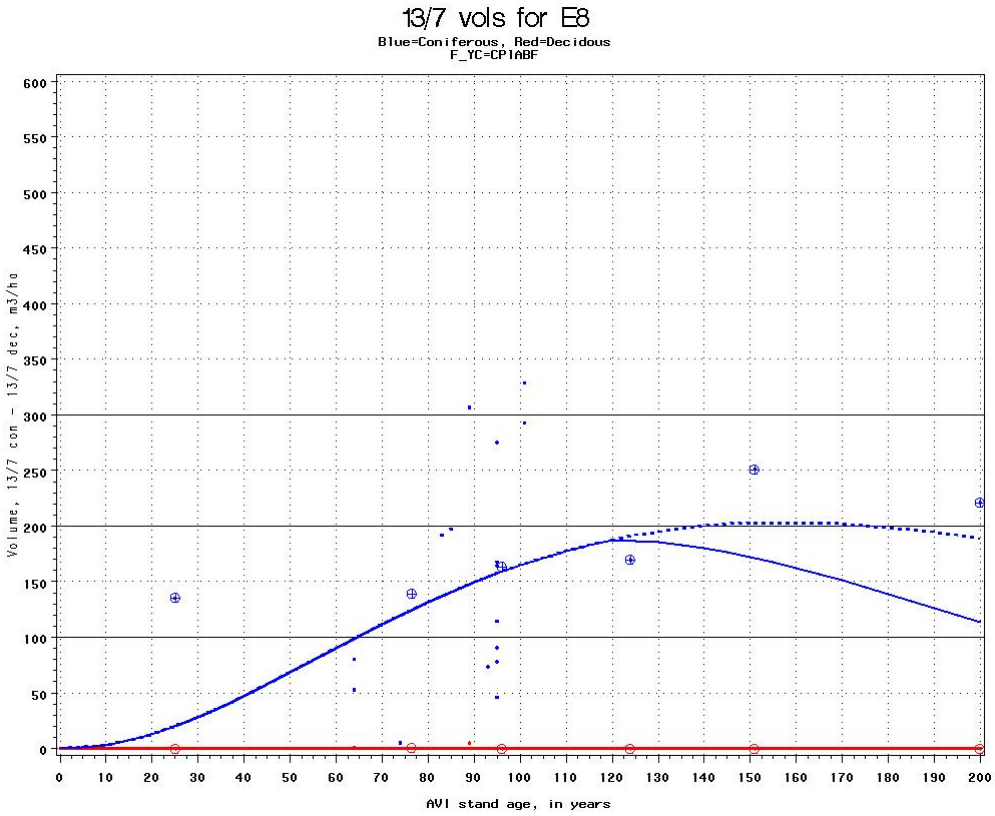
There isn't a mechanism to incorporate the juvenile growth estimates from the large amount of harvested area to ensure that these stands will grow to match the standing timber estimates. This is a big assumption that is not likely going to be answered until the harvested or burned PSPs reach merchantable age, or are predicted in an approved growth model.

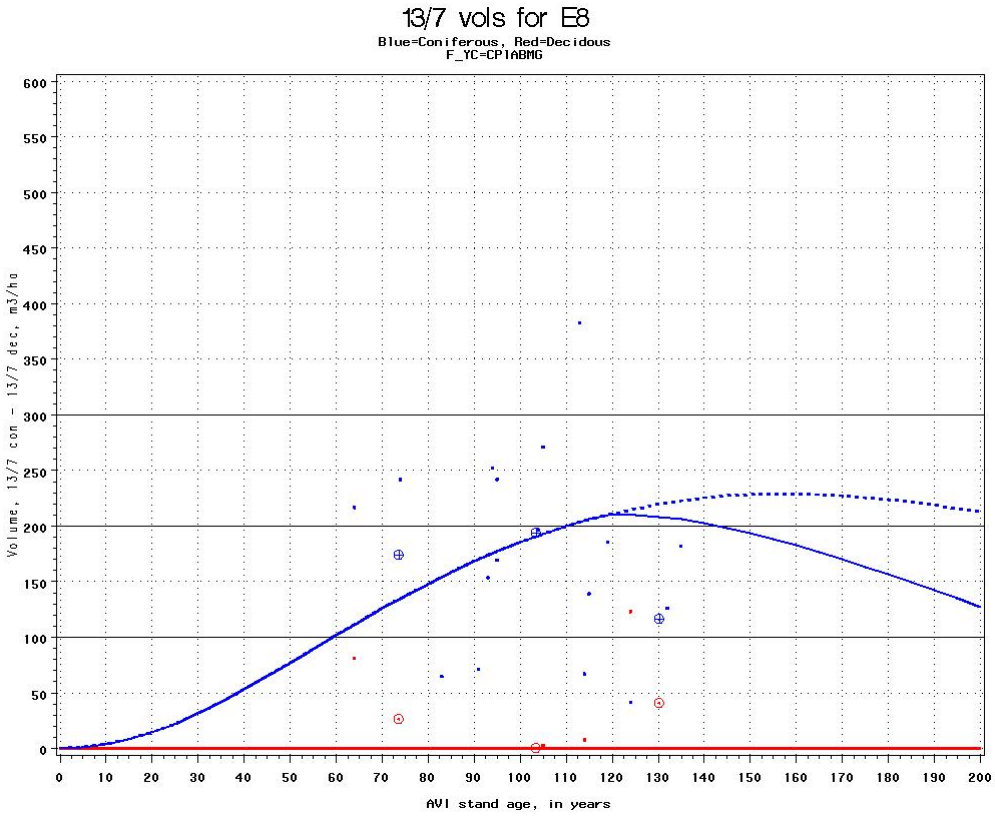
The variation seen in the yield curves and piece size analysis is another big issue. While the average trends are relatively consistent, the variation is pretty high. A larger sample size may eliminate the need to use a guide-curve approach to produce a biologically reasonable yield curve.

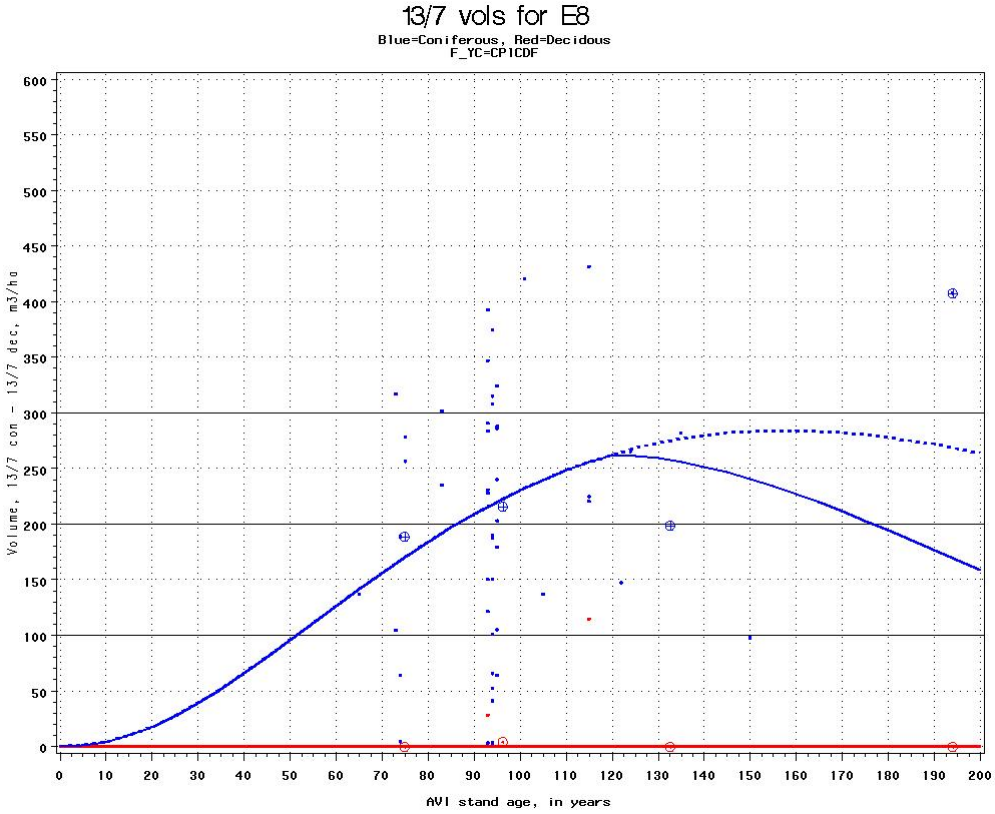
Refererence Section 1:Empirical 13/7 yield estimates for the E8 NLB

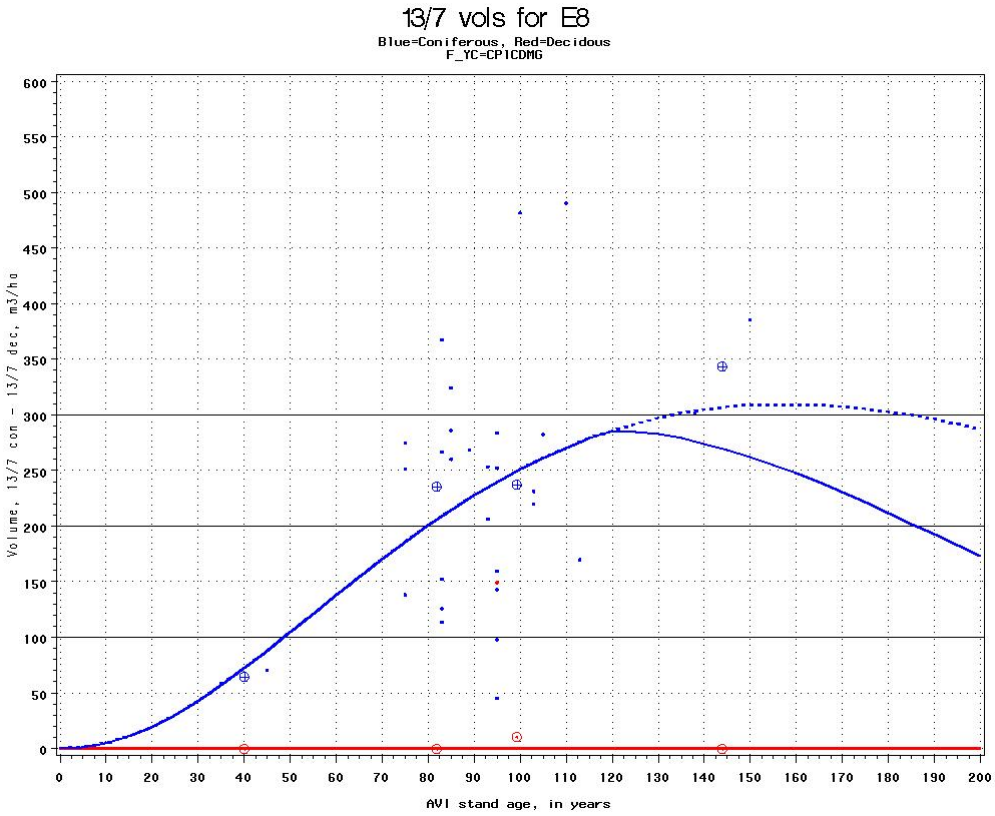
Legend:

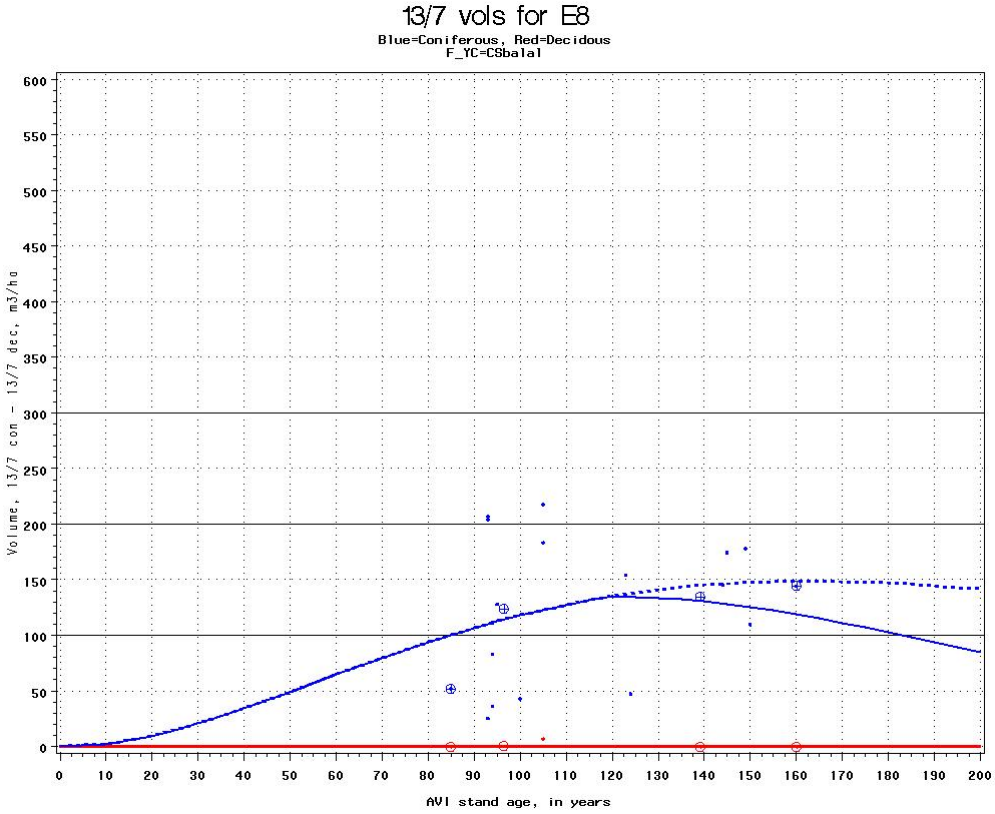
Blue line = capped volumes **Dashed blue line** = 13/7 conifer volumes.	**Red line** = 13/7 deciduous volumes
Blue point = observed 13/7 conifer plot volumes	**Red point** = Observed 13/7 deciduous plot volumes
Circled + = Average conifer volume by 30 year age class	**Circled -** = Average deciduous volume by 30 year age class

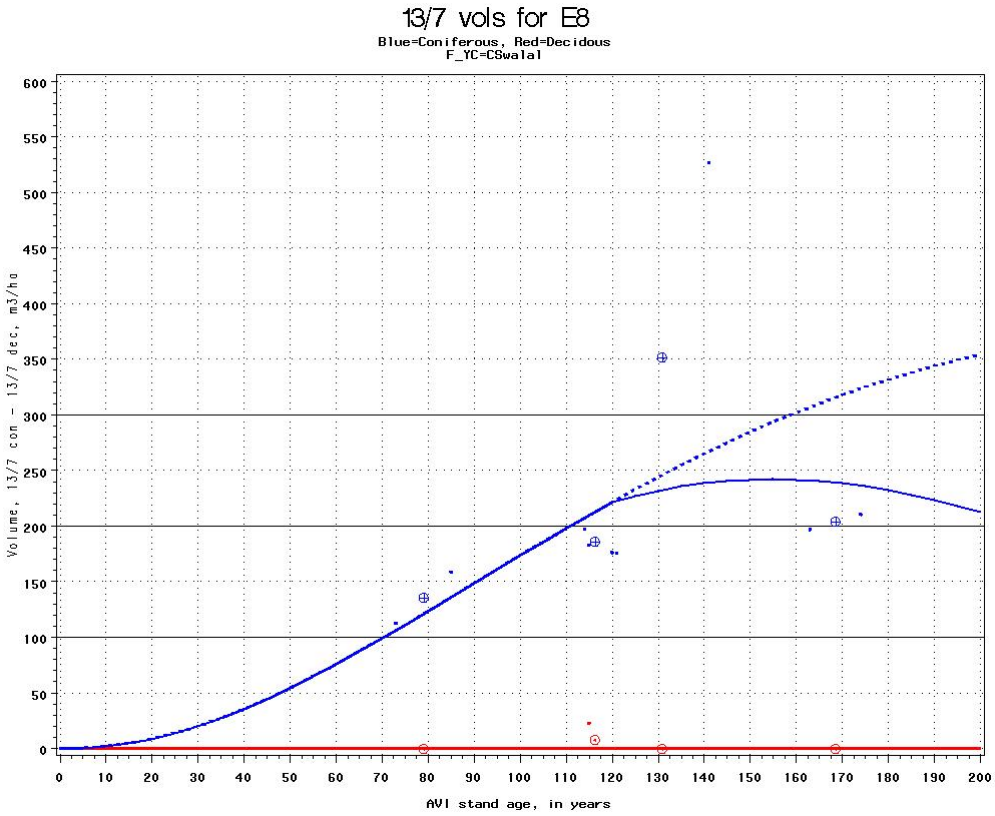



13/7 vols for E8
Blue=Coniferous, Red=Deciduous
F_YC=CP1ABMG
Volume, 13/7 con - 13/7 dec, m3/ha
AVI stand age, in years


13/7 vols for E8
Blue=Coniferous, Red=Deciduous
F_YC=CP1CDF
Volume, 13/7 con - 13/7 dec, m3/ha
AVI stand age, in years


13/7 vols for E8
Blue=Coniferous, Red=Deciduous
F_YC=CP1CDMG
Volume, 13/7 con - 13/7 dec, m3/ha
AVI stand age, in years

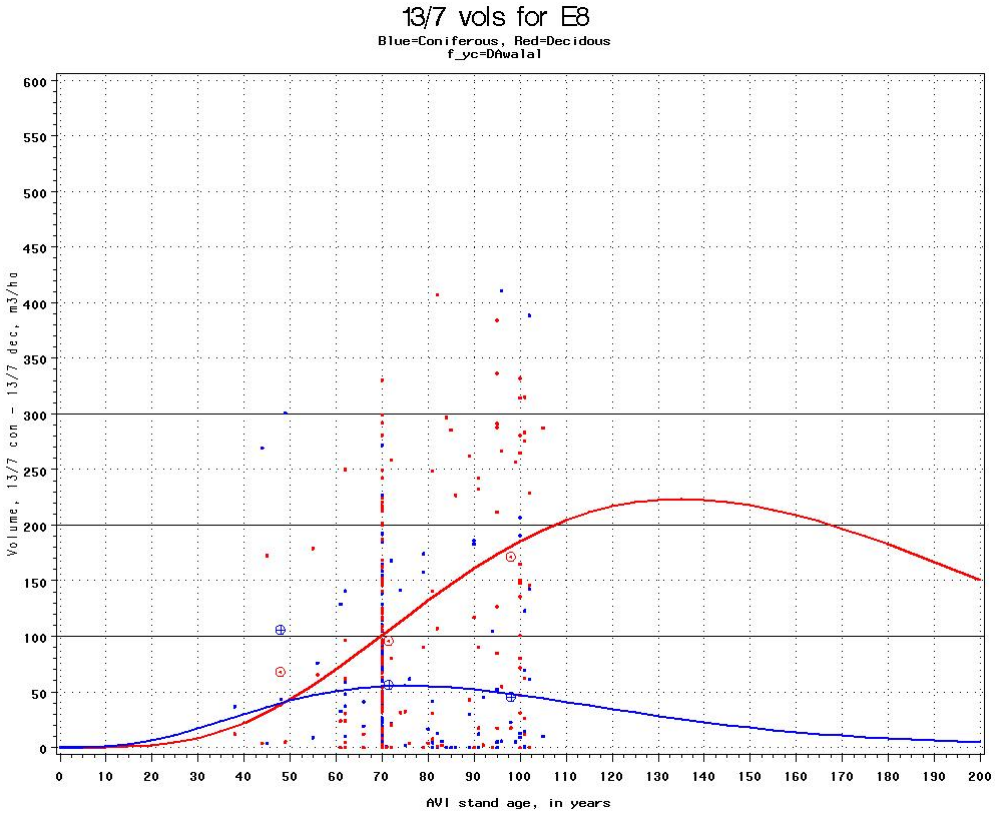

13/7 vols for E8
Blue=Coniferous, Red=Deciduous
F_YC=CSbalal
Volume, 13/7 con - 13/7 dec, m3/ha
AVI stand age, in years

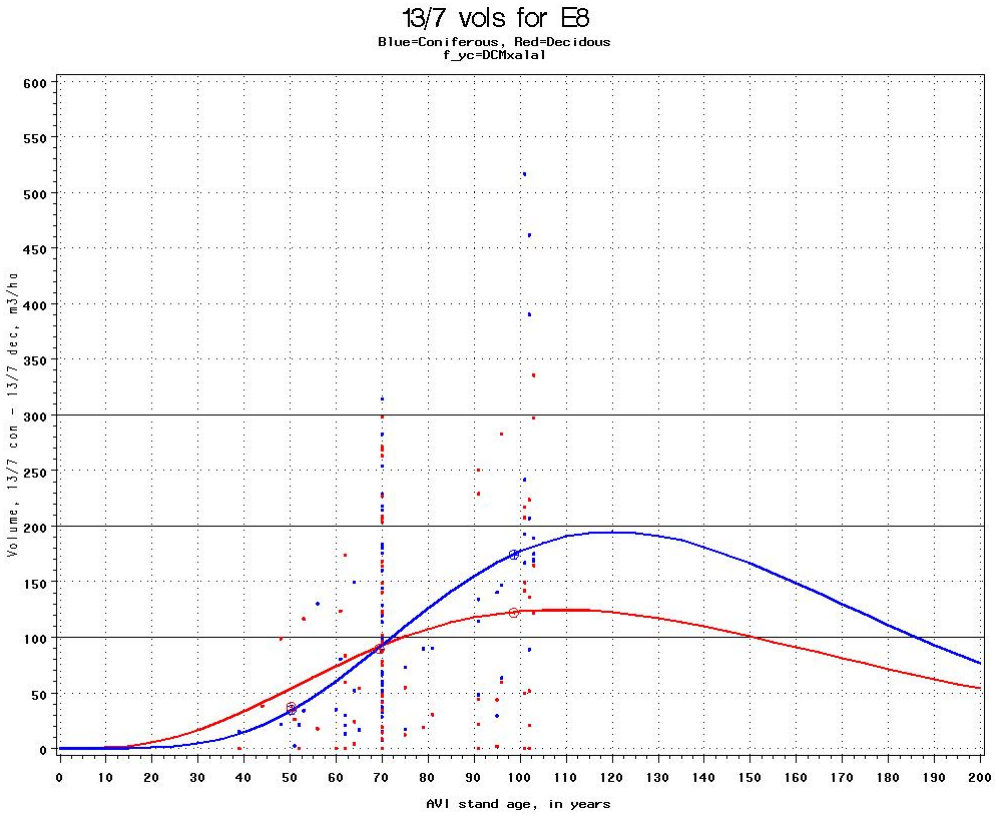

13/7 vols for E8
Blue=Coniferous, Red=Deciduous
F_YC=CSwalal
Volume, 13/7 con - 13/7 dec, m3/ha
AVI stand age, in years
0
50
100
150
200
250
300
350
400
450
500
550
600
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200

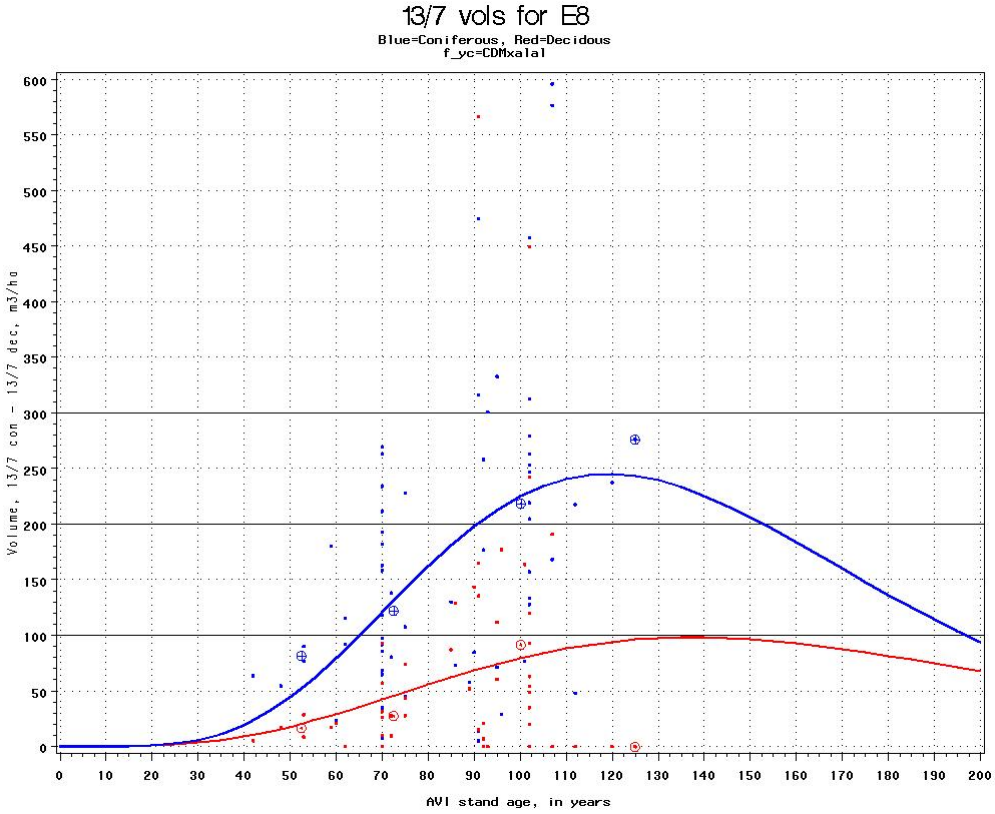
Reference Section 2:Regional 13/7 yield estimates for CD,DC and D stands

Legend:

Blue line = 13/7 conifer volumes	**Red line** = 13/7 deciduous volumes
Blue point = observed 13/7 conifer plot volumes	**Red point** = Observed 13/7 deciduous plot volumes
Circled + = Average conifer volume by 30 year age class	**Circled -** = Average deciduous volume by 30 year age class



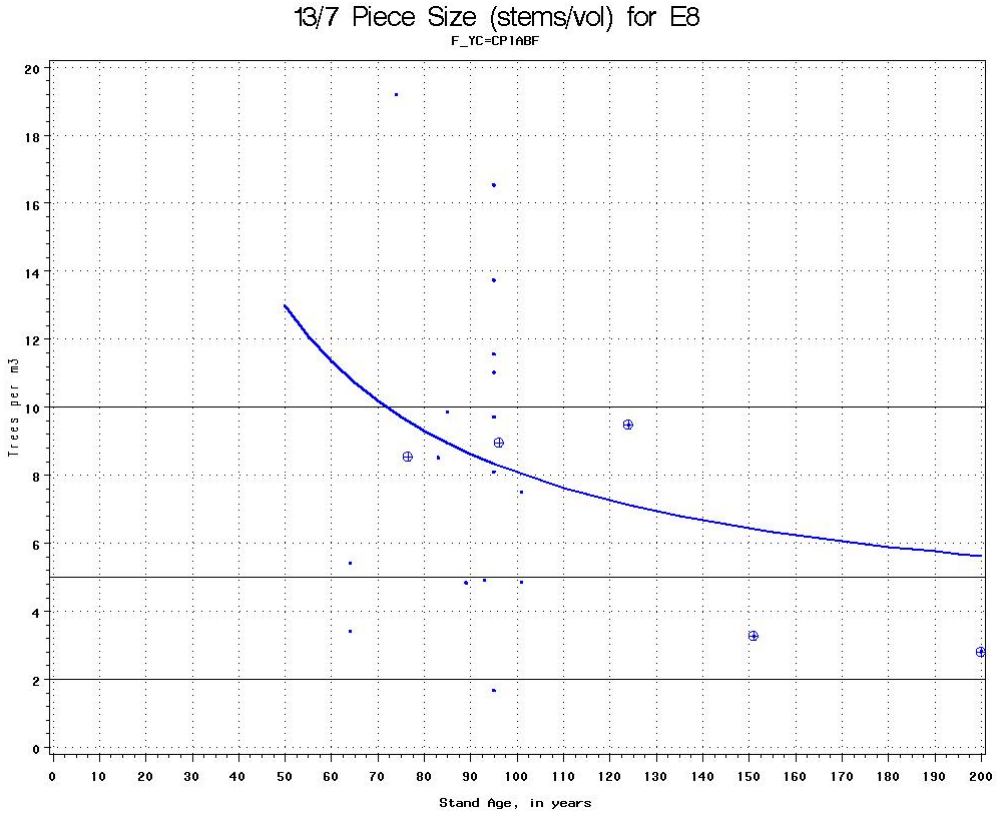

13/7 vols for E8
Blue=Coniferous, Red=Deciduous
f_yc=DCMxalal
Volume, 13/7 con - 13/7 dec, m3/ha
AVI stand age, in years

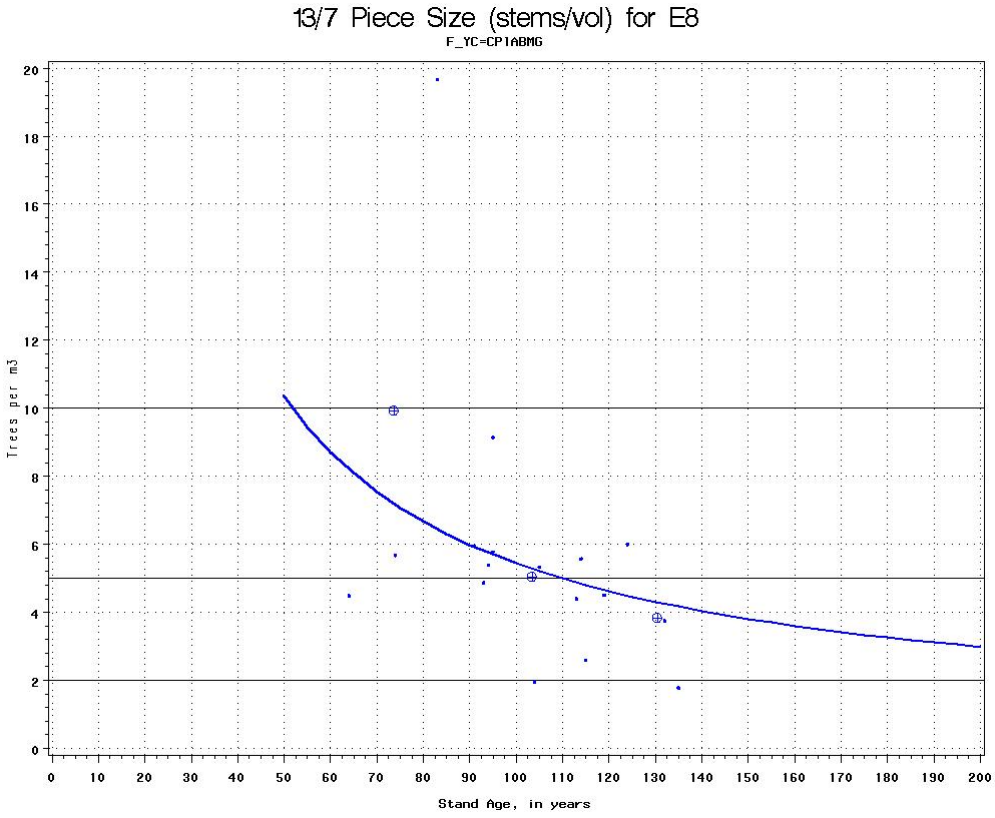

13/7 vols for E8
Blue=Coniferous, Red=Deciduous
f_yc=CDMxalal
Volume, 13/7 con - 13/7 dec, m3/ha
AVI stand age, in years

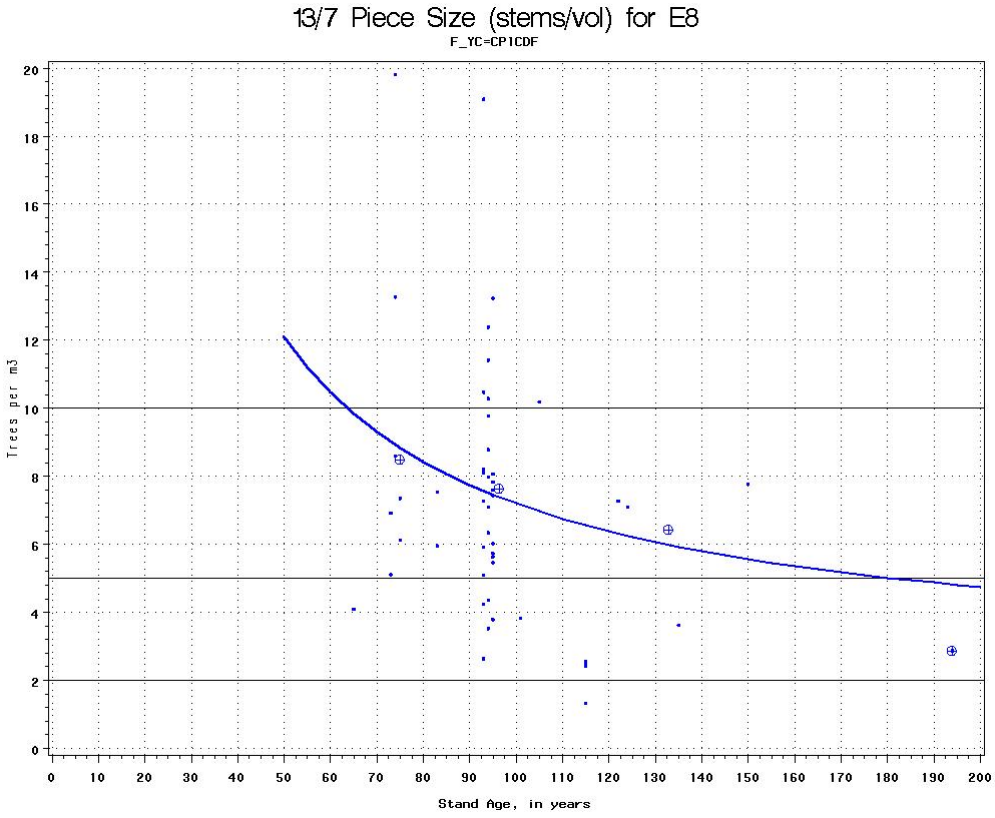
Reference Section 3: Conifer piece size estimates for the final NLB

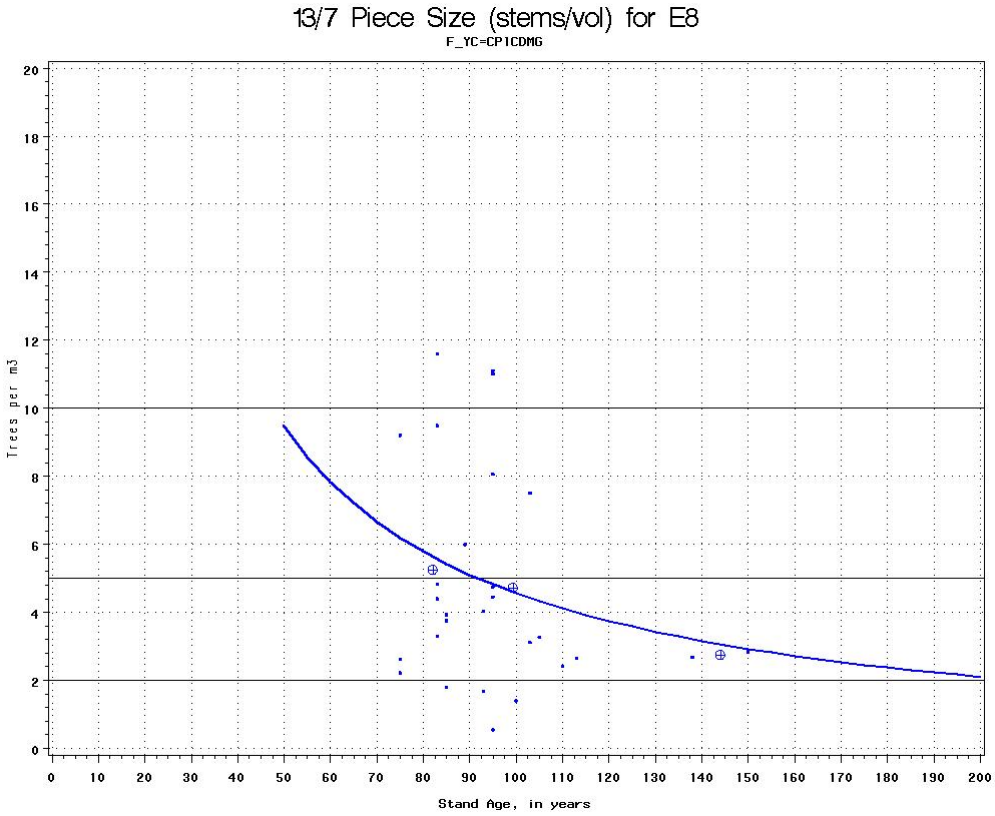
Legend:

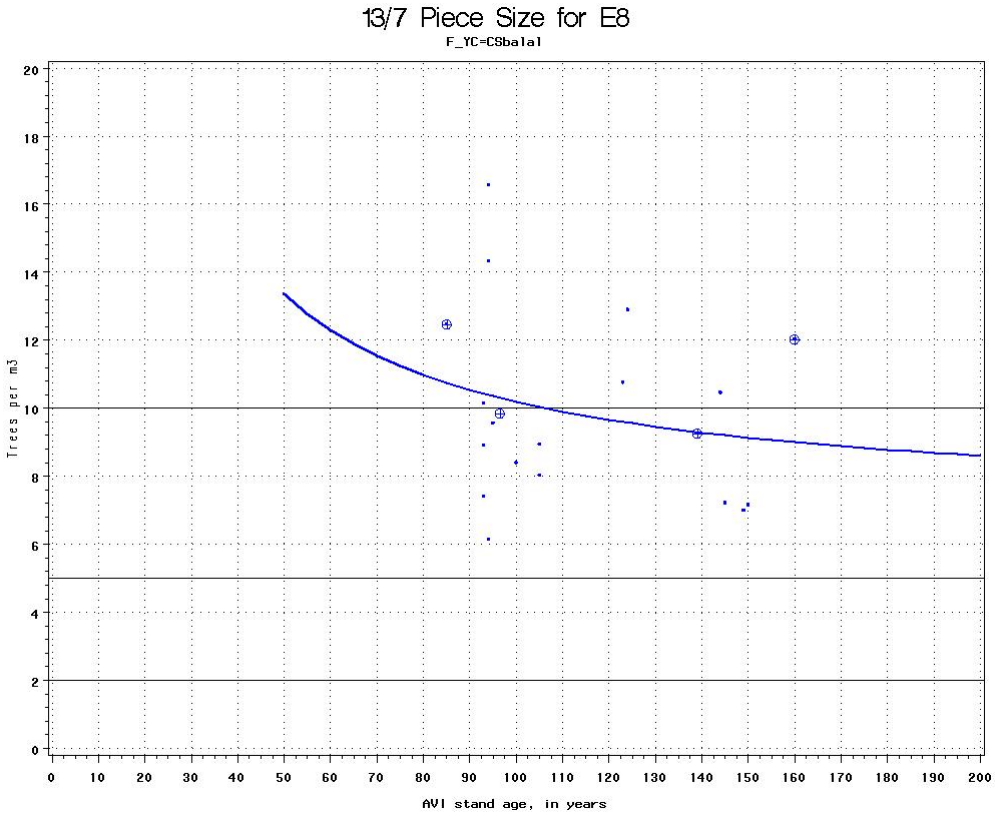
Blue line = 13/7 conifer piece sizes
Blue point = observed 13/7 conifer piece sizes from plots
Circled + = Average conifer piece size by 30 year age class

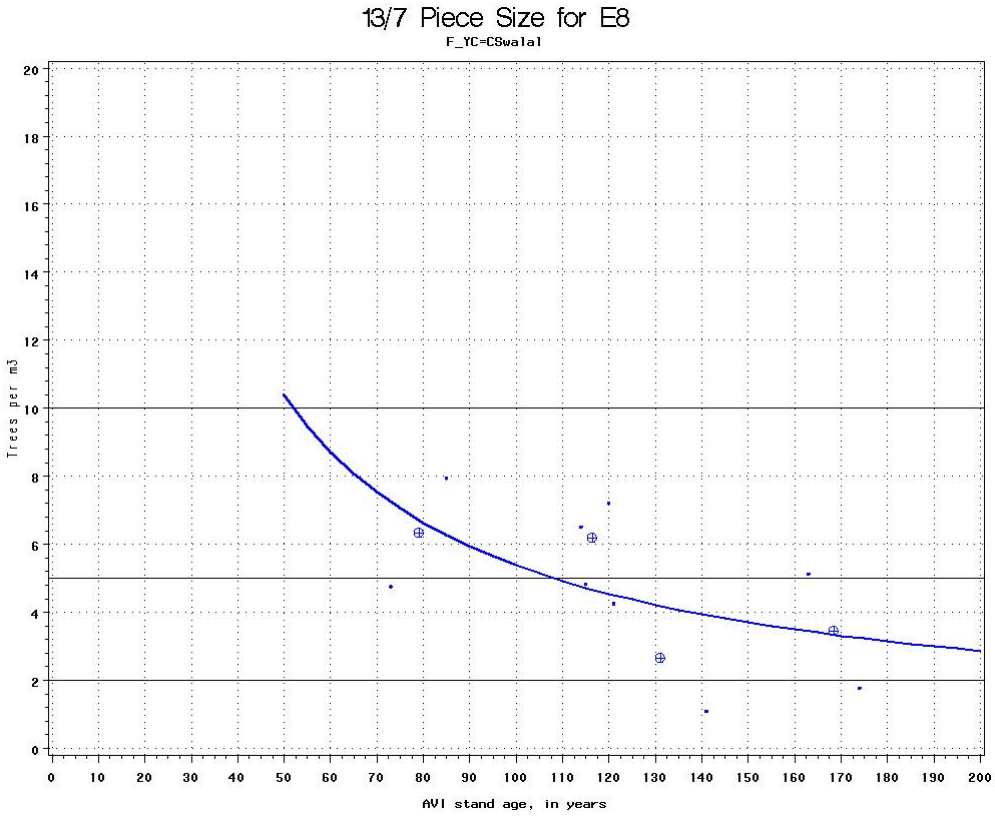



13/7 Piece Size (stems/vol) for E8
F_YC=CP1ABMG
Trees per m3
Stand Age, in years


13/7 Piece Size (stems/vol) for E8
F_YC=CP1CDF
Trees per m3
Stand Age, in years


13/7 Piece Size (stems/vol) for E8
F_YC=CP1CDMG
Trees per m3
Stand Age, in years

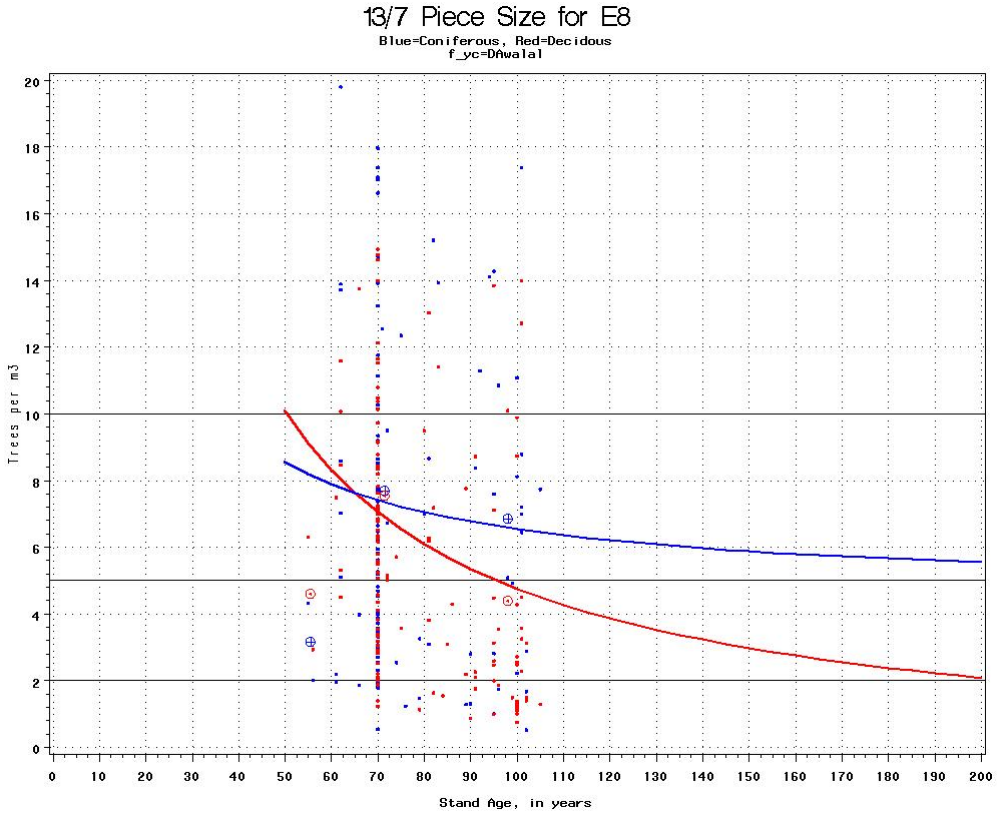

13/7 Piece Size for E8
F_YC=CSbalal
Trees per m3
AVI stand age, in years

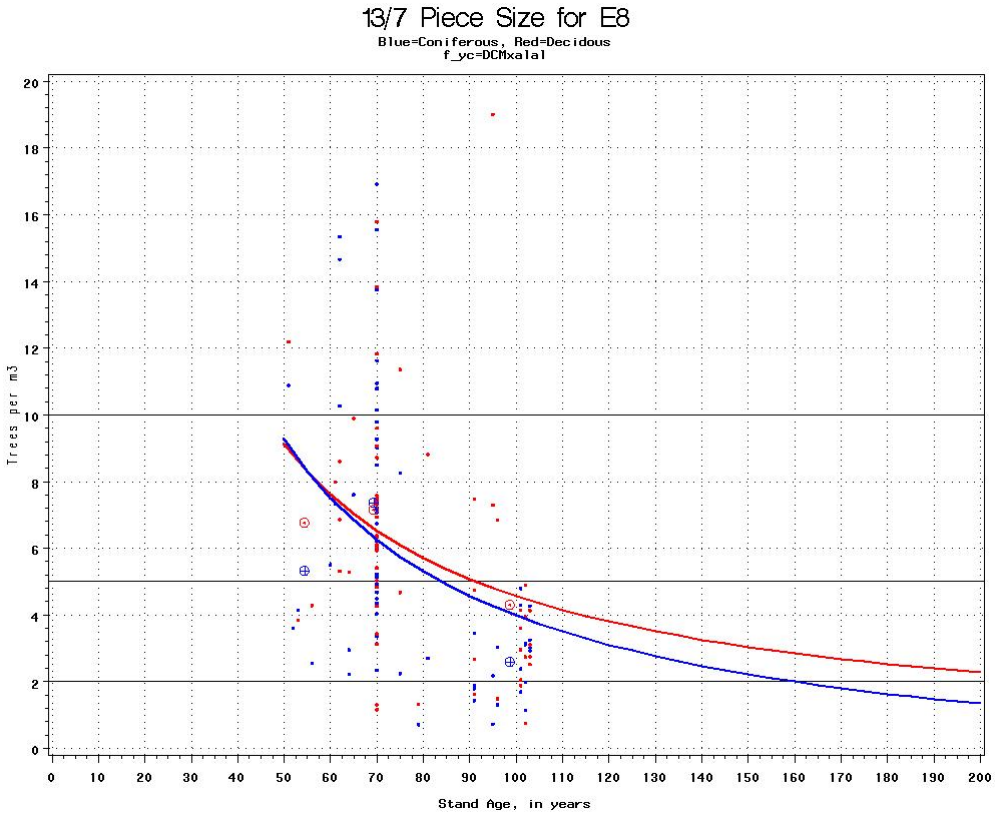

13/7 Piece Size for E8
F_YC=CSwalal
Trees per m3
AVI stand age, in years
0
2
4
6
8
10
12
14
16
18
20
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200

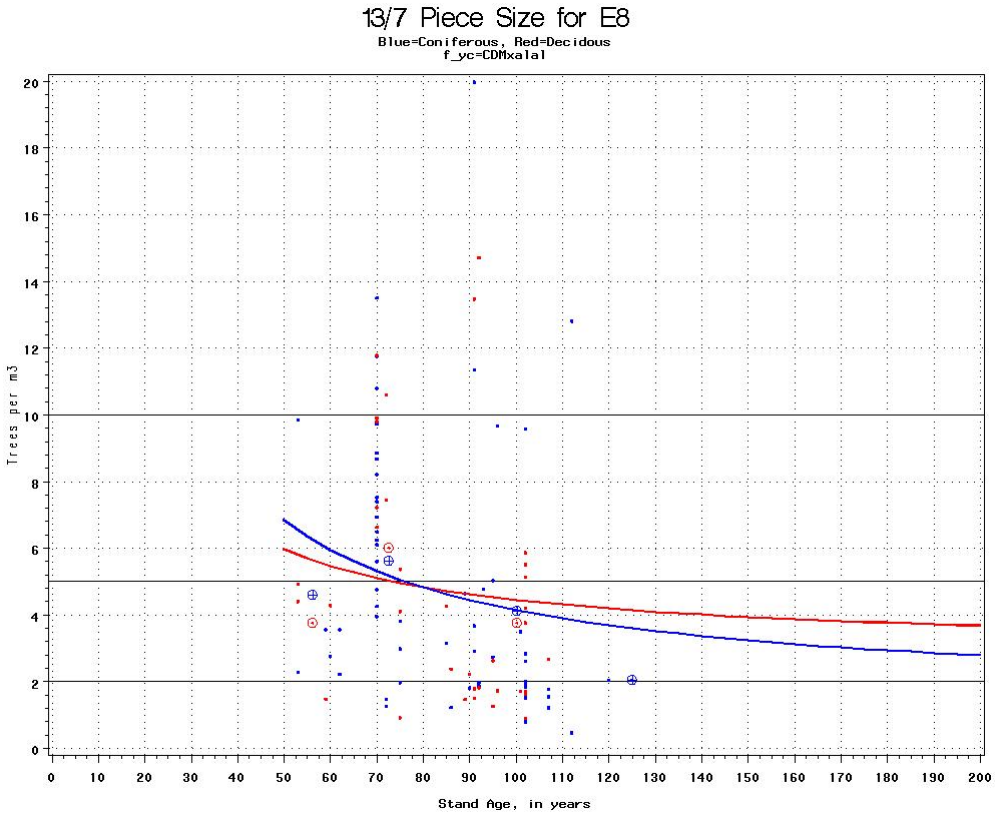
Reference Section 4:Regional piece size estimates for the CD, DC and D strata

Legend:

Blue line = 13/7 conifer piece size	**Red line** = 13/7 deciduous piece size
Blue point = observed 13/7 conifer piece size from plots	**Red point** = Observed 13/7 deciduous piece size from plots
Circled + = Average conifer piece size by 30 year age class	**Circled -** = Average deciduous piece size by 30 year age class



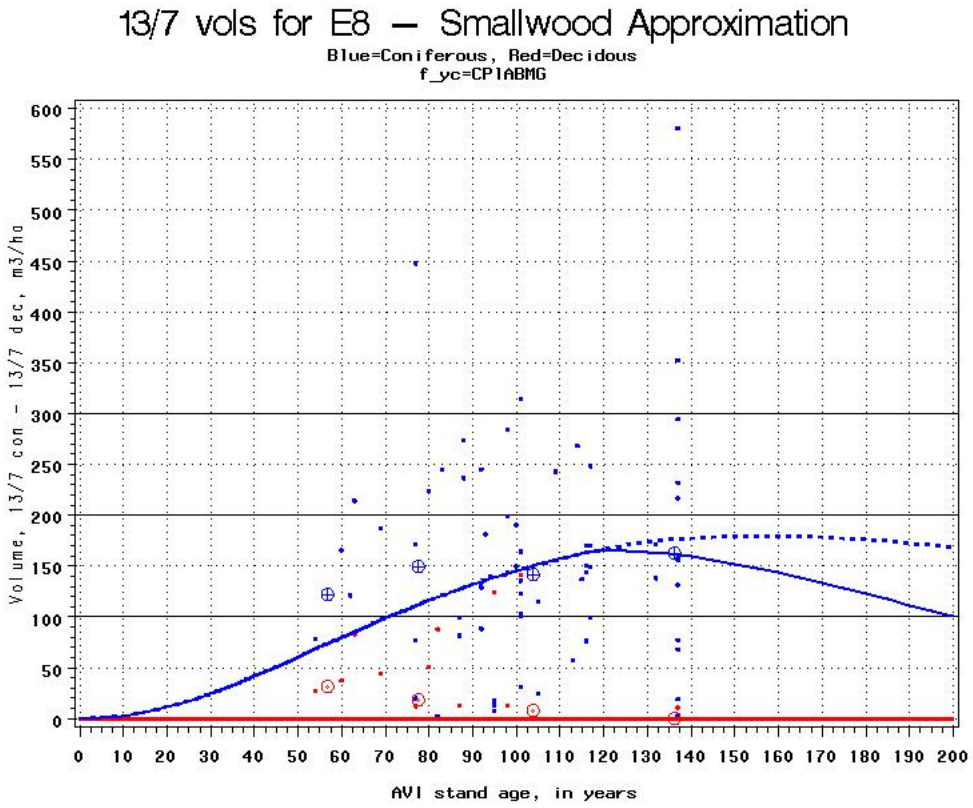

13/7 Piece Size for E8
Blue=Coniferous, Red=Deciduous
f_yc=DCMxalal
Trees per m3
Stand Age, in years

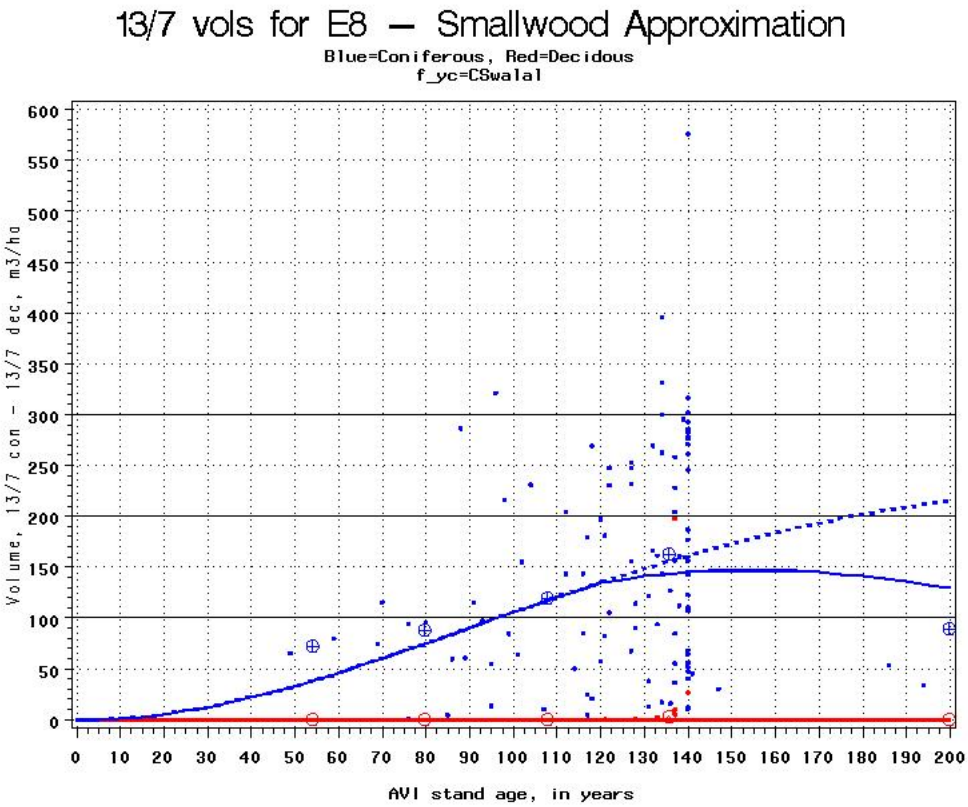

13/7 Piece Size for E8
Blue=Coniferous, Red=Deciduous
f_yc=CDMxalal
Trees per m3
Stand Age, in years

Reference Section 5:.....Smallwood land base yield estimates

Legend:

Blue line = 13/7 conifer volumes	**Red line** = 13/7 deciduous volumes
Blue point = observed 13/7 conifer plot volumes	**Red point** = Observed 13/7 deciduous plot volumes
Circled + = Average conifer volume by 30 year age class	**Circled -** = Average deciduous volume by 30 year age class




13/7 vols for E8 — Smallwood Approximation
Blue=Coniferous, Red=Deciduous
f_yc=CSwalal
Volume, 13/7 con - 13/7 dec, m3/ha
600
550
500
450
400
350
300
250
200
150
100
50
0
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200
AVI stand age, in years

Reference Section 6:.....Smallwood land base piece size estimates

Legend:

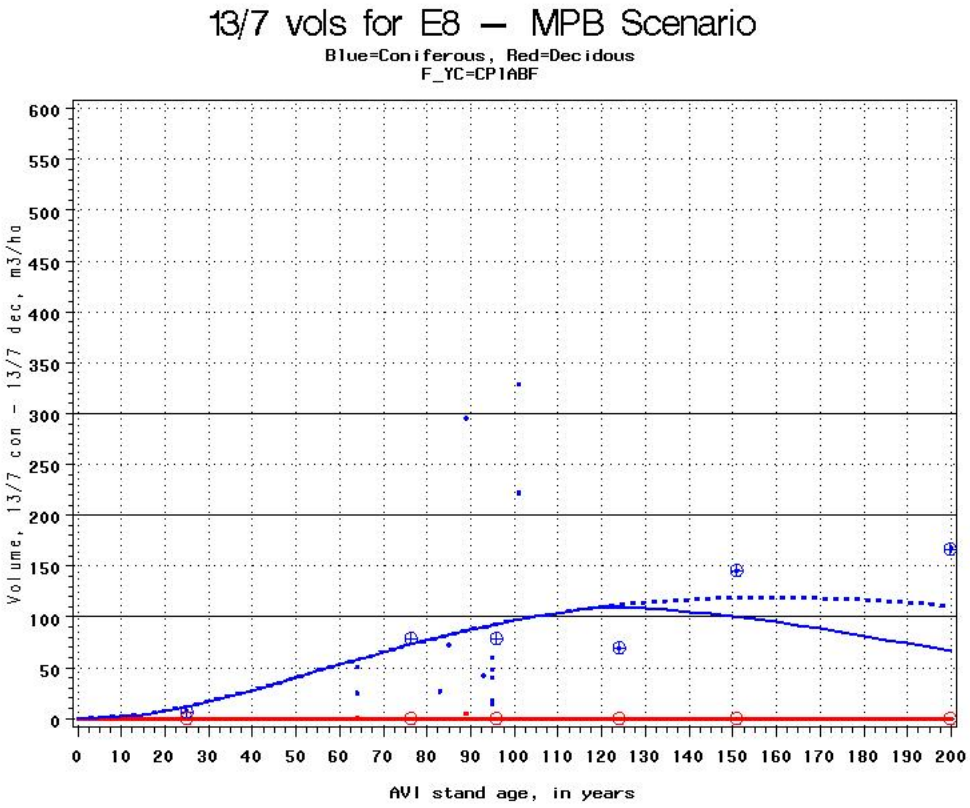
Blue line = 13/7 conifer piece size	**Red line** = 13/7 deciduous piece size
Blue point = observed 13/7 conifer piece size from plots	**Red point** = Observed 13/7 deciduous piece size from plots
Circled + = Average conifer piece size by 30 year age class	**Circled -** = Average deciduous piece size by 30 year age class

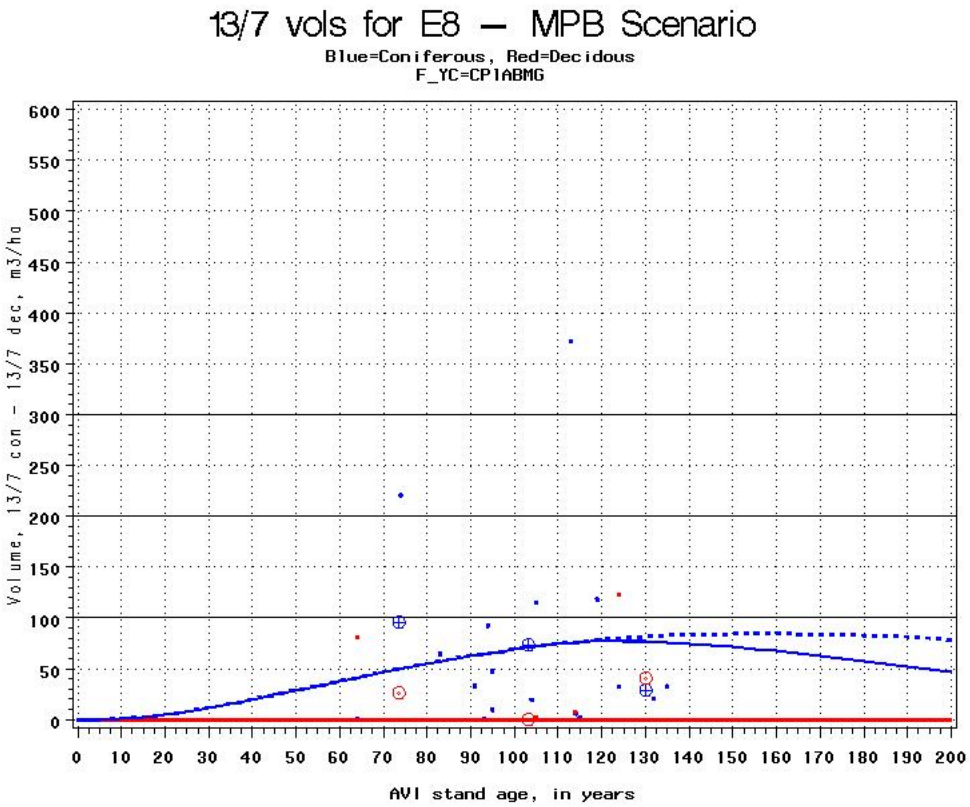

13/7 Piece Size for E8 Smallwood Landbase
f_yc=CSwalal
Trees per m3
Stand Age, in years
0
2
4
6
8
10
12
14
16
18
20
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200

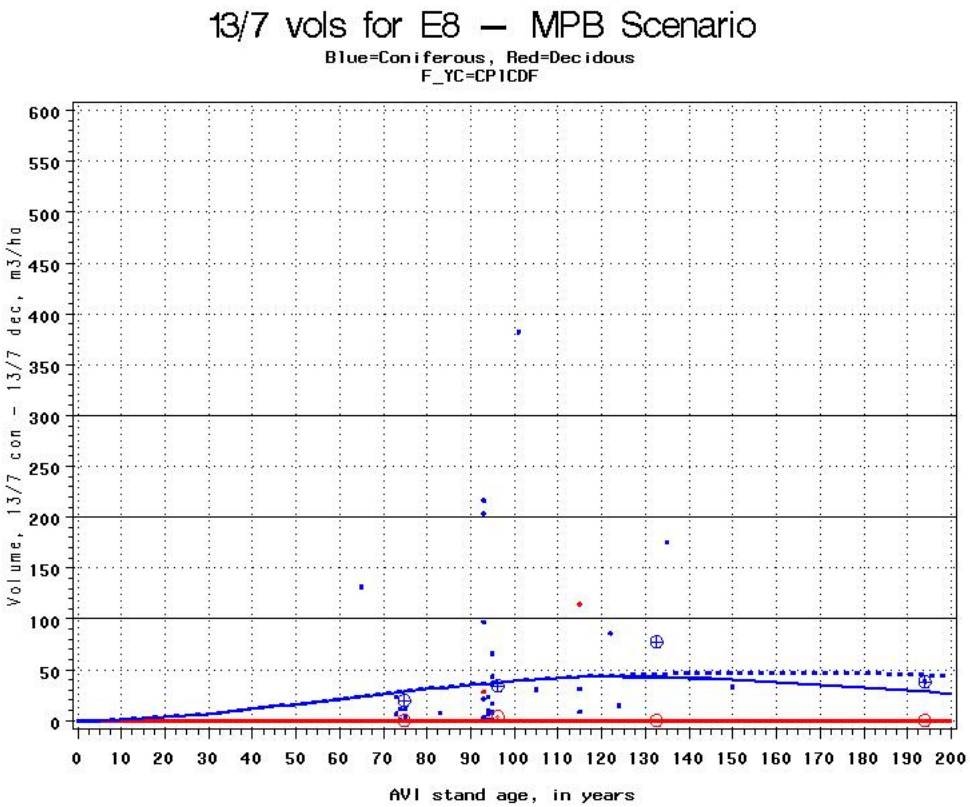
Reference Section 7:..... MPB scenario yield estimates

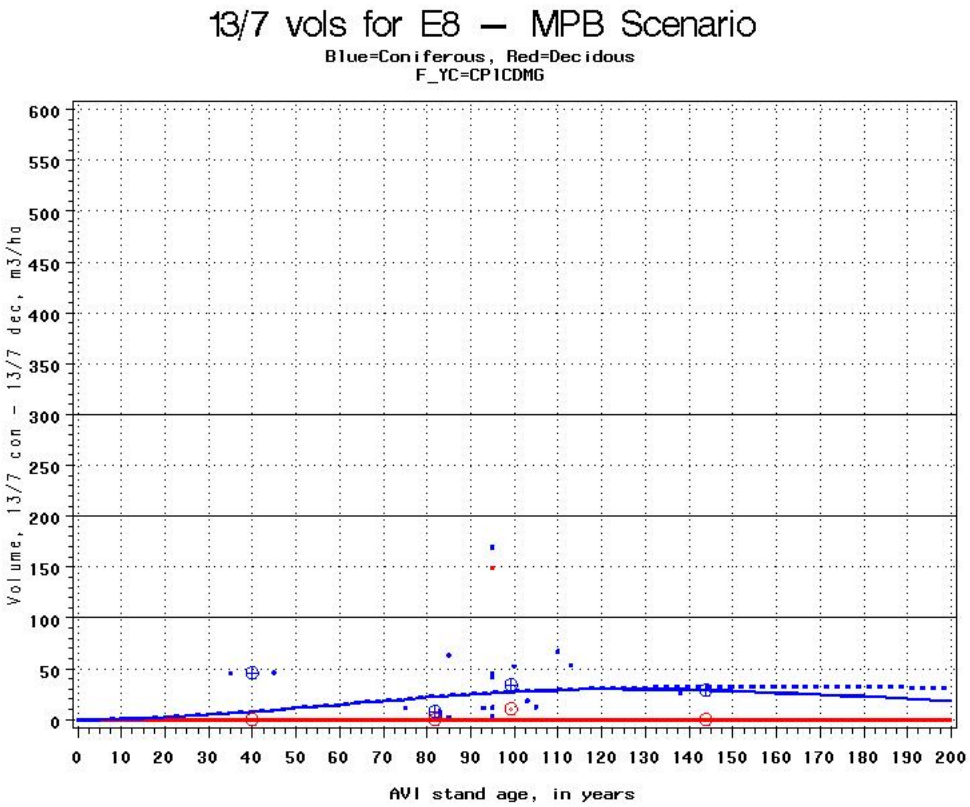
Legend:

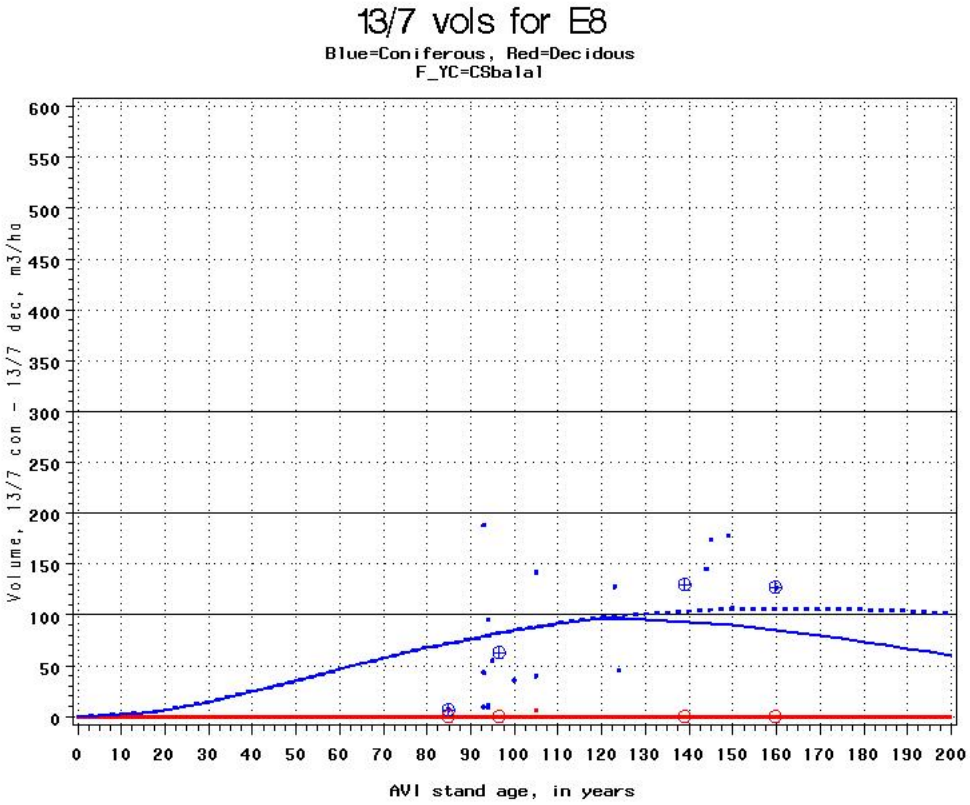
Blue line = 13/7 conifer volumes	**Red line** = 13/7 deciduous volumes
Blue point = observed 13/7 conifer plot volumes	**Red point** = Observed 13/7 deciduous plot volumes
Circled + = Average conifer volume by 30 year age class	**Circled -** = Average deciduous volume by 30 year age class

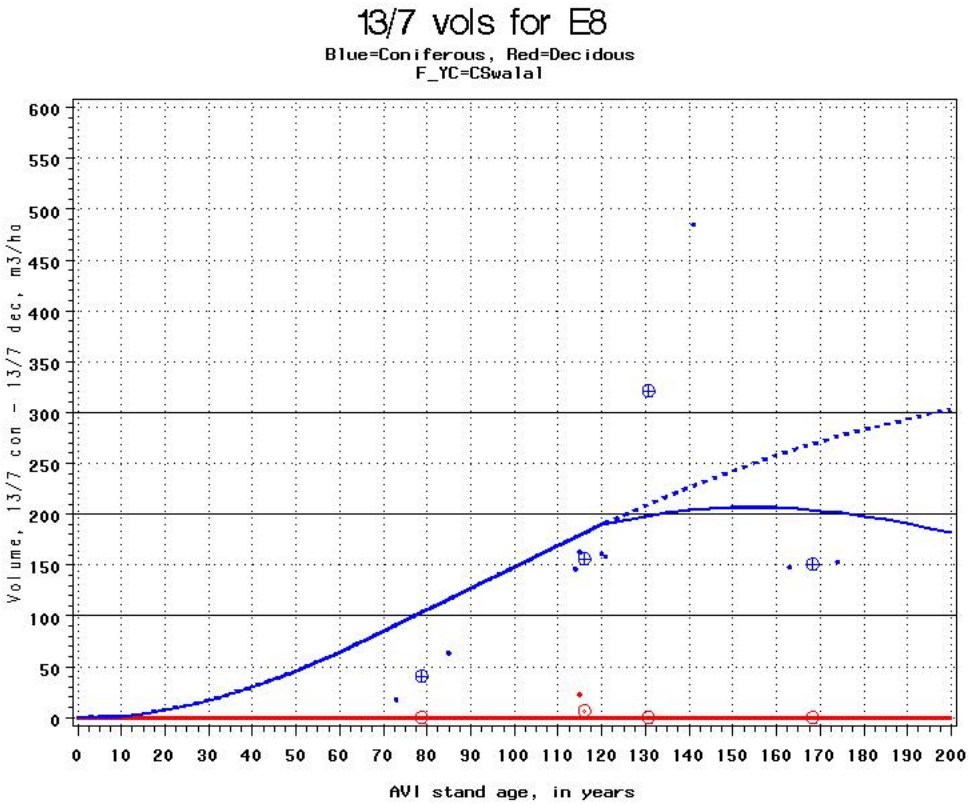


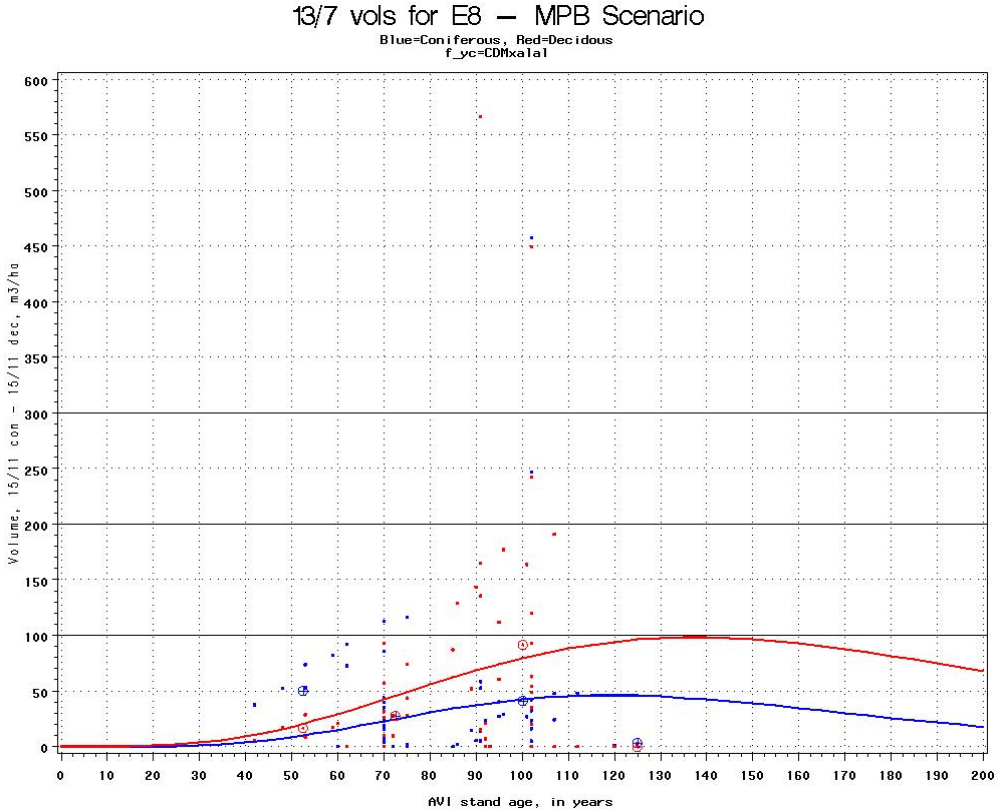

13/7 vols for E8 – MPB Scenario
Blue=Coniferous, Red=Decidous
F_YC=CP1ABMG
Volume, 13/7 con - 13/7 dec, m3/ha
AVI stand age, in years

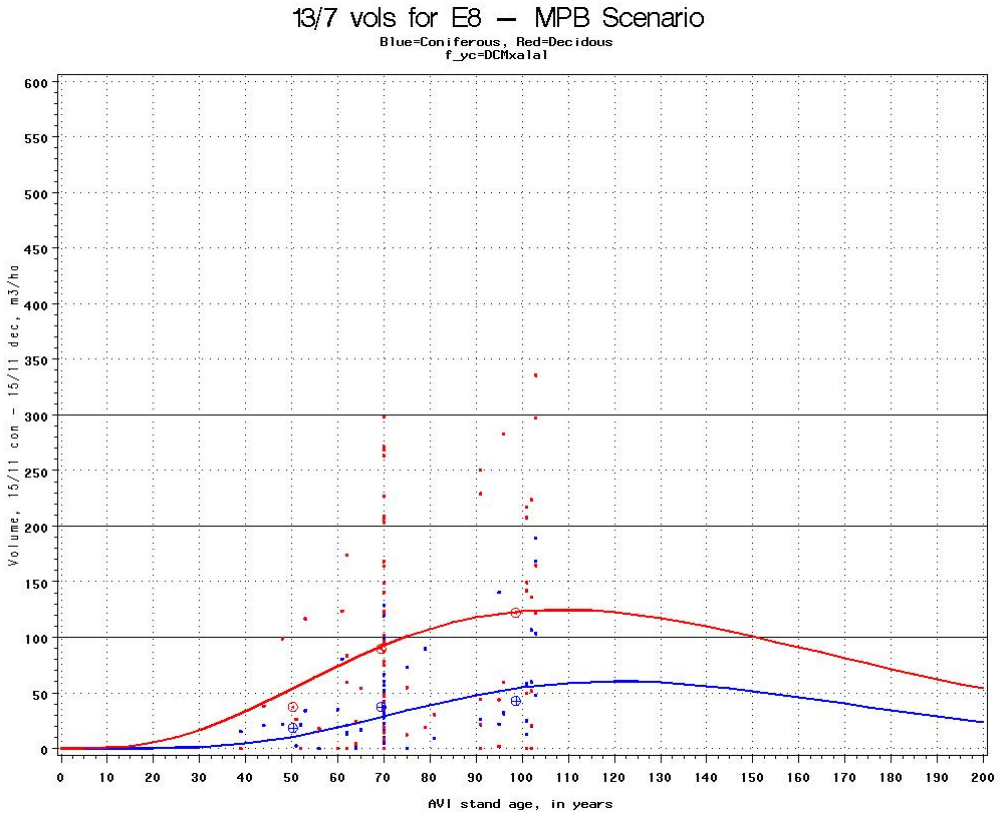

13/7 vols for E8 – MPB Scenario
Blue=Coniferous, Red=Decidous
F_YC=CP1CDF
Volume, 13/7 con - 13/7 dec, m3/ha
AVI stand age, in years

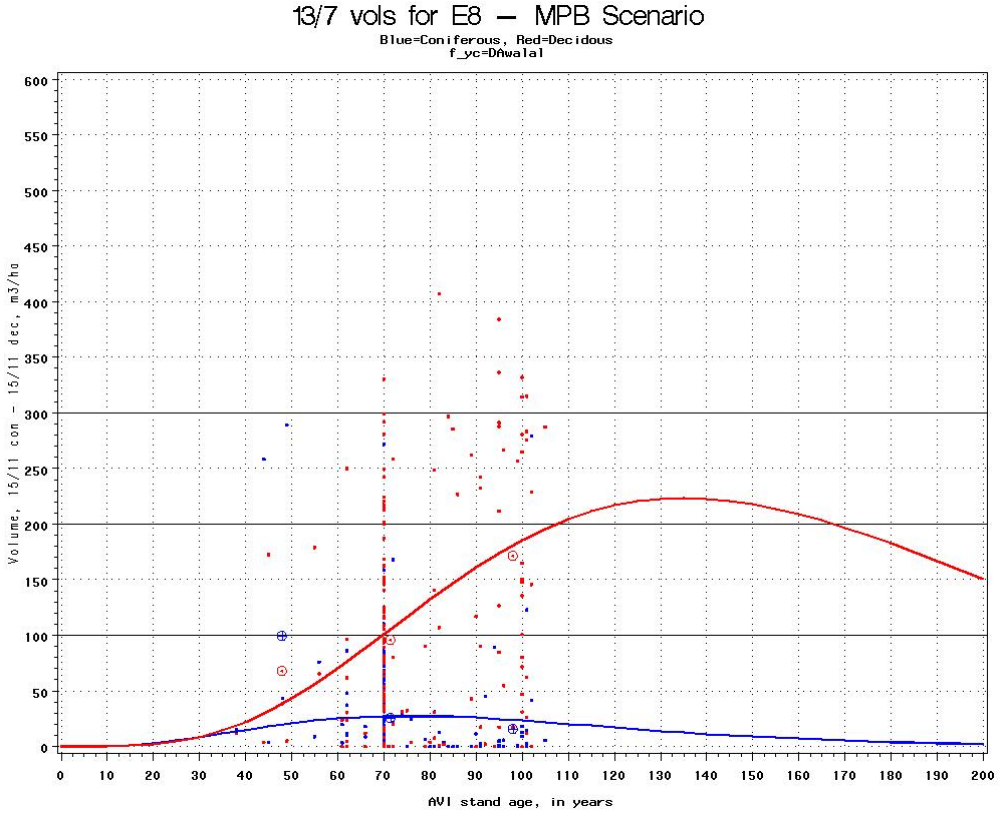

13/7 vols for E8 — MPB Scenario
Blue=Coniferous, Red=Decidous
F_YC=CPICDMG
Volume, 13/7 con - 13/7 dec, m3/ha
AVI stand age, in years


13/7 vols for E8
Blue=Coniferous, Red=Decidous
F_YC=CSbalal
Volume, 13/7 con - 13/7 dec, m3/ha
AVI stand age, in years


13/7 vols for E8
Blue=Coniferous, Red=Decidous
F_YC=CSwalal
Volume, 13/7 con - 13/7 dec, m3/ha
AVI stand age, in years


13/7 vols for E8 – MPB Scenario
Blue=Coniferous, Red=Decidous
f_yc=CDMxalal
Volume, 15/11 con - 15/11 dec, m3/ha
AVI stand age, in years


13/7 vols for E8 – MPB Scenario
Blue=Coniferous, Red=Decidous
f_yc=DCMxalal
Volume, 15/11 con - 15/11 dec, m3/ha
AVI stand age, in years


13/7 vols for E8 – MPB Scenario
Blue=Coniferous, Red=Decidous
f_yc=DAwalal
Volume, 15/11 con - 15/11 dec, m3/ha
AVI stand age, in years