



MISTIK MANAGEMENT LTD.

2019 20-YEAR FOREST MANAGEMENT PLAN

Volume II Document II- Forest Development



2019 FOREST MANAGEMENT PLAN – VOLUME II

Forest Development

for the

Mistik and L&M Forest Management Agreement (FMA) Areas



For the 20-year period from April 1, 2019 to March 31, 2039

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Library and Archives Canada Cataloguing in Publication

Nesdoly, Roger G., 1954
Mistik Management Ltd. 2019: 20-year forest management plan / Roger G. Nesdoly.

Includes bibliographical references.
Title: Mistik Management Ltd. 2019 20-Year Forest Management Plan Vol II Forest Development
ISBN (Vol II Forest Development)



Changes Since Previous Submission

This document was previously submitted to Saskatchewan Ministry of Environment on November 17, 2017. The only changes from the version submitted on that date to this current and final version are listed below.

Section	Page	Change
N/A	N/A	Headers (changed to "2019 Forest Development")
N/A	ii	Changed date: April 1, 2019 to March 31, 2039
N/A	iii	Removed sign-off sheet and added this description of changes
N/A	N/A	Footers (changed to dates)
N/A	N/A	Changed footnotes: date changed from "2017...." to "2019..."
N/A	N/A	Changed throughout document any reference to "2017...." to "2019..."
2.3.2.1	2-8	Removed sentence in last paragraph indicating 12.5 cm Top DIB was being utilized. Replaced with sentence indicating where to find the sensitivity curves in the appendix
2.3.2.1	2-8	Removed sentence in last paragraph indicating 12.5 cm Top DIB was being utilized. Replaced with sentence indicating where to find the sensitivity curves in the appendix



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1.0 INTRODUCTION

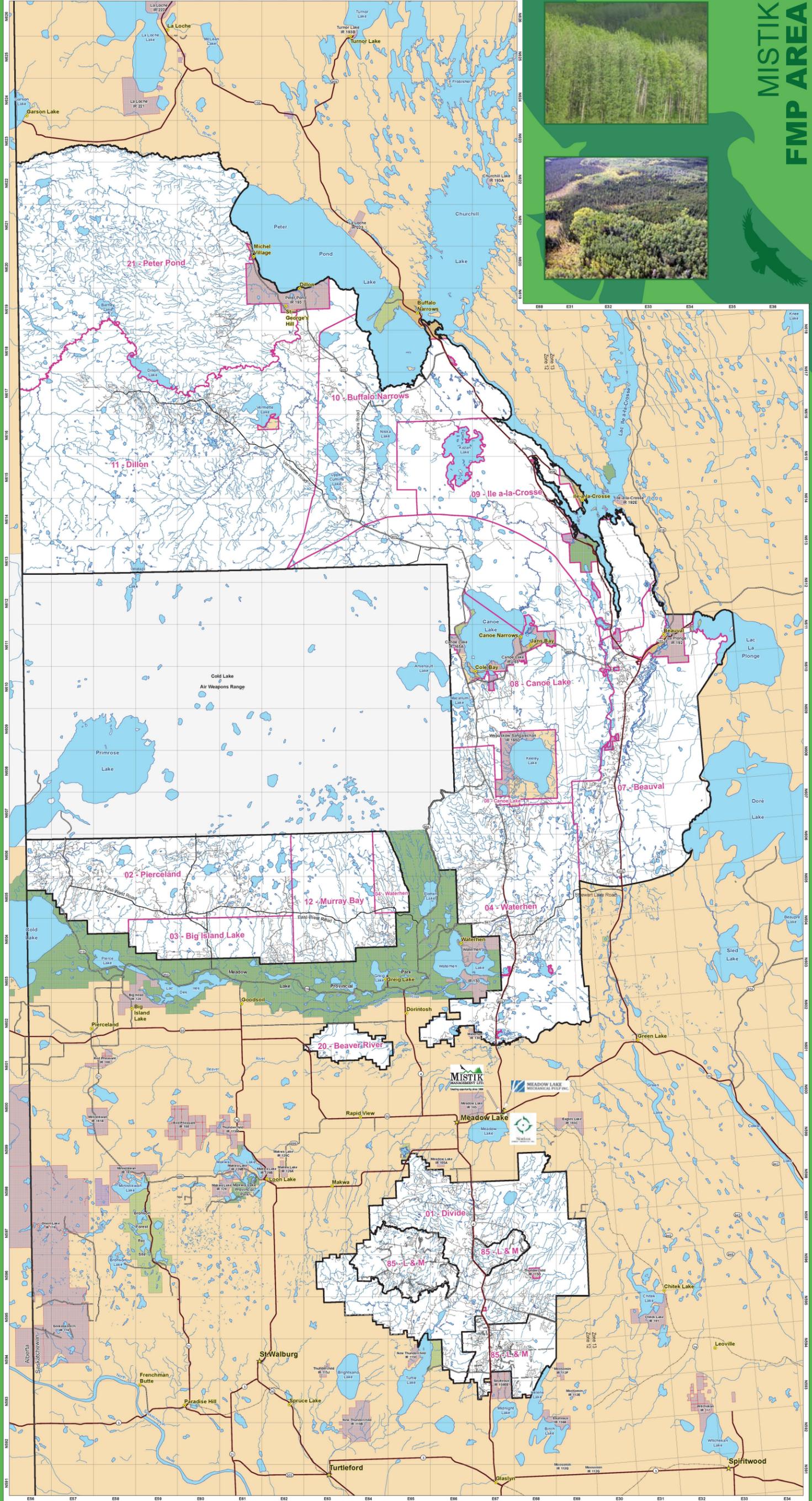
This document contains a detailed description of the methods used to determine development types and yield curves for the Mistik Management Ltd. and L&M FMA areas. It is important to note that neither the volume sampling data nor the yield curves are new. All curves, with the exception of development type #7 (S-JP-L&M) were used in the Mistik 2007 20-Year FMP. The curve for development type #7 was generated for and submitted with the L&M WSA document (August, 2006).

The document has been divided into six main sections:

- Volume Sampling;
- Development Type Stratification;
- Yield Curve Determination;
- Cull Deductions;
- Final Development Type Characteristics;
- Data Sets.

Map 1-1 outlines the FMA area.

MISTIK FMP AREA

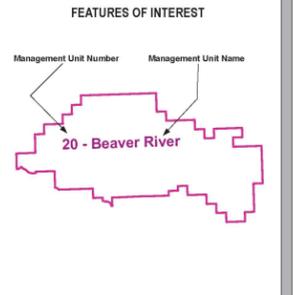
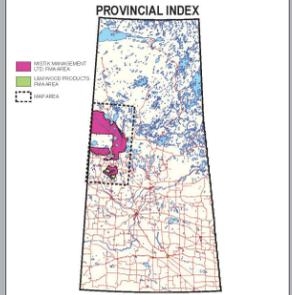


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MISTIK FMP AREA

silvacom™

Map Version: 1.00
Original Map Date: 1/25/00
Map Date: June 22, 2017
Map Projection: UTM
Silvacom File: 020017111.MXD
Map File: Temp\Production_L_Maps\FMP_Area.mxd



PLANIMETRIC LEGEND

	Public Paved Road		Provincial Forestry Class Roads
	Public Gravel Road		Class 1
	Public Road		Class 2
	Oil and Gas Road		Class 3
	Railroad		Oil / Gas Pipeline **
	Lake		Oil / Gas Facility
	Creek		Village
	Provincial Border		Settlement
	FMA Boundary		Timber Exclusion
	MU Boundary		Town
	UTM Tie Boundary		Hamlet / Village
	Air Weapons Range		Mill Site
	Indian Reserve		Woodlands Office
	Park		
	Recreation Area		

** Data is incomplete



2.0 VOLUME SAMPLING

This Section outlines the procedures used to collect and analyze volume sampling data for preparation and use in the development type and yield curve determination process.

2.1 PLOT ALLOCATION AND MEASUREMENT PROCEDURES

2.1.1 SAMPLING PROGRAMS

Two sampling programs were initiated to collect temporary sample data for development type/yield curve determination processes:

- Mistik Management Ltd. Volume Sampling Program
 - Completed within the Mistik Management Ltd. FMA area, commencing in 1999 and completed in 2006.
- Supplemental Development Type Sampling Program
 - Completed within the Mistik Management Ltd. FMA area, during the summer of 2006.

With the addition of the L&M FMA being added to the joint 20197 Forest Management Plan, an additional sampling program was undertaken. The temporary sample plot data used to develop the yield curves in this document was collected under two separate programs and includes plots from the entire Divide Management Unit. The first program (the L&M Program) sampled the L&M FMA and was completed in 2002. The second program (Mistik Divide) sampled the Divide Management Unit of the Mistik FMA area between 1999 and 2004. It should be noted within this document, the only additional curve used using this sample data was Development type #7- S-JP-L&M. This is mainly due to having a higher Jack pine yield within the L&M area, comparatively to the rest of the Mistik FMA Jack pine curves. It should be noted that the following volume sampling data was also used to develop the yield curves for the 2007 Mistik FMP.

2.1.2 OBJECTIVES OF SAMPLING PROGRAMS

Temporary sample plot data collected from both sampling programs were intended for use in the construction of yield curves for each defined FMP development type. The overall objectives of the two sample programs are:

- Mistik Management Ltd. Volume Sampling Program
 - The objective of this program was to obtain field data to calculate softwood and hardwood volume estimates for target strata across the Mistik FMA.
- Supplemental Development Type Sampling Program
 - The objective of this program was to supplement the data collected within the Mistik Management Ltd. Volume Sampling Program in Development Type¹ (SH-WS-A-A; #9) with the aim of increasing sampling in critical age classes (90+).

2.1.3 STRATA DEFINITIONS

- Mistik Management Ltd. Volume Sampling Program

¹ Development Types defined in Sections 3 and 4 of this document



Forested stands with similar characteristics were aggregated into a finite set of sampling strata to aid in plot allocation and to increase sample precision. Sampling strata were assigned by evaluating SFVI overstorey attributes as classified by the flowchart (Figure 2-1). All SFVI stands less than seven metres in height (SFVI overstorey) were assumed to have no merchantable volume and therefore were not sampled.

- Supplemental Development Type Sampling Program

Only one sample stratum was defined by restricting possible sampling to one Development Type² (SH-WS-A-A, #9) within age classes 90+.

2.1.4 STAND SELECTION AND PLOT ALLOCATION

- Mistik Management Volume Sampling Program

In the Murray Bay, Pierceland, Divide and Big Island Lake Management Units, where sampling started, stands were selected at random (with replacement) within strata with equal probability. Six plots were established in each stand and stands less than 5 ha in area were not sampled. However, based on preliminary results and suggestions from experts, some revisions were made to the original sampling design. In the revised design, stands were selected at random with replacement within strata and the probability of selecting a stand was proportional to the stand size. Stands smaller than 5 ha in size were being sampled, however, only three plots were allocated to each of these stands. The revised design was used for cruising in the Beauval, Beaver River, Waterhen, Buffalo Narrows, Canoe Lake, Dillon, Ile a-la-Crosse and Peter Pond Management Units.

To date, a total of 5,616 plots have been established in 1,054 separate stands across 174 UTM map sheets. Over 85,000 individual tree measurements (i.e. live trees within plot boundaries) have been captured.

- L&M Sampling Program

Individual stands were assigned stratum labels and aggregated into sub-population lists. Sample stands were selected at random from each stratum. Sample intensity was proportional to stratum area, importance and inherent variability in each stratum. Individual plots were randomly located along the longest axis within each selected stand. A total of six plots were selected per stand. The entire stand, up to and including the perimeter, was eligible for measurement (i.e. will be included in the sample population).

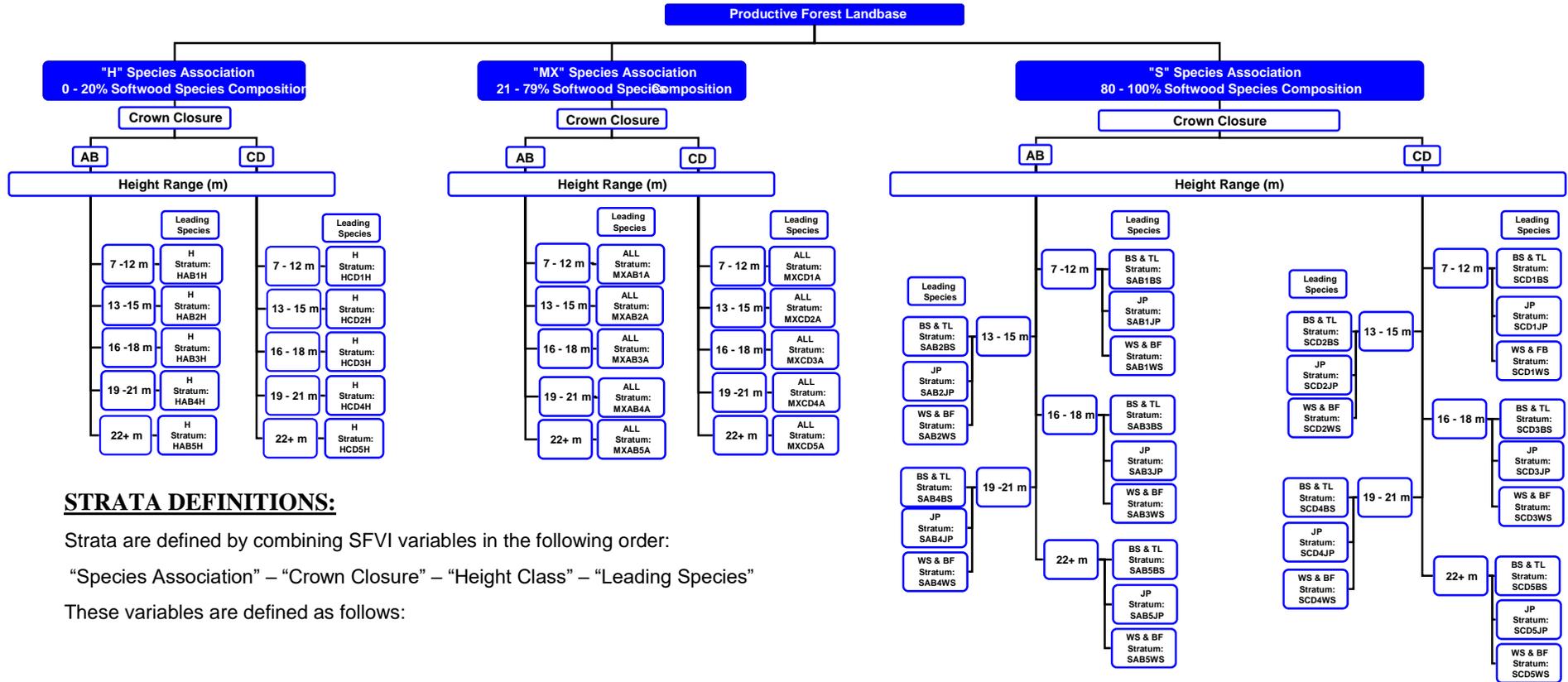
- Supplemental Development Type Sampling Program

Stands were selected at random with replacement within strata and the probability of selecting a stand was proportional to the stand size. Stands greater than 5 ha in size were assigned six plots and those of less than 5 ha in size were assigned three plots.

² Development Types defined in Sections 3 and 4 of this document



FIGURE 2-1 VOLUME SAMPLING STRATIFICATION CHART



STRATA DEFINITIONS:

Strata are defined by combining SFVI variables in the following order:

“Species Association” – “Crown Closure” – “Height Class” – “Leading Species”

These variables are defined as follows:

Species Association:	Crown Closure:	Height Class:	Leading Species:
◆ H = Hardwood	◆ AB = 6 – 50%	◆ 1 = 7 – 12 m	◆ H = All hardwood species
◆ MX = Mixedwood	◆ CD = 51 – 100 %	◆ 2 = 13 – 15 m	◆ A = All species
◆ S = Softwood		◆ 3 = 16 – 18 m	◆ BS = Black spruce or Tamarack
		◆ 4 = 19 – 21 m	◆ JP = Jack Pine
		◆ 5 = 22+ m	◆ WS = White spruce or Balsam fir



2.1.5 SAMPLING TREE SELECTION

One sample tree at minimum was selected within the plot to measure ages and stump diameter. The sample trees were selected to be representative of the predominant species in the plot. They were selected from the living co-dominant trees of the predominant species in the plot. In the case of plots that contain two or more distinct canopy layers, sample trees were selected from the individual layers based on species dominance. Sample tree selection was similar for both sample programs.

2.1.6 FIELD MEASUREMENT PROCEDURES

Table 2-1 outlines the plot configuration and measurements that were used in both volume sampling programs.

TABLE 2-1: PLOT CONFIGURATION

PLOT ATTRIBUTES	DESCRIPTION
Plot Size	100 m ² (5.64 m Radius)
Plot Shape	Circular
DBH Limits	5.0 cm for individual tree measurements
Measurement Records	<ul style="list-style-type: none"> • Tree Species; • DBH; • Total Height (to nearest 0.1 m); • Height to Live Crown (to nearest 0.1 m); • Lean - degree of lean of the tree; • Condition code.
Sample Tree	<ul style="list-style-type: none"> • Stump Diameter (at 0.3 m to nearest 0.1 cm); • DBH age (at 1.3 m); • DSH age (0.3 m); • DSH Radial Increments (1-10 years – 10 -20 years).

Table 2-2 illustrates the stand assessment variables that were collected in both volume sampling programs.

TABLE 2-2: STAND ASSESSMENT VARIABLES

STAND ATTRIBUTES	DESCRIPTION
Eco-Class	Saskatchewan Ecosite Guide ¹ (not measured during the winter)
Field Type	Call of surrounding stand type as seen from the plot centre, in appropriate SFVI codes
Cutline Flag	Identifies whether any portion of a plot falls on a cutline (seismic line)

¹ McLaughlan, M.S.; Wright, R.A.; Jiricka, R.D. 2010. *Field guide to the ecosites of Saskatchewan's provincial forests*. Saskatchewan Ministry of Environment, Forest Service. Prince Albert, Saskatchewan. 343 pp



2.1.7 QUALITY CONTROL CHECKS

To ensure the highest quality standards possible, field supervisors review digital data for:

- ◆ Completeness;
- ◆ Consistency;
- ◆ Accuracy (e.g. “suspect” measurements, such as DBH or heights that seem illogical or outside the range of expected values, were re-examined if possible).

The plots of concern were revisited by the original crew for verification, or crew supervisor for validation.

Additionally, field crew supervisors visited approximately ten percent of the plots

2.2 PLOT REMOVAL

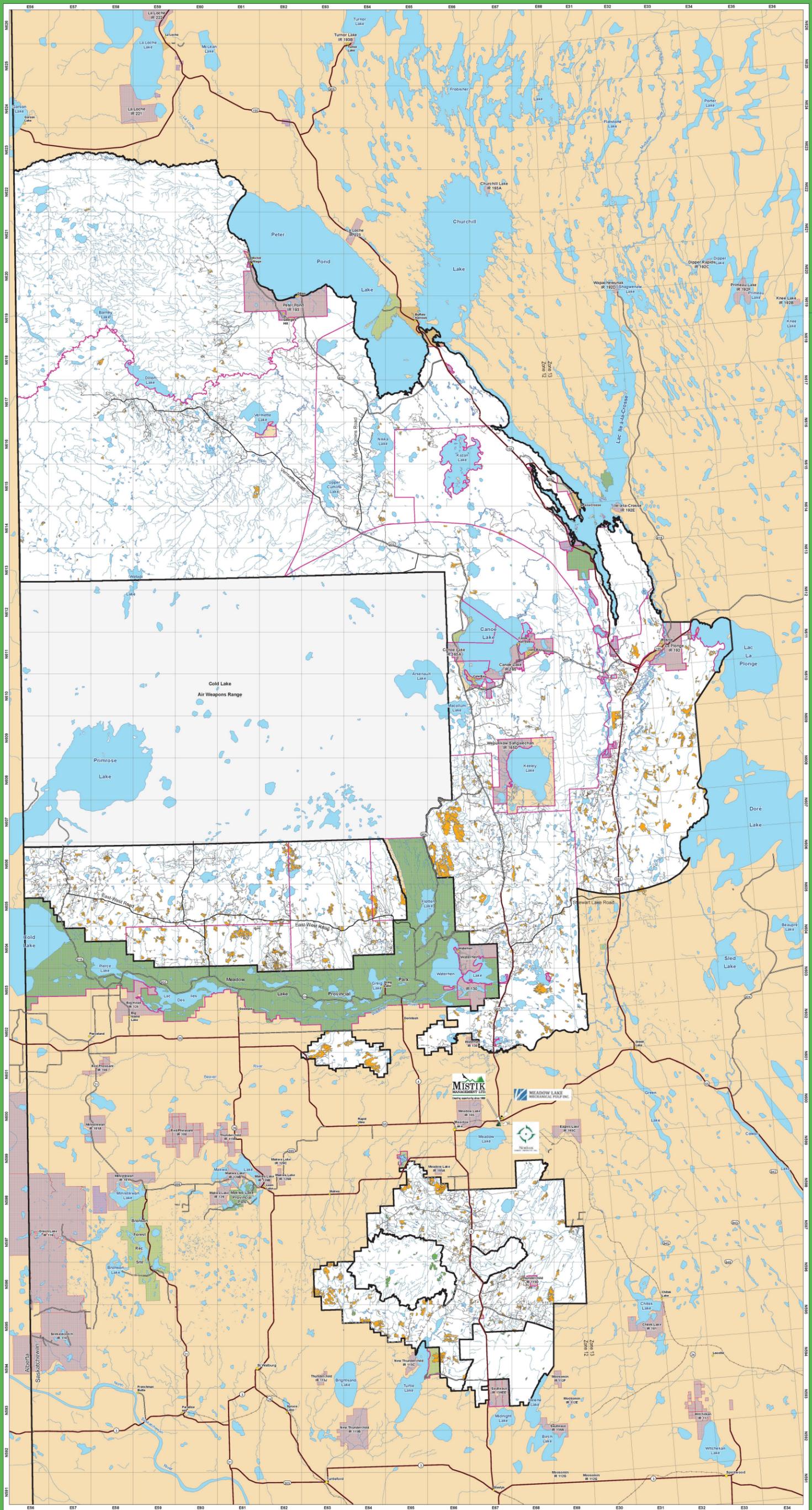
Several plots were removed from the dataset prior to yield curve development, as they were located in stands flagged as operational constraints determined through the forest characterization process (please refer to the document “2019 Mistik FMP Volume II – Planning Inventory and Forest Characterization” for further description of these stand types). Table 2-3 and Table 2-4 outlines the number of plots that were removed from the data due to operational constraints. All removed plots are not assigned to a development type.

TABLE 2-3: REMOVED PLOTS

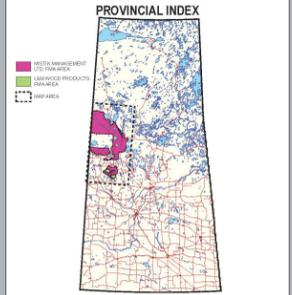
REMOVAL DESCRIPTION	NUMBER OF PLOTS
Low Productivity Stands	92
Low Crown Closure (<20% Total Crown Closure)	130
Significant Tamarack Content	566
Dwarf Mistletoe	15
Black Spruce Considerations	1,209
Total (Some Plots are Flagged For Multiple Operational Constraints)	1,394

TABLE 2-4 L&M REMOVED PLOTS

REMOVAL DESCRIPTION	NUMBER OF PLOTS
Non-Forested	7
Non-Merchantable	24
Total (Some Plots are Flagged For Multiple Operational Constraints)	31



SPATIAL DISTRIBUTION OF SAMPLE PLOTS



FEATURES OF INTEREST

Sample Plots

- Mistik Sample Plots (Orange square)
- L & M Sample Plots (Green square)

PLANIMETRIC LEGEND

Public Paved Road	Provincial Forestry Class Roads
Public Gravel Road	Class 1
Public Road	Class 2
Oil and Gas Road	Class 3
Railroad	FMA Boundary
Creek	MU Boundary
Lake	Village
Provincial Border	Settlement
UTM Tile Boundary	Timber Exclusion
Air Weapons Range	Town
Indian Reserve	Hamlet / Village
Park	Mill Site
Recreation Area	Woodlands Office

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 Map Version: 1.0
 Original Map Scale: 1:250,000
 Map Date: December 7, 2018
 Map Production: Shawn Lis
 Revision No: 001
 Map File: mapversion2_spprovisk_sample_plots.mxd



2.3 PLOT COMPILATION

2.3.1 TREE SPECIES

The species included in the plot volume calculations are outlined in Table 2-5.

TABLE 2-5: MERCHANTABLE SPECIES

SPECIES	VOLUME TYPE
White Spruce (wS)	Softwood
Black Spruce (bS)	Softwood
Jack Pine (jP)	Softwood
Balsam Fir (bF)	Softwood
Tamarack (tL)	Softwood
Trembling Aspen (tA)	Hardwood
Balsam Poplar (bP)	Hardwood
White Birch (wB)	Hardwood

2.3.2 UTILIZATION STANDARDS

The Mistik Management Ltd. base utilization standards presented here were developed in consultation with the Saskatchewan Environment Forest Service.

Table 2-6 outlines the base utilization standards used to calculate hardwood and softwood net merchantable volume.

TABLE 2-6: BASE UTILIZATION PARAMETERS

UTILIZATION PARAMETER	MISTIK		L&M	
	Hardwood	Softwood	Hardwood	Softwood
Stump Height (m)	0.3	0.3	0.3	0.3
Minimum Top Diameter Inside Bark (cm)	7.5	10	8	10
Log Length (m)	2.6	2.6	n/a	n/a
Merchantable Minimum Bole Length (m)	5.2	5.2	4.9	5.2

For the development type 7, (S-JP-L&M) on the L&M Wood Products Ltd. FMA area, a 10/10 utilization standard for softwood and 10/8 utilization standard for hardwood species were applied with 5.2 m and 4.9m bole length for softwood and hardwood, respectively. For other development types whether on the Mistik Management Ltd. or L&M Wood Products Ltd. FMA, a 7.5/7.5 utilization standard for softwood and 10/10 utilization standards for hardwood species were applied with a 2.6 m minimum log length and 5.2 m minimum bole length for hardwood and softwood, respectively.



2.3.2.1 REQUESTED UTILIZATION SENSITIVITY

There were additional utilization standards requested by the government of Saskatchewan to demonstrate the effects of alternate top diameters on the softwood lumber. These alternate utilization standards can be found in Table 2-7 and Table 2-8. At the time of the writing of this document, the process for projecting the yield curves at these alternative utilization standards was still being finalized. A thorough description of the process and the resulting curves will be included in the Forest Estate Modeling document.

TABLE 2-7: CHANGING UTILIZATION STANDARDS FOR CONIFER TO A 7.5CM TOP

UTILIZATION PARAMETER	L&M Yield Curve # 7		MISTIK + L&M (all other Yield Curves)	
	Hardwood	Softwood	Hardwood	Softwood
Stump Height (m)	0.3	0.3	0.3	0.3
Minimum Top Diameter Inside Bark (cm)	8	7.5	7.5	7.5
Log Length (m)	n/a	n/a	2.6	2.6
Merchantable Minimum Bole Length (m)	4.9	5.2	5.2	5.2

In the alternate scenario presented above in Table 2-7, for the development type 7, (S-JP-L&M)) on the L&M Wood Products Ltd. FMA area, a 7.5/7.5 utilization standard for softwood and 10/8 utilization standard for hardwood species were applied. For other development types whether on the Mistik Management Ltd. or L&M Wood Products Ltd. FMA, a 7.5/7.5 utilization standard for both the softwood and hardwood species was applied.

TABLE 2-8: CHANGING UTILIZATION STANDARDS FOR CONIFER TO A 12.5CM TOP

UTILIZATION PARAMETER	L&M Yield Curve # 7		MISTIK + L&M (all other Yield Curves)	
	Hardwood	Softwood	Hardwood	Softwood
Stump Height (m)	0.3	0.3	0.3	0.3
Minimum Top Diameter Inside Bark (cm)	8	12.5	7.5	12.5 ¹
Log Length (m)	n/a	n/a	2.6	2.6
Merchantable Minimum Bole Length (m)	4.9	5.2	5.2	5.2

In the alternate scenario presented above in Table 2-8, for the development type 7, (S-JP-L&M)) on the L&M Wood Products Ltd. FMA area, a 12.5/12.5 utilization standard for softwood and 10/8 utilization standard for hardwood species were applied. For other development types whether on the Mistik Management Ltd. or L&M Wood Products Ltd. FMA, a 12.5/12.5 utilization standard for softwood and 7.5/7.5 utilization standards for hardwood species were applied. The curves for these requested sensitivity utilizations are presented in Appendix I-8.0.

¹ The analysis was completed for a 5" top, which converts to 12.7 cm. However, as discussed with Saskatchewan Government at the August 10, 2017 Planning Team meeting, for consistency with analysis done throughout the province, we have used 12.5cm to label this scenario.



2.3.3 TREE VOLUME CALCULATIONS

Individual tree volumes were calculated using Kozak's variable exponent taper equation. This equation, its coefficients and the methods used to estimate taper coefficients are presented in "New stem taper functions for 12 Saskatchewan timber species" (Gal, J. and I.E. Bella. 1994. CFS Inf. Rep. NOR-X-338). The process of tree volume calculations involves the following steps:

- ◆ Determine the merchantable height of the tree using an iterative technique applied to the Kozak's taper model to calculate at which the specified minimum top diameter inside bark occurs based on specific utilization standard;
- ◆ Determining merchantable length deducting the stump height from merchantable height;
- ◆ Determine the gross merchantable volume for the **hardwood species**, by dividing the whole merchantable length into 10 equal lengths;
 - Determine the diameter of the bottom, middle and top of each section using Kozak's variable exponent taper equation;
 - Calculate the volume of each section using the Newton's formula;
 - Sum up the volume of all sections to get the total hardwood gross merchantable tree volume (GMV);
 - Assign all trees with a merchantable bole length less than the minimum merchantable bole length mentioned in Table 2-6, 2-7, 2-8, a gross merchantable volume of 0.
- ◆ Determine the gross merchantable log volume of the **softwood species**, by dividing the merchantable bole into equal logs of 2.6 m;
 - a. Determine the diameter of the bottom, middle and top of each log using Kozak's variable exponent taper equation;
 - Calculate the volume of each log using the Newton's formula;
 - Sum up the volume of all sections to obtain the total softwood gross merchantable volume (GMV).;
 - Assign all trees with a merchantable bole length less than the minimum merchantable bole length mentioned in Table 2-6, 2-7, 2-8, a gross merchantable volume of 0.
- ◆ It is noteworthy mentioning that a minimum merchantable log length of 2.6 m and a minimum merchantable bole length of 5.2 m were applied for both softwood and hardwood species for all development types except development type 7. No minimum merchantable log length was assumed in the tree volume calculations for development type 7 (S-JP-L&M). However, a minimum merchantable bole length of 4.9 m for hardwood and 5.2 m for softwood were assumed in the tree volume calculations for development type 7 (S-JP-L&M).
- ◆ No cull deduction was applied to determine net merchantable volume (NMV) and fitting yield curves. Thus, the yield curve model equations were fitted to the compiled plot volume per hectare based on gross merchantable volume (GMV). The cull deduction was applied in wood supply analysis.



2.4 AGE CLASS ASSIGNMENTS TO PLOT DATA

The SFVI was matched to the plot data, and plot age was calculated using the Dominant layer³ SFVI origin and the year of data collection as the source year ('P_AGE' = 'YEAR' – Origin (Dominant layer¹)). An age class was assigned according to the classes defined in Table 2-9.

TABLE 2-9: AGE CLASS ASSIGNMENT ('P_AGECLASS')

AGE (YEARS)	AGE CLASS	AGE (YEARS)	AGE CLASS
0-9	0	100-109	100
10-19	10	110-119	110
20-29	20	120-129	120
30-39	30	130-139	130
40-49	40	140-149	140
50-59	50	150-159	150
60-69	60	160-169	160
70-79	70	170-179	170
80-89	80	180-189	180
90-99	90	190-199	190
		200+	200

¹ Dominant layer 'DOM_LAYER' determination process is outlined in the Mistik Management 2007 Forest Characterization Document



3.0 DEVELOPMENT TYPE DETERMINATION

The objective of the development type determination process was to stratify stands and their corresponding compiled sampling plot volume data, into unique strata with relatively similar forest characteristics. Identification of these similar stand type groupings (strata) was accomplished by using a set of predetermined predictors. These unique strata (development types) allow for a more accurate prediction of harvest volumes.

3.1 DEVELOPMENT TYPE PREDICTORS

The following 6 predictors of development type, as identified by the FMP team, were examined:

- ◆ Silviculture Ground Rule (SGR);
- ◆ Crown Closure;
- ◆ Soil Order;
- ◆ Significant Softwood in Hardwood Stands;
- ◆ Softwood Black Spruce (BS) - Jack Pine (JP) Content;
- ◆ Productivity Class.

3.1.1 SILVICULTURE GROUND RULES (SGR)

Silviculture Ground Rules serve as the basis of the development type determination process (Figure 3-1). The SGRs were determined based on a stand's associated SFVI attributes within the SFVI Dominant layer¹ 'DOM_LAYER'. The SGRs and their associated components are defined in Table 3-1.

TABLE 3-1: SILVICULTURE GROUND RULES

SILVICULTURE GROUND RULE	SILVICULTURE GROUND RULE CODE	SPECIES GROUP 'P_SPGP'	LEADING SPECIES 'P_SPECIES'
1	'S-WS'	S	WS
2	'S-BS'	S	BS
3	'S-JP'	S	JP
4	'SH-JP'	SH	JP
5	'SH-WS'	SH	WS
6	'HS-WS'	HS	WS
7	'HS-JP'	HS	JP
8	'H'	H	N/A

3.1.1.1 SPECIES GROUP (P_SPGP)

Plot Species group 'P_SPGP' was defined to be equal to 'SFVI_SPGP'² within each sampled stand based on softwood composition percentage as follows:

¹ Dominant Layer 'DOM_LAYER' determination process is outlined in the Mistik Management Ltd. 2019 Forest Characterization Document

² SFVI species group 'SFVI_SPGP' determination process is outlined in the Mistik Management Ltd. 2019 Forest Characterization Document



- ◆ S – Softwood – 70% or greater;
- ◆ SH – Softwood/Hardwood – 40% and greater but less than or equal to 69%;
- ◆ HS – Hardwood/Softwood – 11% and greater but less than or equal to 39%;
- ◆ H – Hardwood – 0% and greater but less than or equal to 10%.

3.1.1.2 LEADING SPECIES (P_SPECIES)

- ◆ Plot Species was defined based on a stand's associated SFVI attributes within the SFVI Dominant layer 'DOM_LAYER'.
- ◆ Forested stands that are assigned a SFVI leading species (SFVI_LEAD≠'')¹ and the plot species group is 'Hardwood' (P_SPGP='H') are assigned as P_SPECIES='TA'.
- ◆ Forested stands that are assigned a SFVI leading species (SFVI_LEAD≠'')² and the Plot species group is 'Softwood' (P_SPGP='S') and the SFVI leading species is either 'WS' or 'BF' (SFVI_LEAD='WS' or SFVI_LEAD='BF')² are assigned as P_SPECIES='WS'.
- ◆ Forested stands that are assigned a development type leading species (SFVI_LEAD≠'')² and the Plot species group is 'Softwood' (P_SPGP='S') and the SFVI leading species is either 'BS' or 'TL' (SFVI_LEAD='BS' or SFVI_LEAD='TL')² are assigned as P_SPECIES='BS'.
- ◆ Forested stands that are assigned a SFVI leading species (SFVI_LEAD≠'')² and the Plot species group is 'Softwood' (P_SPGP='S') and the SFVI leading species is 'JP' (SFVI_LEAD='JP')² are assigned as P_SPECIES='JP'.
- ◆ Forested stands that are assigned a SFVI leading species (SFVI_LEAD≠'')² and the Plot species group is 'Softwood Dominated Mixedwood' (P_SPGP='SH') and the SFVI leading species is either 'WS' or 'BF' or 'BS' or 'TL' (SFVI_LEAD='WS' or SFVI_LEAD='BF' or SFVI_LEAD='BS' or SFVI_LEAD='TL')² are assigned as P_SPECIES='WS'.
- ◆ Forested stands that are assigned a SFVI leading species (SFVI_LEAD≠'')² and the Plot species group is 'Softwood Dominated Mixedwood' (P_SPGP='SH') and the SFVI leading species is 'JP' (SFVI_LEAD='JP')² are assigned as P_SPECIES='JP'.
- ◆ Forested stands that are assigned a SFVI leading species (SFVI_LEAD≠'')² and the Plot species group is 'Hardwood Dominated Mixedwood' (P_SPGP='HS') and the SFVI leading softwood species is either 'WS' or 'BF' or 'BS' or 'TL' (SFVI_SOFT='WS' or SFVI_SOFT='BF' or SFVI_SOFT='BS' or SFVI_SOFT='TL')³ are assigned as P_SPECIES='WS'.
- ◆ Forested stands that are assigned a SFVI leading species (SFVI_LEAD≠'')¹ and the Plot species group is 'Hardwood Dominated Mixedwood' (P_SPGP='HS') and the SFVI leading softwood species is 'JP' (SFVI_SOFT='JP')² are assigned as P_SPECIES='JP'.

¹ SFVI Lead Species 'SFVI_LEAD' determination process is outlined in the Mistik Management Ltd. 2019 Forest Characterization Document

² SFVI Lead Species 'SFVI_LEAD' determination process is outlined in the Mistik Management Ltd. 2019 Forest Characterization Document

³ SFVI Leading Softwood 'SFVI_SOFT' determination process is outlined in the Mistik Management Ltd. 2019 Forest Characterization Document



3.1.2 CROWN CLOSURE (P_CROWN)

Incorporation of crown closure in development type determination was also considered with stands being classified into two categories based on their associated SFVI attributes within the Dominant layer 'SFVI_CROWN'¹ as follows:

- ◆ SFVI crown low density stands (SFVI_CROWN='A' or SFVI_CROWN='B')³ are assigned a plot crown closure as P_CROWN='LD';
- ◆ SFVI crown high density stands (SFVI_CROWN='C' or SFVI_CROWN='D')³ are assigned a plot crown closure as P_CROWN='HD'.
- ◆ This results in the following two categories within plot crown closure (P_CROWN).
- ◆ HD – High Density >= 50% crown closure;
- ◆ LD – Low Density <50% crown closure.

only stands greater than 60m³/ha with larger blocks, many times it gets lumped in with other more productive sites.

3.1.3 SOIL ORDER (P_SOIL)

Plot soil order 'P_SOIL' was defined to be equal 'DT_SOIL'² within each sampled stand. Soil Order 'DT_SOIL' was considered as a predictor in development type determination with SFVI stands classified into three categories based on their associated Canadian Soil Information System (CanSIS Version 2.1) development codes as outlined in Table 3-2.

TABLE 3-2: SOIL ORDER CATEGORIES

SOIL ORDER	CanSIS VERSION 2.0 SOIL DEVELOPMENT CODES	CanSIS VERSION 2.0 SOIL DEVELOPMENT NAME	DOMINANT SOIL ORDER
B	M,P,R	M – Eutric Brunisolic P – Dystric Brunisolic R – Regosolic	Brunisol
L	C,D,F	C – Black Chernozemic D – Dark Gray or Dark Gray Luvisolic F – Gray Luvisolic	Luvisol
O	W,X,Y	W – Humo-Feric Podzolic X – Fibrisol Y – Mesisol	Organic

3.1.4 SIGNIFICANT SOFTWOOD IN HARDWOOD STANDS (P_SIGSOFT)

Softwood content in hardwood stands (P_SPGP = 'H') was considered as a development type break to ensure incidental softwood volume predictions in hardwoods are closer to actual harvest values. Plot

¹ Dominant Layer 'DOM_LAYER' and SFVI crown closure 'SFVI_CROWN' determination processes are outlined in the Mistik Management Ltd. 2019 Forest Characterization Document

² Development Type Soil 'DT_SOIL' determination process is outlined in the Mistik Management Ltd. 2019 Forest Characterization Document



significant softwood identifier 'P_SIGSOFT' was defined to be equal 'SIG_SOFT'¹ within each sampled stand. ('P_SIGSOFT' = 1) indicates that a stand has a significant softwood component. Note that 'SIG_SOFT' and 'P_SIGSOFT' considers the softwood component in all layers only for those stands where the dominant layer is hardwood.

3.1.5 SOFTWOOD BLACK SPRUCE (BS) – JACK PINE (JP) CONTENT (P_2SOFT)

It is recognized that Black Spruce stands with a large Jack Pine component could have differing growth characteristics than stands more heavily dominated by Black Spruce. Black Spruce dominant stands with a large Jack Pine content stands were therefore considered as a possible development type break.

Plot secondary softwood 'P_2SOFT' was defined to be equal to the Dominant Layer 'SFVI_2SOFT'² within each sampled stand. Stands assigned to the SGR of 'S-BS' with a secondary softwood species (P_2SOFT = 'JP') were considered as a possible break.

3.1.6 PRODUCTIVITY CLASS (P_PCLASS)

Incorporation of productivity class in development type determination was also considered with stands being classified into two categories based on their associated SFVI attributes within the Dominant layer 'SFVIPCLASS'³ as follows:

- ◆ SFVI productivity class lower productivity stands (SFVIPCLASS \geq 1 and SFVIPCLASS \leq 4) are assigned a plot productivity class as P_PCLASS=1;
- ◆ SFVI productivity class higher productivity stands (SFVIPCLASS = 5) are assigned a plot productivity class as P_PCLASS=2;
- ◆ If No 'SFVIPCLASS' was assigned the stand was assumed to be Low Productivity P_PCLASS=1.
- ◆ This results in the following two categories within plot productivity (P_PCLASS).
- ◆ 1 – Low Productivity – 'P_PCLASS' = 1;
- ◆ 2 – High Productivity – 'P_PCLASS' = 2.

3.2 DEVELOPMENT TYPE DETERMINATION STEPPED EVALUATION PROCEDURE

The predictors outlined above were examined in a predetermined stepped evaluation procedure. The following indicators were used in this procedure to identify development type breaks:

- ◆ Management objectives;

¹ Significant Softwood 'SIG_SOFT' determination process is outlined in the Mistik Management Ltd. 2019 Forest Characterization Document

² Dominant Layer 'DOM_LAYER' and SFVI Secondary Softwood 'SFVI_2SOFT' determination processes are outlined in the Mistik Management Ltd. 2019 Forest Characterization Document

³ Dominant Layer 'DOM_LAYER' and SFVI productivity class 'SFVIPCLASS' determination processes are outlined in the Mistik Management Ltd. 2019 Forest Characterization Document



A linkage was maintained between various development types and Mistik's field operations and objectives as specified in the FMP.

SGRs serve as the foundation of the stepped evaluation procedure and provide a direct linkage to forest operations.

- ◆ Number and age class distribution of sample plots;

To construct a yield curve, a sufficient number of sample plots achieving an adequate representation of age classes are required for accurate volume estimates.

On Figure 3-1 the numbers of plots are indicated for each development type comparison.

- ◆ Area of potential development type;

A potential development type should represent sufficient area within the FMA Net Productive Area (as defined in the Forest Characterization Document).

On Figure 3-1 the operable landbase area is indicated for each development type comparison

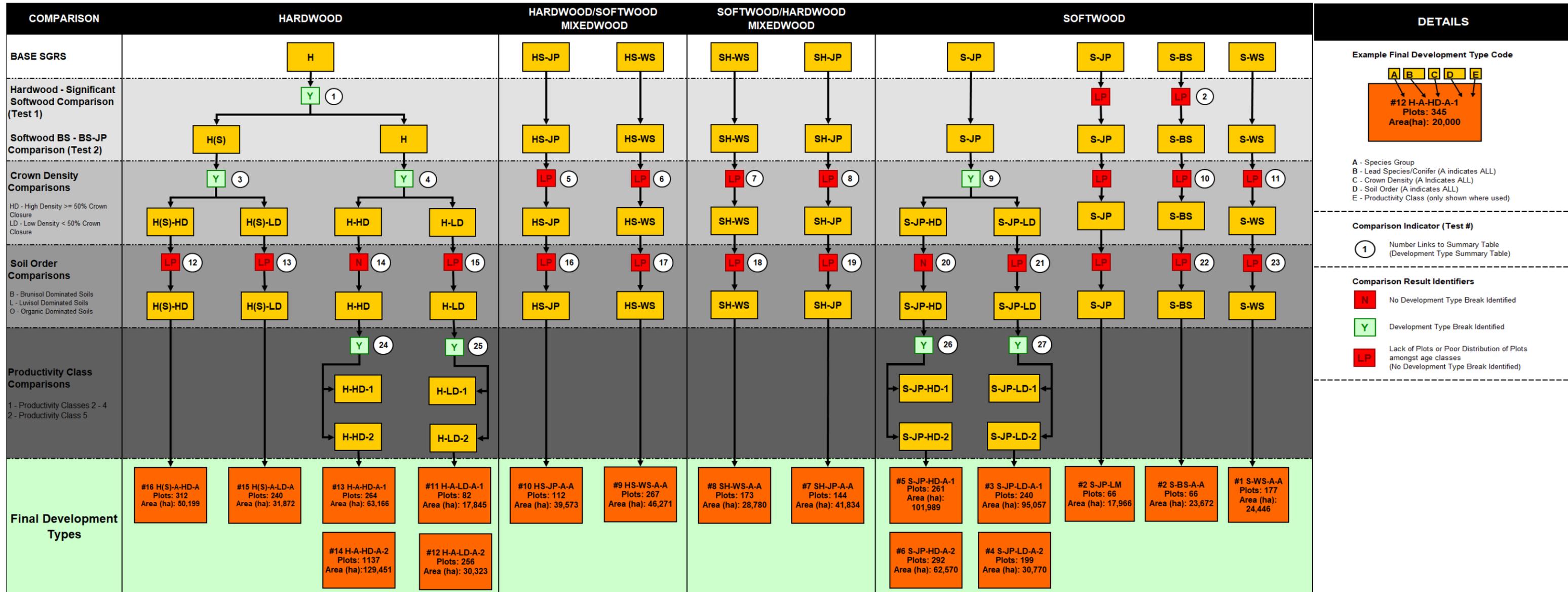
- ◆ Volume differences;

A statistical test was conducted for each development type comparison using an ANCOVA (LS-means with Tukey-Kramer adjustment) test with age class as a covariate to determine if significant difference exists between actual plot volumes (Total, Softwood, Hardwood).

On the p-value results for each statistical test are indicated for each development type comparison.

Figure 3-1 outlines the stepped evaluation procedure that was followed including the development type determination results

FIGURE 3-1 DEVELOPMENT TYPE DETERMINATION STEPPED EVALUATION SUMMARY





DEVELOPMENT TYPE SUMMARY TABLE

TEST #	COMPARISON	CATEGORY	VOLUME (m ³ /ha)			SET 1	AREA (ha)	PLOTS #	SET 2	AREA (ha)	PLOTS #	Notes
			SOFTWOOD	HARDWOOD	TOTAL							
			P-Value (Tukey-Kramer)									
1	H vs. H(S)	Softwood	<0.0001	<0.0001	0.0004	H	240,785	1,739	H(S)	82,071	552	Significant Softwood Break Identified
2	S-BS-JP vs. S-BS-ALL	BS-JP	0.5525	0.8185	0.7045	S-BS-JP	8,922	30	S-BS-ALL	14,749	36	Lack of Plots
3	H(S)-HD vs. H(S)-LD	Density	0.2605	<0.0001	<0.0001	H(S)-HD	50,199	312	H(S)-LD	31,872	240	Density Break Identified
4	H-HD vs. H-LD	Density	0.0083	<0.0001	<0.0001	H-HD	192,618	1,401	H-LD	48,167	338	Density Break Identified
5	HS-JP-HD vs. HS-JP-LD	Density	0.6461	0.0194	0.1835	HS-JP-HD	26,882	93	HS-JP-LD	12,691	19	Lack of Plots
6	HS-WS-HD vs. HS-WS-LD	Density	0.7087	0.0023	0.0074	HS-WS-HD	29,372	104	HS-WS-LD	16,899	163	Lack of Plots
7	SH-WS-HD vs. SH-WS-LD	Density	0.4762	0.6782	0.0215	SH-WS-HD	20,038	63	SH-WS-LD	14,809	110	Lack of Plots
8	SH-JP-HD vs. SH-JP-LD	Density	0.0108	<0.0001	0.0003	SH-JP-HD	27,025	57	SH-JP-LD	14,809	87	Lack of Plots
9	S-JP-HD vs. S-JP-LD	Density	<0.0001	0.0549	<0.0001	S-JP-HD	164,558	553	S-JP-LD	125,827	439	Density Break Identified
10	S-BS-HD vs. S-BS-LD	Density	<0.0001	0.8774	<0.0001	S-BS-HD	6,400	10	S-BS-LD	17,271	56	Lack of Plots
11	S-WS-HD vs. S-WS-LD	Density	0.6901	0.0130	0.1294	S-WS-HD	11,571	74	S-WS-LD	12,875	103	Lack of Plots
12 A	H(S)-HD-B vs. H(S)-HD-L	Soils	0.0295	0.9924	0.8283	H(S)-HD-B	2,967	12	H(S)-HD-L	42,725	293	Lack of Plots
12 B	H(S)-HD-B vs. H(S)-HD-O	Soils	0.9260	0.9514	0.9345	H(S)-HD-B	2,967	12	H(S)-HD-O	4,507	7	Lack of Plots
12 C	H(S)-HD-L vs. H(S)-HD-O	Soils	0.0492	0.9292	0.9999	H(S)-HD-L	42,725	293	H(S)-HD-O	4,507	7	Lack of Plots
13 A	H(S)-LD-B vs. H(S)-LD-L	Soils	0.0676	0.0738	0.0016	H(S)-LD-B	2,662	17	H(S)-LD-L	4,134	194	Lack of Plots
13 B	H(S)-LD-B vs. H(S)-LD-O	Soils	0.0009	0.1433	0.0125	H(S)-LD-B	2,662	17	H(S)-LD-O	25,076	29	Lack of Plots
13 C	H(S)-LD-L vs. H(S)-LD-O	Soils	0.0203	0.9952	0.9968	H(S)-LD-L	25,076	194	H(S)-LD-O	25,076	29	Lack of Plots
14 A	H-HD-B vs. H-HD-L	Soils	0.1972	0.4456	0.3328	H-HD-B	16,662	78	H-HD-L	160,905	1,281	No Breaks Identified
14 B	H-HD-B vs. H-HD-O	Soils	0.9760	0.6447	0.6105	H-HD-B	16,662	78	H-HD-O	15,051	42	No Breaks Identified
14 C	H-HD-L vs. H-HD-O	Soils	0.2835	0.9813	0.9945	H-HD-L	160,905	1,281	H-HD-O	15,051	42	No Breaks Identified
15 A	H-LD-B vs. H-LD-L	Soils	0.3374	0.7764	0.5798	H-LD-B	4,889	30	H-LD-L	38,527	299	Lack of Plots
15 B	H-LD-B vs. H-LD-O	Soils	0.4649	0.3687	0.2812	H-LD-B	4,889	30	H-LD-O	4,751	9	Lack of Plots
15 C	H-LD-L vs. H-LD-O	Soils	0.8913	0.5098	0.5133	H-LD-L	38,527	299	H-LD-O	4,751	9	Lack of Plots
16 A	HS-JP-B vs. HS-JP-L	Soils	0.9769	0.9903	0.9211	HS-JP-B	6,207	12	HS-JP-L	27,190	97	Lack of Plots
16 B	HS-JP-B vs. HS-JP-O	Soils	0.0772	0.9233	0.9781	HS-JP-B	6,207	12	HS-JP-O	6,176	3	Lack of Plots
16 C	HS-JP-L vs. HS-JP-O	Soils	0.0536	0.9327	0.9019	HS-JP-L	27,190	97	HS-JP-O	6,176	3	Lack of Plots
17 A	HS-WS-B vs. HS-WS-L	Soils	0.0099	0.5404	0.9543	HS-WS-B	2,887	8	HS-WS-L	37,897	253	Lack of Plots
17 B	HS-WS-B vs. HS-WS-O	Soils	0.2350	0.9991	0.7241	HS-WS-B	2,887	8	HS-WS-O	5,487	6	Lack of Plots
17 C	HS-WS-L vs. HS-WS-O	Soils	0.8999	0.6624	0.4279	HS-WS-L	37,897	253	HS-WS-O	5,487	6	Lack of Plots
18 A	SH-WS-B vs. SH-WS-L	Soils	0.5173	0.0083	0.4019	SH-WS-B	2,871	12	SH-WS-L	23,033	155	Lack of Plots
18 B	SH-WS-B vs. SH-WS-O	Soils	0.8173	0.9979	0.5426	SH-WS-B	2,871	12	SH-WS-O	2,876	6	Lack of Plots
18 C	SH-WS-L vs. SH-WS-O	Soils	0.2730	0.0811	0.9463	SH-WS-L	23,033	155	SH-WS-O	2,876	6	Lack of Plots
19 A	SH-JP-B vs. SH-JP-L	Soils	0.0221	0.1463	0.0071	SH-JP-B	8,607	33	SH-JP-L	26,957	93	Lack of Plots
19 B	SH-JP-B vs. SH-JP-O	Soils	0.9775	0.9912	0.8714	SH-JP-B	8,607	33	SH-JP-O	6,271	18	Lack of Plots
19 C	SH-JP-L vs. SH-JP-O	Soils	0.1411	0.2267	0.0080	SH-JP-L	26,957	93	SH-JP-O	6,271	18	Lack of Plots
20 A	S-JP-HD-B vs. S-JP-HD-L	Soils	0.0807	0.0500	0.2115	S-JP-HD-B	39,930	147	S-JP-HD-L	91,067	334	No Breaks Identified
20 B	S-JP-HD-B vs. S-JP-HD-O	Soils	0.9556	0.8067	0.6525	S-JP-HD-B	39,930	147	S-JP-HD-O	33,562	72	No Breaks Identified
20 C	S-JP-HD-L vs. S-JP-HD-O	Soils	0.1165	0.0336	0.0624	S-JP-HD-L	91,067	334	S-JP-HD-O	33,562	72	No Breaks Identified
21 A	S-JP-LD-B vs. S-JP-LD-L	Soils	0.3484	0.0684	0.1513	S-JP-LD-B	17,028	69	S-JP-LD-L	73,153	290	Lack of Plots
21 B	S-JP-LD-B vs. S-JP-LD-O	Soils	0.7222	0.3339	0.9087	S-JP-LD-B	17,028	69	S-JP-LD-O	35,646	80	Lack of Plots
21 C	S-JP-LD-L vs. S-JP-LD-O	Soils	0.0367	0.8426	0.3143	S-JP-LD-L	73,153	290	S-JP-LD-O	35,646	80	Lack of Plots
22 A	S-BS-B vs. S-BS-L	Soils	0.8627	0.6808	0.8028	S-BS-B	4,928	9	S-BS-L	10,838	45	Lack of Plots
22 B	S-BS-B vs. S-BS-O	Soils	0.0590	0.9452	0.0623	S-BS-B	4,928	9	S-BS-O	7,906	12	Lack of Plots
22 C	S-BS-L vs. S-BS-O	Soils	0.0006	0.3440	0.0004	S-BS-L	10,838	45	S-BS-O	7,906	12	Lack of Plots
23 A	S-WS-B vs. S-WS-L	Soils	0.9539	0.9873	0.9965	S-WS-B	1,615	10	S-WS-L	20,133	134	Lack of Plots
23 B	S-WS-B vs. S-WS-O	Soils	0.4047	0.6315	0.9916	S-WS-B	1,615	10	S-WS-O	2,698	33	Lack of Plots
23 C	S-WS-L vs. S-WS-O	Soils	0.1490	0.3308	0.9948	S-WS-L	20,133	134	S-WS-O	2,698	33	Lack of Plots
24	H-HD-1 vs. H-HD-2	Productivity	0.6144	<0.0001	<0.0001	H-HD-1	63,166	264	H-HD-2	129,451	1,137	Productivity Break Identified
25	H-LD-1 vs. H-LD-2	Productivity	0.0805	<0.0001	<0.0001	H-LD-1	17,845	82	H-LD-2	30,323	256	Productivity Break Identified
26	S-JP-HD-1 vs. S-JP-HD-2	Productivity	<0.0001	0.0993	<0.0001	S-JP-HD-1	101,989	261	S-JP-HD-2	62,570	292	Productivity Break Identified
27	S-JP-LD-1 vs. S-JP-LD-2	Productivity	<0.0001	0.9497	<0.0001	S-JP-LD-1	95,057	240	S-JP-LD-2	30,770	199	Productivity Break Identified



3.3 DEVELOPMENT TYPE DETERMINATION NORTH/SOUTH COMPARISON

In order to ensure that stands sampled in northern locations of the FMA area will yield consistent volumes with those in the south, an additional check was performed. A statistical test was conducted for each final development type using an ANCOVA (LS-means with Tukey-Kramer adjustment) test with age class as a covariate to determine if significant difference exists between actual plot volumes (Total, Softwood, Hardwood) measured in the northern FMA areas compared to the southern FMA areas. A detailed summary of the procedures and results are outlined in Appendix D.

The results revealed significant North/South volume difference in some development types. Two development types are of particular concern:

- ◆ 3 - 'S-JP-LD-A-1';
- ◆ 5 - 'S-JP-HD-A-1'

To account for these identified North/South difference, adjustments were applied to the yield curves of the two identified Development Types as outlined in Section 4.1.5.

3.4 L&M OVERRIDE

If the timber supply area equals L&M and the leading species equals Jack Pine then the development type code equals 7 (S-JP-L&M).

3.5 DEVELOPMENT TYPE CODE ASSIGNMENT

The final development type and development type number assignment is described in Table 3-3.

TABLE 3-3: DEVELOPMENT TYPES ASSIGNMENT

SILVICULTURE GROUND RULE CODE	SILVICULTURE GROUND RULE	CROWN COVER	PRODUCTIVITY CLASS	SIGNIFICANT SOFTWOOD	DEVELOPMENT TYPE	DEVELOPMENT TYPE CODE
'S-WS'	1	ANY	N/A	N/A	'S-WS-A-A'	1
'S-BS'	2	ANY	N/A	N/A	'S-BS-A-A'	2
'S-JP'	3	LD	1	N/A	'S-JP-LD-A-1'	3
'S-JP'	3	LD	2	N/A	'S-JP-LD-A-2'	4
'S-JP'	3	HD	1	N/A	'S-JP-HD-A-1'	5
'S-JP'	3	HD	2	N/A	'S-JP-HD-A-2'	6
'S-JP'	3	ANY	N/A	N/A	'S-JP-L&M'	7
'SH-JP'	4	ANY	N/A	N/A	'SH-JP-A-A'	8
'SH-WS'	5	ANY	N/A	N/A	'SH-WS-A-A'	9
'HS-WS'	6	ANY	N/A	N/A	'HS-WS-A-A'	10
'HS-JP'	7	ANY	N/A	N/A	'HS-JP-A-A'	11
'H'	8	LD	1	0	'H-A-LD-A-1'	12
'H'	8	LD	2	0	'H-A-LD-A-2'	13
'H'	8	HD	1	0	'H-A-HD-A-1'	14
'H'	8	HD	2	0	'H-A-HD-A-2'	15
'H'	8	LD	N/A	1	'H(S)-A-LD-A'	16
'H'	8	HD	N/A	1	'H(S)-A-HD-A'	17

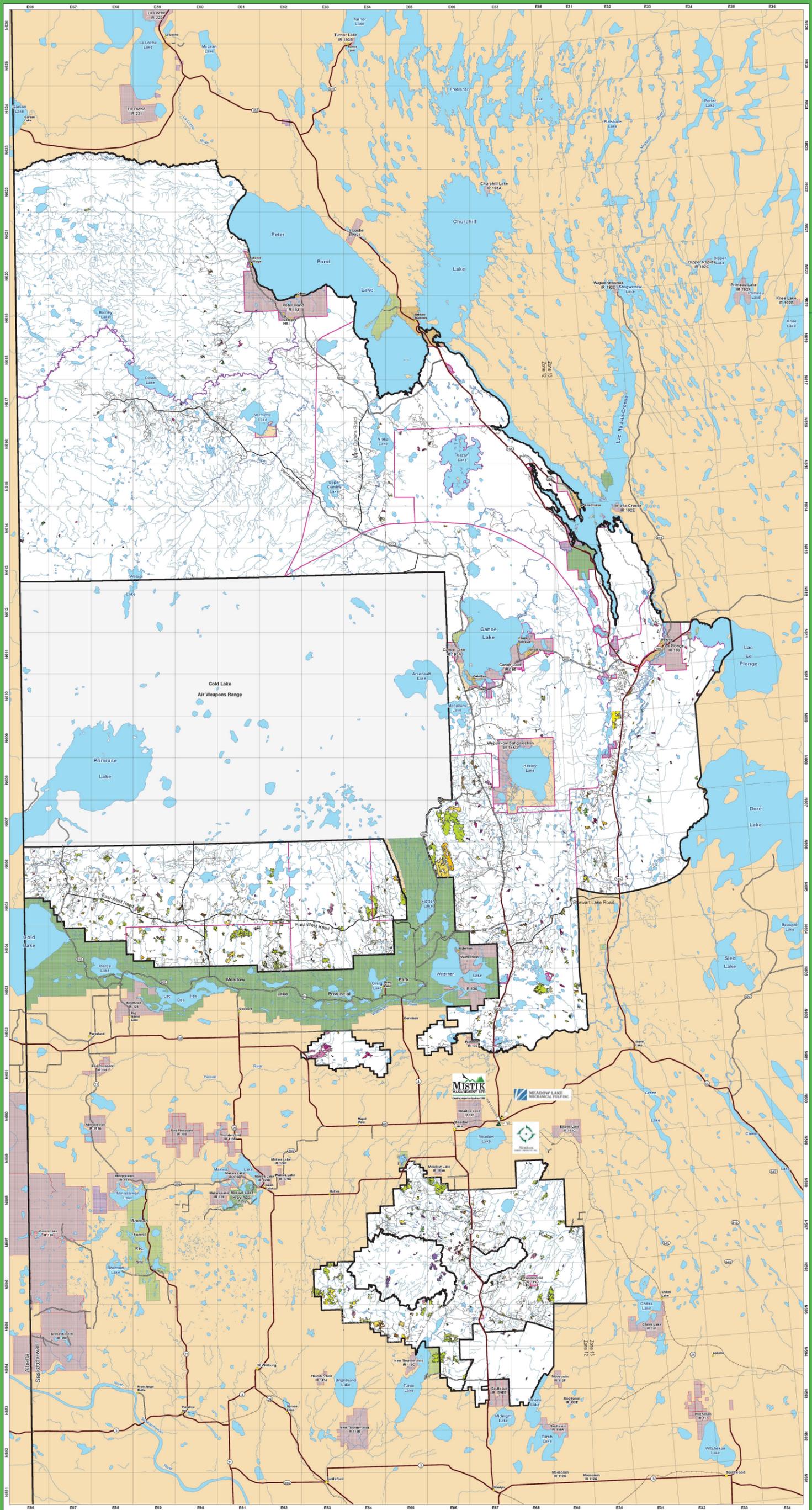


3.6 REGENERATED DEVELOPMENT TYPES (TRANSITIONS)

The yield curves present within this document are the set of yield curves that will be used in wood supply analysis (WSA). Complete information on the regeneration and transition assumptions will be provided in the WSA analysis documentation.

3.7 DEVELOPMENT TYPE ASSIGNMENTS TO THE LANDBASE

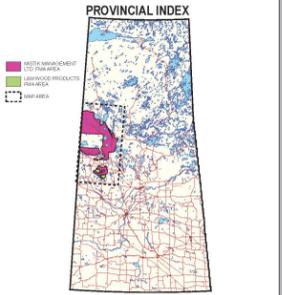
Detailed descriptions of the development type assignments to the landbase are provided within the Mistik Management 2019 Forest Characterization document. The number of plots and operational area for each development type are outlined in Figure 3-1 and Figure 3-2. The spatial distribution of sampled stands development types is outlined on Map 3-1. Map 3-2 illustrates the development type assignments to the net productive landbase.



SPATIAL DISTRIBUTION OF SAMPLED PLOTS DEVELOPMENT TYPES



Map Version: 1.00
 Original Map Scale: 1:250,000
 Map Date: December 7, 2016
 Map Projection: Spheroid UTM
 Map Date: 01/08/2016
 Map File: \\sp\proj\mkt2\sp\mkt2_samp08_utm_devtypes.mxd

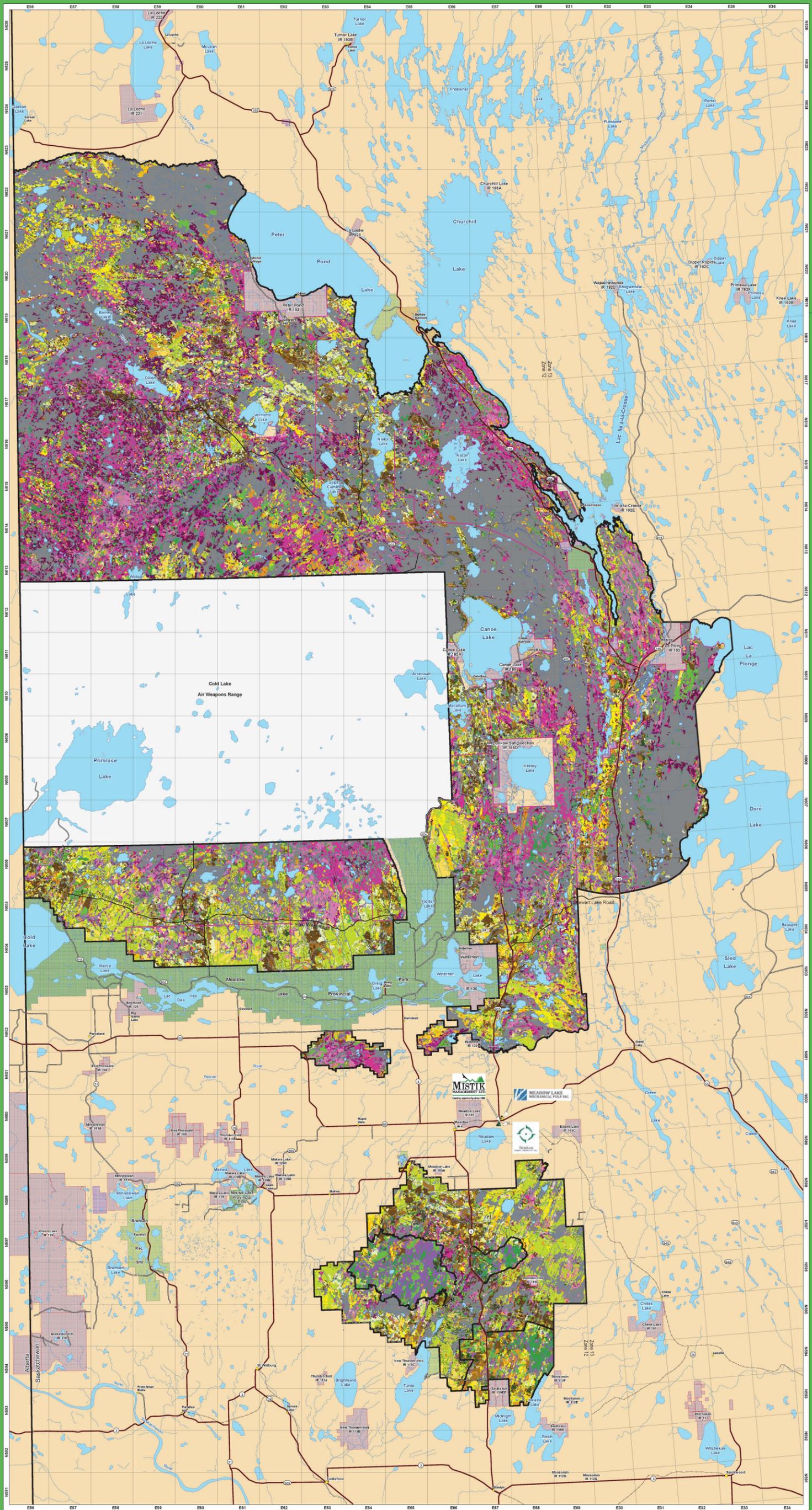


DEVELOPMENT TYPES

1 - S-WS-A-A
2 - S-BS-A-A
3 - S-JP-LD-A-1
4 - S-JP-LD-A-2
5 - S-JP-HD-A-1
6 - S-JP-HD-A-2
7 - S-JP-L&M
8 - SH-JP-A-A
9 - SH-WS-A-A
10 - HS-WS-A-A
11 - HS-JP-A-A
12 - H-A-LD-A-1
13 - H-A-LD-A-2
14 - H-A-HD-A-1
15 - H-A-HD-A-2
16 - H(S)-A-LD-A
17 - H(S)-A-HD-A

PLANIMETRIC LEGEND

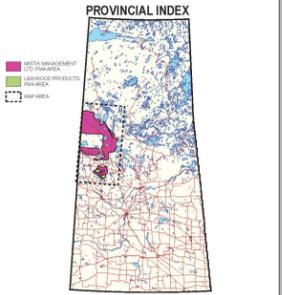
Public Paved Road	Provincial Forestry Class Roads
Public Gravel Road	Class 1
Public Road	Class 2
Oil and Gas Road	Class 3
Railroad	MU Boundary
Creek	FMA Boundary
Lake	Village
Provincial Border	Settlement
UTM Tile Boundary	Timber Exclusion
Air Weapons Range	Town
Indian Reserve	Hamlet / Village
Park	Mill Site
Recreation Area	Woodlands Office



DEVELOPMENT TYPES



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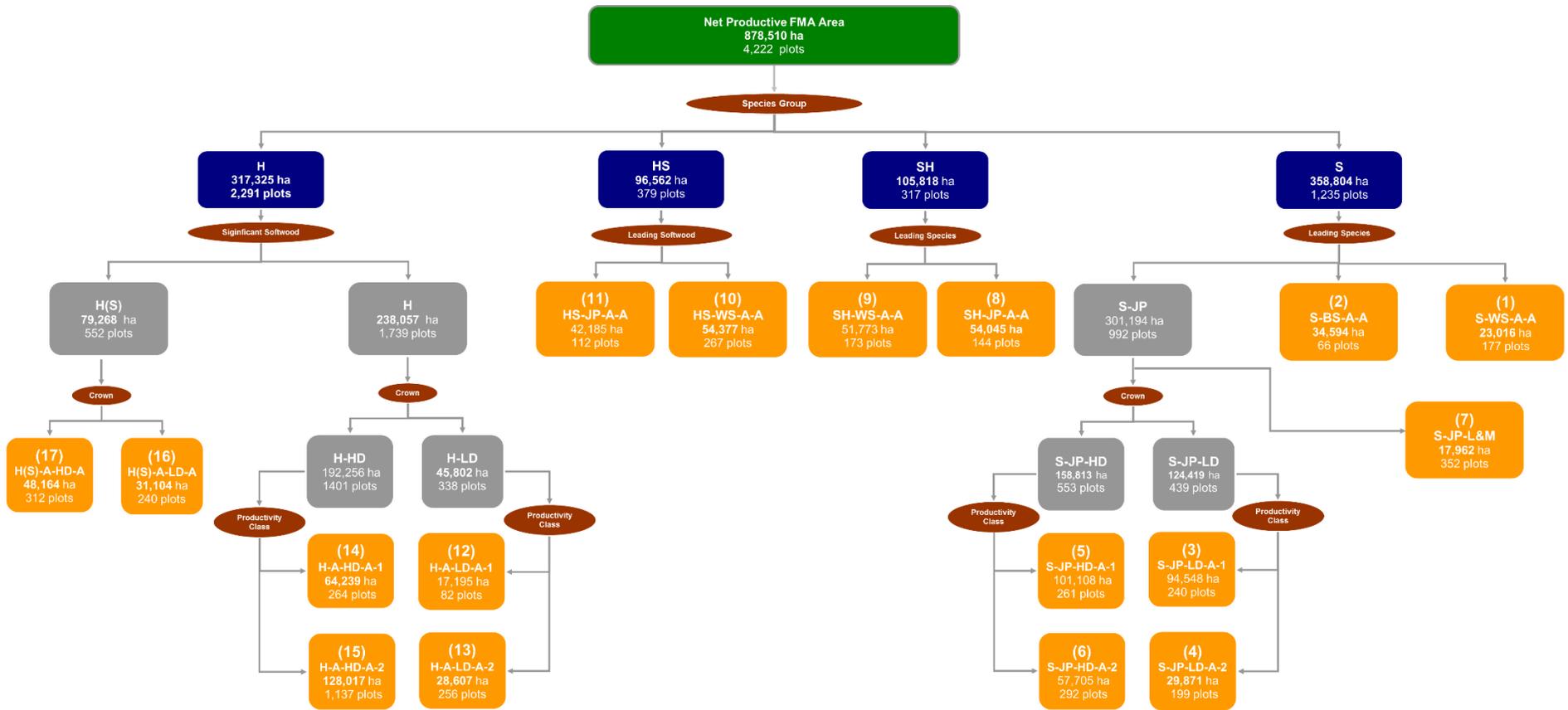
DEVELOPMENT TYPES	
1 - S-WS-A-A	
2 - S-BS-A-A	
3 - S-JP-LD-A-1	
4 - S-JP-LD-A-2	
5 - S-JP-HD-A-1	
6 - S-JP-HD-A-2	
7 - S-JP-L&M	
8 - SH-JP-A-A	
9 - SH-WS-A-A	
10 - HS-WS-A-A	
11 - HS-JP-A-A	
12 - H-A-LD-A-1	
13 - H-A-LD-A-2	
14 - H-A-HD-A-1	
15 - H-A-HD-A-2	
16 - H(S)-A-LD-A	
17 - H(S)-A-HD-A	
■ No Development Type Assigned	

PLANIMETRIC LEGEND	
Public Paved Road	Provincial Forestry Class Roads
Public Gravel Road	Class 1
Public Road	Class 2
Oil and Gas Road	Class 3
Railroad	MU Boundary
Creek	FMA Boundary
Lake	Village
Provincial Border	Settlement
UTM Tile Boundary	Timber Exclusion
Air Weapons Range	Town
Indian Reserve	Hamlet / Village
Park	Mill Site
Recreation Area	Woodlands Office

Map Version: 1.00
 Digital Map Date: 1/20/2018
 Map Date: December 17, 2015
 Map Projection: UTM Zone 18N
 Spheroid: WGS 84
 Map File: mapserver_development_types_2018.mxd



FIGURE 3-2 DEVELOPMENT TYPE DETERMINATION PROCESS FLOW CHART





4.0 YIELD CURVE AND VOLUME TABLE DEVELOPMENT

4.1 MODELLING PROCEDURES TESTED AND EVALUATED

The yield curves and empirical yield tables were developed directly from the compiled volume sampling plot data (Mistik Licensee Utilization standards) available for each development type after the net down process. Several nonlinear models were then examined using plot based methodology to predict softwood and hardwood yields.

4.1.1 TWO PARAMETER NONLINEAR MODEL

$$y = a(\text{age})^b e^{(-a(\text{age}))}$$

Where:

- y = Predicted merchantable volume (m³/ha) – softwood or hardwood
- $a b$ = Predicted nonlinear regression coefficients
- age = 10 year age class
- e = Base of the natural logarithm (~2.71828)

4.1.2 TWO PARAMETER NONLINEAR (GUIDE CURVE) MODEL

$$y = (a + dt)(\text{age})^b e^{(-a(\text{age}))}$$

Where:

- y = Predicted merchantable volume (m³/ha) – softwood or hardwood
- $a b d$ = Predicted nonlinear regression coefficients
- t = A dummy variable which identifies the (0) target development type curve and (1) combined development type guide curve
- age = 10-year age class
- e = Base of the natural logarithm (~2.71828)

4.1.3 THREE PARAMETER NONLINEAR MODEL

$$y = a(\text{age})^b e^{(-c(\text{age}))}$$

Where:

- y = Predicted merchantable volume (m³/ha) – softwood or hardwood
- $a b c$ = Predicted nonlinear regression coefficients
- age = 10-year age class
- e = Base of the natural logarithm (~2.71828)



4.1.4 THREE PARAMETER NONLINEAR (GUIDE CURVE) MODEL

$$y = (a + dt)(age)^b e^{(-c(age))}$$

Where:

y	=	Predicted merchantable volume (m ³ /ha) – softwood or hardwood
$a b c d$	=	Predicted nonlinear regression coefficients
t	=	A dummy variable which identifies the (0) target development type curve and (1) combined development type guide curve
age	=	10-year age class
e	=	Base of the natural logarithm (~2.71828)

4.1.5 NORTH/SOUTH YIELD CURVE ADJUSTMENT

Based on the North/South Comparison analysis, two development types were identified as having a difference between the north and south volumes and requiring adjustment:

- ◆ 3 - 'S-JP-LD-A-1';
- ◆ 5 - 'S-JP-HD-A-1'.

To account for the North/South volume differences, the yield projections of the two curves were adjusted through the use of an area weighted curve using the following steps:

- 1) First, the average softwood and hardwood volume was calculated for each 10-year age class separately in the North and South portions of the Development Type strata;
- 2) These average volumes were then multiplied by the corresponding area weighting factor (e.g., North Productive Area by plot development type);
- 3) Next, the area weighted North and South volumes were then added together and divided by the sum of the North and South factors (i.e., Total productive area within each age class and development type);
- 4) Nonlinear models (section 4.1.1 – section 4.1.4) were then examined using the area weighted adjusted plot averages as the input;
- 5) The models were then evaluated (Section 4.1.6).

4.1.6 MODEL EVALUATION

Model forms were evaluated on the following basis:

- ◆ Simplicity and flexibility:
Increasing the number of parameters within a nonlinear model means increased flexibility.
- ◆ Fit to trends:
Increasing the number of parameters within a nonlinear model increases a model's ability to show or be influenced by minor trends within data.
- ◆ Fit to outliers and extremes:
Increasing the number of parameters within a nonlinear model increases a models susceptibility to be influenced by outliers.



- ◆ Pattern of growth assumptions:

Guide curves should only be used between yield strata where the pattern of growth is considered comparable.

Overall a model form for each curve was chosen to represent the final yield curves according to how accurately it represented the volumes found in the plot data. Guide curve model forms were only used in cases where all other model forms failed to produce a realistic solution.

4.2 FINAL YIELD CURVES

A summary of the models used and the resulting coefficients are given in Table 4-1 and Table 4-2. Figures 4-1 to 4-17 and Tables 4-3 to 4-19 display the final yield curves and associated yield tables.



TABLE 4-1: NONLINEAR MODEL COEFFICIENTS (SOFTWOOD)

MODEL FORM (HEADING NUMBER)	DEVELOPMENT TYPE NUMBER	DEVELOPMENT TYPE	SOFTWOOD COEFFICIENTS				
			a	b	c	d	t
4.1.2 ¹⁶	1	S-WS-A-A	0.01545	2.413		-0.00356	0
4.1.1	2	S-BS-A-A	0.01921	2.162			
4.1.3 (4.1.5) ¹⁷	3	S-JP-LD-A-1	5.707E-06	4.534	0.04671	3.1601E-06	0
4.1.3	4	S-JP-LD-A-2	0.0003502	3.452	0.03183		
4.1.3(4.1.5)	5	S-JP-HD-A-1	1.576E-09	7.304	0.08897		
4.1.3	6	S-JP-HD-A-2	1.375E-08	6.986	0.09150		
4.1.2	7	S-JP-L&M	0.023859	2.488			
4.1.1	8	SH-JP-A-A	0.01876	2.296			
4.1.1	9	SH-WS-A-A	0.02717	2.443			
4.1.1	10	HS-WS-A-A	0.01736	2.164			
4.1.3	11	HS-JP-A-A	0.001521	3.433	0.06427		
4.1.1	12	H-A-LD-A-1	0.01046	1.698			
4.1.4 ¹⁸	13	H-A-LD-A-2	14.94	-0.9731	-0.03180	22.96	0
4.1.2 ¹⁹	14	H-A-HD-A-1	0.005264	1.759		-0.0003521	0
4.1.1	15	H-A-HD-A-2	0.01374	1.646			
4.1.1	16	H(S)-A-LD-A	0.01233	2.074			
4.1.1	17	H(S)-A-HD-A	0.01432	2.071			

¹⁶ The softwood yield curve for development type 1: S-WS-A-A was guided with softwood plot volumes from development type 9: SH-WS-A-A.

¹⁷ The softwood yield curve for development type 3: S-JP-LD-A-1 was guided with softwood plot volumes from development type 5: S-JP-HD-A-1.

¹⁸ The softwood yield curve for development type 13: H-A-LD-A-2 was guided with softwood plot volumes from development type 15: H-A-HD-A-2.

¹⁹ The softwood yield curve for development type 14: H-A-HD-A-1 was guided with softwood plot volumes from development type 16: H(S)-A-LD-A.



TABLE 4-2: NONLINEAR MODEL COEFFICIENTS (HARDWOOD)

MODEL FORM (HEADING NUMBER)	DEVELOPMENT TYPE NUMBER	DEVELOPMENT TYPE	HARDWOOD COEFFICIENTS				
			a	b	c	d	t
4.1.1	1	S-WS-A-A	0.01724	2.126			
4.1.1	2	S-BS-A-A	0.003447	1.873			
4.1.1 (4.1.5)	3	S-JP-LD-A-1	0.03477	1.938			
4.1.3	4	S-JP-LD-A-2	0.01133	1.777	0.007850		
4.1.1 (4.1.5)	5	S-JP-HD-A-1	0.03892	2.016			
4.1.1	6	S-JP-HD-A-2	0.02119	2.020			
4.1.2 ²⁰	7	S-JP-L&M	0.02548	1.954		0.003094	0
4.1.2 ²¹	8	SH-JP-A-A	0.02247	2.288		-0.01304	0
4.1.4 ²²	9	SH-WS-A-A	0.005585	2.817	0.02875	0.001730	0
4.1.1	10	HS-WS-A-A	0.02269	2.416			
4.1.3	11	HS-JP-A-A	4.725E-07	6.219	0.09881		
4.1.3	12	H-A-LD-A-1	1.542E-20	15.25	0.1992		
4.1.3	13	H-A-LD-A-2	1.563E-10	8.406	0.1107		
4.1.2 ²³	14	H-A-HD-A-1	0.02193	2.479		0.007083	0
4.1.1	15	H-A-HD-A-2	0.02512	2.564			
4.1.1	16	H(S)-A-LD-A	0.02725	2.462			
4.1.2 ²⁴	17	H(S)-A-HD-A	0.02445	2.505		-0.002909	0

²⁰ The combined hardwood plot volume dataset of all pure softwood strata (S-BS, S-JP, and S-WS) from L&M Wood Products FMA was used to guide the incidental hardwood plot volume data of the development type 7: (S-JP-L&M) stratum.

²¹ The hardwood yield curve for development type 8: SH-JP-A-A was guided with combined hardwood plot volume dataset from development type 3: S-JP-LD-A-1, development type 4: S-JP-LD-A-2, development type 5: S-JP-HD-A-1, development type 6: S-JP-HD-A-2, development type 8: SH-JP-A-A, and development type 11: HS-JP-A-A.

²² The hardwood yield curve for development type 9: SH-WS-A-A was guided with combined hardwood plot volume dataset from development type 9: SH-WS-A-A, development type 10: HS-WS-A-A, development type 16: H(S)-A-LD-A, and development type 17: H(S)-A-HD-A.

²³ The hardwood yield curve for development type 14: H-A-HD-A-1 was guided with hardwood plot volume dataset from development type 15: H-A-HD-A-2.

²⁴ The hardwood yield curve for development type 17: H(S)-A-HD-A was guided with combined hardwood plot volume dataset from development type 16: H(S)-A-LD-A and development type 17: H(S)-A-HD-A.



FIGURE 4-1 DEVELOPMENT TYPE 1: S-WS-A-A

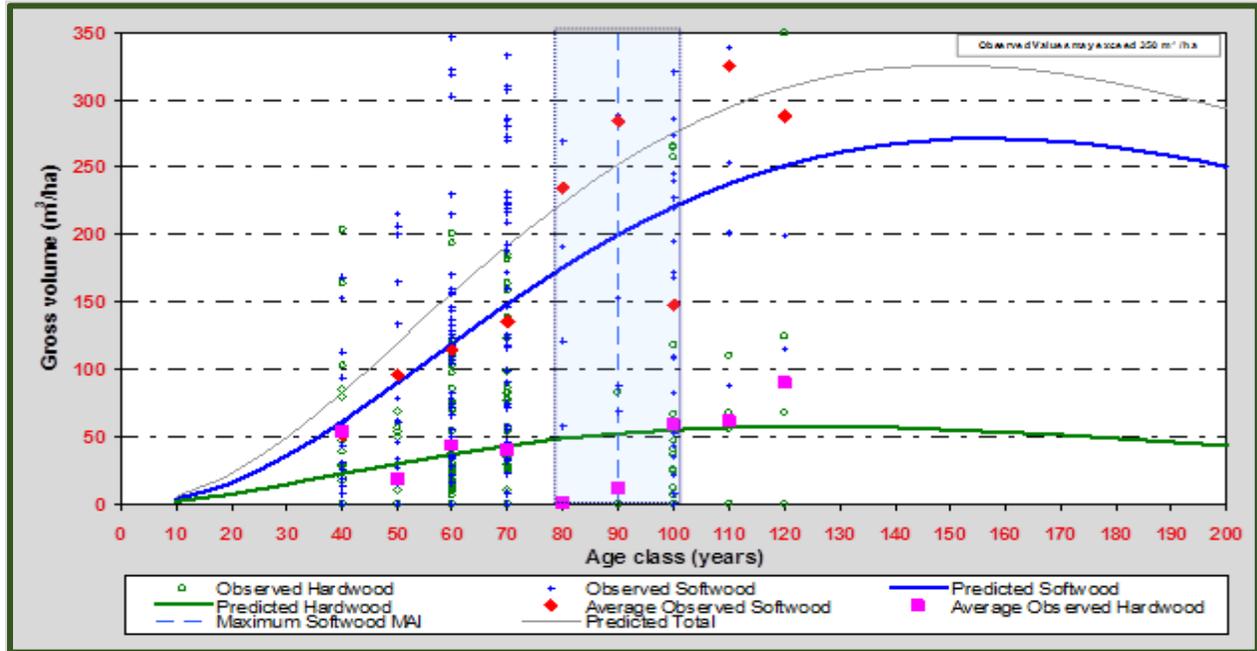


TABLE 4-3: #1 S-WS-A-A COEFFICIENTS/YIELD TABLE

Development Type Coefficients		a	b	c	d	t	
Softwood		0.01545	2.413		-0.003563	0	
Hardwood		0.01724	2.126				
Age Class (yrs)	Observed Average Volume (m³/ha)		Predicted volume		Mean annual increment		Net area (ha)
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	
0			0.00	0.00	0.00	0.00	4,544
10			3.42	1.94	0.34	0.19	142
20			15.62	7.14	0.78	0.36	78
30			35.59	14.22	1.19	0.47	357
40	50.05	52.69	61.04	22.07	1.53	0.55	1,021
50	95.52	18.25	89.61	29.85	1.79	0.60	2,804
60	114.60	43.55	119.20	37.03	1.99	0.62	2,679
70	135.29	39.51	148.14	43.25	2.12	0.62	3,752
80	234.54	0.00	175.17	48.36	2.19	0.60	2,736
90	284.20	11.79	199.42	52.28	2.22	0.58	2,022
100	147.60	58.16	220.31	55.06	2.20	0.55	1,400
110	325.13	61.51	237.57	56.75	2.16	0.52	1,150
120	287.75	90.12	251.10	57.47	2.09	0.48	1,186
130			260.98	57.34	2.01	0.44	407
140			267.39	56.50	1.91	0.40	125
150			270.60	55.07	1.80	0.37	21
160			270.91	53.17	1.69	0.33	19
170			268.68	50.91	1.58	0.30	4
180			264.25	48.38	1.47	0.27	0
190			257.96	45.68	1.36	0.24	0
200			250.14	42.88	1.25	0.21	0



FIGURE 4-2 DEVELOPMENT TYPE 2: S-BS-A-A

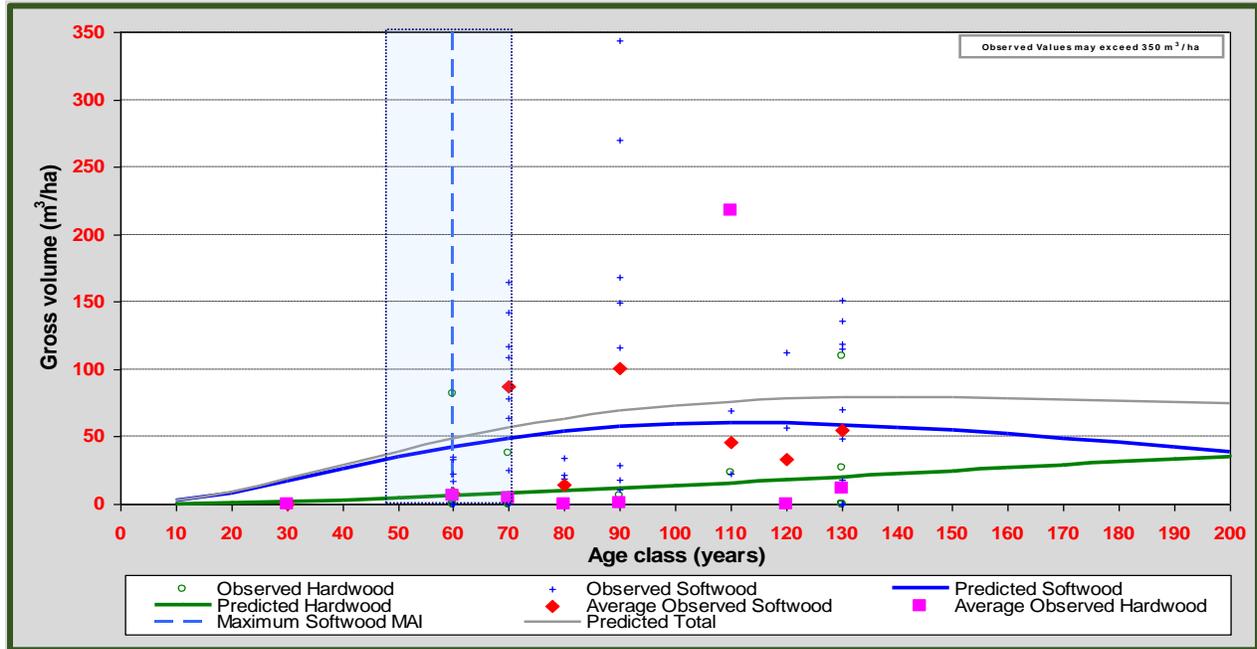


TABLE 4-4: #2 S-BS-A-A COEFFICIENTS/YIELD TABLE

Development Type Coefficients		a	b	c	d	t	
Softwood		0.01921	2.162				
Hardwood		0.003447	1.873				
Age Class (yrs)	Observed Average Volume (m ³ /ha)		Predicted volume		Mean annual increment		Net area (ha)
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	
0			0.00	0.00	0.00	0.00	394
10			2.30	0.25	0.23	0.02	1,550
20			8.50	0.88	0.43	0.04	3,722
30	0.00	0.00	16.86	1.82	0.56	0.06	2,168
40			25.91	3.01	0.65	0.08	1,234
50			34.64	4.42	0.69	0.09	1,942
60	8.36	6.27	42.40	6.01	0.71	0.10	2,815
70	87.22	4.16	48.83	7.75	0.70	0.11	2,478
80	14.81	0.00	53.79	9.61	0.67	0.12	2,126
90	100.36	0.54	57.26	11.58	0.64	0.13	1,771
100			59.35	13.63	0.59	0.14	1,409
110	46.14	217.41	60.18	15.74	0.55	0.14	977
120	33.52	0.00	59.95	17.90	0.50	0.15	521
130	54.82	11.34	58.82	20.09	0.45	0.15	346
140			56.97	22.30	0.41	0.16	162
150			54.58	24.51	0.36	0.16	48
160			51.79	26.73	0.32	0.17	8
170			48.72	28.93	0.29	0.17	0
180			45.50	31.10	0.25	0.17	0
190			42.20	33.25	0.22	0.18	0
200			38.91	35.37	0.19	0.18	0



FIGURE 4-3 DEVELOPMENT TYPE 3: S-JP-LD-A-1

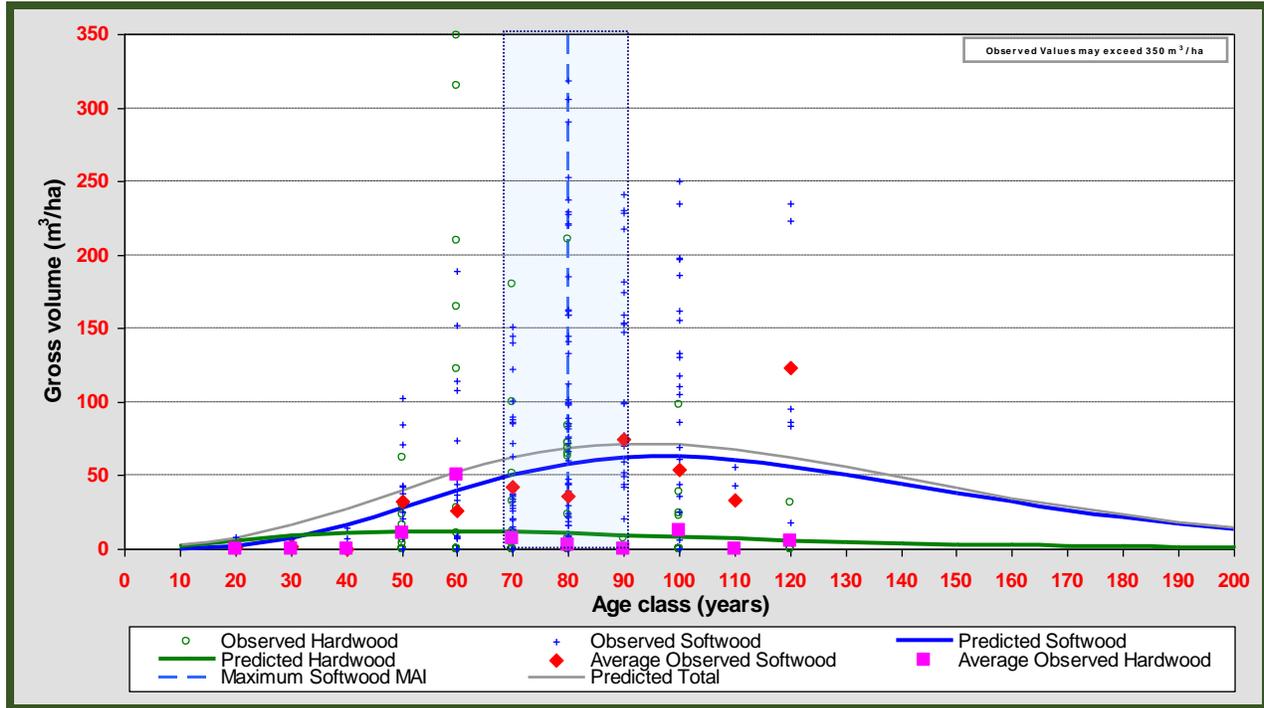


TABLE 4-5: #3 S-JP-LDA-1 COEFFICIENTS/YIELD TABLE

Development Type Coefficients		a	b	c	d	t
Softwood		5.707E-06	4.534	0.04671	3.160E-06	0
Hardwood		0.03477	1.938			

Age Class (yrs)	Observed Average Volume (m ³ /ha)		Predicted volume		Mean annual increment		Net area (ha)
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	
0			0.00	0.00	0.00	0.00	1,962
10			0.12	2.13	0.01	0.21	9,921
20	1.35	0.00	1.78	5.77	0.09	0.29	11,028
30	2.18	0.00	7.01	8.94	0.23	0.30	3,305
40	0.41	0.00	16.19	11.03	0.40	0.28	3,608
50	32.21	10.82	27.91	12.00	0.56	0.24	9,776
60	26.43	50.25	39.98	12.07	0.67	0.20	9,643
70	42.49	7.34	50.41	11.49	0.72	0.16	15,063
80	35.62	3.13	57.89	10.52	0.72	0.13	12,164
90	74.47	0.10	61.90	9.33	0.69	0.10	9,152
100	54.16	12.22	62.56	8.09	0.63	0.08	4,977
110	33.17	0.00	60.41	6.87	0.55	0.06	3,232
120	123.67	5.28	56.18	5.74	0.47	0.05	1,090
130			50.62	4.74	0.39	0.04	60
140			44.40	3.86	0.32	0.03	74
150			38.05	3.12	0.25	0.02	0
160			31.96	2.50	0.20	0.02	0
170			26.37	1.98	0.16	0.01	0
180			21.42	1.56	0.12	0.01	0
190			17.15	1.23	0.09	0.01	0
200			13.57	0.96	0.07	0.00	0



FIGURE 4-4 DEVELOPMENT TYPE 4: S-JP-LD-A-2

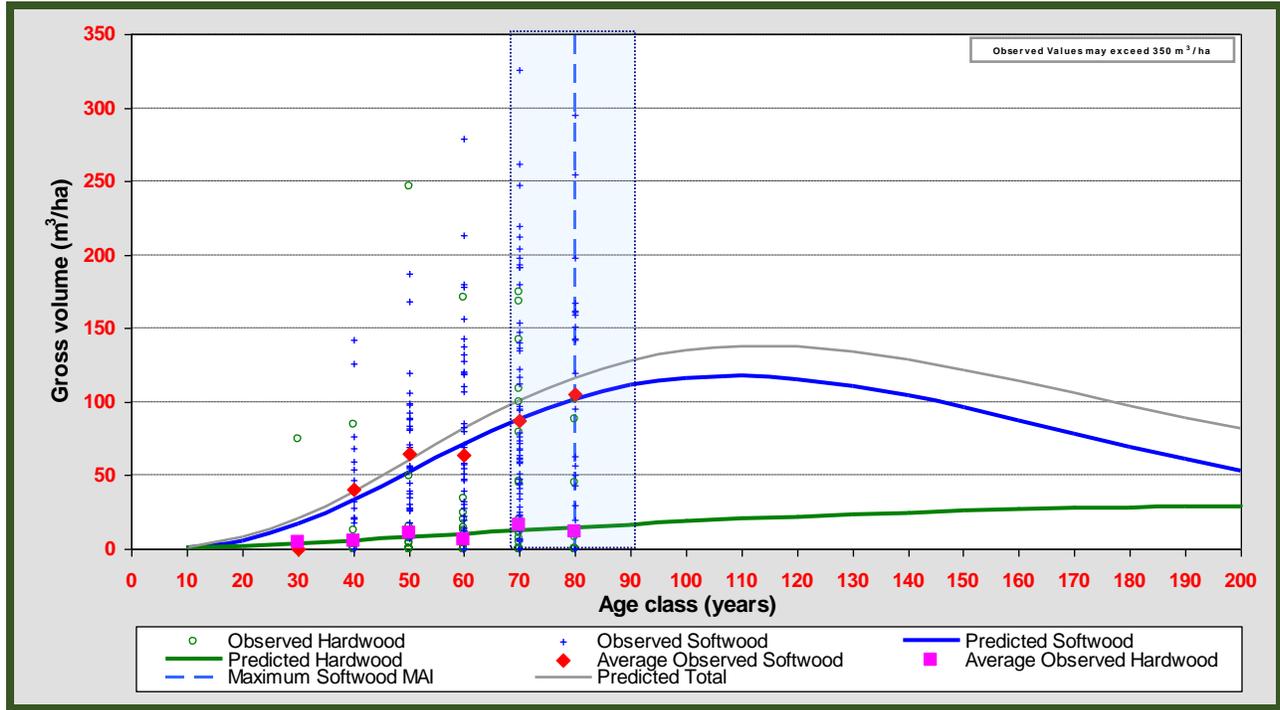


TABLE 4-6: #4 S-JP-LD-A-2 COEFFICIENTS/YIELD TABLE

Development Type Coefficients		a	b	c	d	t	
Softwood		0.0003502	3.452	0.03183			
Hardwood		0.01133	1.777	0.007850			
Age Class (yrs)	Observed Average Volume (m ³ /ha)		Predicted volume		Mean annual increment		Net area (ha)
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	
0			0.00	0.00	0.00	0.00	1,024
10			0.72	0.63	0.07	0.06	663
20			5.74	1.99	0.29	0.10	3,466
30	0.00	4.14	16.92	3.78	0.56	0.13	1,479
40	40.22	5.46	33.22	5.82	0.83	0.15	2,656
50	64.91	10.54	52.20	8.00	1.04	0.16	8,705
60	64.05	5.89	71.24	10.23	1.19	0.17	4,626
70	87.58	15.80	88.23	12.44	1.26	0.18	5,618
80	105.64	11.64	101.76	14.58	1.27	0.18	2,015
90			111.15	16.62	1.24	0.18	394
100			116.32	18.53	1.16	0.19	77
110			117.58	20.29	1.07	0.18	47
120			115.49	21.90	0.96	0.18	0
130			110.74	23.34	0.85	0.18	1
140			104.04	24.61	0.74	0.18	0
150			96.03	25.72	0.64	0.17	0
160			87.28	26.67	0.55	0.17	0
170			78.27	27.46	0.46	0.16	0
180			69.35	28.11	0.39	0.16	0
190			60.80	28.60	0.32	0.15	0
200			52.79	28.97	0.26	0.14	0



FIGURE 4-5 DEVELOPMENT TYPE 5: S-JP-HD-A-1

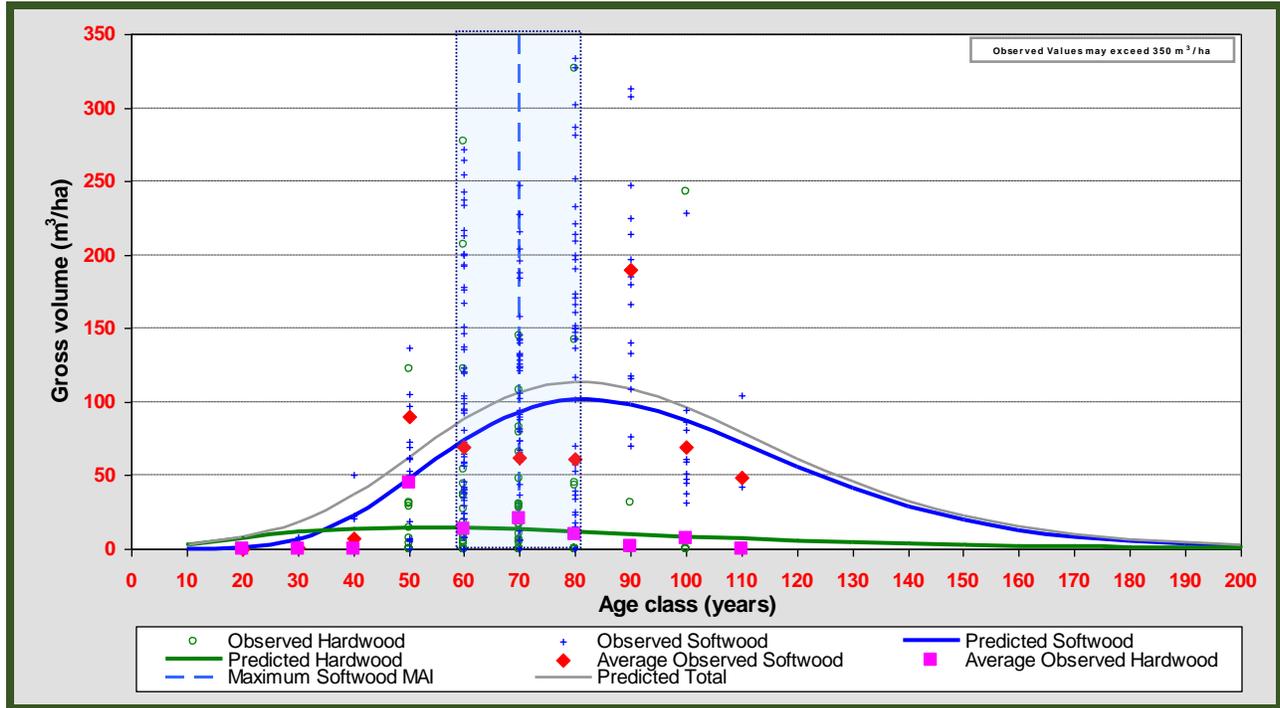


TABLE 4-7: #5 S-JP-HD-A-1 COEFFICIENTS/YIELD TABLE

Development Type Coefficients		a	b	c	d	t	
Softwood		1.576E-09	7.304	0.08897			
Hardwood		0.03892	2.016				
Age Class (yrs)	Observed Average Volume (m ³ /ha)		Predicted volume		Mean annual increment		Net area (ha)
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	
0			0.00	0.00	0.00	0.00	4,041
10			0.01	2.74	0.00	0.27	22,051
20	0.00	0.00	0.85	7.50	0.04	0.37	16,729
30	0.57	0.00	6.71	11.50	0.22	0.38	9,940
40	7.13	0.00	22.54	13.92	0.56	0.35	4,390
50	89.82	44.97	47.25	14.79	0.94	0.30	9,324
60	68.88	13.25	73.50	14.47	1.23	0.24	9,536
70	61.77	20.70	93.08	13.38	1.33	0.19	9,251
80	61.02	9.98	101.40	11.86	1.27	0.15	7,541
90	189.53	1.92	98.45	10.19	1.09	0.11	5,200
100	69.06	7.32	87.30	8.54	0.87	0.09	1,928
110	49.04	0.00	71.94	7.01	0.65	0.06	1,651
120			55.79	5.66	0.46	0.05	368
130			41.12	4.51	0.32	0.03	10
140			29.02	3.55	0.21	0.03	28
150			19.73	2.76	0.13	0.02	0
160			12.99	2.13	0.08	0.01	0
170			8.31	1.63	0.05	0.01	0
180			5.18	1.24	0.03	0.01	0
190			3.16	0.94	0.02	0.00	0
200			1.89	0.70	0.01	0.00	0



FIGURE 4-6 DEVELOPMENT TYPE 6: S-JP-HD-A-2

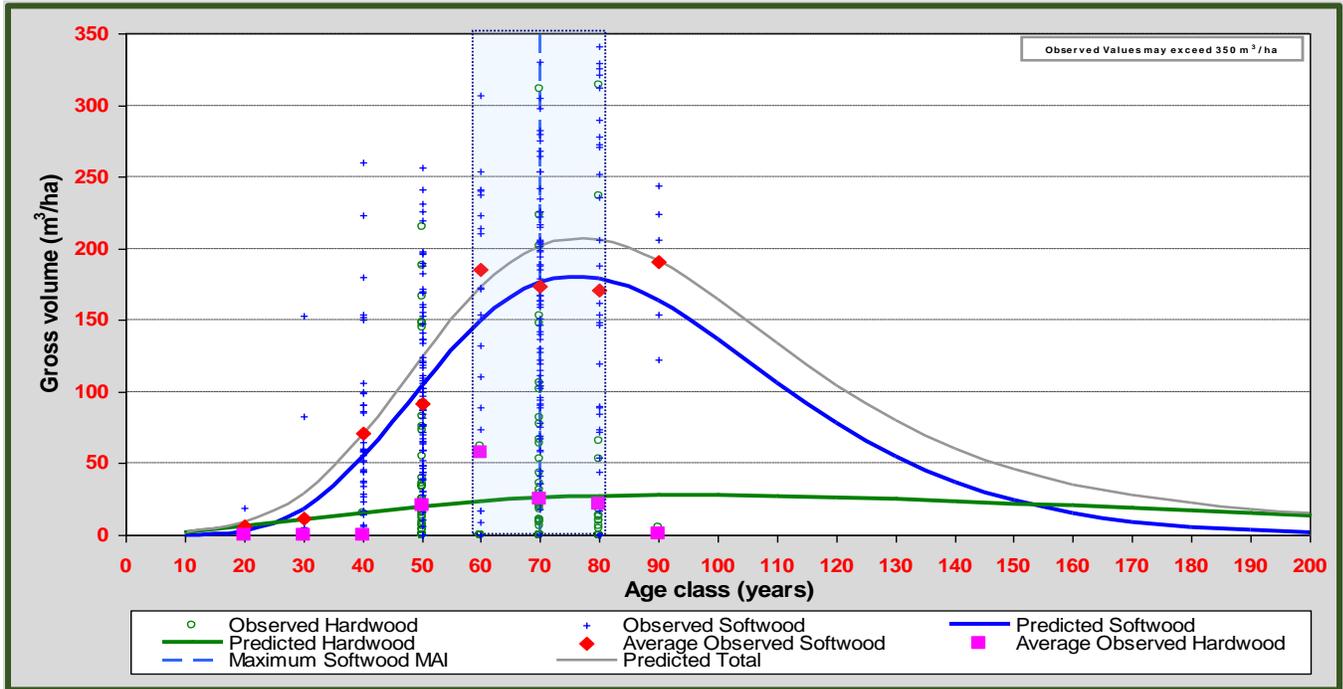


TABLE 4-8: #6 S-JP-HD-A-2 COEFFICIENTS/YIELD TABLE

Development Type Coefficients		a	b	c	d	t
Softwood		1.375E-08	6.986	0.09150		
Hardwood		0.02119	2.020			

Age Class (yrs)	Observed Average Volume (m ³ /ha)		Predicted volume		Mean annual increment		Net area (ha)
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	
0			0.00	0.00	0.00	0.00	5,116
10			0.05	1.80	0.01	0.18	5,738
20	6.37	0.00	2.70	5.90	0.14	0.29	10,225
30	11.89	0.00	18.39	10.82	0.61	0.36	2,902
40	70.76	0.39	54.96	15.65	1.37	0.39	5,658
50	91.41	20.54	104.63	19.88	2.09	0.40	16,522
60	185.54	57.23	149.75	23.24	2.50	0.39	6,888
70	173.26	25.15	176.05	25.67	2.52	0.37	6,996
80	171.39	21.65	179.21	27.20	2.24	0.34	1,961
90	190.47	0.83	163.42	27.92	1.82	0.31	478
100			136.63	27.94	1.37	0.28	53
110			106.49	27.41	0.97	0.25	21
120			78.32	26.43	0.65	0.22	9
130			54.87	25.14	0.42	0.19	4
140			36.88	23.62	0.26	0.17	0
150			23.92	21.97	0.16	0.15	0
160			15.03	20.25	0.09	0.13	0
170			9.20	18.51	0.05	0.11	0
180			5.49	16.81	0.03	0.09	0
190			3.21	15.17	0.02	0.08	0
200			1.84	13.61	0.01	0.07	0



FIGURE 4-7 DEVELOPMENT TYPE 7: S-JP-L&M

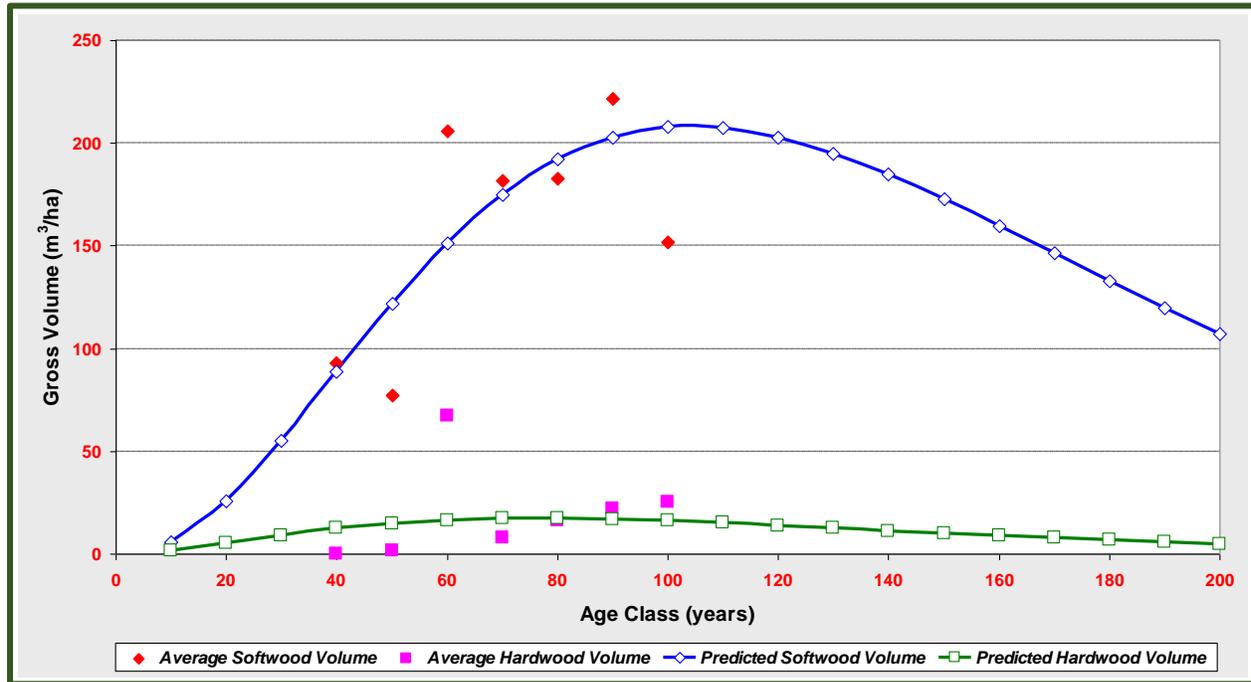


TABLE 4-9: #8 S-JP-L&M COEFFICIENTS/YIELD TABLE

Development Type Coefficients		a	b	d	T1	R2	
Softwood		0.023859	2.488067	-	-	0.061567	
Hardwood		0.025484	1.954092	0.003094	0	0.001744	
Age Class (yrs)	Observed Average Volume (m³/ha)		Predicted volume		Mean annual increment		Net area (ha)
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	
0			0	0	0.00	0.00	2,729
10			6	2	0.58	0.18	96
20			26	5	1.28	0.27	447
30			55	9	1.84	0.30	870
40	93	0	89	12	2.22	0.31	261
50	77	2	122	15	2.44	0.30	1,145
60	206	67	151	16	2.52	0.27	1,421
70	182	8	175	17	2.50	0.25	7,921
80	183	16	192	17	2.40	0.22	4,172
90	221	22	203	17	2.25	0.19	1,379
100	152	25	208	16	2.08	0.16	115
110			207	15	1.89	0.14	0
120			203	14	1.69	0.12	0
130			195	13	1.50	0.10	0
140			185	11	1.32	0.08	0
150			173	10	1.15	0.07	0
160			160	9	1.00	0.05	0
170			146	8	0.86	0.04	0
180			133	7	0.74	0.04	0
190			120	6	0.63	0.03	0
200			107	5	0.54	0.02	0



FIGURE 4-8 DEVELOPMENT TYPE 8: SH-JP-A-A

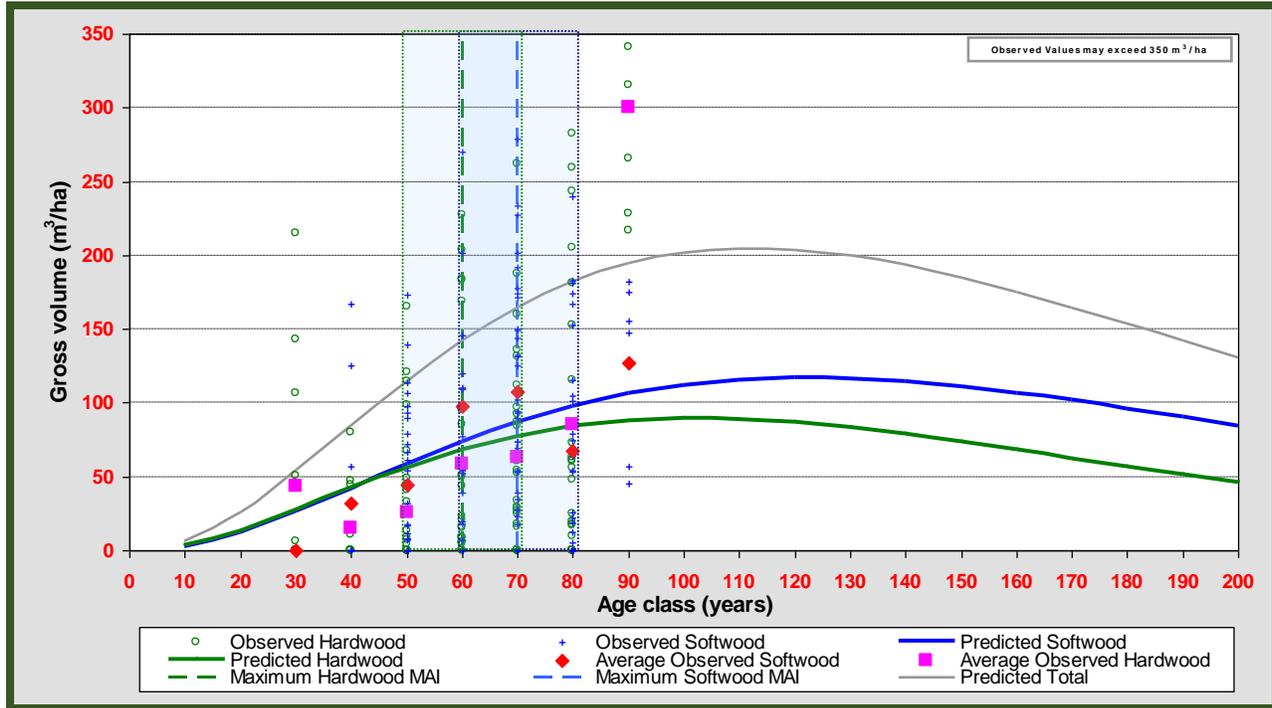


TABLE 4-10: #8 SH-JP-A-A COEFFICIENTS/YIELD TABLE

Development Type Coefficients		a	b	c	d	t
Softwood		0.01876	2.296			
Hardwood		0.02247	2.288		-0.01304	0

Age Class (yrs)	Observed Average Volume (m ³ /ha)		Predicted volume		Mean annual increment		Net area (ha)
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	
0			0.00	0.00	0.00	0.00	7,539
10			3.07	3.49	0.31	0.35	10,726
20			12.50	13.60	0.62	0.68	4,185
30	0.00	43.37	26.28	27.47	0.88	0.92	1,808
40	31.94	15.19	42.17	42.37	1.05	1.06	2,281
50	44.56	25.64	58.34	56.40	1.17	1.13	4,831
60	97.71	58.94	73.49	68.37	1.22	1.14	2,830
70	107.63	62.72	86.78	77.70	1.24	1.11	3,211
80	67.74	84.85	97.74	84.25	1.22	1.05	2,014
90	127.08	300.45	106.17	88.11	1.18	0.98	1,284
100			112.09	89.56	1.12	0.90	632
110			115.64	88.97	1.05	0.81	419
120			117.05	86.72	0.98	0.72	74
130			116.60	83.19	0.90	0.64	0
140			114.57	78.73	0.82	0.56	0
150			111.27	73.64	0.74	0.49	0
160			106.97	68.18	0.67	0.43	0
170			101.91	62.56	0.60	0.37	0
180			96.32	56.95	0.54	0.32	0
190			90.39	51.48	0.48	0.27	0
200			84.29	46.24	0.42	0.23	0



FIGURE 4-9 DEVELOPMENT TYPE 9: SH-WS-A-A

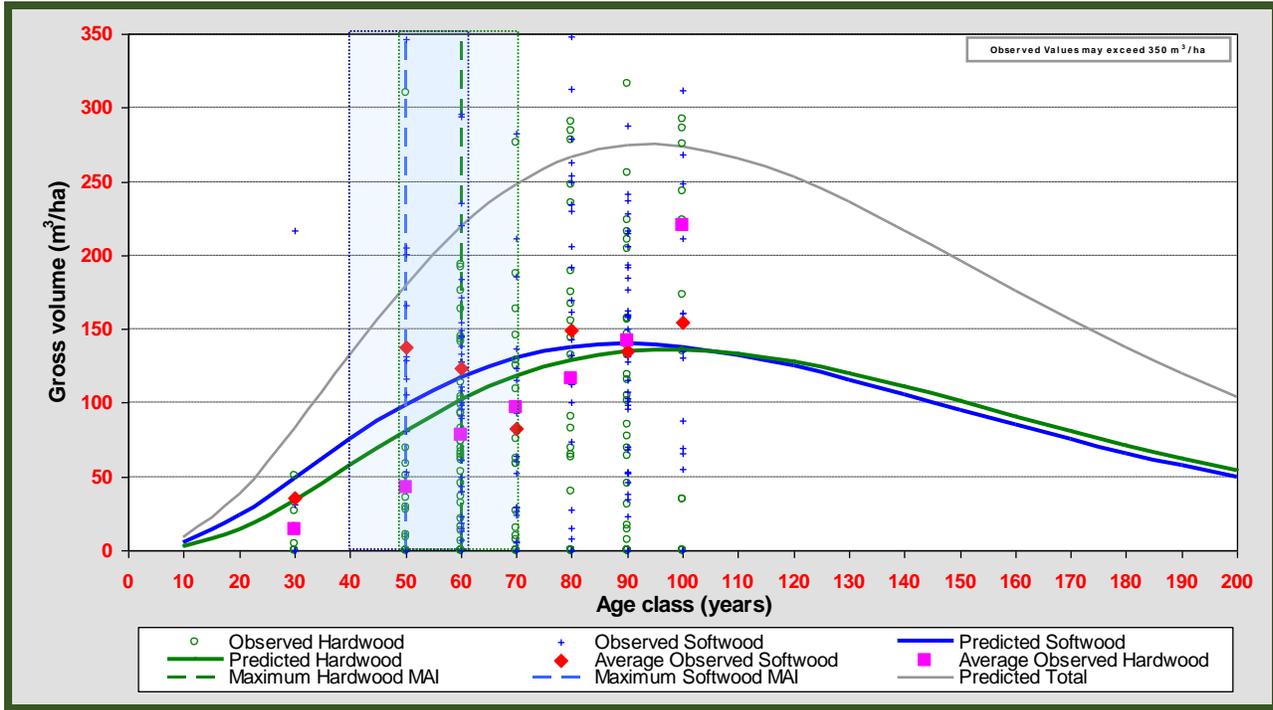


TABLE 4-11: #9 SH-WS-A-A COEFFICIENTS/YIELD TABLE

Development Type Coefficients		a	b	c	d	t	
Softwood		0.02717	2.443				
Hardwood		0.005585	2.817	0.02875	0.001730	0	
Age Class (yrs)	Observed Average Volume (m³/ha)		Predicted volume		Mean annual increment		Net area (ha)
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	
0			0.00	0.00	0.00	0.00	8,597
10			5.74	2.75	0.57	0.28	6,751
20			23.78	14.55	1.19	0.73	228
30	35.38	13.84	48.80	34.20	1.63	1.14	531
40			75.10	57.70	1.88	1.44	1,130
50	138.07	42.70	98.72	81.16	1.97	1.62	1,585
60	123.31	77.74	117.44	101.76	1.96	1.70	1,991
70	83.02	97.26	130.42	117.85	1.86	1.68	2,055
80	149.41	116.22	137.72	128.79	1.72	1.61	1,776
90	135.43	142.23	139.95	134.63	1.55	1.50	1,661
100	154.77	220.10	137.95	135.90	1.38	1.36	1,101
110			132.69	133.35	1.21	1.21	848
120			125.07	127.82	1.04	1.07	403
130			115.90	120.14	0.89	0.92	126
140			105.85	111.05	0.76	0.79	0
150			95.47	101.18	0.64	0.67	0
160			85.18	91.04	0.53	0.57	0
170			75.28	81.01	0.44	0.48	0
180			65.96	71.39	0.37	0.40	0
190			57.37	62.37	0.30	0.33	0
200			49.55	54.06	0.25	0.27	0



FIGURE 4-10 DEVELOPMENT TYPE 10: HS-WS-A-A

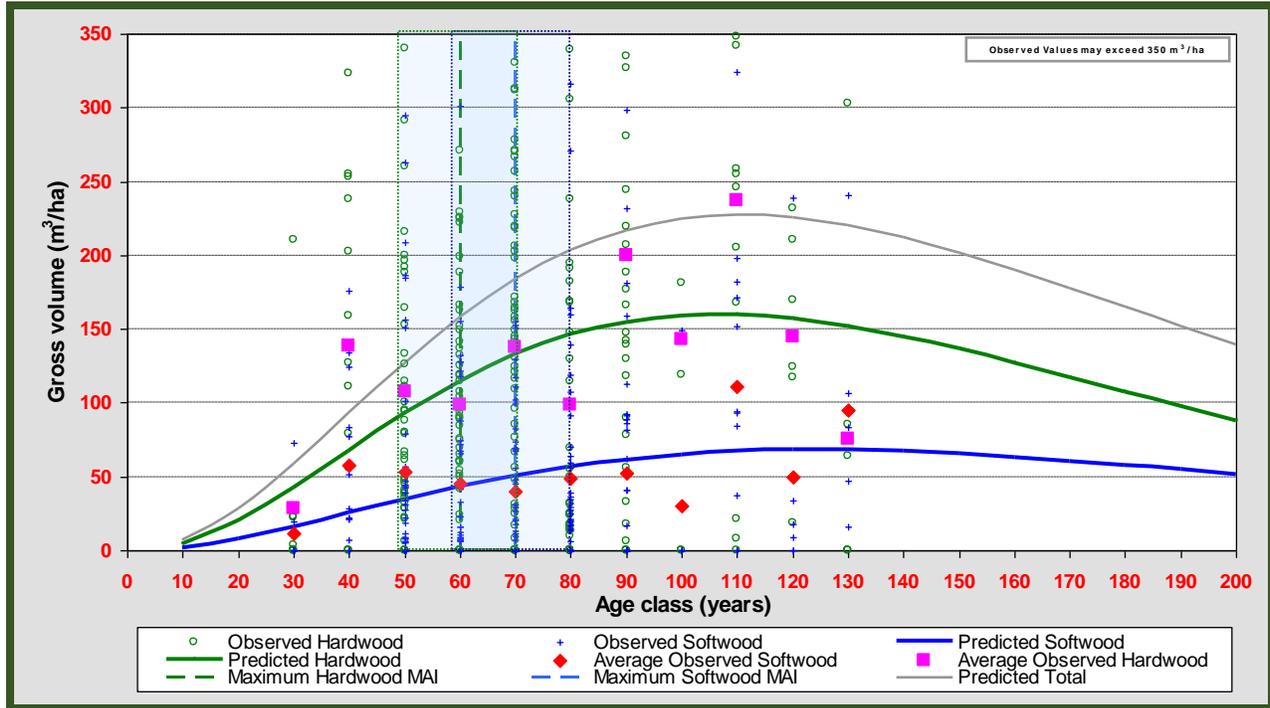


TABLE 4-12: #10 HS-WS-A-A COEFFICIENTS/YIELD TABLE

Development Type Coefficients		a	b	c	d	t	
Softwood		0.01736	2.164				
Hardwood		0.02269	2.416				
Age Class (yrs)	Observed Average Volume (m³/ha)		Predicted volume		Mean annual increment		Net area (ha)
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	
0			0.00	0.00	0.00	0.00	6,923
10			2.13	4.71	0.21	0.47	5,596
20			8.01	20.05	0.40	1.00	1,150
30	11.71	28.86	16.19	42.55	0.54	1.42	2,239
40	57.49	138.91	25.37	67.95	0.63	1.70	2,494
50	53.21	107.24	34.56	92.85	0.69	1.86	4,530
60	45.19	98.57	43.10	114.96	0.72	1.92	4,671
70	39.97	137.60	50.58	132.96	0.72	1.90	5,765
80	48.61	98.31	56.77	146.31	0.71	1.83	3,434
90	52.83	200.14	61.57	154.98	0.68	1.72	3,499
100	29.84	142.92	65.01	159.32	0.65	1.59	3,012
110	111.46	236.78	67.17	159.85	0.61	1.45	1,465
120	49.71	145.10	68.17	157.20	0.57	1.31	1,247
130	94.79	75.30	68.14	152.01	0.52	1.17	211
140			67.25	144.90	0.48	1.04	36
150			65.63	136.43	0.44	0.91	0
160			63.44	127.08	0.40	0.79	0
170			60.81	117.25	0.36	0.69	0
180			57.85	107.28	0.32	0.60	0
190			54.67	97.43	0.29	0.51	0
200			51.35	87.89	0.26	0.44	0



FIGURE 4-11 DEVELOPMENT TYPE 11: HS-JP-A-A

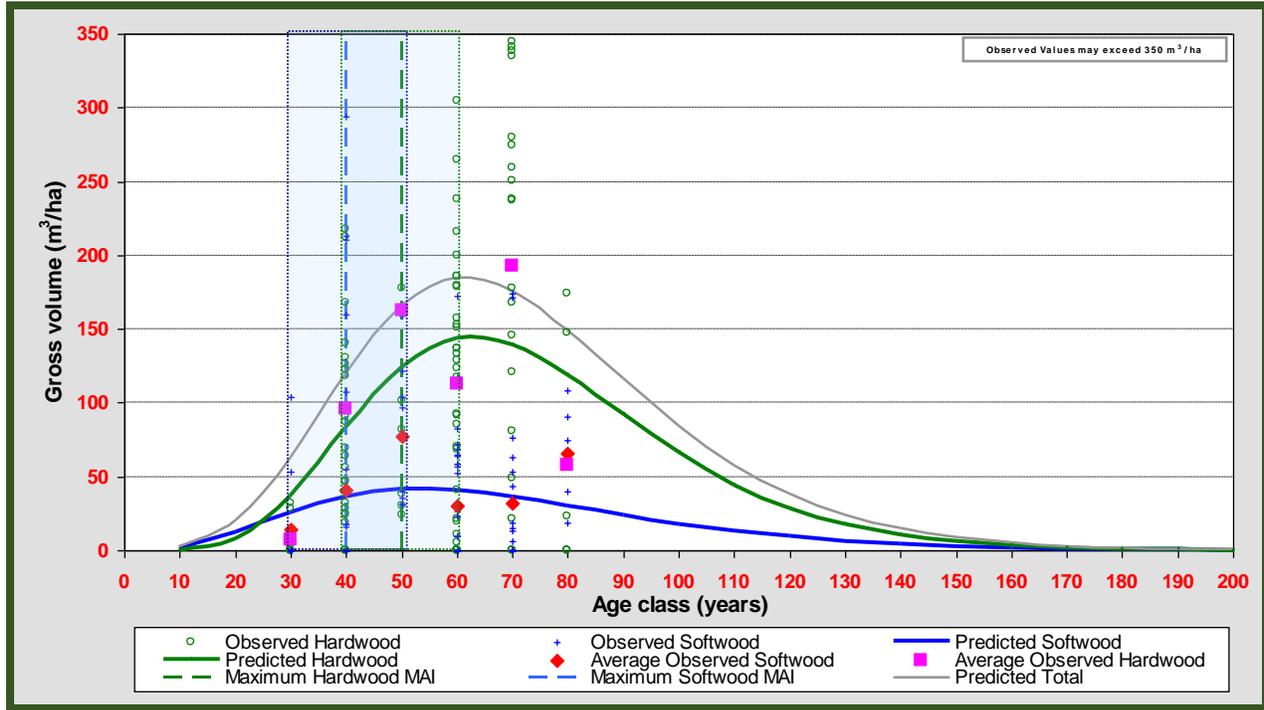


TABLE 4-13: #11 HS-JP-A-A COEFFICIENTS/YIELD TABLE

Development Type Coefficients		a	b	c	d	t	
Softwood		0.001521	3.433	0.06427			
Hardwood		4.725E-07	6.219	0.09881			
Age Class (yrs)	Observed Average Volume (m³/ha)		Predicted volume		Mean annual increment		Net area (ha)
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	
0			0.00	0.00	0.00	0.00	4,856
10			2.17	0.29	0.22	0.03	13,193
20			12.32	8.07	0.62	0.40	2,737
30	13.82	7.53	26.06	37.42	0.87	1.25	2,220
40	40.52	95.70	36.79	83.35	0.92	2.08	1,948
50	77.18	162.51	41.63	124.29	0.83	2.49	4,097
60	30.15	113.25	40.93	143.78	0.68	2.40	3,223
70	31.71	192.74	36.54	139.61	0.52	1.99	4,301
80	66.17	57.59	30.39	119.24	0.38	1.49	1,739
90			23.95	92.34	0.27	1.03	711
100			18.08	66.19	0.18	0.66	501
110			13.19	44.57	0.12	0.41	33
120			9.35	28.51	0.08	0.24	16
130			6.47	17.46	0.05	0.13	0
140			4.39	10.30	0.03	0.07	0
150			2.92	5.89	0.02	0.04	0
160			1.92	3.28	0.01	0.02	0
170			1.24	1.78	0.01	0.01	0
180			0.80	0.94	0.00	0.01	0
190			0.50	0.49	0.00	0.00	0
200			0.32	0.25	0.00	0.00	0



FIGURE 4-12 DEVELOPMENT TYPE 12: H-A-LD-A-1

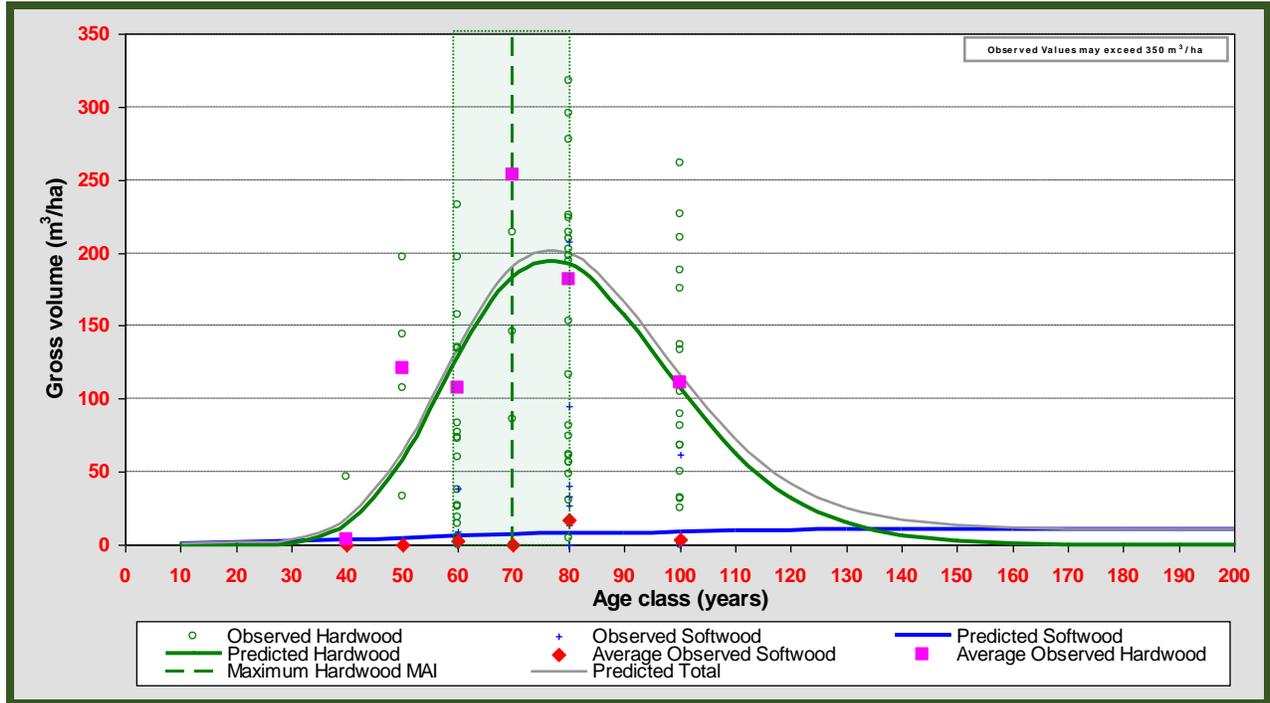


TABLE 4-14: #12 H-A-LD-A-1 COEFFICIENTS/YIELD TABLE

Development Type Coefficients		a	b	c	d	t	
Softwood		0.01046	1.698				
Hardwood		1.542E-20	15.25	0.1992			
Age Class (yrs)	Observed Average Volume (m³/ha)		Predicted volume		Mean annual increment		Net area (ha)
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	
0			0.00	0.00	0.00	0.00	396
10			0.47	0.00	0.05	0.00	1,938
20			1.37	0.02	0.07	0.00	528
30			2.46	1.30	0.08	0.04	917
40	0.00	3.84	3.61	14.27	0.09	0.36	1,174
50	0.00	120.46	4.75	58.45	0.09	1.17	1,342
60	2.64	107.08	5.83	128.51	0.10	2.14	2,051
70	0.00	253.15	6.82	183.89	0.10	2.63	2,603
80	17.32	182.10	7.71	192.15	0.10	2.40	3,917
90			8.48	157.93	0.09	1.75	1,133
100	3.44	110.93	9.13	107.40	0.09	1.07	1,454
110			9.67	62.66	0.09	0.57	360
120			10.09	32.21	0.08	0.27	30
130			10.41	14.89	0.08	0.11	2
140			10.64	6.29	0.08	0.04	0
150			10.77	2.46	0.07	0.02	0
160			10.82	0.90	0.07	0.01	0
170			10.81	0.31	0.06	0.00	0
180			10.72	0.10	0.06	0.00	0
190			10.59	0.03	0.06	0.00	0
200			10.40	0.01	0.05	0.00	0



FIGURE 4-13 DEVELOPMENT TYPE 13: H-A-LD-A-2

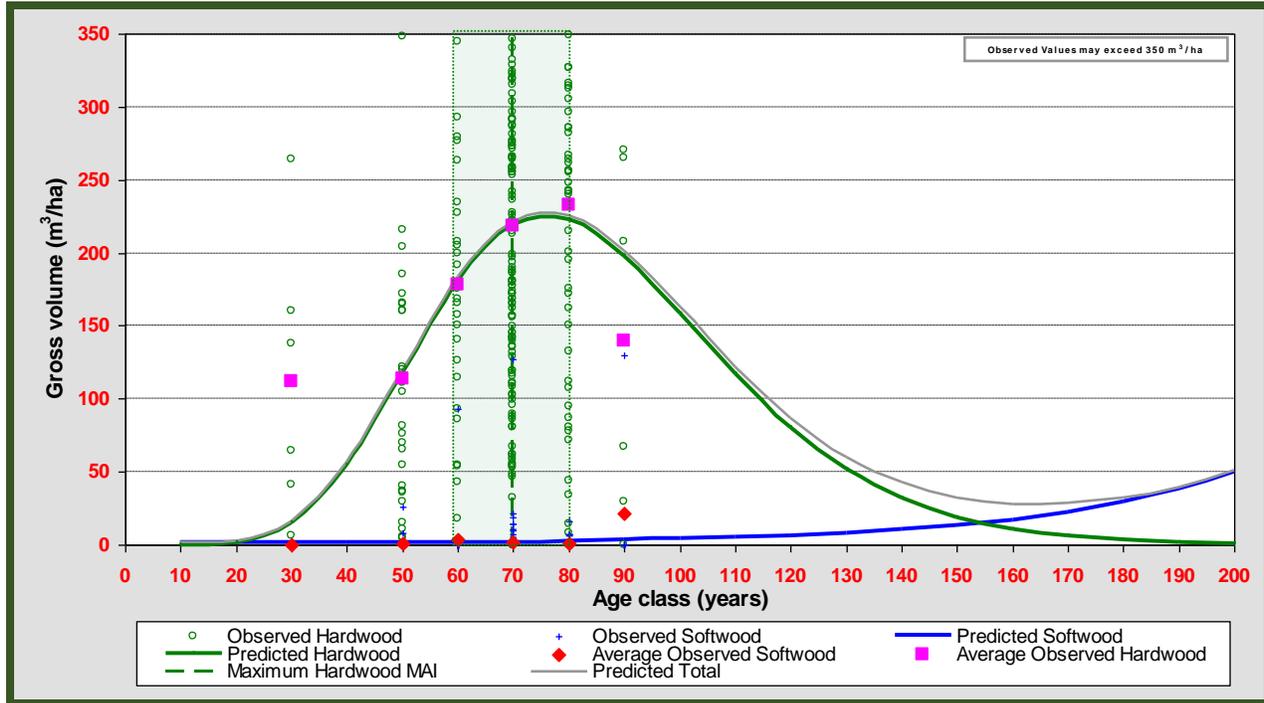


TABLE 4-15: #13 H-A-LD-A-2 COEFFICIENTS/YIELD TABLE

Development Type Coefficients		a	b	c	d	t	
Softwood		14.94	-0.9731	-0.03180	22.96	0	
Hardwood		1.562E-10	8.406	0.1107			
Age Class (yrs)	Observed Average Volume (m ³ /ha)		Predicted volume		Mean annual increment		Net area (ha)
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	
0			0.00	0.00	0.00	0.00	310
10			2.18	0.01	0.22	0.00	3,086
20			1.53	1.48	0.08	0.07	624
30	0.00	112.31	1.42	14.77	0.05	0.49	566
40			1.47	54.85	0.04	1.37	1,008
50	1.08	113.39	1.63	118.37	0.03	2.37	3,241
60	3.58	178.08	1.87	181.26	0.03	3.02	6,191
70	1.70	218.16	2.22	219.03	0.03	3.13	8,935
80	0.86	233.14	2.67	222.55	0.03	2.78	3,876
90	21.61	139.90	3.28	198.09	0.04	2.20	1,644
100			4.06	158.84	0.04	1.59	470
110			5.09	117.04	0.05	1.06	297
120			6.43	80.43	0.05	0.67	68
130			8.17	52.13	0.06	0.40	7
140			10.45	32.14	0.07	0.23	0
150			13.43	18.98	0.09	0.13	0
160			17.33	10.80	0.11	0.07	0
170			22.45	5.95	0.13	0.03	0
180			29.19	3.18	0.16	0.02	0
190			38.06	1.66	0.20	0.01	0
200			49.75	0.84	0.25	0.00	0



FIGURE 4-14 DEVELOPMENT TYPE 14: H-A-HD-A-1

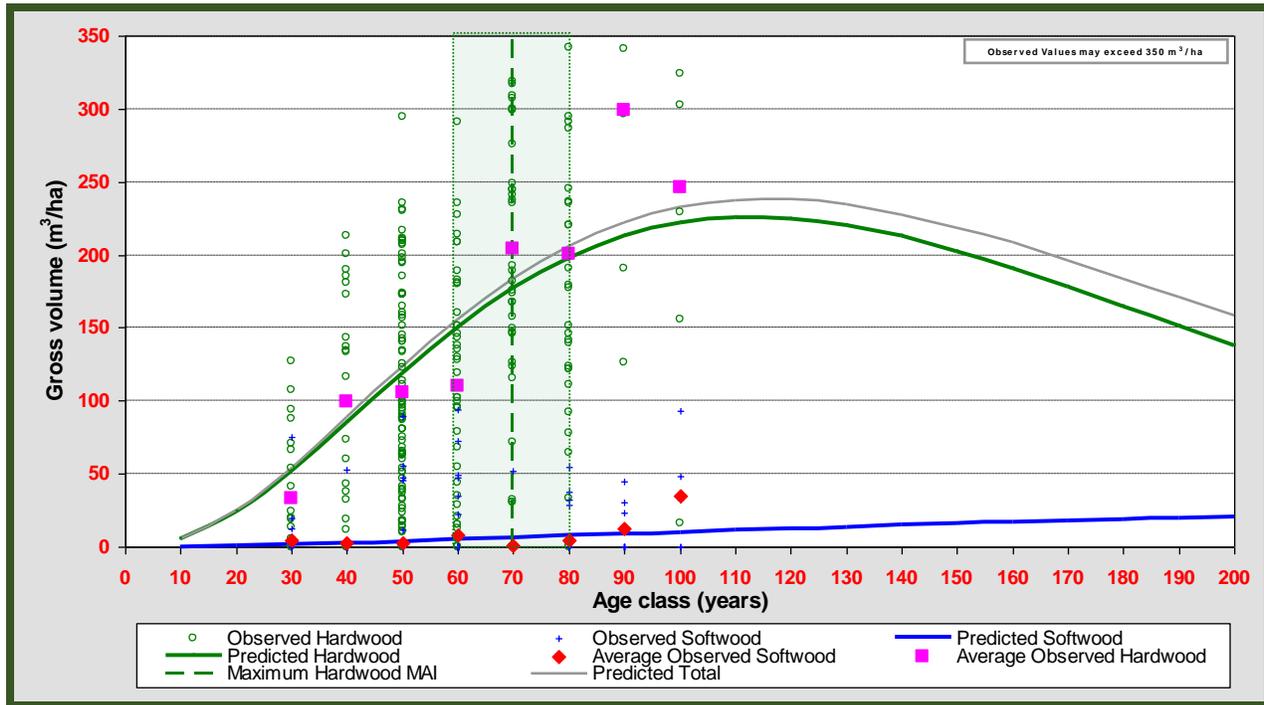


TABLE 4-16: #14 H-A-HD-A-1 COEFFICIENTS/YIELD TABLE

Development Type Coefficients		a	b	c	d	t	
Softwood		0.005264	1.759		-0.0003521	0	
Hardwood		0.02193	2.479		0.007083	0	
Age Class (yrs)	Observed Average Volume (m³/ha)		Predicted volume		Mean annual increment		Net area (ha)
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	
0			0.00	0.00	0.00	0.00	7,926
10			0.29	5.31	0.03	0.53	4,366
20			0.92	23.75	0.05	1.19	1,066
30	4.80	33.24	1.78	52.12	0.06	1.74	3,657
40	2.52	99.25	2.80	85.41	0.07	2.14	3,881
50	2.78	105.28	3.94	119.27	0.08	2.39	8,647
60	7.97	109.97	5.15	150.51	0.09	2.51	8,955
70	1.25	204.08	6.40	177.13	0.09	2.53	10,156
80	4.92	200.09	7.68	198.07	0.10	2.48	8,005
90	12.30	298.87	8.97	213.01	0.10	2.37	3,409
100	34.94	246.05	10.24	222.12	0.10	2.22	2,123
110			11.48	225.92	0.10	2.05	672
120			12.70	225.11	0.11	1.88	271
130			13.87	220.46	0.11	1.70	29
140			14.99	212.76	0.11	1.52	2
150			16.05	202.74	0.11	1.35	0
160			17.06	191.06	0.11	1.19	0
170			18.01	178.32	0.11	1.05	0
180			18.89	165.01	0.10	0.92	0
190			19.71	151.52	0.10	0.80	0
200			20.46	138.19	0.10	0.69	0



FIGURE 4-15 DEVELOPMENT TYPE 15: H-A-HD-A-2

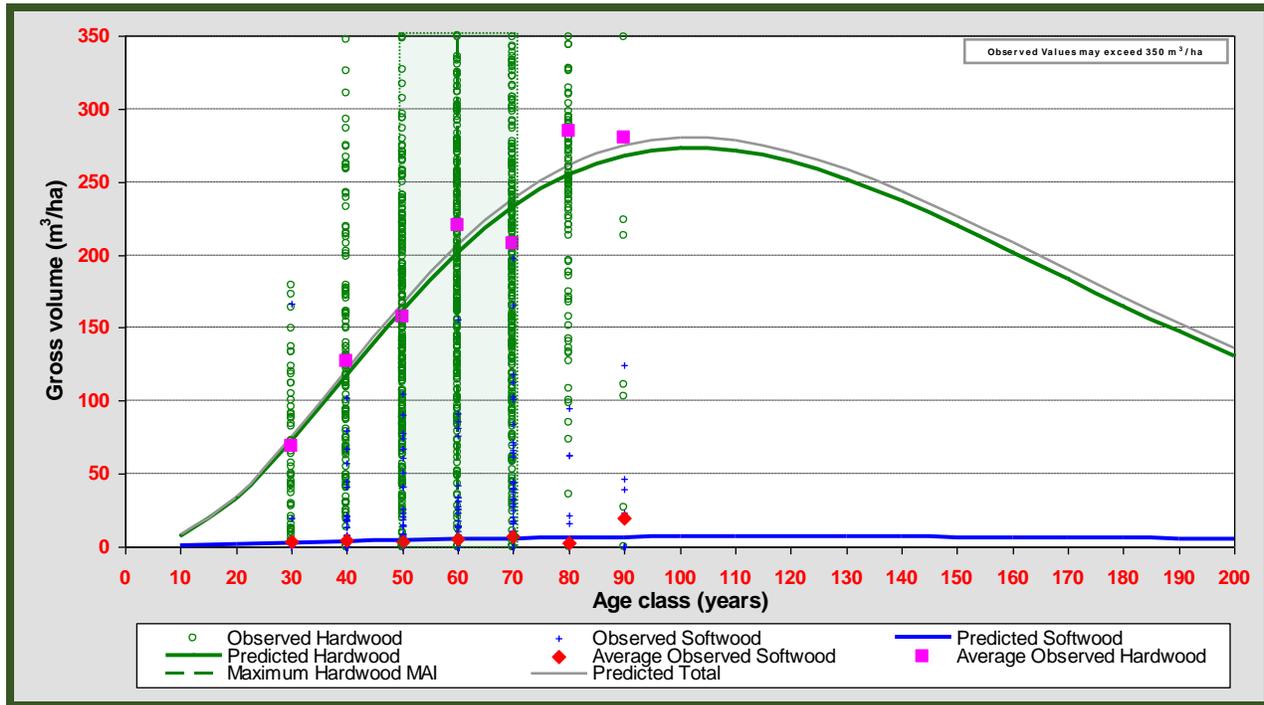


TABLE 4-17: #15 H-A-HD-A-2 COEFFICIENTS/YIELD TABLE

Development Type Coefficients		a	b	c	d	t	
Softwood		0.01374	1.646				
Hardwood		0.02512	2.564				
Age Class (yrs)	Observed Average Volume (m³/ha)		Predicted volume		Mean annual increment		Net area (ha)
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	
0			0.00	0.00	0.00	0.00	12,273
10			0.53	7.16	0.05	0.72	10,428
20			1.45	32.90	0.07	1.65	3,637
30	3.45	68.69	2.46	72.37	0.08	2.41	6,274
40	4.39	127.19	3.44	117.70	0.09	2.94	9,776
50	3.14	157.88	4.33	162.22	0.09	3.24	28,910
60	5.37	220.22	5.10	201.36	0.08	3.36	24,402
70	6.96	207.99	5.73	232.54	0.08	3.32	21,593
80	2.32	284.66	6.22	254.72	0.08	3.18	9,247
90	19.51	280.27	6.58	267.98	0.07	2.98	2,380
100			6.82	273.08	0.07	2.73	370
110			6.96	271.21	0.06	2.47	90
120			7.00	263.68	0.06	2.20	68
130			6.96	251.82	0.05	1.94	3
140			6.85	236.86	0.05	1.69	0
150			6.69	219.88	0.04	1.47	0
160			6.48	201.81	0.04	1.26	0
170			6.24	183.37	0.04	1.08	0
180			5.98	165.15	0.03	0.92	0
190			5.70	147.56	0.03	0.78	0
200			5.40	130.91	0.03	0.65	0



FIGURE 4-16 DEVELOPMENT TYPE 16: H(S)-A-LD-A

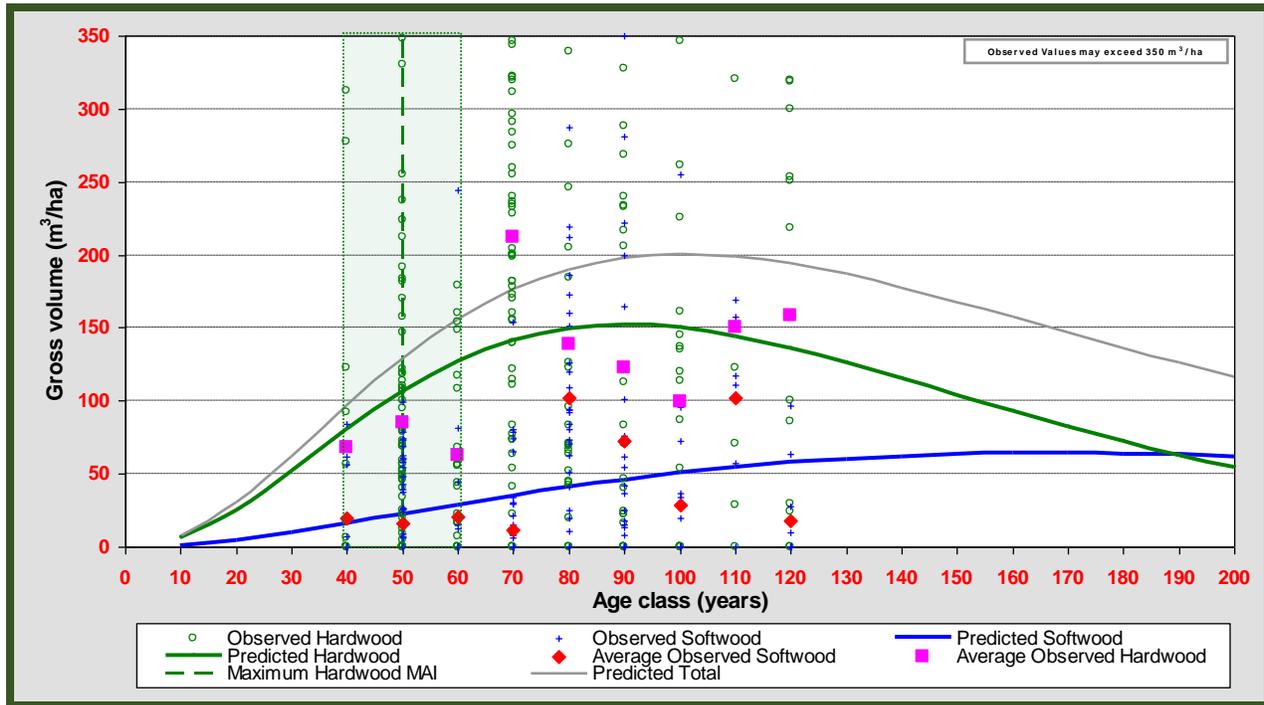


TABLE 4-18: #16 H(S)-A-LD-A COEFFICIENTS/YIELD TABLE

Development Type Coefficients		a	b	c	d	t	
Softwood		0.01233	2.074				
Hardwood		0.02725	2.462				
Age Class (yrs)	Observed Average Volume (m³/ha)		Predicted volume		Mean annual increment		Net area (ha)
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	
0			0.00	0.00	0.00	0.00	497
10			1.29	6.01	0.13	0.60	2,470
20			4.82	25.23	0.24	1.26	1,291
30			9.87	52.14	0.33	1.74	1,219
40	19.79	68.19	15.85	80.63	0.40	2.02	1,060
50	16.55	84.70	22.26	106.35	0.45	2.13	3,524
60	20.86	62.37	28.73	126.87	0.48	2.11	4,492
70	11.32	212.29	34.97	141.21	0.50	2.02	5,670
80	101.74	138.98	40.78	149.39	0.51	1.87	4,048
90	72.51	122.91	46.03	152.03	0.51	1.69	2,561
100	28.58	99.30	50.63	150.06	0.51	1.50	2,064
110	102.08	150.81	54.54	144.49	0.50	1.31	1,415
120	17.94	158.34	57.76	136.31	0.48	1.14	1,331
130			60.28	126.41	0.46	0.97	229
140			62.15	115.53	0.44	0.83	0
150			63.39	104.26	0.42	0.70	0
160			64.07	93.07	0.40	0.58	0
170			64.23	82.28	0.38	0.48	0
180			63.93	72.12	0.36	0.40	0
190			63.23	62.74	0.33	0.33	0
200			62.17	54.21	0.31	0.27	0



FIGURE 4-17 DEVELOPMENT TYPE 17: H(S)-A-HD-A

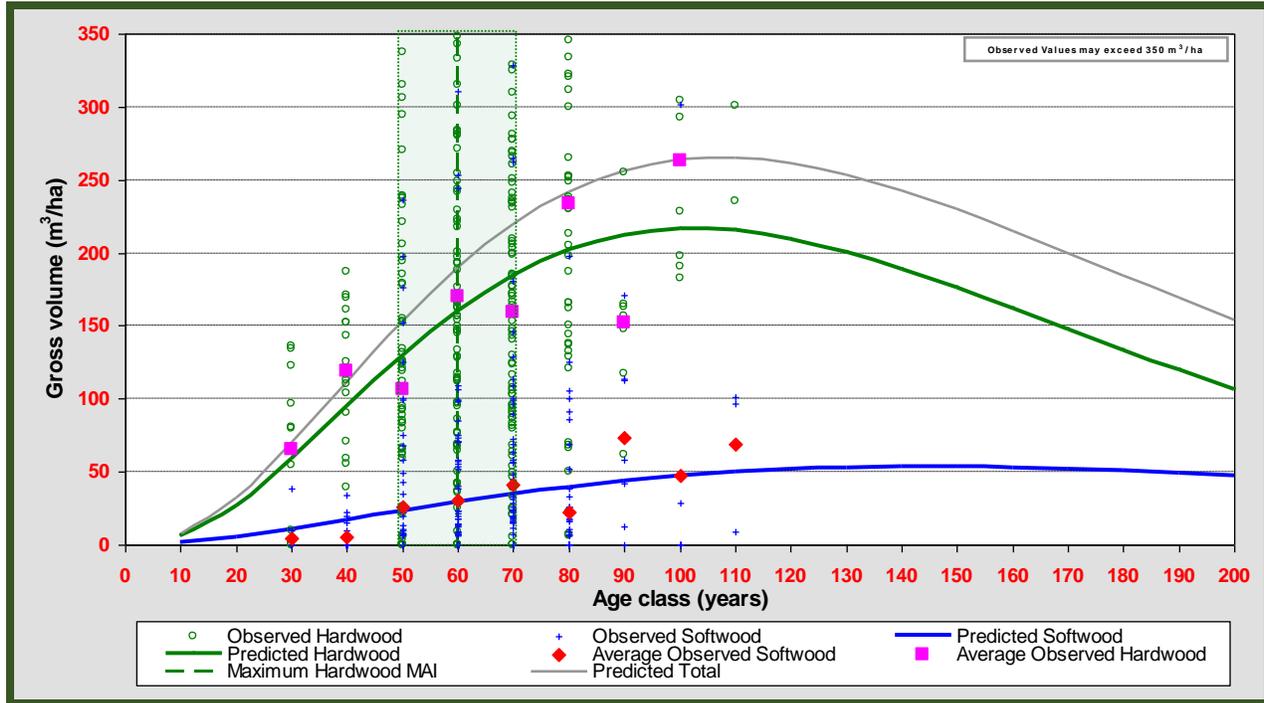


TABLE 4-19: #17 H(S)-A-HD-A COEFFICIENTS/YIELD TABLE

Development Type Coefficients		a	b	c	d	t
Softwood		0.01432	2.071			
Hardwood		0.02445	2.505		-0.002909	0

Age Class (yrs)	Observed Average Volume (m³/ha)		Predicted volume		Mean annual increment		Net area (ha)
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	
0			0.00	0.00	0.00	0.00	7,275
10			1.46	6.12	0.15	0.61	920
20			5.32	27.20	0.27	1.36	971
30	4.04	65.15	10.66	58.82	0.36	1.96	1,537
40	5.64	118.84	16.77	94.67	0.42	2.37	1,528
50	26.14	106.83	23.06	129.65	0.46	2.59	6,285
60	30.14	170.24	29.15	160.28	0.49	2.67	6,341
70	40.99	159.75	34.76	184.66	0.50	2.64	10,839
80	22.47	233.42	39.71	202.04	0.50	2.53	5,443
90	72.98	152.27	43.92	212.50	0.49	2.36	4,428
100	47.27	263.56	47.33	216.65	0.47	2.17	2,324
110	68.76	377.90	49.97	215.40	0.45	1.96	954
120			51.85	209.75	0.43	1.75	1,209
130			53.03	200.71	0.41	1.54	108
140			53.57	189.23	0.38	1.35	37
150			53.55	176.13	0.36	1.17	0
160			53.04	162.12	0.33	1.01	0
170			52.11	147.77	0.31	0.87	0
180			50.83	133.53	0.28	0.74	0
190			49.26	119.72	0.26	0.63	0
200			47.47	106.61	0.24	0.53	0



4.3 LATE SERAL STEADY STATE YIELD PROJECTIONS

Each development type yield curve will reach a steady state when used in the Wood Supply Analysis (WSA). At some age class a development type's yield projections will remain constant into the future till it is harvested (not following the yield curve).

A literature review was completed and based on that, late seral stage was found to be defined by forest structure, including: multi-layered canopy, large snags and coarse woody debris, gaps and anti-gaps, large living trees for the species and site, thickets of understorey vegetation, varied and diverse 3-dimensional structure. Age in and of itself is not a direct indicator of late seral stage but rather used to approximate late seral stage characteristics.

Based on the literature and consensus during the field tour, it was agreed that in the absence of a major disturbance like fire or harvesting, a stand will always have the described structure and thus will remain in late seral stage.



5.0 CULL DEDUCTIONS

Cull deductions were not applied during the development type and yield curve creation processes. All cull deductions will be documented and applied during the Wood Supply Analysis.



6.0 PIECE SIZE

This section describes the piece size for the HVS Determination Strategy.

Table 6-1 outlines the utilization standards used to calculate hardwood and softwood net merchantable volume.

TABLE 6-1: LICENSEE-SPECIFIED UTILIZATION PARAMETERS

UTILIZATION PARAMETER	MISTIK		L&M	
	Hardwood	Softwood	Hardwood	Softwood
Stump Height (m)	0.3	0.3	0.3	0.3
Minimum Top Diameter Inside Bark (cm)	7.5	10	8	10
Log Length (m)	2.6	2.6	n/a	n/a
Merchantable Minimum Bole Length (m)	5.2	5.2	4.9	5.2

6.1.1 TWO PARAMETER NONLINEAR MODEL USED FOR PIECE SIZE

$$y = ae^{(-b(\text{age}))}$$

Where:

- y = Predicted merchantable trees/m³ – softwood or hardwood
- $a b$ = Predicted nonlinear regression coefficients
- age = 10 year age class
- e = Base of the natural logarithm (~2.71828)

6.1.2 TWO PARAMETER NONLINEAR (GUIDE CURVE) MODEL USED FOR PIECE SIZE

$$y = (a + dt)e^{(-b(\text{age}))}$$

Where:

- y = Predicted merchantable trees/m³ – softwood or hardwood
- $a b d$ = Predicted nonlinear regression coefficients
- t = A dummy variable which identifies the (0) target development type curve and (1) combined development type guide curve
- age = 10-year age class
- e = Base of the natural logarithm (~2.71828)

Once the number of predicted trees per cubic meter was determined, the cubic meter per predicted tree was determined by dividing the unity by the number of predicted trees (i.e., 1/(number of trees per cubic meter)). Table 6-2 through Table 6-18 and Figure 6-1 through Figure 6-17 describe the piece size in trees/m³ within each development type.



FIGURE 6-1 PIECE SIZE DEVELOPMENT TYPE 1: S-WS-A-A

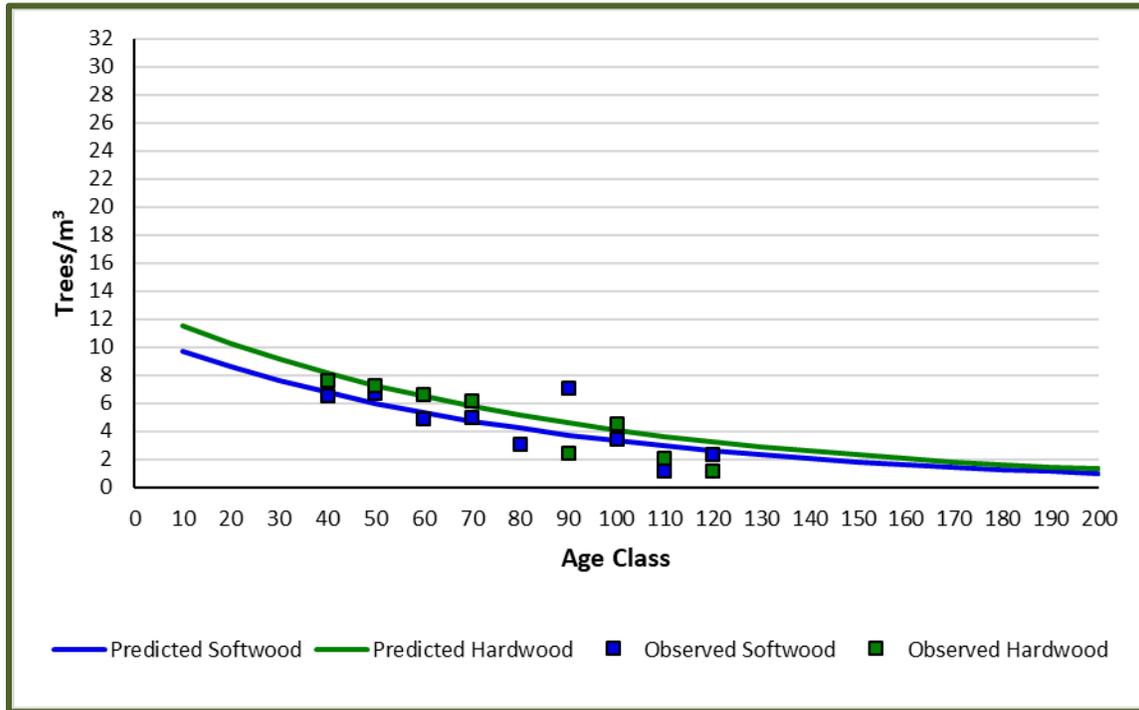


TABLE 6-2: PIECE SIZE DEVELOPMENT TYPE 1: S-WS-A-A

Development Type Coefficients		a	b	c	d	t
Softwood		1.090936E+01	1.193618E-02			
Hardwood		1.293250E+01	1.154863E-02			
Age Class (yrs)	Observed Average Piece Size (trees/m³)		Predicted Piece Size (trees/m³)		Predicted Piece Size (m³/tree)	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
10			9.6819	11.5220	0.1033	0.0868
20			8.5926	10.2653	0.1164	0.0974
30			7.6258	9.1457	0.1311	0.1093
40	6.5028	7.6113	6.7678	8.1482	0.1478	0.1227
50	6.6492	7.2667	6.0063	7.2595	0.1665	0.1378
60	4.9088	6.6039	5.3305	6.4677	0.1876	0.1546
70	4.9646	6.1820	4.7308	5.7623	0.2114	0.1735
80	3.0565		4.1985	5.1338	0.2382	0.1948
90	7.0451	2.4225	3.7261	4.5739	0.2684	0.2186
100	3.4554	4.4692	3.3069	4.0750	0.3024	0.2454
110	1.1858	2.0357	2.9348	3.6306	0.3407	0.2754
120	2.3276	1.1445	2.6046	3.2346	0.3839	0.3092
130			2.3115	2.8818	0.4326	0.3470
140			2.0515	2.5675	0.4875	0.3895
150			1.8207	2.2875	0.5493	0.4372
160			1.6158	2.0380	0.6189	0.4907
170			1.4340	1.8157	0.6973	0.5507
180			1.2727	1.6177	0.7858	0.6182
190			1.1295	1.4412	0.8854	0.6938
200			1.0024	1.2840	0.9976	0.7788



FIGURE 6-2 PIECE SIZE DEVELOPMENT TYPE 2: S-BS-A-A

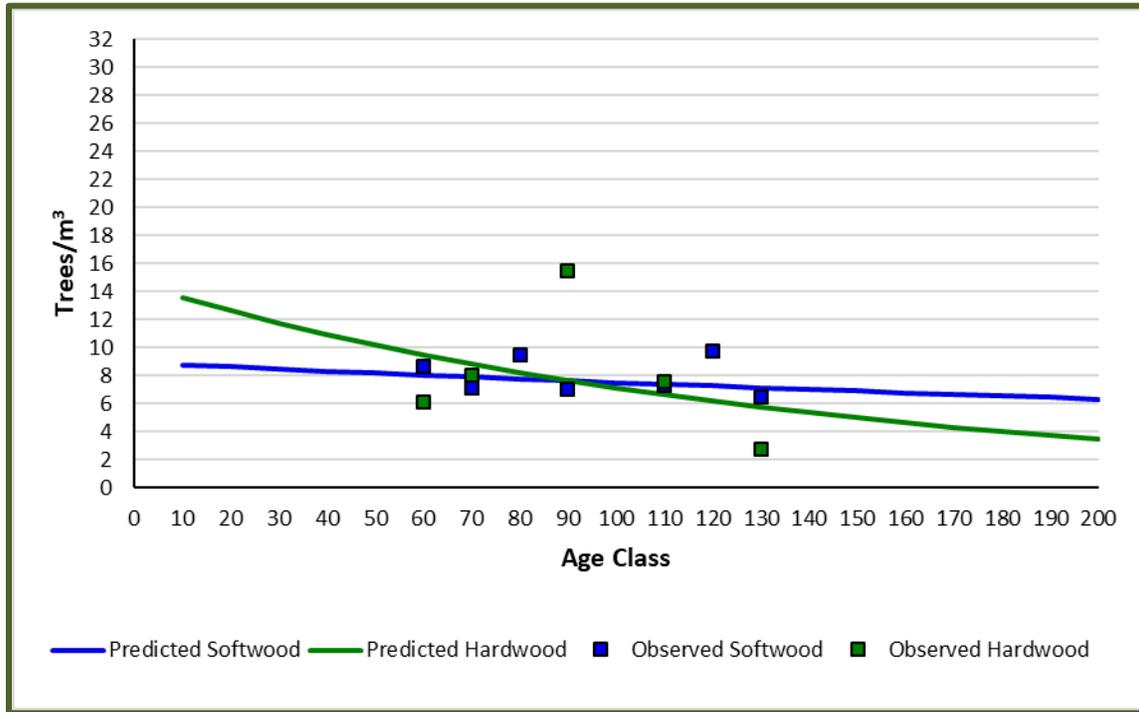


TABLE 6-3: PIECE SIZE DEVELOPMENT TYPE 2: S-BS-A-A

Development Type Coefficients		a	b	c	d	t
Softwood		8.923556E+00	1.709487E-03			
Hardwood		1.459727E+01	7.169398E-03			
Age Class (yrs)	Observed Average Piece Size (trees/m³)		Predicted Piece Size (trees/m³)		Predicted Piece Size (m³/tree)	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
10			8.7723	13.5874	0.1140	0.0736
20			8.6236	12.6473	0.1160	0.0791
30			8.4775	11.7723	0.1180	0.0849
40			8.3338	10.9579	0.1200	0.0913
50			8.1925	10.1998	0.1221	0.0980
60	8.7011	6.1372	8.0536	9.4941	0.1242	0.1053
70	7.1516	8.0128	7.9171	8.8373	0.1263	0.1132
80	9.5124		7.7830	8.2259	0.1285	0.1216
90	7.0148	15.5280	7.6510	7.6568	0.1307	0.1306
100			7.5214	7.1270	0.1330	0.1403
110	7.2600	7.6040	7.3939	6.6340	0.1352	0.1507
120	9.7865		7.2685	6.1750	0.1376	0.1619
130	6.4390	2.7917	7.1453	5.7478	0.1400	0.1740
140			7.0242	5.3501	0.1424	0.1869
150			6.9052	4.9800	0.1448	0.2008
160			6.7881	4.6354	0.1473	0.2157
170			6.6731	4.3147	0.1499	0.2318
180			6.5600	4.0162	0.1524	0.2490
190			6.4488	3.7384	0.1551	0.2675
200			6.3395	3.4797	0.1577	0.2874



FIGURE 6-3 PIECE SIZE DEVELOPMENT TYPE 3: S-JP-LD-A-1

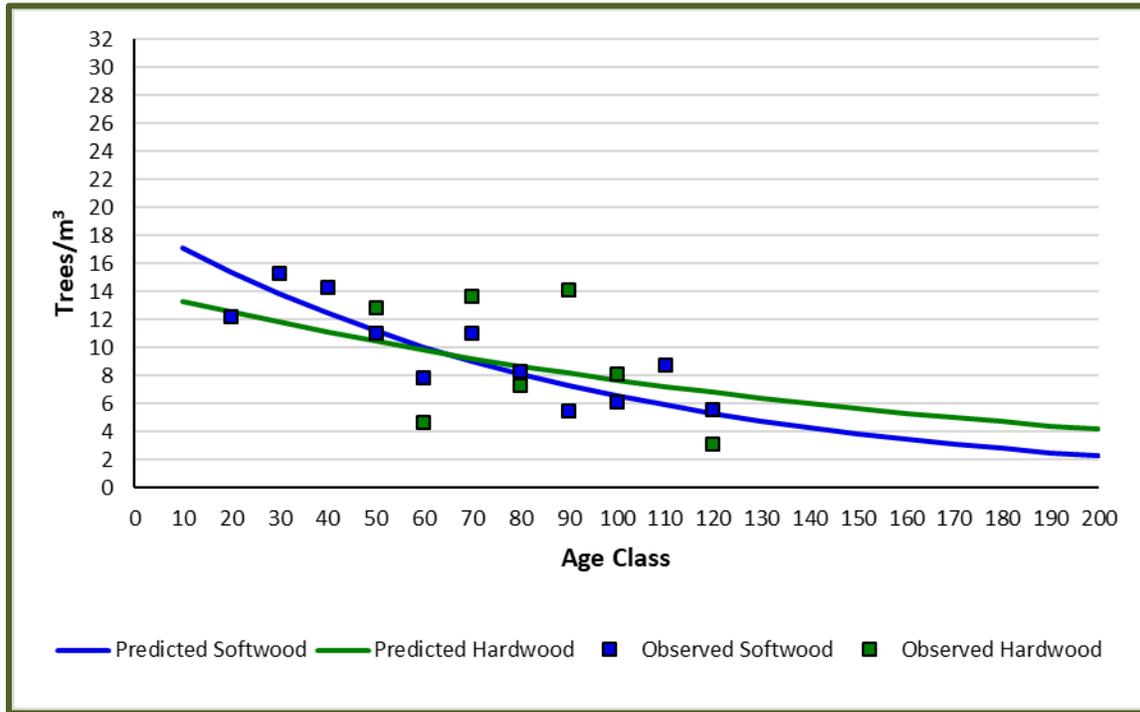


TABLE 6-4: PIECE SIZE DEVELOPMENT TYPE 3: S-JP-LD-A-1

Development Type Coefficients		a	b	c	d	t
Softwood		1.906942E+01	1.064310E-02			
Hardwood		1.418362E+01	6.119314E-03			
Age Class (yrs)	Observed Average Piece Size (trees/m³)		Predicted Piece Size (trees/m³)		Predicted Piece Size (m³/tree)	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
10			17.1441	13.3417	0.0583	0.0750
20	12.2249		15.4132	12.5498	0.0649	0.0797
30	15.3139		13.8570	11.8048	0.0722	0.0847
40	14.2814		12.4580	11.1041	0.0803	0.0901
50	11.0365	12.8455	11.2002	10.4450	0.0893	0.0957
60	7.8333	4.6823	10.0694	9.8250	0.0993	0.1018
70	11.0071	13.7063	9.0528	9.2418	0.1105	0.1082
80	8.3069	7.2636	8.1388	8.6932	0.1229	0.1150
90	5.5285	14.1044	7.3171	8.1772	0.1367	0.1223
100	6.0929	8.0794	6.5783	7.6918	0.1520	0.1300
110	8.8021		5.9141	7.2352	0.1691	0.1382
120	5.5383	3.1556	5.3170	6.8058	0.1881	0.1469
130			4.7802	6.4018	0.2092	0.1562
140			4.2976	6.0218	0.2327	0.1661
150			3.8637	5.6643	0.2588	0.1765
160			3.4736	5.3281	0.2879	0.1877
170			3.1229	5.0118	0.3202	0.1995
180			2.8076	4.7143	0.3562	0.2121
190			2.5241	4.4345	0.3962	0.2255
200			2.2693	4.1713	0.4407	0.2397



FIGURE 6-4 PIECE SIZE DEVELOPMENT TYPE 4: S-JP-LD-A-2

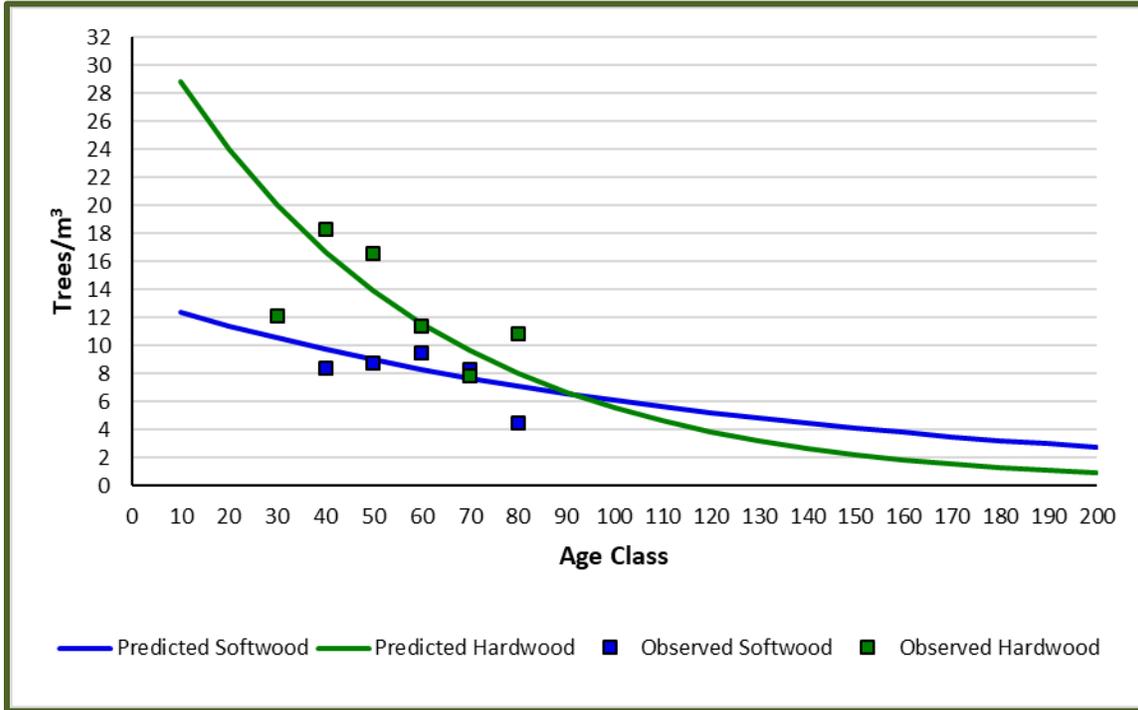


TABLE 6-5: PIECE SIZE DEVELOPMENT TYPE 4: S-JP-LD-A-2

Development Type Coefficients		a	b	c	d	t
Softwood		1.336282E+01	7.865057E-03			
Hardwood		3.463192E+01	1.824683E-02			
Age Class (yrs)	Observed Average Piece Size (trees/m³)		Predicted Piece Size (trees/m³)		Predicted Piece Size (m³/tree)	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
10			12.3521	28.8557	0.0810	0.0347
20			11.4178	24.0429	0.0876	0.0416
30		12.0773	10.5542	20.0328	0.0947	0.0499
40	8.3902	18.2944	9.7559	16.6915	0.1025	0.0599
50	8.7856	16.5781	9.0180	13.9076	0.1109	0.0719
60	9.4902	11.3977	8.3359	11.5880	0.1200	0.0863
70	8.2705	7.8291	7.7054	9.6552	0.1298	0.1036
80	4.5047	10.8197	7.1226	8.0448	0.1404	0.1243
90			6.5839	6.7030	0.1519	0.1492
100			6.0859	5.5850	0.1643	0.1790
110			5.6256	4.6535	0.1778	0.2149
120			5.2001	3.8774	0.1923	0.2579
130			4.8067	3.2307	0.2080	0.3095
140			4.4432	2.6918	0.2251	0.3715
150			4.1071	2.2429	0.2435	0.4459
160			3.7965	1.8688	0.2634	0.5351
170			3.5093	1.5571	0.2850	0.6422
180			3.2439	1.2974	0.3083	0.7708
190			2.9985	1.0810	0.3335	0.9251
200			2.7717	0.9007	0.3608	1.1103



FIGURE 6-5 PIECE SIZE DEVELOPMENT TYPE 5: S-JP-HD-A-1

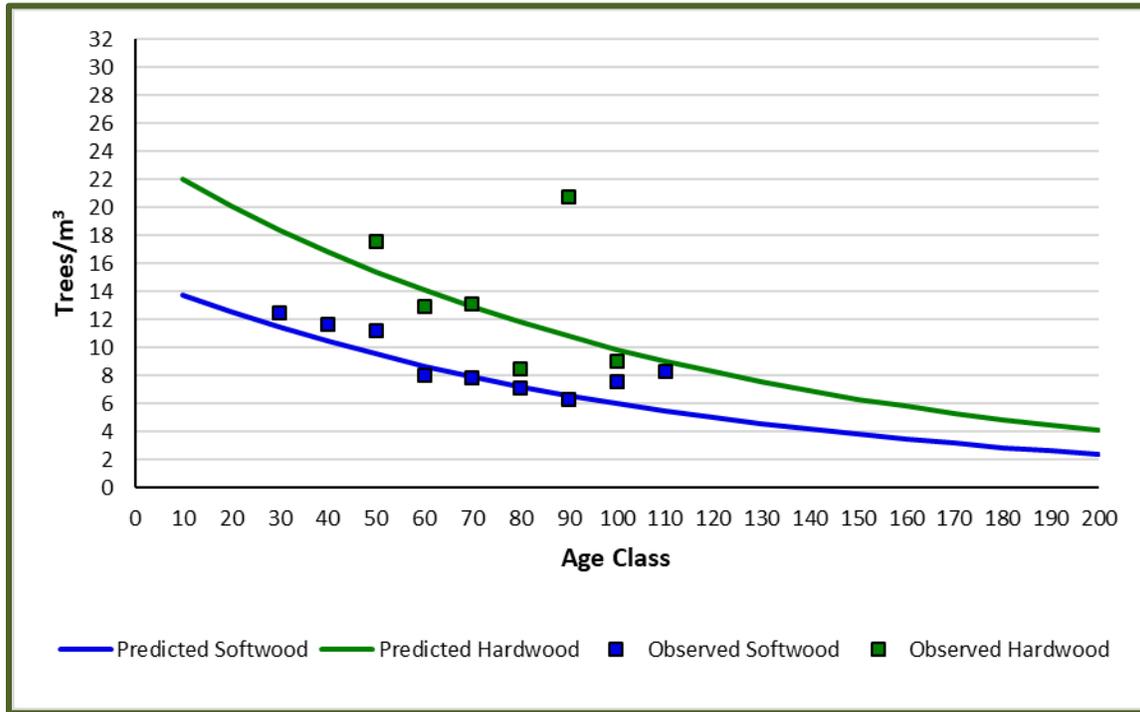


TABLE 6-6: PIECE SIZE DEVELOPMENT TYPE 5: S-JP-HD-A-1

Development Type Coefficients		a	b	c	d	t
Softwood		1.509221E+01	9.226411E-03			
Hardwood		2.402961E+01	8.900305E-03			
Age Class (yrs)	Observed Average Piece Size (trees/m³)		Predicted Piece Size (trees/m³)		Predicted Piece Size (m³/tree)	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
10			13.7620	21.9833	0.0727	0.0455
20			12.5491	20.1113	0.0797	0.0497
30	12.4844		11.4431	18.3987	0.0874	0.0544
40	11.6866		10.4345	16.8319	0.0958	0.0594
50	11.1512	17.5292	9.5149	15.3985	0.1051	0.0649
60	8.0248	12.9316	8.6763	14.0872	0.1153	0.0710
70	7.8524	13.0710	7.9116	12.8876	0.1264	0.0776
80	7.1013	8.4822	7.2143	11.7901	0.1386	0.0848
90	6.2334	20.7037	6.5785	10.7861	0.1520	0.0927
100	7.5936	9.0183	5.9987	9.8676	0.1667	0.1013
110	8.2481		5.4700	9.0273	0.1828	0.1108
120			4.9879	8.2586	0.2005	0.1211
130			4.5483	7.5553	0.2199	0.1324
140			4.1474	6.9119	0.2411	0.1447
150			3.7819	6.3233	0.2644	0.1581
160			3.4485	5.7848	0.2900	0.1729
170			3.1446	5.2922	0.3180	0.1890
180			2.8675	4.8415	0.3487	0.2065
190			2.6147	4.4292	0.3824	0.2258
200			2.3843	4.0521	0.4194	0.2468



FIGURE 6-6 PIECE SIZE DEVELOPMENT TYPE 6: S-JP-HD-A-2

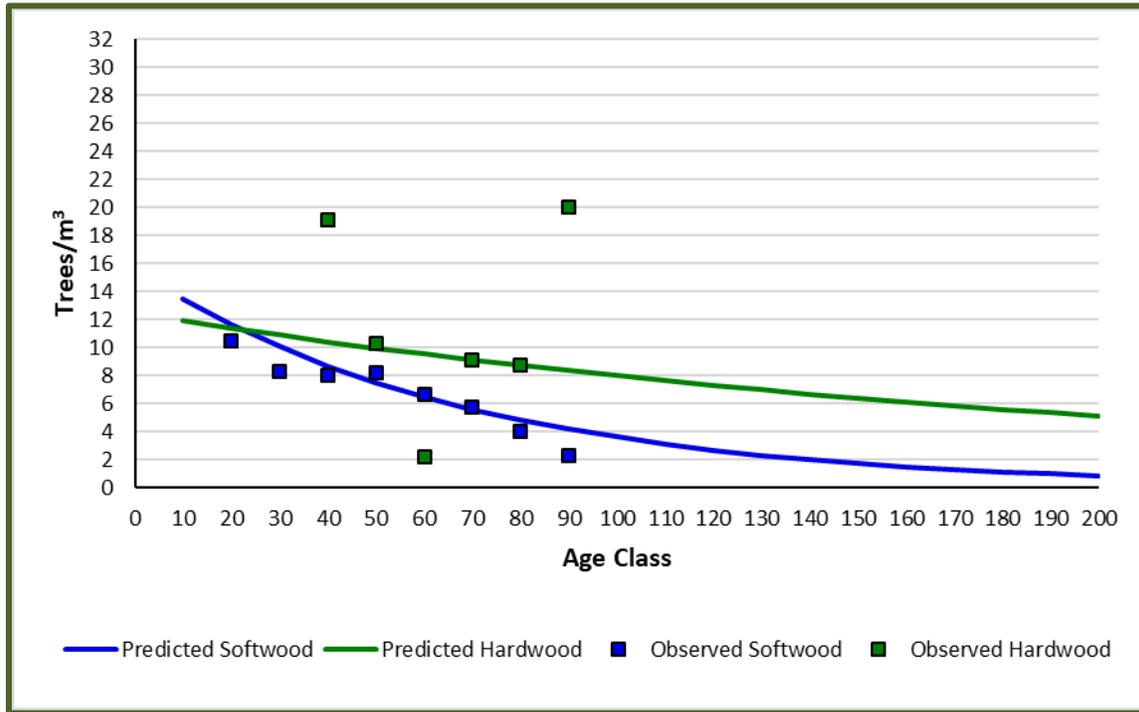


TABLE 6-7: PIECE SIZE DEVELOPMENT TYPE 6: S-JP-HD-A-2

Development Type Coefficients		a	b	c	d	t
Softwood		1.561568E+01	1.466984E-02			
Hardwood		1.245177E+01	4.464203E-03			
Age Class (yrs)	Observed Average Piece Size (trees/m³)		Predicted Piece Size (trees/m³)		Predicted Piece Size (m³/tree)	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
10			13.4850	11.9081	0.0742	0.0840
20	10.4767		11.6450	11.3882	0.0859	0.0878
30	8.2869		10.0561	10.8910	0.0994	0.0918
40	8.0260	19.0597	8.6840	10.4155	0.1152	0.0960
50	8.1892	10.3106	7.4991	9.9607	0.1333	0.1004
60	6.6680	2.1915	6.4759	9.5259	0.1544	0.1050
70	5.7169	9.0824	5.5923	9.1100	0.1788	0.1098
80	4.0230	8.6893	4.8292	8.7122	0.2071	0.1148
90	2.2389	20.0401	4.1703	8.3318	0.2398	0.1200
100			3.6013	7.9681	0.2777	0.1255
110			3.1099	7.6202	0.3216	0.1312
120			2.6856	7.2875	0.3724	0.1372
130			2.3191	6.9693	0.4312	0.1435
140			2.0027	6.6650	0.4993	0.1500
150			1.7294	6.3740	0.5782	0.1569
160			1.4935	6.0957	0.6696	0.1640
170			1.2897	5.8296	0.7754	0.1715
180			1.1137	5.5751	0.8979	0.1794
190			0.9618	5.3317	1.0398	0.1876
200			0.8305	5.0989	1.2041	0.1961



FIGURE 6-7 PIECE SIZE DEVELOPMENT TYPE 7: S-JP-L&M

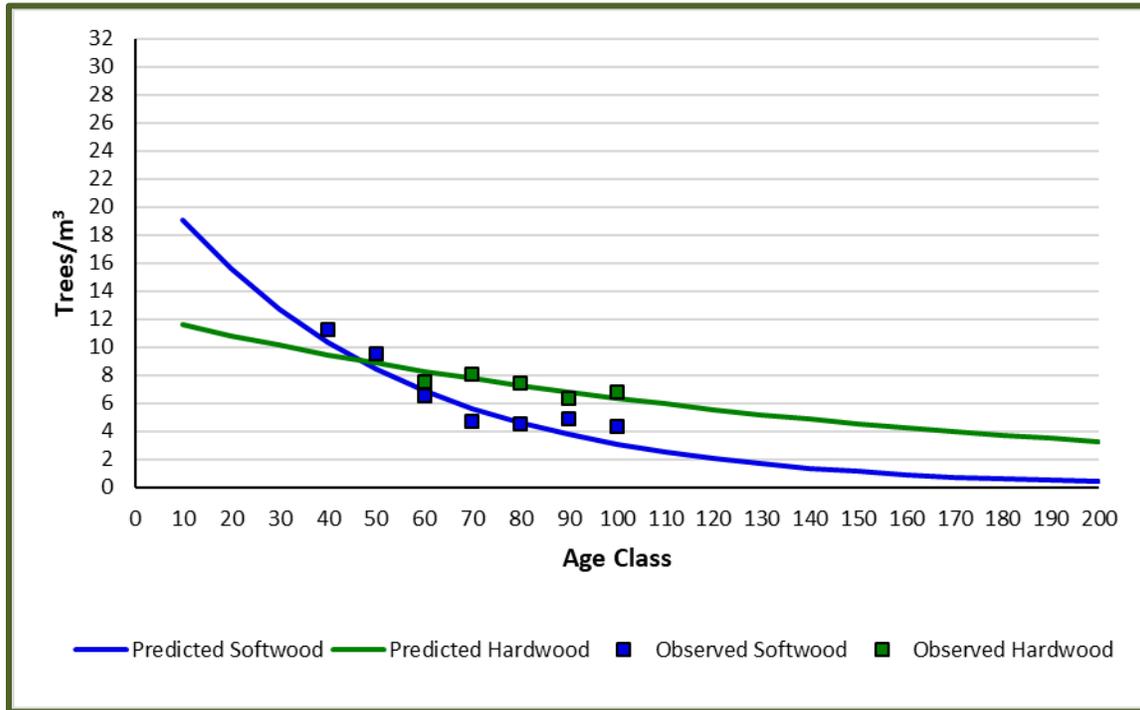


TABLE 6-8: PIECE SIZE DEVELOPMENT TYPE 7: S-JP-L&M

Development Type Coefficients		a	b	c	d	t
Softwood		2.341631E+01	2.035329E-02			
Hardwood		1.236110E+01	6.680309E-03			
Age Class (yrs)	Observed Average Piece Size (trees/m ³)		Predicted Piece Size (trees/m ³)		Predicted Piece Size (m ³ /tree)	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
10			19.1040	11.5623	0.0523	0.0865
20			15.5859	10.8152	0.0642	0.0925
30			12.7157	10.1163	0.0786	0.0989
40	11.2080		10.3740	9.4626	0.0964	0.1057
50	9.4882		8.4635	8.8511	0.1182	0.1130
60	6.5448	7.5468	6.9049	8.2791	0.1448	0.1208
70	4.7286	8.0717	5.6333	7.7441	0.1775	0.1291
80	4.4938	7.3829	4.5959	7.2437	0.2176	0.1381
90	4.8639	6.3553	3.7496	6.7756	0.2667	0.1476
100	4.3657	6.8266	3.0590	6.3378	0.3269	0.1578
110			2.4957	5.9282	0.4007	0.1687
120			2.0361	5.5451	0.4911	0.1803
130			1.6611	5.1868	0.6020	0.1928
140			1.3552	4.8516	0.7379	0.2061
150			1.1057	4.5381	0.9044	0.2204
160			0.9020	4.2448	1.1086	0.2356
170			0.7359	3.9705	1.3588	0.2519
180			0.6004	3.7140	1.6656	0.2693
190			0.4898	3.4740	2.0415	0.2879
200			0.3996	3.2495	2.5023	0.3077



FIGURE 6-8 PIECE SIZE DEVELOPMENT TYPE 8: SH-JP-A-A

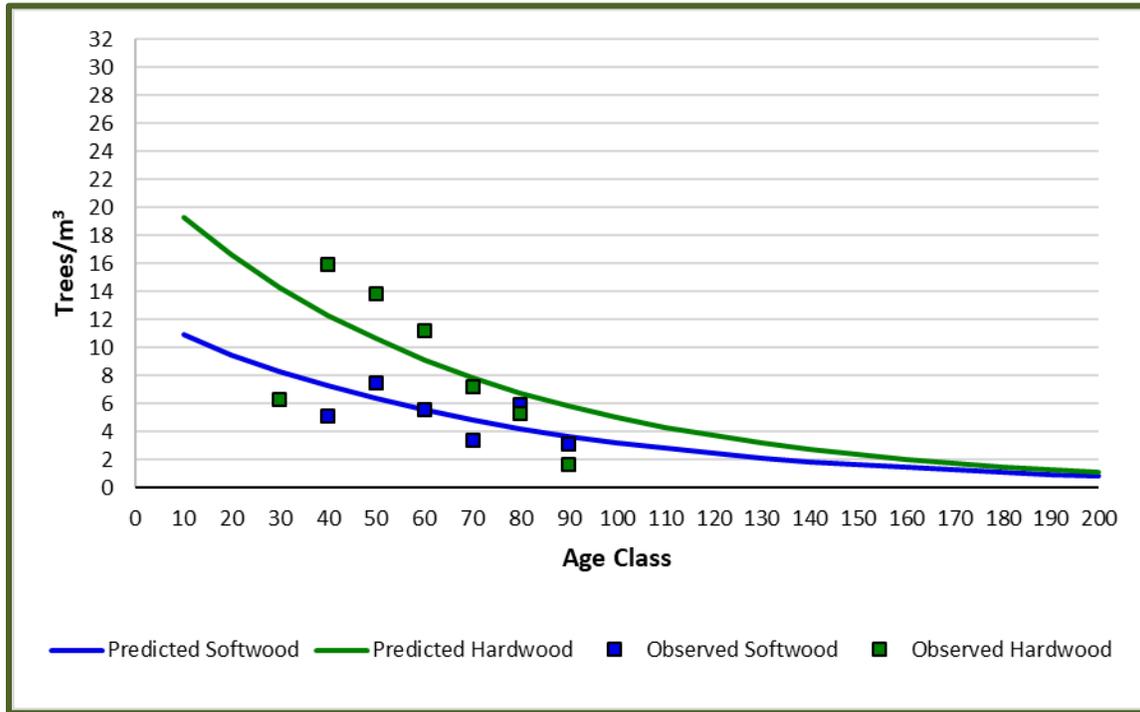


TABLE 6-9: PIECE SIZE DEVELOPMENT TYPE 8: SH-JP-A-A

Development Type Coefficients		a	b	c	d	t
Softwood		1.247074E+01	1.350713E-02			
Hardwood		2.247153E+01	1.500171E-02			
Age Class (yrs)	Observed Average Piece Size (trees/m³)		Predicted Piece Size (trees/m³)		Predicted Piece Size (m³/tree)	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
10			10.8951	19.3411	0.0918	0.0517
20			9.5186	16.6467	0.1051	0.0601
30		6.2829	8.3159	14.3277	0.1203	0.0698
40	5.1462	15.9110	7.2652	12.3318	0.1376	0.0811
50	7.4564	13.8725	6.3473	10.6139	0.1575	0.0942
60	5.5651	11.2054	5.5453	9.1353	0.1803	0.1095
70	3.3718	7.1759	4.8447	7.8627	0.2064	0.1272
80	5.9423	5.3061	4.2326	6.7674	0.2363	0.1478
90	3.1535	1.6558	3.6978	5.8246	0.2704	0.1717
100			3.2306	5.0132	0.3095	0.1995
110			2.8224	4.3148	0.3543	0.2318
120			2.4658	3.7138	0.4055	0.2693
130			2.1543	3.1964	0.4642	0.3129
140			1.8821	2.7511	0.5313	0.3635
150			1.6443	2.3679	0.6082	0.4223
160			1.4366	2.0380	0.6961	0.4907
170			1.2550	1.7541	0.7968	0.5701
180			1.0965	1.5097	0.9120	0.6624
190			0.9579	1.2994	1.0439	0.7696
200			0.8369	1.1184	1.1949	0.8941



FIGURE 6-9 PIECE SIZE DEVELOPMENT TYPE 9: SH-WS-A-A

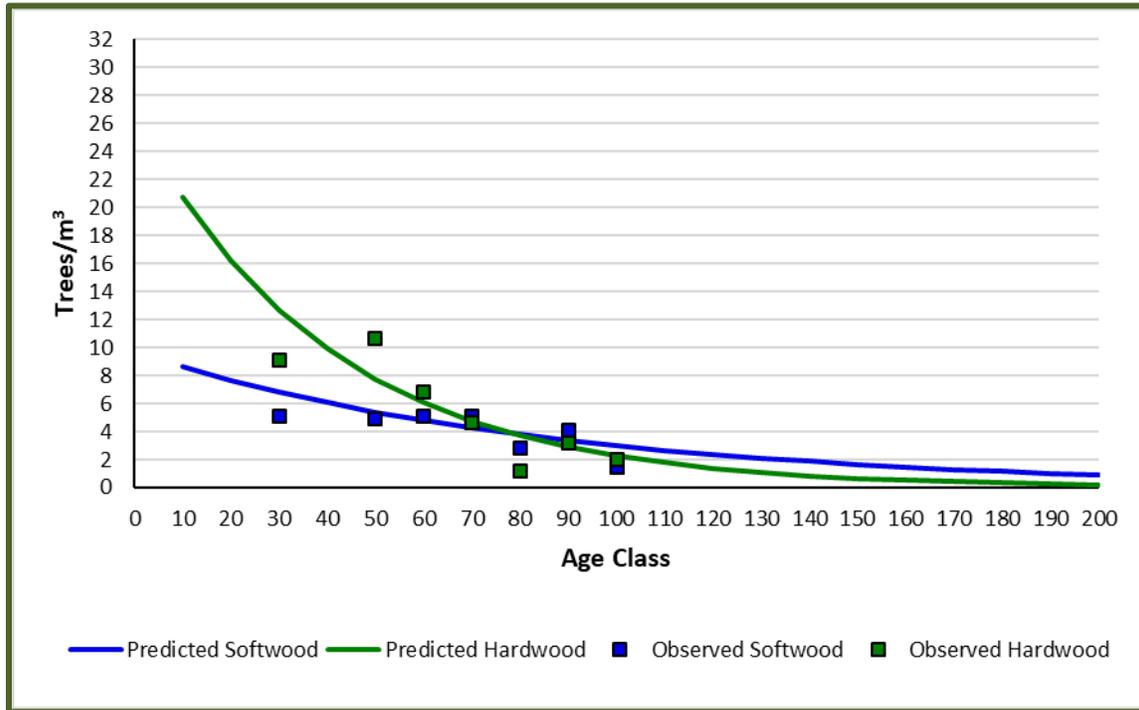


TABLE 6-10: PIECE SIZE DEVELOPMENT TYPE 9: SH-WS-A-A

Development Type Coefficients		a	b	c	d	t
Softwood		9.718785E+00	1.179931E-02			
Hardwood		2.642567E+01	2.448865E-02			
Age Class (yrs)	Observed Average Piece Size (trees/m³)		Predicted Piece Size (trees/m³)		Predicted Piece Size (m³/tree)	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
10			8.6371	20.6858	0.1158	0.0483
20			7.6758	16.1927	0.1303	0.0618
30	5.0804	9.0532	6.8215	12.6756	0.1466	0.0789
40			6.0623	9.9224	0.1650	0.1008
50	4.9414	10.6199	5.3876	7.7672	0.1856	0.1287
60	5.0998	6.8232	4.7879	6.0801	0.2089	0.1645
70	5.0897	4.6336	4.2551	4.7594	0.2350	0.2101
80	2.7812	1.1973	3.7815	3.7257	0.2644	0.2684
90	4.0689	3.1830	3.3606	2.9164	0.2976	0.3429
100	1.4714	1.9999	2.9866	2.2830	0.3348	0.4380
110			2.6542	1.7871	0.3768	0.5596
120			2.3588	1.3989	0.4239	0.7148
130			2.0963	1.0951	0.4770	0.9132
140			1.8629	0.8572	0.5368	1.1666
150			1.6556	0.6710	0.6040	1.4903
160			1.4713	0.5253	0.6797	1.9038
170			1.3076	0.4112	0.7648	2.4320
180			1.1620	0.3219	0.8605	3.1069
190			1.0327	0.2520	0.9683	3.9690
200			0.9178	0.1972	1.0896	5.0703



FIGURE 6-10 PIECE SIZE DEVELOPMENT TYPE 10: HS-WS-A-A

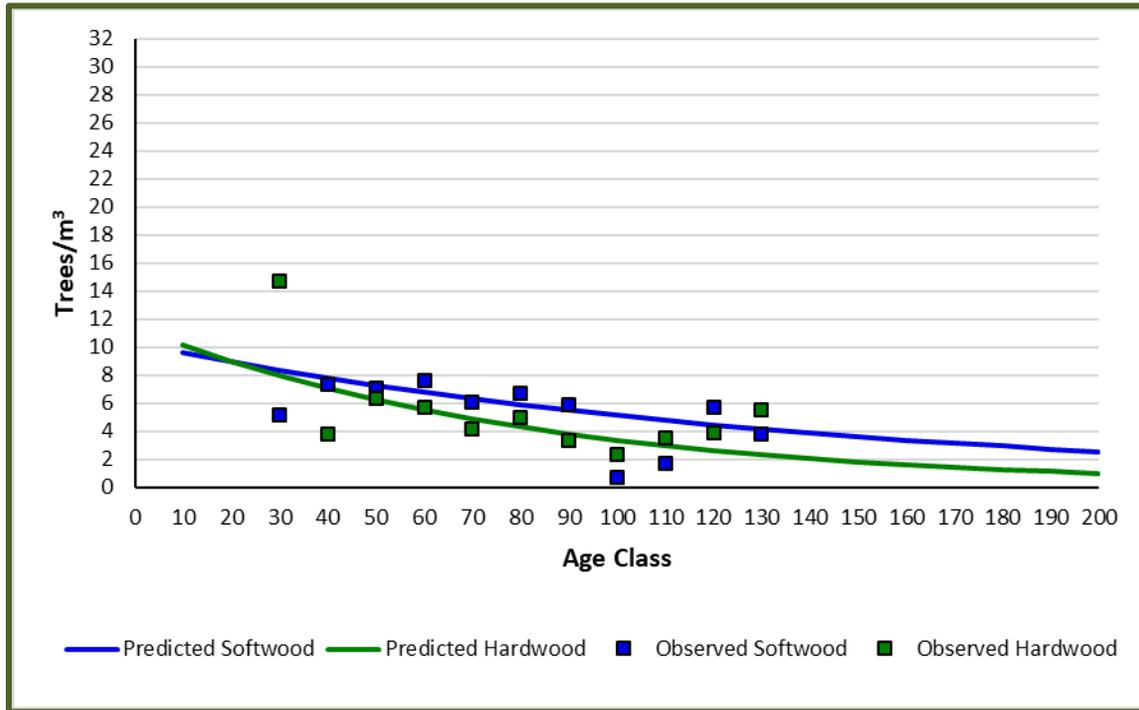


TABLE 6-11: PIECE SIZE DEVELOPMENT TYPE 10: HS-WS-A-A

Development Type Coefficients		a	b	c	d	t
Softwood		1.029280E+01	7.000593E-03			
Hardwood		1.145453E+01	1.226536E-02			
Age Class (yrs)	Observed Average Piece Size (trees/m ³)		Predicted Piece Size (trees/m ³)		Predicted Piece Size (m ³ /tree)	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
10			9.5969	10.1323	0.1042	0.0987
20			8.9480	8.9628	0.1118	0.1116
30	5.1627	14.6837	8.3430	7.9282	0.1199	0.1261
40	7.2965	3.8058	7.7789	7.0130	0.1286	0.1426
50	7.0931	6.2877	7.2530	6.2035	0.1379	0.1612
60	7.5527	5.6853	6.7626	5.4875	0.1479	0.1822
70	6.0441	4.1817	6.3054	4.8540	0.1586	0.2060
80	6.7079	4.9847	5.8791	4.2937	0.1701	0.2329
90	5.8471	3.3354	5.4816	3.7981	0.1824	0.2633
100	0.6703	2.3575	5.1109	3.3597	0.1957	0.2976
110	1.6642	3.5170	4.7654	2.9719	0.2098	0.3365
120	5.7060	3.8780	4.4432	2.6288	0.2251	0.3804
130	3.7657	5.5170	4.1428	2.3254	0.2414	0.4300
140			3.8627	2.0570	0.2589	0.4862
150			3.6015	1.8195	0.2777	0.5496
160			3.3580	1.6095	0.2978	0.6213
170			3.1310	1.4237	0.3194	0.7024
180			2.9193	1.2594	0.3426	0.7940
190			2.7219	1.1140	0.3674	0.8977
200			2.5379	0.9854	0.3940	1.0148



FIGURE 6-11 PIECE SIZE DEVELOPMENT TYPE 11: HS-JP-A-A

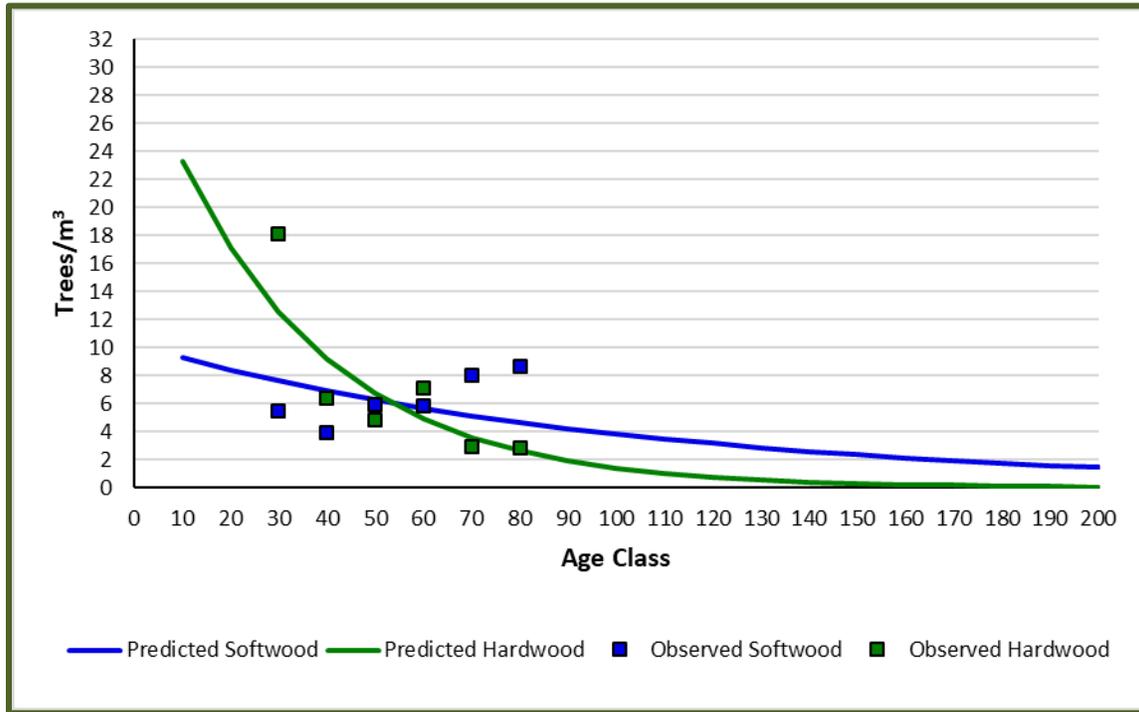


TABLE 6-12: PIECE SIZE DEVELOPMENT TYPE 11: HS-JP-A-A

Development Type Coefficients		a	b	c	d ²⁵	t
Softwood		1.022279E+01	9.769422E-03		4.472449E-01	0
Hardwood		3.185340E+01	3.109161E-02			
Age Class (yrs)	Observed Average Piece Size (trees/m ³)		Predicted Piece Size (trees/m ³)		Predicted Piece Size (m ³ /tree)	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
10			9.2713	23.3414	0.1079	0.0428
20			8.4084	17.1040	0.1189	0.0585
30	5.4900	18.0864	7.6258	12.5334	0.1311	0.0798
40	3.9066	6.3876	6.9160	9.1842	0.1446	0.1089
50	5.9775	4.8742	6.2723	6.7299	0.1594	0.1486
60	5.8382	7.0799	5.6885	4.9315	0.1758	0.2028
70	8.0191	2.9267	5.1591	3.6137	0.1938	0.2767
80	8.6239	2.8728	4.6789	2.6480	0.2137	0.3776
90			4.2434	1.9404	0.2357	0.5154
100			3.8485	1.4219	0.2598	0.7033
110			3.4903	1.0419	0.2865	0.9598
120			3.1654	0.7635	0.3159	1.3098
130			2.8708	0.5595	0.3483	1.7874
140			2.6036	0.4100	0.3841	2.4392
150			2.3613	0.3004	0.4235	3.3288
160			2.1415	0.2201	0.4670	4.5427
170			1.9422	0.1613	0.5149	6.1993
180			1.7614	0.1182	0.5677	8.4600
190			1.5975	0.0866	0.6260	11.5451
200			1.4488	0.0635	0.6902	15.7553

²⁵ The softwood piece data for HS-JP-A-A was guided with data from S-JP-LM and SH-JP-A-A.



FIGURE 6-12 PIECE SIZE DEVELOPMENT TYPE 12: H-A-LD-A-1

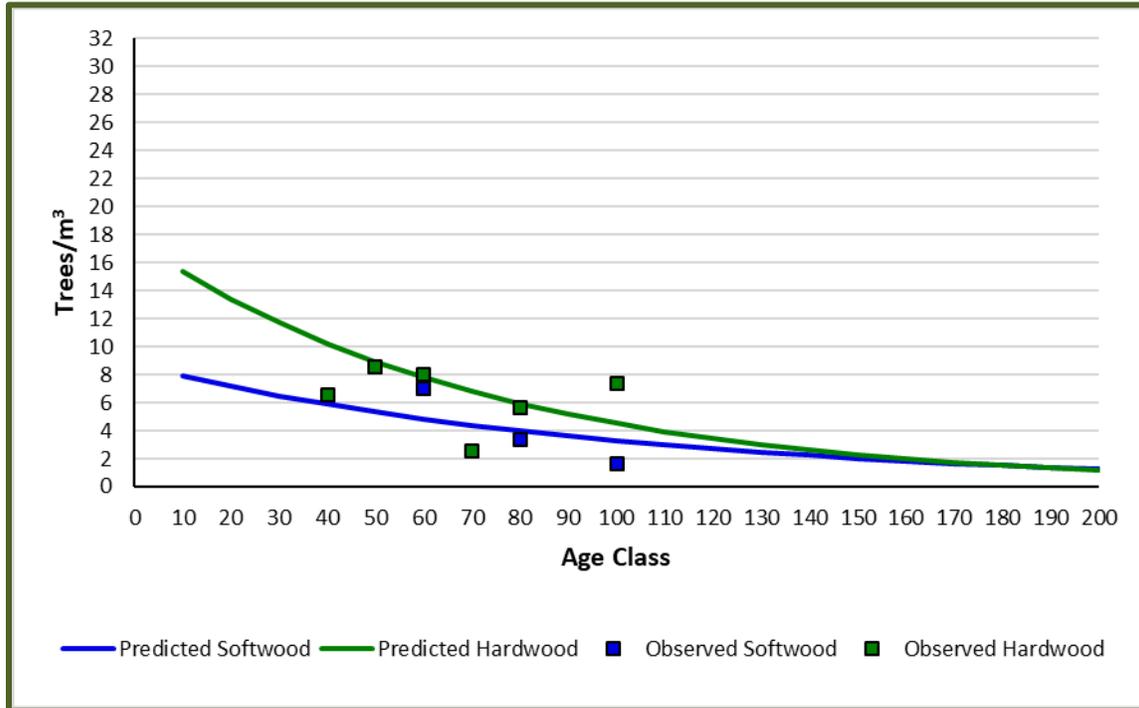


TABLE 6-13: PIECE SIZE DEVELOPMENT TYPE 12: H-A-LD-A-1

Development Type Coefficients		a	b	c	d ²⁶	t
Softwood		8.665846E+00	9.708316E-03		4.677981E+00	0
Hardwood		1.757841E+01	1.357217E-02		5.408412E+00	0
Age Class (yrs)	Observed Average Piece Size (trees/m ³)		Predicted Piece Size (trees/m ³)		Predicted Piece Size (m ³ /tree)	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
10			7.8641	15.3475	0.1272	0.0652
20			7.1365	13.3996	0.1401	0.0746
30			6.4762	11.6990	0.1544	0.0855
40		6.5034	5.8771	10.2143	0.1702	0.0979
50		8.5181	5.3333	8.9179	0.1875	0.1121
60	7.0407	7.9555	4.8399	7.7861	0.2066	0.1284
70		2.5269	4.3921	6.7979	0.2277	0.1471
80	3.3236	5.6466	3.9857	5.9352	0.2509	0.1685
90			3.6170	5.1819	0.2765	0.1930
100	1.6163	7.3333	3.2823	4.5243	0.3047	0.2210
110			2.9787	3.9501	0.3357	0.2532
120			2.7031	3.4487	0.3699	0.2900
130			2.4530	3.0111	0.4077	0.3321
140			2.2260	2.6289	0.4492	0.3804
150			2.0201	2.2953	0.4950	0.4357
160			1.8332	2.0040	0.5455	0.4990
170			1.6636	1.7496	0.6011	0.5716
180			1.5097	1.5276	0.6624	0.6546
190			1.3700	1.3337	0.7299	0.7498
200			1.2432	1.1644	0.8043	0.8588

²⁶ The softwood piece data for H-A-LD-A-1 was guided with data from H-A-HD-A-1 and the hardwood piece size data was guided with H-A-LD-A-2.



FIGURE 6-13 PIECE SIZE DEVELOPMENT TYPE 13: H-A-LD-A-2

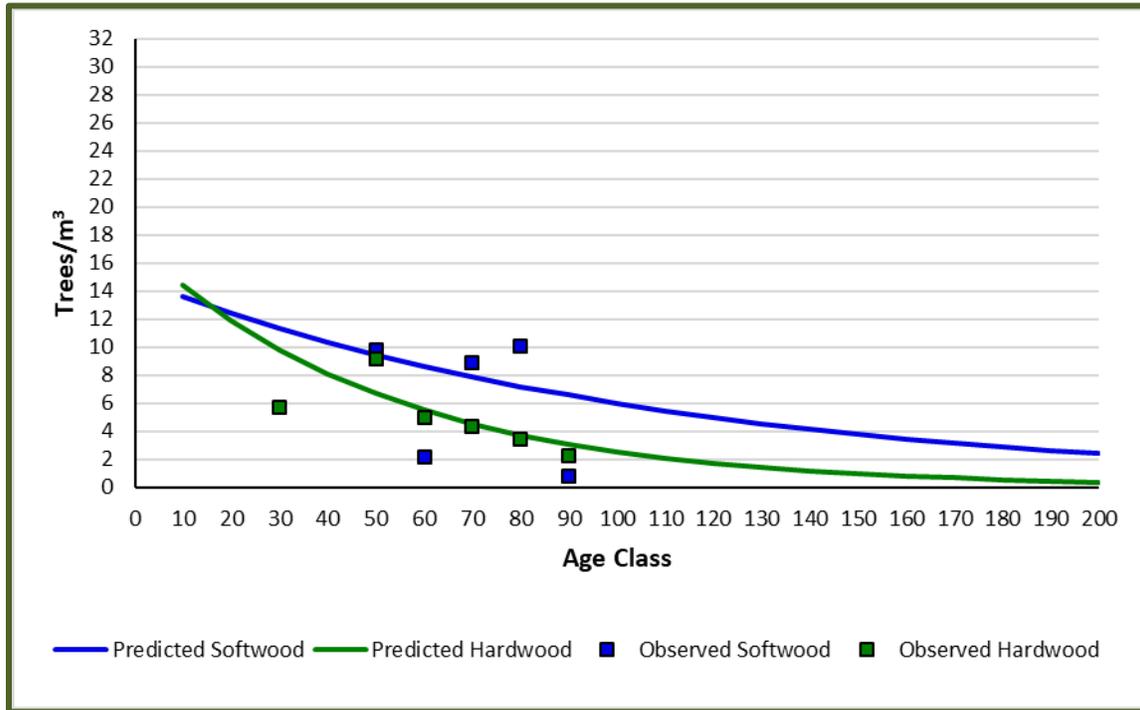


TABLE 6-14: PIECE SIZE DEVELOPMENT TYPE 13: H-A-LD-A-2

Development Type Coefficients		a	b	c	d ²⁷	t
Softwood		1.493007E+01	9.122216E-03		2.797621E+00	0
Hardwood		1.750402E+01	1.928773E-02			
Age Class (yrs)	Observed Average Piece Size (trees/m ³)		Predicted Piece Size (trees/m ³)		Predicted Piece Size (m ³ /tree)	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
10			13.6284	14.4335	0.0734	0.0693
20			12.4402	11.9016	0.0804	0.0840
30		5.7183	11.3556	9.8139	0.0881	0.1019
40			10.3656	8.0924	0.0965	0.1236
50	9.8293	9.1622	9.4618	6.6728	0.1057	0.1499
60	2.1501	4.9747	8.6369	5.5023	0.1158	0.1817
70	8.8590	4.3636	7.8839	4.5371	0.1268	0.2204
80	10.0474	3.4582	7.1965	3.7412	0.1390	0.2673
90	0.7712	2.2795	6.5691	3.0849	0.1522	0.3242
100			5.9964	2.5438	0.1668	0.3931
110			5.4736	2.0976	0.1827	0.4767
120			4.9964	1.7296	0.2001	0.5782
130			4.5608	1.4262	0.2193	0.7012
140			4.1631	1.1760	0.2402	0.8503
150			3.8002	0.9697	0.2631	1.0312
160			3.4688	0.7996	0.2883	1.2506
170			3.1664	0.6594	0.3158	1.5166
180			2.8904	0.5437	0.3460	1.8393
190			2.6384	0.4483	0.3790	2.2305
200			2.4083	0.3697	0.4152	2.7050

²⁷ The softwood piece data for H-A-LD-A-2 was guided with data H-A-HD-A-2.



FIGURE 6-14 PIECE SIZE DEVELOPMENT TYPE 14: H-A-HD-A-1

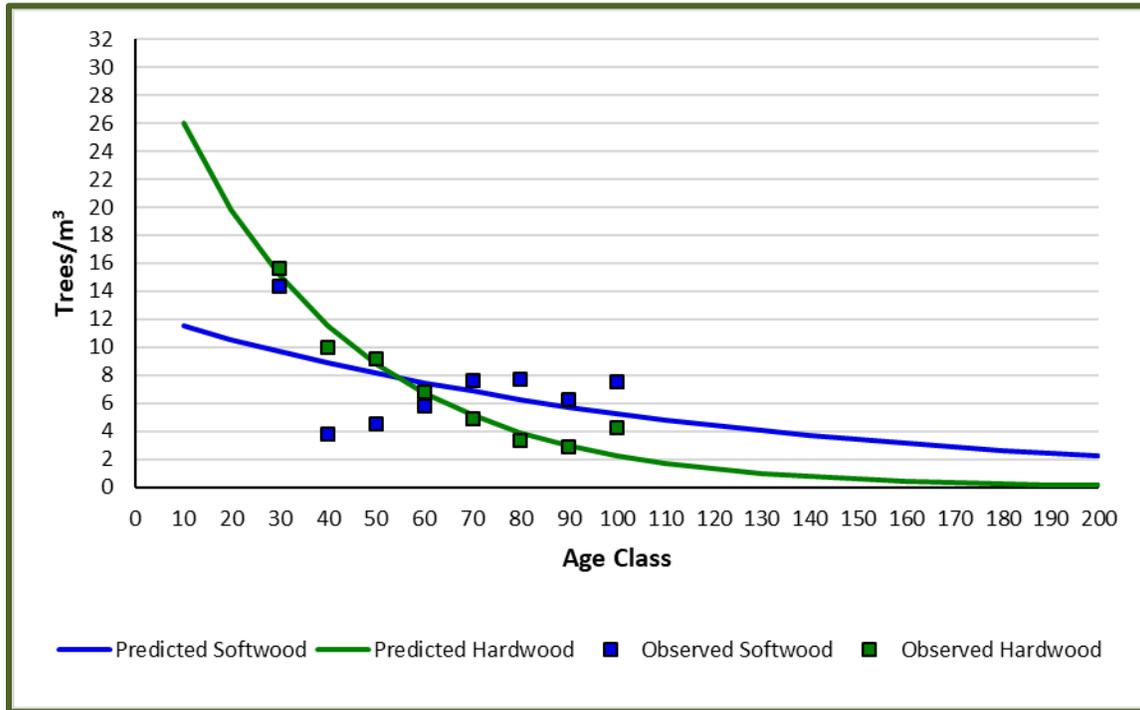


TABLE 6-15: PIECE SIZE DEVELOPMENT TYPE 14: H-A-HD-A-1

Development Type Coefficients		a	b	c	d	t
Softwood		1.258294E+01	8.675243E-03			
Hardwood		3.401042E+01	2.699109E-02			
Age Class (yrs)	Observed Average Piece Size (trees/m³)		Predicted Piece Size (trees/m³)		Predicted Piece Size (m³/tree)	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
10			11.5373	25.9652	0.0867	0.0385
20			10.5786	19.8230	0.0945	0.0504
30	14.3387	15.5870	9.6996	15.1339	0.1031	0.0661
40	3.7757	10.0026	8.8936	11.5539	0.1124	0.0866
50	4.5401	9.1950	8.1546	8.8208	0.1226	0.1134
60	5.8213	6.8223	7.4770	6.7342	0.1337	0.1485
70	7.6394	4.9424	6.8557	5.1412	0.1459	0.1945
80	7.6744	3.3786	6.2860	3.9251	0.1591	0.2548
90	6.2291	2.8738	5.7636	2.9966	0.1735	0.3337
100	7.5810	4.3003	5.2847	2.2877	0.1892	0.4371
110			4.8456	1.7466	0.2064	0.5726
120			4.4429	1.3334	0.2251	0.7500
130			4.0737	1.0180	0.2455	0.9823
140			3.7352	0.7772	0.2677	1.2867
150			3.4248	0.5933	0.2920	1.6854
160			3.1403	0.4530	0.3184	2.2076
170			2.8793	0.3458	0.3473	2.8916
180			2.6401	0.2640	0.3788	3.7876
190			2.4207	0.2016	0.4131	4.9612
200			2.2195	0.1539	0.4505	6.4984



FIGURE 6-15 PIECE SIZE DEVELOPMENT TYPE 15: H-A-HD-A-2

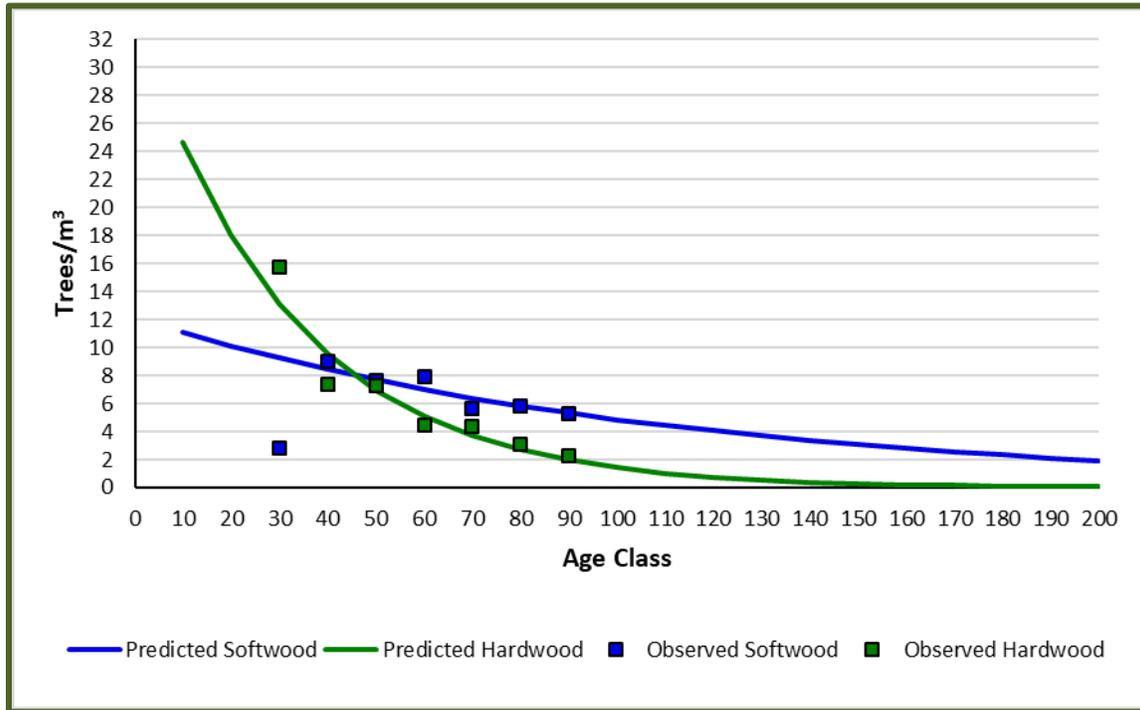


TABLE 6-16: PIECE SIZE DEVELOPMENT TYPE 15: H-A-HD-A-2

Development Type Coefficients		a	b	c	d	t
Softwood		1.217425E+01	9.183878E-03			
Hardwood		3.384811E+01	3.170011E-02			
Age Class (yrs)	Observed Average Piece Size (trees/m³)		Predicted Piece Size (trees/m³)		Predicted Piece Size (m³/tree)	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
10			11.1060	24.6526	0.0900	0.0406
20			10.1315	17.9552	0.0987	0.0557
30	2.8457	15.7066	9.2424	13.0773	0.1082	0.0765
40	8.9981	7.3333	8.4314	9.5246	0.1186	0.1050
50	7.6574	7.3060	7.6916	6.9371	0.1300	0.1442
60	7.9102	4.4655	7.0167	5.0525	0.1425	0.1979
70	5.6503	4.3327	6.4010	3.6799	0.1562	0.2717
80	5.7869	3.0781	5.8393	2.6802	0.1713	0.3731
90	5.2810	2.3051	5.3269	1.9520	0.1877	0.5123
100			4.8595	1.4217	0.2058	0.7034
110			4.4331	1.0355	0.2256	0.9657
120			4.0441	0.7542	0.2473	1.3260
130			3.6892	0.5493	0.2711	1.8205
140			3.3655	0.4001	0.2971	2.4996
150			3.0702	0.2914	0.3257	3.4320
160			2.8008	0.2122	0.3570	4.7121
170			2.5550	0.1546	0.3914	6.4697
180			2.3308	0.1126	0.4290	8.8830
190			2.1263	0.0820	0.4703	12.1964
200			1.9397	0.0597	0.5155	16.7456



FIGURE 6-16 PIECE SIZE DEVELOPMENT TYPE 16: H(S)-A-LD-A

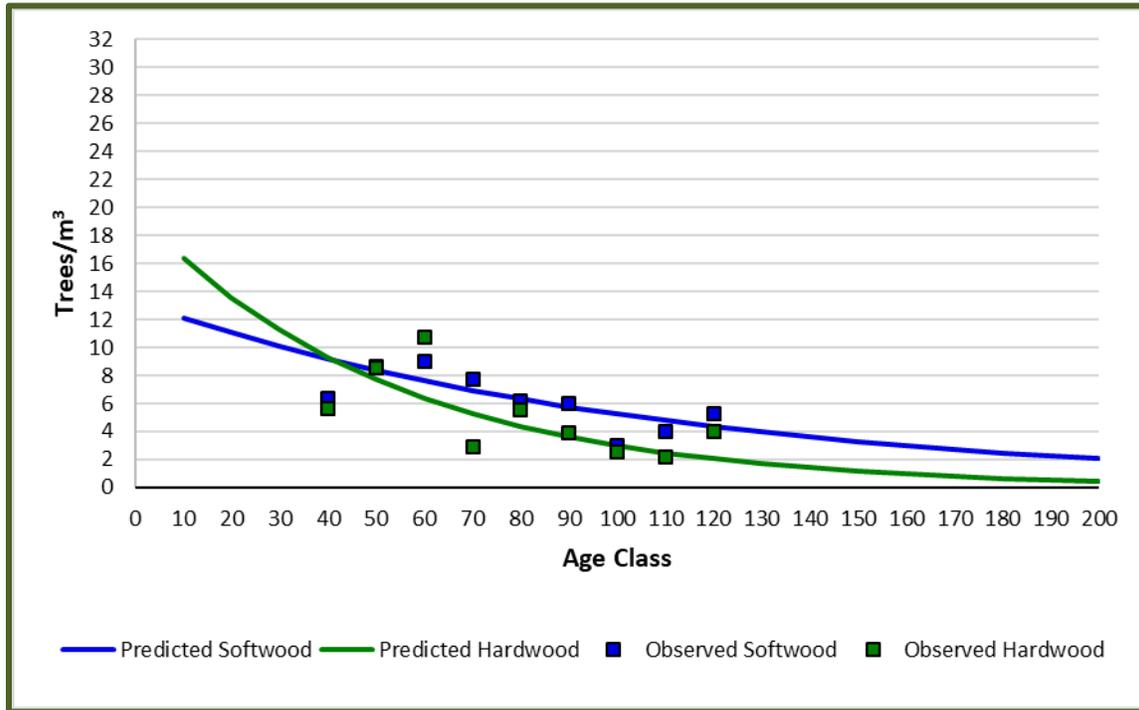


TABLE 6-17: PIECE SIZE DEVELOPMENT TYPE 16: H(S)-A-LD-A

Development Type Coefficients		a	b	c	d	t
Softwood		1.331409E+01	9.326052E-03			
Hardwood		1.980868E+01	1.886610E-02			
Age Class (yrs)	Observed Average Piece Size (trees/m³)		Predicted Piece Size (trees/m³)		Predicted Piece Size (m³/tree)	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
10			12.1286	16.4029	0.0825	0.0610
20			11.0486	13.5827	0.0905	0.0736
30			10.0648	11.2474	0.0994	0.0889
40	6.3186	5.5904	9.1686	9.3136	0.1091	0.1074
50	8.6554	8.5743	8.3522	7.7123	0.1197	0.1297
60	8.9647	10.7668	7.6085	6.3863	0.1314	0.1566
70	7.7215	2.8678	6.9310	5.2883	0.1443	0.1891
80	6.1571	5.5140	6.3138	4.3791	0.1584	0.2284
90	5.9770	3.9281	5.7516	3.6261	0.1739	0.2758
100	3.0117	2.5099	5.2395	3.0027	0.1909	0.3330
110	3.9923	2.1594	4.7729	2.4864	0.2095	0.4022
120	5.2228	4.0029	4.3479	2.0589	0.2300	0.4857
130			3.9608	1.7049	0.2525	0.5865
140			3.6081	1.4118	0.2772	0.7083
150			3.2868	1.1691	0.3042	0.8554
160			2.9941	0.9681	0.3340	1.0330
170			2.7275	0.8016	0.3666	1.2475
180			2.4847	0.6638	0.4025	1.5065
190			2.2634	0.5497	0.4418	1.8193
200			2.0619	0.4552	0.4850	2.1970



FIGURE 6-17 PIECE SIZE DEVELOPMENT TYPE 17: H(S)-A-HD-A

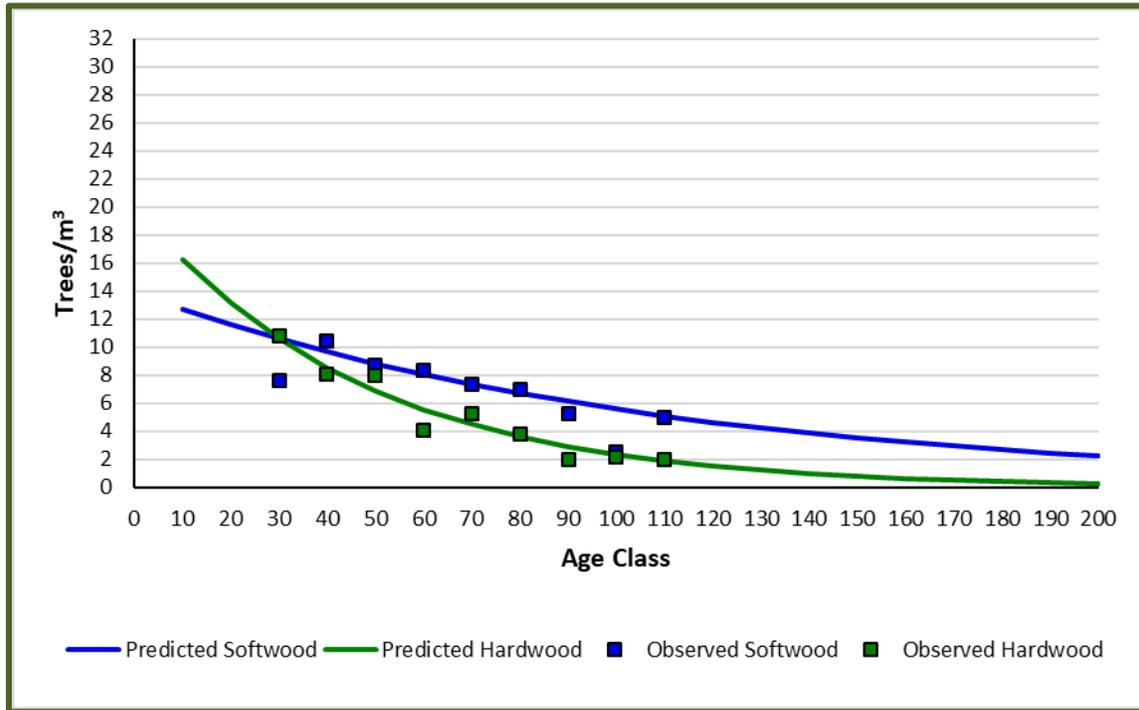


TABLE 6-18: PIECE SIZE DEVELOPMENT TYPE 17: H(S)-A-HD-A

Development Type Coefficients		a	b	c	d	t
Softwood		1.397298E+01	9.180973E-03			
Hardwood		2.018677E+01	2.150009E-02			
Age Class (yrs)	Observed Average Piece Size (trees/m³)		Predicted Piece Size (trees/m³)		Predicted Piece Size (m³/tree)	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
10			12.7473	16.2814	0.0784	0.0614
20			11.6290	13.1317	0.0860	0.0762
30	7.5815	10.7932	10.6089	10.5912	0.0943	0.0944
40	10.4582	8.0320	9.6783	8.5422	0.1033	0.1171
50	8.6675	7.9779	8.8293	6.8897	0.1133	0.1451
60	8.3186	4.0416	8.0548	5.5568	0.1241	0.1800
70	7.3718	5.2889	7.3482	4.4818	0.1361	0.2231
80	7.0191	3.7955	6.7036	3.6147	0.1492	0.2766
90	5.2329	1.9621	6.1156	2.9154	0.1635	0.3430
100	2.5557	2.1755	5.5791	2.3514	0.1792	0.4253
110	4.9375	2.0164	5.0897	1.8965	0.1965	0.5273
120			4.6432	1.5296	0.2154	0.6538
130			4.2359	1.2337	0.2361	0.8106
140			3.8643	0.9950	0.2588	1.0050
150			3.5253	0.8025	0.2837	1.2461
160			3.2161	0.6473	0.3109	1.5449
170			2.9340	0.5221	0.3408	1.9155
180			2.6766	0.4211	0.3736	2.3750
190			2.4418	0.3396	0.4095	2.9446
200			2.2276	0.2739	0.4489	3.6510



7.0 DATA SETS

The following datasets have been prepared and are included on the enclosed CD at the end of this section:

1. Mistik raw tree data (RAWTREEDATA.DBF) – see Table 7-1 for the data structure document.
2. Mistik individual tree compilation (COMPILEDTREEDATA.DBF)- SEE Table 7-2 for the data structure.
3. Mistik plot compilation (COMPILEDPLOTDATA.DBF)- See Table 7-3 for the data structure.
4. Mistik plot SFVI data (SFVI PLOT.DBF)- See Table 7-4 for the data structure.
5. Predicted licensee – utilization standards yield data structure and description – see Table 7-5 for the data structure.



TABLE 7-1: MISTIK RAW TREE DATA STRUCTURE AND DESCRIPTION

Number of data records: 105,682

Field Number	Field Name	Field Type	Field Width	No. of Decimals	Field Description
1	ID_FOR	Numeric	20	0	Unique Stand ID
2	ID_TILE	Numeric	11	0	UTM Tile
3	CRZNORTH	Numeric	3	0	UTM North grid reference
4	CRZ_EAST	Numeric	2	0	UTM East grid Reference
5	CRZ_ZONE	Numeric	2	0	UTM zone
6	PROJNO	String	8		Internal Volume Sampling Project Number
7	STAND	Numeric	5	0	SFVI Stand Number
8	PLOTNUM	Numeric	4	0	Plot number
9	CRUZ_STRAT	String	8		Cruise stratum
10	CREW	String	5		Measurement crew
11	YEAR	Numeric	4	0	Collection year
12	MONTH	Numeric	2	0	Collection month
13	DAY	Numeric	2	0	Collection day
14	CUTLINE	String	2		Cutline - "CL" indicates that a portion or all of plot located on cutline (seismic line)
15	PTYPE	Numeric	1	0	Plot type ♦ 1 – Variable radius plot ♦ 2 – Fixed area plot <i>*all plots type 2</i>
16	PSIZE	Numeric	8	3	Plot area (ha) or BAF
17	TREENO	Numeric	4	0	Tree Number
18	SPECIES	String	2		Tree species
19	DBH	Numeric	4	1	Diameter (cm) at breast height (1.3m)
20	HEIGHT	Numeric	4	1	Total tree height (m)
21	HEIGHT_L	Numeric	8	2	Lean adjusted tree height (m)
22	LEAN	Numeric	2	0	Lean degrees
23	STUMPDIA	Numeric	4	1	Diameter (cm) at stump height (0.3m)
24	DSHAGE	Numeric	3	0	Age (years) at stump height (0.3m)
25	DBHAGE	Numeric	3	0	Age (years) at breast height (1.3m)
26	IW1_10	Numeric	3	1	Increment width - last 10 years at breast height (1.3m)
27	IW11_20	Numeric	3	1	Increment width – 10 – 20 years ago at breast height (1.3m)



Field Number	Field Name	Field Type	Field Width	No. of Decimals	Field Description
28	CONDCOD1	String	2		Tree condition code 1 as Defined: <ul style="list-style-type: none"> ◆ HE-healthy; ◆ DE-dead tree; ◆ BS-broken stem; ◆ FO-fork; ◆ DT-dead top; ◆ SS-same stump; ◆ CR-crook; ◆ PF-poor form; ◆ CO-conks; ◆ SW-sweep; ◆ BT-broken top; ◆ OS-open scars; ◆ CS-closed scar.
29	CONDCOD2	String	2		Tree condition code 2 (See Condition Code 1)
30	CONDCOD3	String	2		Tree condition code 3 (See Condition Code 1)
31	SOURCE	String	6		Data Source: <ul style="list-style-type: none"> ◆ Mistik; ◆ L&M;



TABLE 7-2: MISTIK COMPILED TREE DATA STRUCTURE AND DESCRIPTION

Number of data records: 105,682

Field Number	Field Name	Field Type	Field Width	No. of Decimals	Field Description
1	ID_FOR	Numeric	22	0	Unique Stand ID
2	ID_TILE	Numeric	11	0	UTM Tile
3	CRZNORTH	Numeric	3	0	UTM North grid reference
4	CRZ_EAST	Numeric	2	0	UTM East grid Reference
5	CRZ_ZONE	Numeric	2	0	UTM zone
6	PROJNO	String	8		Internal Volume Sampling Project Number
7	STAND	Numeric	5	0	SFVI Stand Number
8	PLOTNUM	Numeric	4	0	Plot number
9	CRUZ_STRAT	String	8		Cruise stratum
10	CREW	String	5		Measurement crew
11	YEAR	Numeric	4	0	Collection year
12	MONTH	Numeric	2	0	Collection month
13	DAY	Numeric	2	0	Collection day
14	CUTLINE	String	2		Cutline - "CL" indicates that a portion or all of plot located on outline (seismic line)
15	PTYPE	Numeric	1	0	Plot type ♦ 1 – Variable radius plot ♦ 2 – Fixed area plot *all plots type 2
16	PSIZE	Numeric	8	3	Plot area (ha) or BAF
17	TREENO	Numeric	4	0	Tree Number
18	SPECIES	String	2		Tree species
19	DBH	Numeric	4	1	Diameter (cm) at breast height (1.3m)
20	HEIGHT	Numeric	4	1	Total tree height (m)
21	HEIGHT_L	Numeric	8	2	Lean adjusted tree height (m)
22	LEAN	Numeric	2	0	Lean degrees
23	STUMPDIA	Numeric	4	1	Diameter (cm) at stump height (0.3m)
24	DSHAGE	Numeric	3	0	Age (years) at stump height (0.3m)
25	DBHAGE	Numeric	3	0	Age (years) at breast height (1.3m)
26	IW1_10	Numeric	3	1	Increment width - last 10 years at breast height (1.3m)
27	IW11_20	Numeric	3	1	Increment width – 10 – 20 years ago at breast height (1.3m)



Field Number	Field Name	Field Type	Field Width	No. of Decimals	Field Description
28	CONDCOD1	String	2		Tree condition code 1 as Defined: <ul style="list-style-type: none"> ◆ HE-healthy; ◆ DE-dead tree; ◆ BS-broken stem; ◆ FO-fork; ◆ DT-dead top; ◆ SS-same stump; ◆ CR-crook; ◆ PF-poor form; ◆ CO-conks; ◆ SW-sweep; ◆ BT-broken top; ◆ OS-open scars; ◆ CS-closed scar.
29	CONDCOD2	String	2		Tree condition code 2 (See Condition Code 1)
30	CONDCOD3	String	2		Tree condition code 3 (See Condition Code 1)
CALCULATED FIELDS					
31	STUMP_C	Numeric	4	1	Calculated stump diameter (cm) <i>*Defaults to measured stump where available</i>
32	HEIGHT_C ²⁸	Numeric	4	1	Calculated tree height (cm) <i>*Defaults to measured height where available</i>
33	MERCHHT_C	Numeric	4	1	Merchantable tree height (m) <i>*Licensee-specified utilization standards</i>
34	TLOGLEN	Numeric	6	2	Total log length (m) <i>*Calculated for Softwoods only</i>
35	NUMLOGT	Numeric	8	6	Number of Log segments <i>*Calculated for Softwoods only</i>
36	LMV	Numeric	8	6	Licensee specified utilization standards - gross merchantable tree volume (m ³)
37	SOFT_FLAG	Numeric	8	2	Binary identifier of softwood species: <ul style="list-style-type: none"> ◆ 0 – Hardwood species; ◆ 1 – Softwood species.
38	HARD_FLAG	Numeric	8	2	Binary identifier of hardwood species: <ul style="list-style-type: none"> ◆ 0 – Softwood species; ◆ 1 – Hardwood species.

²⁸ The Chapman-Richards height-diameter function is used to calculate HEIGHT_C. A detailed description of the function can be found in Shongming Huang, Stephen J. Titus, Tom W. Lakusta, and Robert J. Held (1994) report on Ecologically-Based Individual Tree Volume Estimation for Major Alberta Tree Species, Report No. 2. p11.



TABLE 7-3: MISTIK COMPILED PLOT DATA STRUCTURE AND DESCRIPTION

Number of data records: 5,972

Field Number	Field Name	Field Type	Field Width	No. of Decimals	Field Description
1	ID_FOR	Numeric	20	0	Unique Stand ID
2	ID_TILE	Numeric	11	0	UTM Tile
3	CRZNORTH	Numeric	3	0	UTM North grid reference
4	CRZ_EAST	Numeric	2	0	UTM East grid Reference
5	CRZ_ZONE	Numeric	2	0	UTM zone
6	PROJNO	String	8		Internal Volume Sampling Project Number
7	STAND	Numeric	5	0	SFVI Stand Number
8	PLOTNUM	Numeric	4	0	Plot number
9	YEAR	Numeric	4	0	Collection year
10	CUTLINE	String	2		Cutline - "CL" indicates that a portion or all of plot located on cutline (seismic line)
11	PTYPE	Numeric	1	0	Plot Type
12	PSIZE	Numeric	8	3	Plot Size (radius m)
CALCULATED FIELDS					
13	SOFT_LVOL	Numeric	8	2	Softwood Volume (m3/ha) Licensee-Utilization Standards
14	L_SOFTTREE	Numeric	8	2	Softwood Stems/ha Licensee-Utilization Standards
15	HARD_LVOL	Numeric	8	2	Hardwood Volume (m3/ha) Licensee-Utilization Standards
16	L_HARDTREE	Numeric	8	2	Hardwood Stems/ha Licensee-Utilization Standards
17	TOTAL_LVOL	Numeric	8	2	Total Volume (m3/ha) Licensee-Utilization Standards
18	L_TOTTREE	Numeric	8	2	Total Stems/ha Licensee-Utilization Standards
19	C_PROD	Numeric	8	2	Binary identifier of stands with low productivity: <ul style="list-style-type: none"> ◆ 0 - No Productivity Constraint; ◆ 1 - Low Productivity Constraint. <i>Described in the Planning Inventory and Forest Characterization document</i>
20	C_LOWCROW N	Numeric	8	2	Binary identifier of stands with low crown closure: <ul style="list-style-type: none"> ◆ 0 - No Crown Closure Constraint; ◆ 1 - Low Crown Closure Constraint. <i>Described in the Planning Inventory and Forest Characterization document</i>
21	C_TAMARACK	Numeric	8	2	Binary identifier of stands with significant (>40%) Tamarack component: <ul style="list-style-type: none"> ◆ 0 - No Tamarack Constraint; ◆ 1 - Significant Tamarack Composition Constraint.



Field Number	Field Name	Field Type	Field Width	No. of Decimals	Field Description
22	C_PINETOE	Numeric	8	2	Binary identifier of stands infested with Mistletoe using SFVI modifiers and FORHEALTH field from NRCAN: <ul style="list-style-type: none"> ◆ 0 - No Mistletoe Constraint; ◆ 1 - Mistletoe Constraint. <p><i>Described in the Planning Inventory and Forest Characterization document</i></p>
23	C_BS	Numeric	8	2	Binary identifier of low productivity Black Spruce stands: <ul style="list-style-type: none"> ◆ 0 - No Black Spruce Constraint; ◆ 1 - Low Productivity Black Spruce Constraint. <p><i>Described in the Planning Inventory and Forest Characterization document</i></p>
24	P_SPGP	String	4		Plot Assignment Species Group(dominant layer species group) <ul style="list-style-type: none"> ◆ S - Softwood; ◆ SH - Softwood dominated mixedwood; ◆ HS - Hardwood dominated mixedwood; ◆ H – Hardwood <p><i>Identified as 'SFVI_SPGP' in the Planning Inventory and Forest Characterization Document.</i></p>
25	P_SPECIES	String	2		Plot Assignment Species: <ul style="list-style-type: none"> ◆ BS - Black Spruce; ◆ JP - Jack Pine; ◆ TA - Trembling Aspen; ◆ WS - White Spruce.
26	P_2SOFT	String	2		Plot Assignment Secondary Softwood (Dominant layer secondary softwood): <ul style="list-style-type: none"> ◆ BF - Balsam Fir; ◆ BS - Black Spruce; ◆ JP - Jack Pine; ◆ TL - Tamarack; ◆ WS - White Spruce. <p><i>Identified as 'SFVI_2SOFT' in the Planning Inventory and Forest Characterization Document.</i></p>
27	P_CROWN	String	2		Plot Assignment Crown Closure: <ul style="list-style-type: none"> ◆ HD - High Density; ◆ LD - Low Density
28	P_SOIL	String	1		Plot Assignment Soil type: <ul style="list-style-type: none"> ◆ B - Brunisolic; ◆ L - Luvisolic; ◆ O - Organic. <p><i>Identified as 'DT_SOIL' in the Planning Inventory and Forest Characterization Document.</i></p>
29	P_SIGSOFT	Numeric	8	2	Identifies polygons with a hardwood development type species group that contains softwood in one or more layers.
30	P_PCLASS	Numeric	8	2	Plot Assignment Productivity Class: <ul style="list-style-type: none"> ◆ 1 - Lower Productivity; ◆ 2 - Higher Productivity.
31	P_AGECLS	Numeric	8	2	10-year age class



Field Number	Field Name	Field Type	Field Width	No. of Decimals	Field Description
32	PLOT_FLAG	Numeric	8	2	Binary identifier used to identify plots used in final development type determination. <ul style="list-style-type: none"> ◆ 0 – Removed Plot; ◆ 1 – Used in Development Type Determination.
33	NS_FLAG	Numeric	8	2	When NS_FLAG equals 1 plot location is in the North including the following management units; <ul style="list-style-type: none"> ◆ Ile a-la-Crosse; ◆ Dillon; ◆ Peter Pond; ◆ Buffalo Narrows; ◆ Canoe Lake. When NS_Flag equals 2 plot location is in the South including the following management units; <ul style="list-style-type: none"> ◆ Divide; ◆ Big Island Lake; ◆ Pierceland; ◆ Murray Bay; ◆ Beauval; ◆ Beaver River; ◆ Waterhen.
34	P_DEV_COD	Numeric	8	2	Plot Development Type Code as Defined: ('P_Dev_COD' – 'P_DEVTYPE') <ul style="list-style-type: none"> ◆ 0- Blank (Removed Plots) ◆ 1-'S-WS-A-A' ◆ 2-'S-BS-A-A' ◆ 3-'S-JP-LD-A-1' ◆ 4-'S-JP-LD-A-2' ◆ 5-'S-JP-HD-A-1' ◆ 6-'S-JP-HD-A-2' ◆ 7-'S-JP-L&M' ◆ 8-'SH-JP-A-A' ◆ 9-'SH-WS-A-A' ◆ 10-'HS-WS-A-A' ◆ 11-'HS-JP-A-A' ◆ 12-'H-A-LD-A-1' ◆ 13-'H-A-LD-A-2' ◆ 14-'H-A-HD-A-1' ◆ 15-'H-A-HD-A-2' ◆ 16-'H(S)-A-LD-A' ◆ 17-'H(S)-A-HD-A'



Field Number	Field Name	Field Type	Field Width	No. of Decimals	Field Description
35	P_DEVTYPE	String	15		Plot Development Type as Defined: ('P_Dev_COD' – 'P_DEVTYPE') <ul style="list-style-type: none"> ◆ 0- Blank (Removed Plots) ◆ 1-'S-WS-A-A' ◆ 2-'S-BS-A-A' ◆ 3-'S-JP-LD-A-1' ◆ 4-'S-JP-LD-A-2' ◆ 5-'S-JP-HD-A-1' ◆ 6-'S-JP-HD-A-2' ◆ 7-'S-JP-L&M' ◆ 8-'SH-JP-A-A' ◆ 9-'SH-WS-A-A' ◆ 10-'HS-WS-A-A' ◆ 11-'HS-JP-A-A' ◆ 12-'H-A-LD-A-1' ◆ 13-'H-A-LD-A-2' ◆ 14-'H-A-HD-A-1' ◆ 15-'H-A-HD-A-2' ◆ 16-'H(S)-A-LD-A' ◆ 17-'H(S)-A-HD-A'



TABLE 7-4: MISTIK SFVI PLOT DATA STRUCTURE AND DESCRIPTION

Number of data records: 5,616

Field Number	Field Name	Field Type	Field Width	No. of Decimals	Field Description
1	ID_FOR	Numeric	22	0	Unique Stand ID
2	ID_TILE	Numeric	11	0	UTM Tile
3	CRZNORTH	Numeric	3	0	UTM North grid reference
4	CRZ_EAST	Numeric	2	0	UTM East grid Reference
5	CRZ_ZONE	Numeric	2	0	UTM zone
6	PROJNO	String	8		Internal Volume Sampling Project Number
7	STAND	Numeric	5	0	SFVI Stand Number
8	PLOTNUM	Numeric	4	0	Plot number
9	YEAR	Numeric	4	0	Collection year
10	CUTLINE	String	2		Cutline - "CL" indicates that a portion or all of plot located on cutline (seismic line)
11	PTYPE	Numeric	1	0	Plot Type
12	PSIZE	Numeric	8	3	Plot Size (radius m)
CALCULATED FIELDS					
13	SOFT_LVOL	Numeric	8	2	Softwood Volume (m3/ha) Licensee-Utilization Standards
14	L_SOFTTREE	Numeric	8	2	Softwood Stems/ha Licensee-Utilization Standards
15	HARD_LVOL	Numeric	8	2	Hardwood Volume (m3/ha) Licensee-Utilization Standards
16	L_HARDTREE	Numeric	8	2	Hardwood Stems/ha Licensee-Utilization Standards
17	TOTAL_LVOL	Numeric	8	2	Total Volume (m3/ha) Licensee-Utilization Standards
18	L_TOTTREE	Numeric	8	2	Total Stems/ha Licensee-Utilization Standards
19	C_PROD	Numeric	8	2	Binary identifier of stands with low productivity: ◆ 0 - No Productivity Constraint; ◆ 1 - Low Productivity Constraint.
20	C_LOWCROWN	Numeric	8	2	Binary identifier of stands with low crown closure: ◆ 0 - No Crown Closure Constraint; ◆ 1 - Low Crown Closure Constraint.
21	C_TAMARACK	Numeric	8	2	Binary identifier of stands with significant (>40%) Tamarack component: ◆ 0 - No Tamarack Constraint; ◆ 1 - Significant Tamarack Composition Constraint.
22	C_PINETOE	Numeric	8	2	Binary identifier of stands infested with Mistletoe using SFVI modifiers and FORHEALTH field from NRCAN: ◆ 0 - No Mistletoe Constraint; ◆ 1 - Mistletoe Constraint.



Field Number	Field Name	Field Type	Field Width	No. of Decimals	Field Description
23	C_BS	Numeric	8	2	Binary identifier of low productivity Black Spruce stands: <ul style="list-style-type: none"> ◆ 0 - No Black Spruce Constraint; ◆ 1 - Low Productivity Black Spruce Constraint.
24	P_SPGP	String	4		Plot Assignment Species Group (dominant layer species group) <ul style="list-style-type: none"> ◆ S - Softwood; ◆ SH - Softwood dominated mixedwood; ◆ HS - Hardwood dominated mixedwood; ◆ H – Hardwood <p><i>Identified as 'SFVI_SPGP' in the Forest Characterization Document.</i></p>
25	P_SPECIES	String	2		Plot Assignment Species: <ul style="list-style-type: none"> ◆ BS - Black Spruce; ◆ JP - Jack Pine; ◆ TA - Trembling Aspen; ◆ WS - White Spruce.
26	P_2SOFT	String	2		Plot Assignment Secondary Softwood (Dominant layer secondary softwood): <ul style="list-style-type: none"> ◆ BF - Balsam Fir; ◆ BS - Black Spruce; ◆ JP - Jack Pine; ◆ TL - Tamarack; ◆ WS - White Spruce. <p><i>Identified as 'SFVI_2SOFT' in the Forest Characterization Document.</i></p>
27	P_CROWN	String	2		Plot Assignment Crown Closure: <ul style="list-style-type: none"> ◆ HD - High Density; ◆ LD - Low Density
28	P_SOIL	String	1		Plot Assignment Soil type: <ul style="list-style-type: none"> ◆ B - Brunisolic; ◆ L - Luvisolic; ◆ O - Organic. <p><i>Identified as 'DT_SOIL' in the Forest Characterization Document.</i></p>
29	P_SIGSOFT	Numeric	8	2	Identifies polygons with a hardwood development type species group that contains softwood in one or more layers.
30	P_PCLASS	Numeric	8	2	Plot Assignment Productivity Class: <ul style="list-style-type: none"> ◆ 1 - Lower Productivity; ◆ 2 - Higher Productivity.
31	P_AGECLS	Numeric	8	2	10-year age class
32	PLOT_FLAG	Numeric	8	2	Binary identifier used to identify plots used in final development type determination. <ul style="list-style-type: none"> ◆ 0 – Removed Plot; ◆ 1 – Used in Development Type Determination.



Field Number	Field Name	Field Type	Field Width	No. of Decimals	Field Description
33	NS_FLAG	Numeric	8	2	<p>When NS_FLAG equals 1 plot location is in the North including the following management units;</p> <ul style="list-style-type: none"> ◆ Ile a-la-Crosse; ◆ Dillon; ◆ Peter Pond; ◆ Buffalo Narrows; ◆ Canoe Lake. <p>When NS_Flag equals 2 plot location is in the South including the following management units;</p> <ul style="list-style-type: none"> ◆ Divide; ◆ Big Island Lake; ◆ Pierceland; ◆ Murray Bay; ◆ Beauval; ◆ Beaver River; ◆ Waterhen.
34	P_DEV_CODE	Numeric	8	2	<p>Plot Development Type Code as Defined: ('P_Dev_CODE' – 'P_DEVTYPE')</p> <ul style="list-style-type: none"> ◆ 0- Blank (Removed Plots) ◆ 1-'S-WS-A-A' ◆ 2-'S-BS-A-A' ◆ 3-'S-JP-LD-A-1' ◆ 4-'S-JP-LD-A-2' ◆ 5-'S-JP-HD-A-1' ◆ 6-'S-JP-HD-A-2' ◆ 7-'S-JP-L&M' ◆ 8-'SH-JP-A-A' ◆ 9-'SH-WS-A-A' ◆ 10-'HS-WS-A-A' ◆ 11-'HS-JP-A-A' ◆ 12-'H-A-LD-A-1' ◆ 13-'H-A-LD-A-2' ◆ 14-'H-A-HD-A-1' ◆ 15-'H-A-HD-A-2' ◆ 16-'H(S)-A-LD-A' ◆ 17-'H(S)-A-HD-A'
35	P_DEVTYPE	String	15		<p>Plot Development Type as Defined: ('P_Dev_COD' – 'P_DEVTYPE')</p> <ul style="list-style-type: none"> ◆ 0- Blank (Removed Plots) ◆ 1-'S-WS-A-A' ◆ 2-'S-BS-A-A' ◆ 3-'S-JP-LD-A-1' ◆ 4-'S-JP-LD-A-2' ◆ 5-'S-JP-HD-A-1' ◆ 6-'S-JP-HD-A-2' ◆ 7-'S-JP-L&M' ◆ 8-'SH-JP-A-A' ◆ 9-'SH-WS-A-A' ◆ 10-'HS-WS-A-A' ◆ 11-'HS-JP-A-A' ◆ 12-'H-A-LD-A-1' ◆ 13-'H-A-LD-A-2' ◆ 14-'H-A-HD-A-1' ◆ 15-'H-A-HD-A-2' ◆ 16-'H(S)-A-LD-A' ◆ 17-'H(S)-A-HD-A'



Field Number	Field Name	Field Type	Field Width	No. of Decimals	Field Description
36	DOM_LAYER	Numeric	8	2	Identifies which canopy layer is the dominant layer based on canopy structure as assigned in HFLAG and SFLAG: <ul style="list-style-type: none"> ◆ 1 - Overstorey layer is the dominant layer; ◆ 2 - Secondary layer is the dominant layer; ◆ 3 - Tertiary layer is the dominant layer.
SFVI ATTRIBUTES					
37	CROWN_1	Numeric	3	0	Crown Closure of layer 1 expressed to the nearest 1%.
38	HEIGHT_1	Numeric	2	0	Average height of layer 1 (m).
39	COMPLX_1	String	1		Canopy structure as follows: <ul style="list-style-type: none"> ◆ C - Complex; ◆ H - Horizontal.
40	COMPRG_1	Numeric	2	0	Complex Stand Quantifier <ul style="list-style-type: none"> ◆ Complex Stand - Describes Height range; ◆ Horizontal Stand - Describes percent of ground area covered by the horizontal component.
41	SP1_1	String	2		Species 1 of layer 1 as follows: <ul style="list-style-type: none"> ◆ TA - Trembling Aspen; ◆ WB - White Birch; ◆ BP - Balsam Poplar; ◆ BF - Balsam Fir; ◆ TL - Tamarack; ◆ JP - Jack Pine; ◆ BS - Black Spruce; ◆ WS - White Spruce.
42	PER1_1	Numeric	2	0	Percent Composition for Species 1 of Layer 1.
43	SP2_1	String	2		Species 2 of layer 1 as follows: <ul style="list-style-type: none"> ◆ TA - Trembling Aspen; ◆ WB - White Birch; ◆ BP - Balsam Poplar; ◆ BF - Balsam Fir; ◆ TL - Tamarack; ◆ JP - Jack Pine; ◆ BS - Black Spruce; ◆ WS - White Spruce.
44	PER2_1	Numeric	2	0	Percent Composition for Species 2 of Layer 1.
45	SP3_1	String	2		Species 3 of layer 1 as follows: <ul style="list-style-type: none"> ◆ TA - Trembling Aspen; ◆ WB - White Birch; ◆ BP - Balsam Poplar; ◆ BF - Balsam Fir; ◆ TL - Tamarack; ◆ JP - Jack Pine; ◆ BS - Black Spruce; ◆ WS - White Spruce.
46	PER3_1	Numeric	2	0	Percent Composition for Species 3 of Layer 1.
47	SP4_1	String	2		Species 4 of layer 1 as follows: <ul style="list-style-type: none"> ◆ TA - Trembling Aspen; ◆ WB - White Birch; ◆ BP - Balsam Poplar; ◆ BF - Balsam Fir; ◆ TL - Tamarack; ◆ JP - Jack Pine; ◆ BS - Black Spruce; ◆ WS - White Spruce.
48	PER4_1	Numeric	2	0	Percent Composition for Species 4 of Layer 1.



Field Number	Field Name	Field Type	Field Width	No. of Decimals	Field Description
49	SP5_1	String	2		Species 5 of layer 1 as follows: <ul style="list-style-type: none"> ◆ TA - Trembling Aspen; ◆ WB - White Birch; ◆ TL - Tamarack; ◆ JP - Jack Pine; ◆ BS - Black Spruce; ◆ WS - White Spruce.
50	PER5_1	Numeric	2	0	Percent Composition for Species 5 of Layer 1.
51	SP6_1	String	2		Species 6 of layer 1 as follows: <ul style="list-style-type: none"> ◆ No species present.
52	PER6_1	Numeric	2	0	Percent Composition for Species 6 of Layer 1.
53	PATTRN_1	String	2		Canopy pattern of layer 1 defined as follows: <ul style="list-style-type: none"> ◆ P0 - Single stems; ◆ P1 - Single patch of stems; ◆ P2 - Few patches of stems; ◆ P3 - Several patches of stems; ◆ P4 - Continuous canopy; openings common; ◆ P5 - Continuous canopy; openings uncommon.
54	ORIGIN_1	Numeric	4	0	Year of origin of Layer 1.
55	ORGNINT1	String	1		Differentiates between known and estimated year of origin of layer 1 as follows: <ul style="list-style-type: none"> ◆ A - year of origin is known to the nearest year (annum); ◆ D - year of origin is estimated to the nearest decade.
56	CROWN_2	Numeric	3	0	Crown Closure of layer 2 expressed to the nearest 1%.
57	HEIGHT_2	Numeric	2	0	Average height of layer 2 (m).
58	COMPLX_2	String	1		Canopy structure as follows: <ul style="list-style-type: none"> ◆ H - Horizontal.
59	COMPRG_2	Numeric	2	0	Complex Stand Quantifier Horizontal Stand - Describes percent of ground area covered by the horizontal component.
60	SP1_2	String	2		Species 1 of layer 2 as follows: <ul style="list-style-type: none"> ◆ TA - Trembling Aspen; ◆ WB - White Birch; ◆ BP - Balsam Poplar; ◆ BF - Balsam Fir; ◆ TL - Tamarack; ◆ JP - Jack Pine; ◆ BS - Black Spruce; ◆ WS - White Spruce.
61	PER1_2	Numeric	2	0	Percent Composition for Species 1 of Layer 2.
62	SP2_2	String	2		Species 2 of layer 2 as follows: <ul style="list-style-type: none"> ◆ TA - Trembling Aspen; ◆ WB - White Birch; ◆ BP - Balsam Poplar; ◆ BF - Balsam Fir; ◆ TL - Tamarack; ◆ JP - Jack Pine; ◆ BS - Black Spruce; ◆ WS - White Spruce.
63	PER2_2	Numeric	2	0	Percent Composition for Species 2 of Layer 2.



Field Number	Field Name	Field Type	Field Width	No. of Decimals	Field Description
64	SP3_2	String	2		Species 3 of layer 2 as follows: <ul style="list-style-type: none"> ◆ TA - Trembling Aspen; ◆ WB - White Birch; ◆ BP - Balsam Poplar; ◆ BF - Balsam Fir; ◆ TL - Tamarack; ◆ JP - Jack Pine; ◆ BS - Black Spruce; ◆ WS - White Spruce.
65	PER3_2	Numeric	2	0	Percent Composition for Species 3 of Layer 2.
66	SP4_2	String	2		Species 4 of layer 2 as follows: <ul style="list-style-type: none"> ◆ TA - Trembling Aspen; ◆ WB - White Birch; ◆ BP - Balsam Poplar; ◆ BF - Balsam Fir; ◆ TL - Tamarack; ◆ JP - Jack Pine; ◆ BS - Black Spruce; ◆ WS - White Spruce.
67	PER4_2	Numeric	2	0	Percent Composition for Species 4 of Layer 2.
68	SP5_2	String	2		Species 5 of layer 2 as follows: <ul style="list-style-type: none"> ◆ TA - Trembling Aspen; ◆ WB - White Birch; ◆ TL - Tamarack; ◆ JP - Jack Pine; ◆ BS - Black Spruce; ◆ WS - White Spruce.
69	PER5_2	Numeric	2	0	Percent Composition for Species 5 of Layer 2.
70	SP6_2	String	2		Species 6 of layer 2 as follows: <ul style="list-style-type: none"> ◆ No species present.
71	PER6_2	Numeric	2	0	Percent Composition for Species 6 of Layer 2.
72	PATTRN_2	String	2		Canopy pattern of layer 2 defined as follows: <ul style="list-style-type: none"> ◆ P0 - Single stems; ◆ P1 - Single patch of stems; ◆ P2 - Few patches of stems; ◆ P3 - Several patches of stems; ◆ P4 - Continuous canopy; openings common; ◆ P5 - Continuous canopy; openings uncommon.
73	ORIGIN_2	Numeric	4	0	Year of origin of layer 2.
74	ORGNINT2	String	1		Differentiates between known and estimated year of origin of layer 2 as follows: <ul style="list-style-type: none"> ◆ A - year of origin is known to the nearest year (annum); ◆ D - year of origin is estimated to the nearest decade.
75	CROWN_3	Numeric	3	0	Crown Closure of layer 3 expressed to the nearest 1%.
76	HEIGHT_3	Numeric	2	0	Average height of layer 3 (m).
77	COMPLX_3	String	1		Canopy structure as follows: <ul style="list-style-type: none"> ◆ None present.
78	COMPRG_3	Numeric	2	0	Complex Stand Quantifier <ul style="list-style-type: none"> ◆ None present.



Field Number	Field Name	Field Type	Field Width	No. of Decimals	Field Description
79	SP1_3	String	2		Species 1 of layer 3 as follows: <ul style="list-style-type: none"> ◆ TA - Trembling Aspen; ◆ WB - White Birch; ◆ BP - Balsam Poplar; ◆ BF - Balsam Fir; ◆ TL - Tamarack; ◆ JP - Jack Pine; ◆ BS - Black Spruce; ◆ WS - White Spruce.
80	PER1_3	Numeric	2	0	Percent Composition for Species 1 of Layer 3.
81	SP2_3	String	2		Species 2 of layer 3 as follows: <ul style="list-style-type: none"> ◆ TA - Trembling Aspen; ◆ WB - White Birch; ◆ BP - Balsam Poplar; ◆ BF - Balsam Fir; ◆ TL - Tamarack; ◆ JP - Jack Pine; ◆ BS - Black Spruce; ◆ WS - White Spruce.
82	PER2_3	Numeric	2	0	Percent Composition for Species 2 of Layer 3.
83	SP3_3	String	2		Species 3 of layer 3 as follows: <ul style="list-style-type: none"> ◆ TA - Trembling Aspen; ◆ WB - White Birch; ◆ BP - Balsam Poplar; ◆ BF - Balsam Fir; ◆ TL - Tamarack; ◆ JP - Jack Pine; ◆ BS - Black Spruce; ◆ WS - White Spruce.
84	PER3_3	Numeric	2	0	Percent Composition for Species 3 of Layer 3.
85	SP4_3	String	2		Species 4 of layer 3 as follows: <ul style="list-style-type: none"> ◆ TA - Trembling Aspen; ◆ WB - White Birch; ◆ BP - Balsam Poplar; ◆ BF - Balsam Fir; ◆ TL - Tamarack; ◆ JP - Jack Pine; ◆ BS - Black Spruce; ◆ WS - White Spruce.
86	PER4_3	Numeric	2	0	Percent Composition for Species 4 of Layer 3.
87	SP5_3	String	2		Species 5 of layer 3 as follows: <ul style="list-style-type: none"> ◆ JP - Jack Pine.
88	PER5_3	Numeric	2	0	Percent Composition for Species 5 of Layer 3.
89	SP6_3	String	2		Species 6 of layer 3 as follows: <ul style="list-style-type: none"> ◆ No species present.
90	PER6_3	Numeric	2	0	Percent Composition for Species 6 of Layer 3.
91	PATTRN_3	String	2		Canopy pattern of layer 3 defined as follows: <ul style="list-style-type: none"> ◆ P0 - Single stems; ◆ P1 - Single patch of stems; ◆ P2 - Few patches of stems; ◆ P3 - Several patches of stems; ◆ P4 - Continuous canopy; openings common; ◆ P5 - Continuous canopy; openings uncommon.
92	ORIGIN_3	Numeric	4	0	Year of origin of layer 3.



Field Number	Field Name	Field Type	Field Width	No. of Decimals	Field Description
93	ORGNINT3	String	1		Differentiates between known and estimated year of origin of layer 3 as follows: <ul style="list-style-type: none"> ◆ A - year of origin is known to the nearest year (annum); ◆ D - year of origin is estimated to the nearest decade.
94	CROWN_S	Numeric	3	0	Crown Closure of the shrub layer expressed to the nearest 1%.
95	COMPLX_S	String	1		Canopy structure as follows: <ul style="list-style-type: none"> ◆ H - Horizontal.
96	COMPRG_S	Numeric	2	0	Complex Stand Quantifier Horizontal Stand - Describes percent of ground area covered by the horizontal component.
97	SP1_S	String	2		Species 1 of the shrub layer as follows: <ul style="list-style-type: none"> ◆ Ts - Tall Shrubs; ◆ Al - Alder; ◆ Bh - Beaked Hazel; ◆ Wi - Willow; ◆ Ls - Low Shrub Category; ◆ Bi - Bog Birch; ◆ Bl - Bog Laurel; ◆ La - Labrador tea.
98	PER1_S	Numeric	2	0	Percent Composition for Species 1 of the Shrub Layer.
99	SP2_S	String	2		Species 2 of the shrub layer as follows: <ul style="list-style-type: none"> ◆ Ts - Tall Shrubs; ◆ Al - Alder; ◆ Bh - Beaked Hazel; ◆ Cr - High Bush Cranberry; ◆ Wi - Willow; ◆ Ls - Low Shrub Category; ◆ Bu - Buffalo Berry; ◆ Bl - Bog Laurel.
100	PER2_S	Numeric	2	0	Percent Composition for Species 1 of the Shrub Layer.
101	SP3_S	String	2		Species 3 of the shrub layer as follows: <ul style="list-style-type: none"> ◆ Wi - Willow; ◆ Ls - Low Shrub Category; ◆ Ro - Prickly Rose;
102	PER3_S	Numeric	2	0	Percent Composition for Species 3 of the Shrub Layer.
103	CROWN_H	Numeric	3	0	Crown Closure of the herb layer expressed to the nearest 1%
104	COMPLX_H	String	1		Canopy structure as follows: <ul style="list-style-type: none"> ◆ H - Horizontal
105	COMPRG_H	Numeric	2	0	Complex Stand Quantifier Horizontal Stand - Describes percent of ground area covered by the horizontal component.
106	SP1_H	String	2		Species 1 of the herb layer as follows: <ul style="list-style-type: none"> ◆ Gr - Grasses; ◆ Se - Sedges, Rushes, Reeds; ◆ Li - Lichens.
107	PER1_H	Numeric	2	0	Percent Composition for Species 1 of the Herb Layer.
108	SP2_H	String	2		Species 2 of the herb layer as follows: <ul style="list-style-type: none"> ◆ He - Herbs (unknown species);
109	PER2_H	Numeric	2	0	Percent Composition for Species 2 of the Herb Layer.



Field Number	Field Name	Field Type	Field Width	No. of Decimals	Field Description
110	SP3_H	String	2		Species 3 of the herb layer as follows: ◆ No species present.
111	PER3_H	Numeric	2	0	Percent Composition for Species 3 of the Herb Layer.
112	CROWN_A	Numeric	3	0	Crown Closure of the aquatic layer expressed to the nearest 1%.
113	COMPLX_A	String	1		Canopy structure as follows: ◆ H - Horizontal.
114	COMPRG_A	Numeric	2	0	Complex Stand Quantifier Horizontal Stand - Describes percent of ground area covered by the horizontal component.
115	SP1_A	String	2		Species 1 of the aquatic layer as follows: ◆ Av - Aquatic Vegetation; ◆ Af - Floating Aquatic Vegetation; ◆ Ae - Emergent Aquatic Vegetation.
116	PER1_A	Numeric	2	0	Percent Composition for Species 1 of the Aquatic Layer.
117	SP2_A	String	2		Species 2 of the aquatic layer as follows: ◆ No species present.
118	PER2_A	Numeric	2	0	Percent Composition for Species 2 of the Aquatic Layer.
119	SP3_A	String	2		Species 3 of the aquatic layer as follows: ◆ No species present.
120	PER3_A	Numeric	2	0	Percent Composition for Species 3 of the Aquatic Layer.
121	COMPLX_N	String	1		Canopy structure as follows: ◆ H - Horizontal.
122	COMPRG_N	Numeric	2	0	Complex Stand Quantifier Horizontal Stand - Describes percent of ground area covered by the horizontal component.
123	NONFOR	String	3		Non-forested features identified as follows: ◆ L - Lakes or Ponds; ◆ R - Rivers; ◆ FL - Floods; ◆ RD - Roads; ◆ TL - Transmission Line; ◆ PL - Oil or Gas Pipeline.
124	NONFOR_E	Numeric	2	0	Extent; used for roads only as follows: ◆ 1 - Paved, numbered highway; ◆ 2 - Gravel, numbered highway; ◆ 3 - Gravel, access road; ◆ 4 - Local access, dirt/ice road; ◆ 5 - Trail, dirt.
125	LANDUSE	String	5		Non-vegetated land-use clearings identified as follows: ◆ vequ - Vegetation (agriculture); ◆ bugp - Built-up area (settlement); ◆ towu - Tower; generic; ◆ cmtu - Cemetery; ◆ dmgu - Campground (recreation); ◆ gsof - Gas and oil facilities; ◆ rwgu - Runway; ◆ muou - Mining area: open pit; ◆ mg - Mining area: generic; ◆ peatc - Peat cutting; ◆ lmby - Lumber yard; ◆ sdgu - Solids depot; ◆ bupo - Built-up area (industrial); ◆ ftow - Fire tower.



Field Number	Field Name	Field Type	Field Width	No. of Decimals	Field Description
126	MOIST	String	2		Soil moisture regime identified as follows: <ul style="list-style-type: none"> ◆ VD - Very Dry; ◆ D - Dry; ◆ MF - Moderately Fresh; ◆ F - Fresh; ◆ VF - Very Fresh; ◆ MM - Moderately Moist; ◆ M - Moist; ◆ VM - Very Moist; ◆ MW - Moderately Wet; ◆ W - Wet; ◆ VW - Very Wet; ◆ A - Aquatic.
127	MOD1	String	2		Stand modifier 1 identified as follows: <ul style="list-style-type: none"> ◆ CO - Cutover; ◆ BO - Burnover; ◆ WI - Windthrow; ◆ IN - Insect; ◆ DI - Disease; ◆ AK - Animal Kill; ◆ SF - Seasonal Flood; ◆ SL - Slump; ◆ SI - Silviculture; ◆ CW - Abandoned Well Site; ◆ GZ - Grazing; ◆ CL - Clearing; ◆ SN - Snags; ◆ SB - Sand/gravel; ◆ CB - Cutbank.
128	EXT1	Numeric	2	0	Extent of modification 1 identified as follows: <ul style="list-style-type: none"> ◆ 'Blank' - No disturbance; ◆ 1 - Light; ◆ 2 - Moderate; ◆ 3 - Heavy; ◆ 4 - Severe; ◆ 5 - Entire.
129	YEAR1	Numeric	4	0	Year of modification 1.
130	YR1_INT	String	1		Differentiates between known and estimated year of modifier 1 as follows: <ul style="list-style-type: none"> ◆ a - year of modification is known to the nearest year (annum); ◆ d - year of modification is estimated to the nearest decade.
131	MOD2	String	2		Stand modifier 2 identified as follows: <ul style="list-style-type: none"> ◆ CO - Cutover; ◆ BO - Burnover; ◆ WI - Windthrow; ◆ DI - Disease; ◆ CL - Clearing; ◆ SF - Seasonal Flood; ◆ SI - Silviculture; ◆ SN - Snags;
132	EXT2	Numeric	2	0	Extent of modification 2 identified as follows: <ul style="list-style-type: none"> ◆ 'Blank' - No disturbance; ◆ 1 - Light; ◆ 2 - Moderate; ◆ 3 - Heavy; ◆ 4 - Severe; ◆ 5 - Entire.
133	YEAR2	Numeric	4	0	Year of modification 2.



Field Number	Field Name	Field Type	Field Width	No. of Decimals	Field Description
134	YR2_INT	String	1		Differentiates between known and estimated year of modifier 2 as follows: <ul style="list-style-type: none"> ◆ a - year of modification is known to the nearest year (annum).
135	MOD3	String	2		Stand modifier 3 identified as follows: <ul style="list-style-type: none"> ◆ CO - Cutover; ◆ BO - Burnover; ◆ WI - Windthrow; ◆ SF - Seasonal Flood; ◆ SI - Silviculture; ◆ CL - Clearing; ◆ SN - Snags.
136	EXT3	Numeric	2	0	Extent of modification 3 identified as follows: <ul style="list-style-type: none"> ◆ 1 - Light; ◆ 2 - Moderate; ◆ 3 - Heavy; ◆ 4 - Severe; ◆ 5 - Entire.
137	YEAR3	Numeric	4	0	Year of modification 3.
138	YR3_INT	String	1		Differentiates between known and estimated year of modifier 3 as follows: <ul style="list-style-type: none"> ◆ a - year of modification is known to the nearest year (annum).
139	MOD4	String	2		Stand modifier 4 identified as follows: <ul style="list-style-type: none"> ◆ SN - Snags;
140	EXT4	Numeric	2	0	Extent of modification 4 identified as follows: <ul style="list-style-type: none"> ◆ 1 - Light; ◆ 2 - Moderate.
141	YEAR4	Numeric	4	0	Year of modification 4.
142	YR4_INT	String	1		Differentiates between known and estimated year of modifier 4 as follows: <ul style="list-style-type: none"> ◆ Not present.
143	MOISTH2	String	2		Soil moisture regime for the minor horizontal layer identified as follows: <ul style="list-style-type: none"> ◆ F - Fresh; ◆ VF - Very Fresh; ◆ MM - Moderately Moist; ◆ M - Moist; ◆ VM - Very Moist; ◆ MW - Moderately Wet; ◆ W - Wet; ◆ VW - Very Wet; ◆ A - Aquatic.
144	MOD1H2	String	2		Stand modifier 1 for the minor horizontal layer identified as follows: <ul style="list-style-type: none"> ◆ BO - Burnover; ◆ SF - Seasonal Flood; ◆ CL - Clearing; ◆ SN - Snags.
145	EXT1H2	Numeric	2	0	Extent of modification 1 for the minor horizontal layer identified as follows: <ul style="list-style-type: none"> ◆ 1 - Light; ◆ 2 - Moderate; ◆ 3 - Heavy; ◆ 5 - Entire.
146	YEAR1H2	Numeric	4	0	Year of modification 1 for the minor horizontal layer.
147	YR1_INH2	String	1		Differentiates between known and estimated year of modifier 1 for the minor horizontal layer as follows: <ul style="list-style-type: none"> ◆ a - year of modification is known to the nearest year (annum).



Field Number	Field Name	Field Type	Field Width	No. of Decimals	Field Description
148	MOD2H2	String	2		Stand modifier 2 for the minor horizontal layer identified as follows: ◆ No modifier present.
149	EXT2H2	Numeric	2	0	Extent of modification 2 for the minor horizontal layer identified as follows: ◆ No extent present.
150	YEAR2H2	Numeric	4	0	Year of modification 2 for the minor horizontal layer.
151	YR2_INH2	String	1		Differentiates between known and estimated year of modifier 2 for the minor horizontal layer as follows: ◆ Not present.
152	MOD3H2	String	2		Stand modifier 3 for the minor horizontal layer identified as follows: ◆ No modifier present.
153	EXT3H2	Numeric	2	0	Extent of modification 3 for the minor horizontal layer identified as follows: ◆ No extent present.
154	YEAR3H2	Numeric	4	0	Year of modification 3 for the minor horizontal layer.
155	YR3_INH2	String	1		Differentiates between known and estimated year of modifier 3 for the minor horizontal layer as follows: ◆ Not present.



TABLE 7-5: PREDICTED LICENSEE-UTILIZATION STANDARDS YIELD DATA STRUCTURE AND DESCRIPTION.

Number of records: 320

Field Number	Field Name	Field Type	Field Width	No. of Decimals	Field Description
1	P_DEV_COD	Numeric	11	0	Plot Development Type Code as Defined: ('P_Development_COD' – 'P_Development_TYPE') <ul style="list-style-type: none"> ◆ 0- Blank (Removed Plots) ◆ 1-'S-WS-A-A' ◆ 2-'S-BS-A-A' ◆ 3-'S-JP-LD-A-1' ◆ 4-'S-JP-LD-A-2' ◆ 5-'S-JP-HD-A-1' ◆ 6-'S-JP-HD-A-2' ◆ 7-'S-JP-L&M' ◆ 8-'SH-JP-A-A' ◆ 9-'SH-WS-A-A' ◆ 10-'HS-WS-A-A' ◆ 11-'HS-JP-A-A' ◆ 12-'H-A-LD-A-1' ◆ 13-'H-A-LD-A-2' ◆ 14-'H-A-HD-A-1' ◆ 15-'H-A-HD-A-2' ◆ 16-'H(S)-A-LD-A' ◆ 17-'H(S)-A-HD-A'
2	P_DEVTYPE	String	11		Plot Development Type as Defined: ('P_Development_COD' – 'P_Development_TYPE') <ul style="list-style-type: none"> ◆ 0- Blank (Removed Plots) ◆ 1-'S-WS-A-A' ◆ 2-'S-BS-A-A' ◆ 3-'S-JP-LD-A-1' ◆ 4-'S-JP-LD-A-2' ◆ 5-'S-JP-HD-A-1' ◆ 6-'S-JP-HD-A-2' ◆ 7-'S-JP-L&M' ◆ 8-'SH-JP-A-A' ◆ 9-'SH-WS-A-A' ◆ 10-'HS-WS-A-A' ◆ 11-'HS-JP-A-A' ◆ 12-'H-A-LD-A-1' ◆ 13-'H-A-LD-A-2' ◆ 14-'H-A-HD-A-1' ◆ 15-'H-A-HD-A-2' ◆ 16-'H(S)-A-LD-A' ◆ 17-'H(S)-A-HD-A'
3	AGECLASS	Numeric	11	4	10-year age class
4	AS	Numeric	13	12	'a' coefficient – licensee-utilization standards softwood volumes
5	BS	Numeric	13	12	'b' coefficient – licensee-utilization standards softwood volumes
6	CS	Numeric	13	12	'c' coefficient – licensee-utilization standards softwood volumes
7	DS	Numeric	13	12	'd' coefficient – licensee-utilization standards softwood volumes
8	TS	Numeric	11	0	't' coefficient – licensee-utilization standards softwood volumes
9	AH	Numeric	13	12	'a' coefficient – licensee-utilization standards hardwood volumes



Field Number	Field Name	Field Type	Field Width	No. of Decimals	Field Description
10	BH	Numeric	13	12	'b' coefficient – licensee-utilization standards hardwood volumes
11	CH	Numeric	13	12	'c' coefficient – licensee-utilization standards hardwood volumes
12	DH	Numeric	13	12	'd' coefficient – licensee-utilization standards hardwood volumes
13	TH	Numeric	11	0	't' coefficient – licensee-utilization standards hardwood volumes
14	P_SOFTVOL	Numeric	8	2	Softwood Volume (m ³ /ha) Licensee-Utilization Standards
15	P_HARDVOL	Numeric	8	2	Hardwood Volume (m ³ /ha) Licensee-Utilization Standards
16	MAI_SOFT	Numeric	11	4	Predicted softwood mean annual increment (m ³ /ha/yr) Licensee-Utilization Standards
17	MAI_DEC	Numeric	11	4	Predicted hardwood mean annual increment (m ³ /ha/yr) Licensee-Utilization Standards



8.0 APPENDIX I- YIELD PROJECTIONS FOR 3” & 5” TOPS

Yield projection for sensitivity analysis

To create yield curves for the alternative softwood utilization standards (3” top and 5” top), the following approach was used. Also presented are the resulting ratios and yield curves.

Computation of ratios by development type

As requested by the Saskatchewan Ministry of Environment, the plots used for this analysis were selected using a two-step process. First, any plots under the minimum harvest age were dropped (Table 8-1). Second, using the yield curve predicted values from the 4” top utilization standards as a benchmark, any plots over the minimum harvest age but at an age beyond where the combined (softwood + hardwood) predicted value is below the minimum harvest volume (m³/ha) were also dropped (Table 8-1).

TABLE 8-1: MINIMUM HARVEST AGES AND VOLUMES BY DEVELOPMENT TYPE.

DEVELOPMENT TYPE CODE	DEVELOPMENT TYPE	MINIMUM HARVEST AGE	MINIMUM HARVEST VOLUME (m ³ /ha)
1	'S-WS-A-A'	100	60
2	'S-BS-A-A'	100	60
3	'S-JP-LD-A-1'	70	60
4	'S-JP-LD-A-2'	70	60
5	'S-JP-HD-A-1'	70	60
6	'S-JP-HD-A-2'	70	60
7	S-JP-L&M'	70	60
8	'SH-JP-A-A'	80	60
9	'SH-WS-A-A'	90	60
10	'HS-WS-A-A'	80	60
11	'HS-JP-A-A'	80	60
12	'H-A-LD-A-1'	70	60
13	'H-A-LD-A-2'	70	60
14	'H-A-HD-A-1'	70	60
15	'H-A-HD-A-2'	70	60
16	'H(S)-A-LD-A'	70	60
17	'H(S)-A-HD-A'	70	60

The individual tree volumes were compiled based on the alternate utilization standards and summed up to compute plot volumes. Then a set of ratios were computed by dividing the total Softwood or Hardwood plot volume based on the alternate utilization standards by the corresponding total Softwood or Hardwood plot volumes compiled at the base utilization standards for each development type (Table 8-2). The calculation process is depicted as follows:



$$R_{j_{con}} = \frac{\sum_{i=1}^n Convol_i}{\sum_{i=1}^n Convol_{base}}$$

$$R_{j_{dec}} = \frac{\sum_{i=1}^n Decvol_i}{\sum_{i=1}^n Decvol_{base}}$$

Where,

$R_{j_{con}}$ =ratio for Softwood volume adjustment at utilization standards “j”.

$R_{j_{dec}}$ =ratio for Hardwood volume adjustment at utilization standards “j”.

$Convol_i$ = Observed Softwood plot volume at i^{th} plot for a set of utilization standards

$Convol_{base}$ =Observed Softwood plot volume at base utilization standards

$Decvol_i$ = Observed Hardwood plot volume at i^{th} plot for a set of utilization standards

$Decvol_{base}$ = Observed Hardwood plot volume at base utilization standards

$i=1, 2, \dots, nth$ plots in a development type.

TABLE 8-2: SOFTWOOD AND HARDWOOD RATIOS BY DEVELOPMENT TYPE.

DEVELOPMENT TYPE NUMBER	DEVELOPMENT TYPE	Scenario 1		Scenario 2	
		Ratio 3” _{Con}	Ratio 3” _{Dec}	Ratio 5” _{Con}	Ratio 5” _{Dec}
1	S-WS-A-A	1.05	1.00	0.97	1.00
2	S-BS-A-A	1.36	1.00	0.79	1.00
3	S-JP-LD-A-1	1.37	1.00	0.75	1.00
4	S-JP-LD-A-2	1.34	1.00	0.80	1.00
5	S-JP-HD-A-1	1.30	1.00	0.77	1.00
6	S-JP-HD-A-2	1.18	1.00	0.87	1.00
7	S-JP-L&M	1.14	1.00	0.82	1.00
8	SH-JP-A-A	1.14	1.00	0.91	1.00
9	SH-WS-A-A	1.10	1.00	0.93	1.00
10	HS-WS-A-A	1.17	1.00	0.90	1.00
11	HS-JP-A-A	1.38	1.00	0.65	1.00
12	H-A-LD-A-1	1.08	1.00	1.00	1.00
13	H-A-LD-A-2	1.46	1.00	0.74	1.00
14	H-A-HD-A-1	1.36	1.00	0.79	1.00
15	H-A-HD-A-2	1.17	1.00	0.87	1.00
16	H(S)-A-LD-A	1.16	1.00	0.89	1.00
17	H(S)-A-HD-A	1.29	1.00	0.84	1.00

Determination of predicted volume at the target utilization standards by development type

The predicted Softwood (Pconvol) and Hardwood (Pdecol) volume by 10-year age class for the base utilization standards as resolved from the respective models (see previously submitted draft Forest



Characterization document for further details) were multiplied by the respective ratios shown in Table 8-2 to ascertain the predicted Softwood ($P_{convolRj}$) and Hardwood ($P_{decvolRj}$) volumes by development type and age class for each scenario.

$$P_{convolRj} = P_{convol} * R_{jcon}$$

$$P_{decvolRj} = P_{decvol} * R_{jdec}$$

Finally, two sets of additional yield curves were created plotting the predicated Softwood and Hardwood volumes for the respective scenarios against the age classes (Figure 8-1 to Figure 8-17).



FIGURE 8-1 DEVELOPMENT TYPE 1: S-WS-A-A

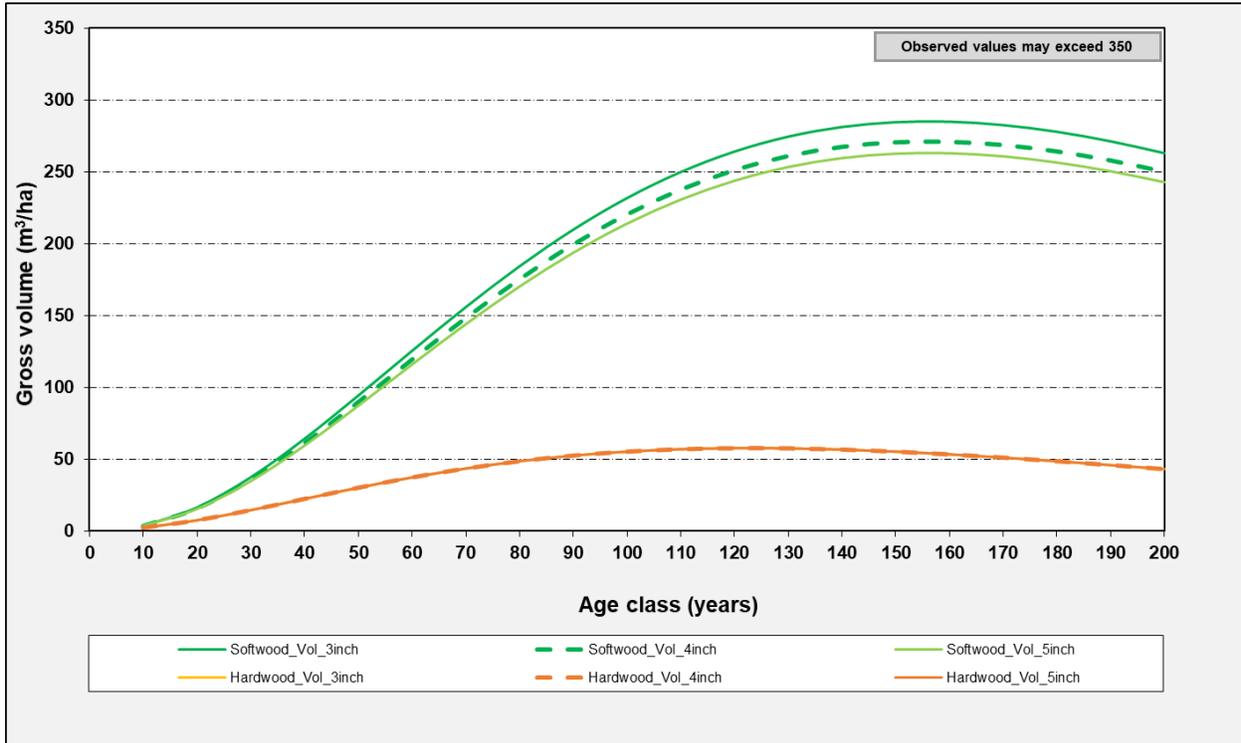


FIGURE 8-2 DEVELOPMENT TYPE 2: S-BS-A-A

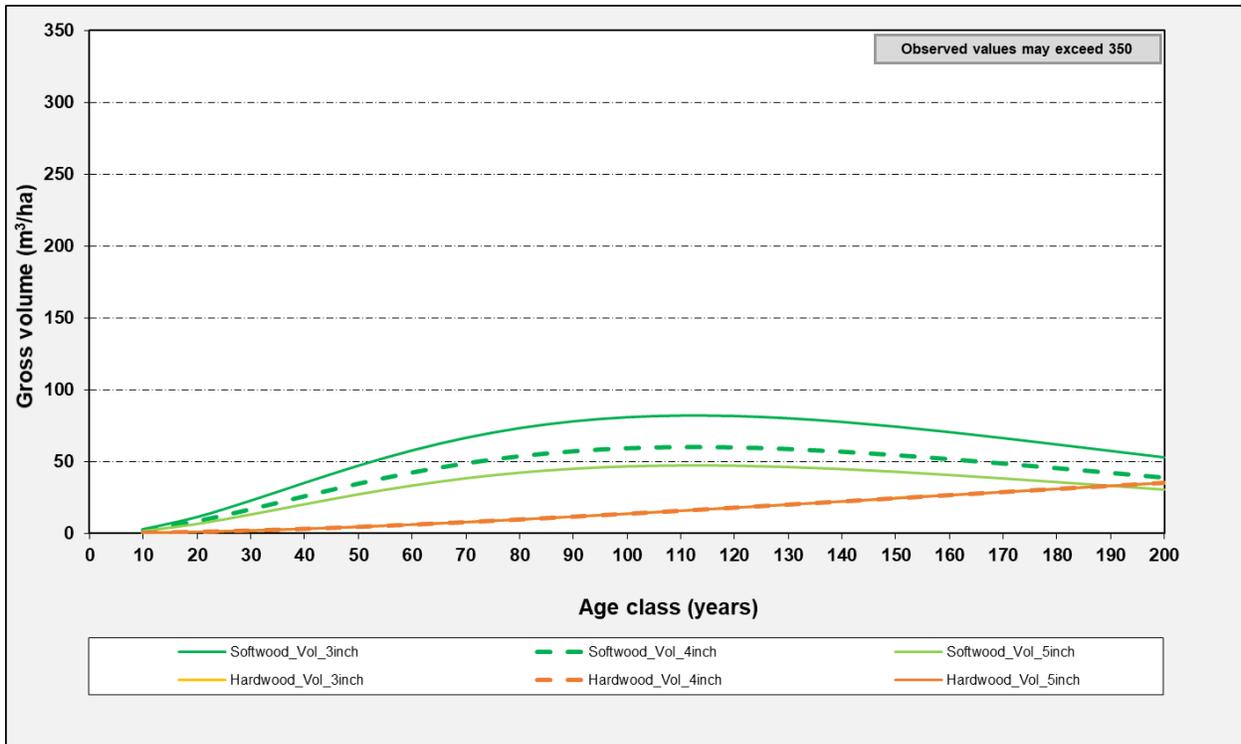




FIGURE 8-3 DEVELOPMENT TYPE 3: S-JP-LD-A-1

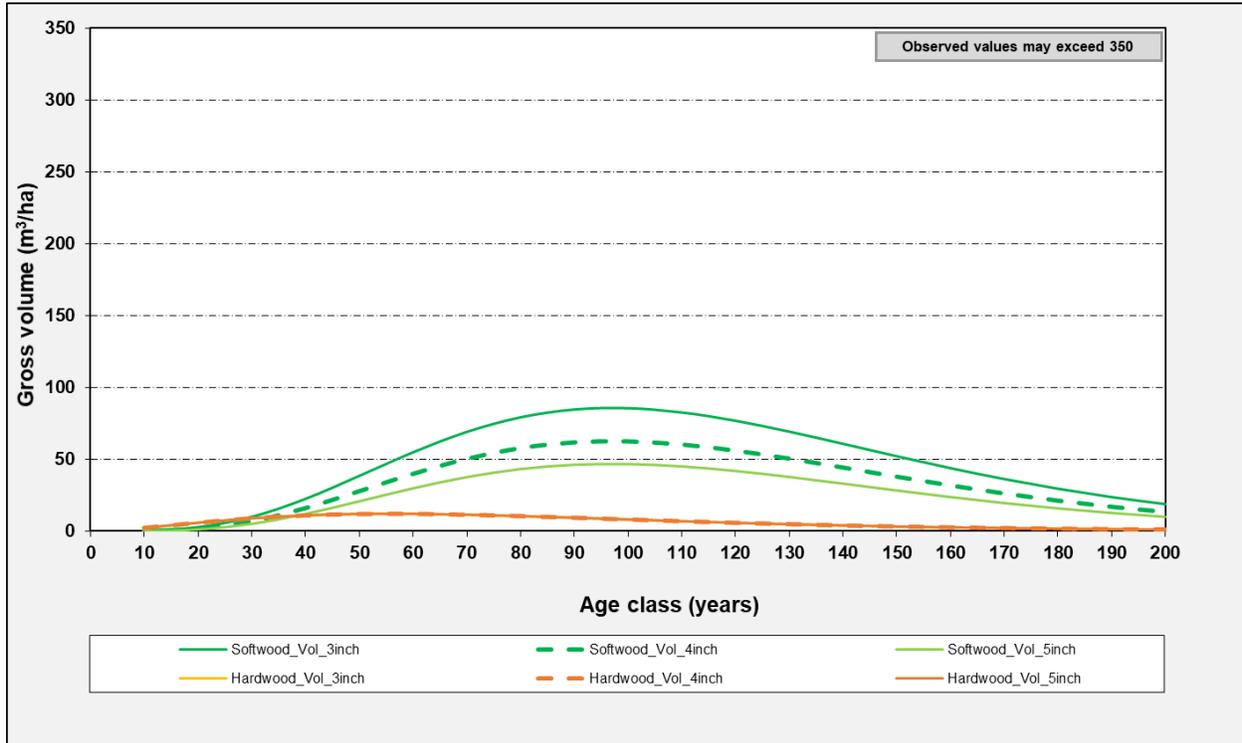


FIGURE 8-4 DEVELOPMENT TYPE 4: S-JP-LD-A-2

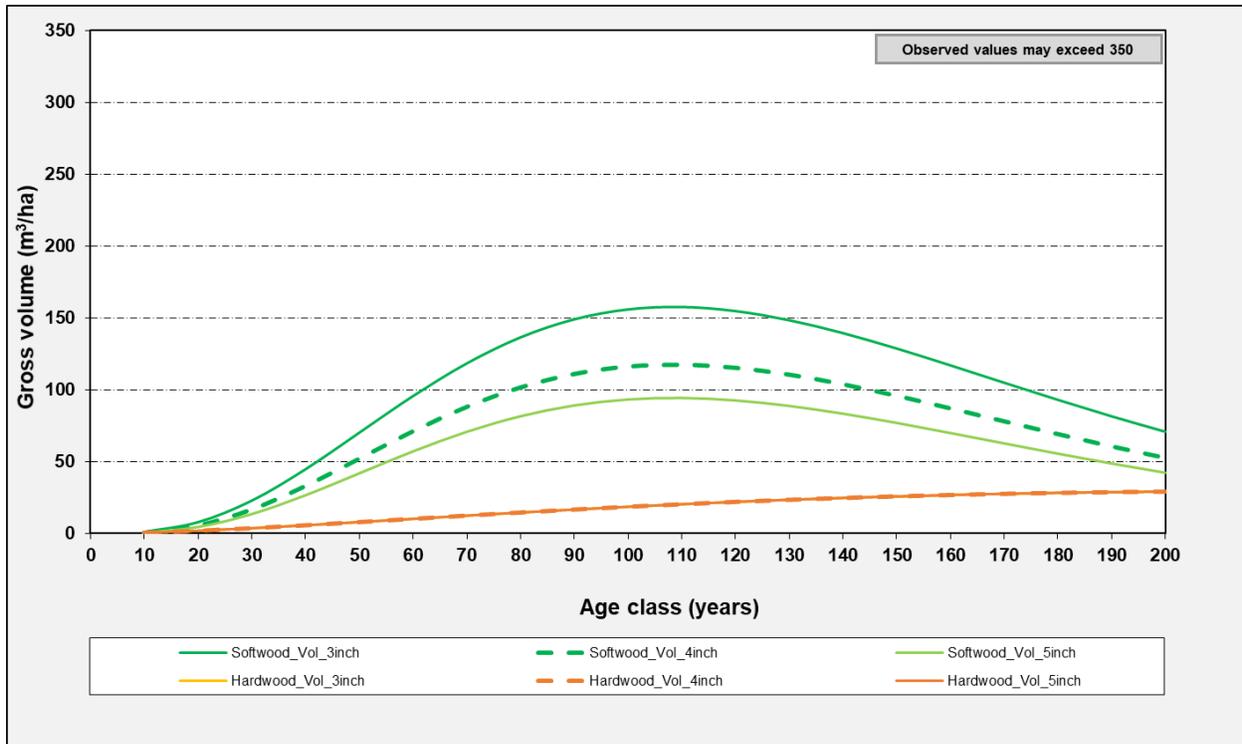




FIGURE 8-5 DEVELOPMENT TYPE 5: S-JP-HD-A-1

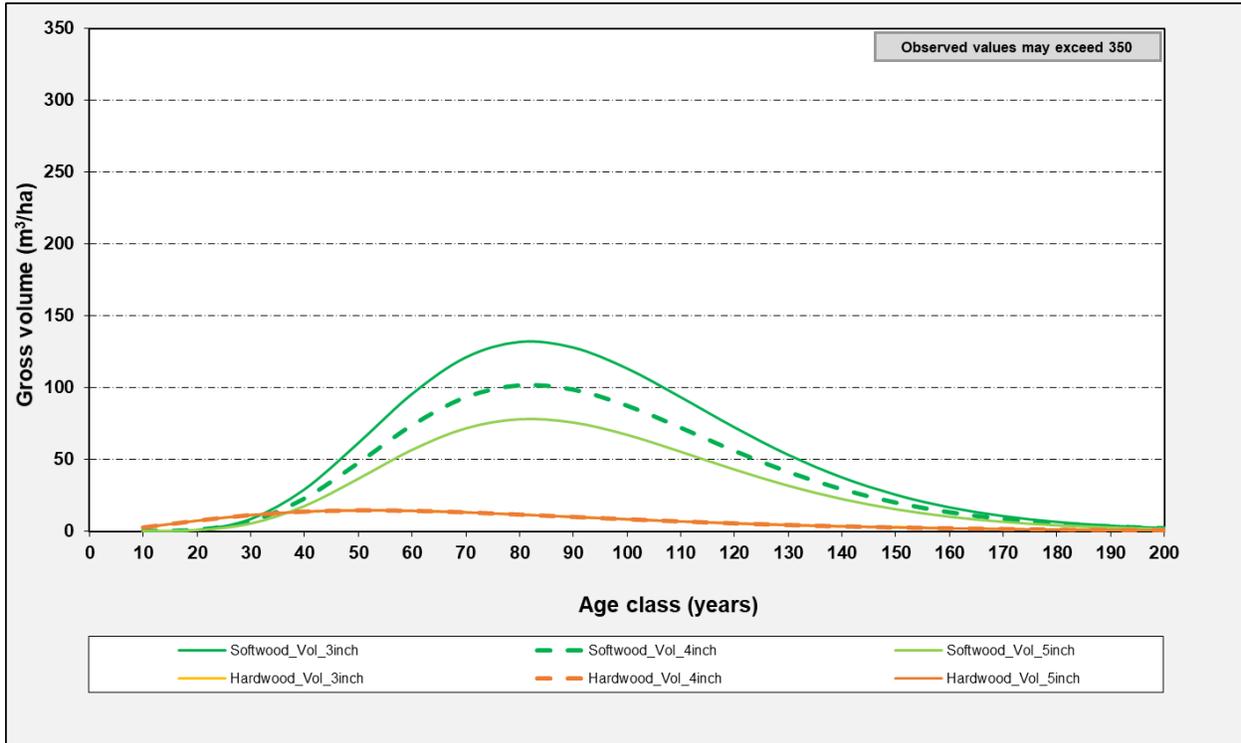


FIGURE 8-6 DEVELOPMENT TYPE 6: S-JP-HD-A-2

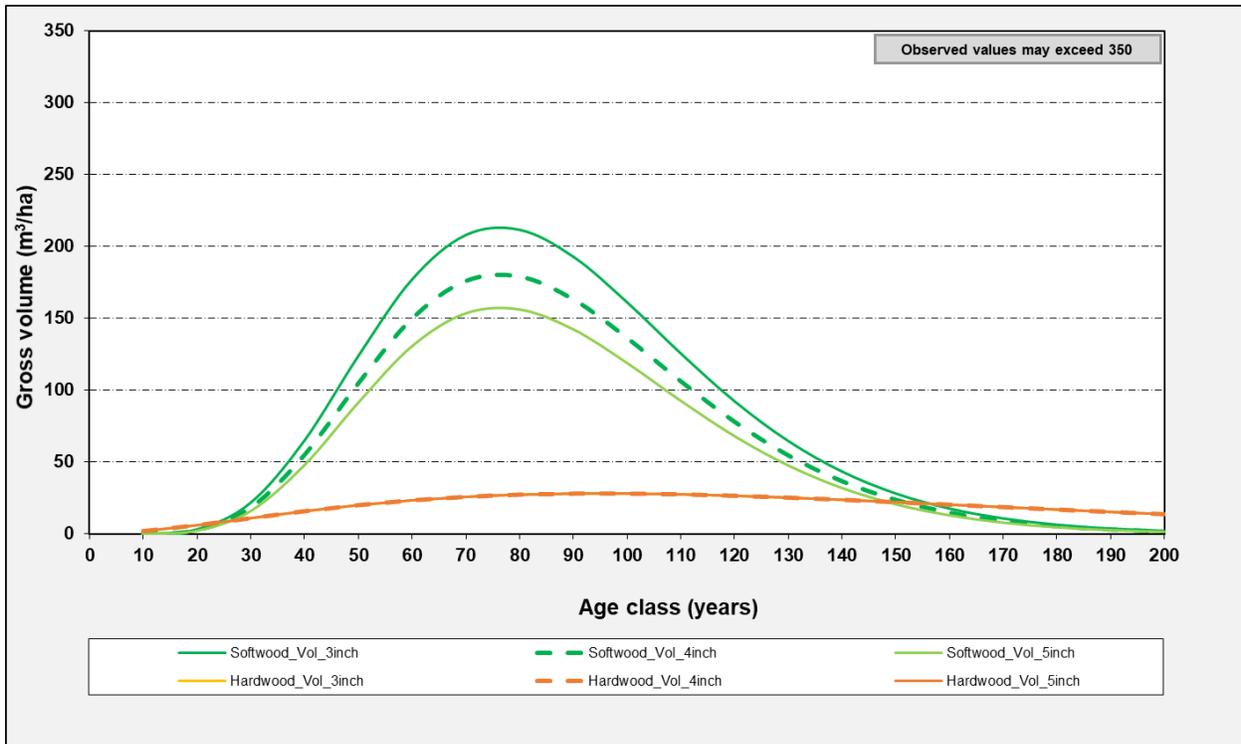




FIGURE 8-7 DEVELOPMENT TYPE 7: S-JP-L&M

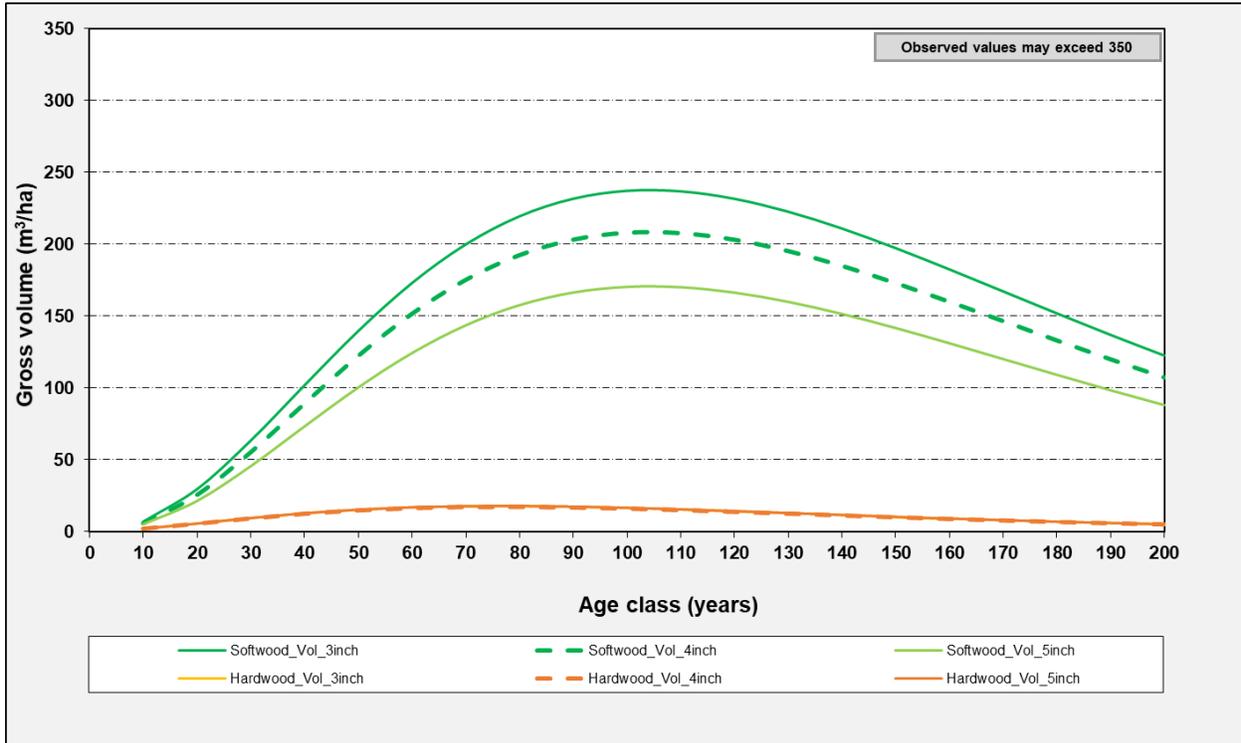


FIGURE 8-8 DEVELOPMENT TYPE 8: SH-JP-A-A

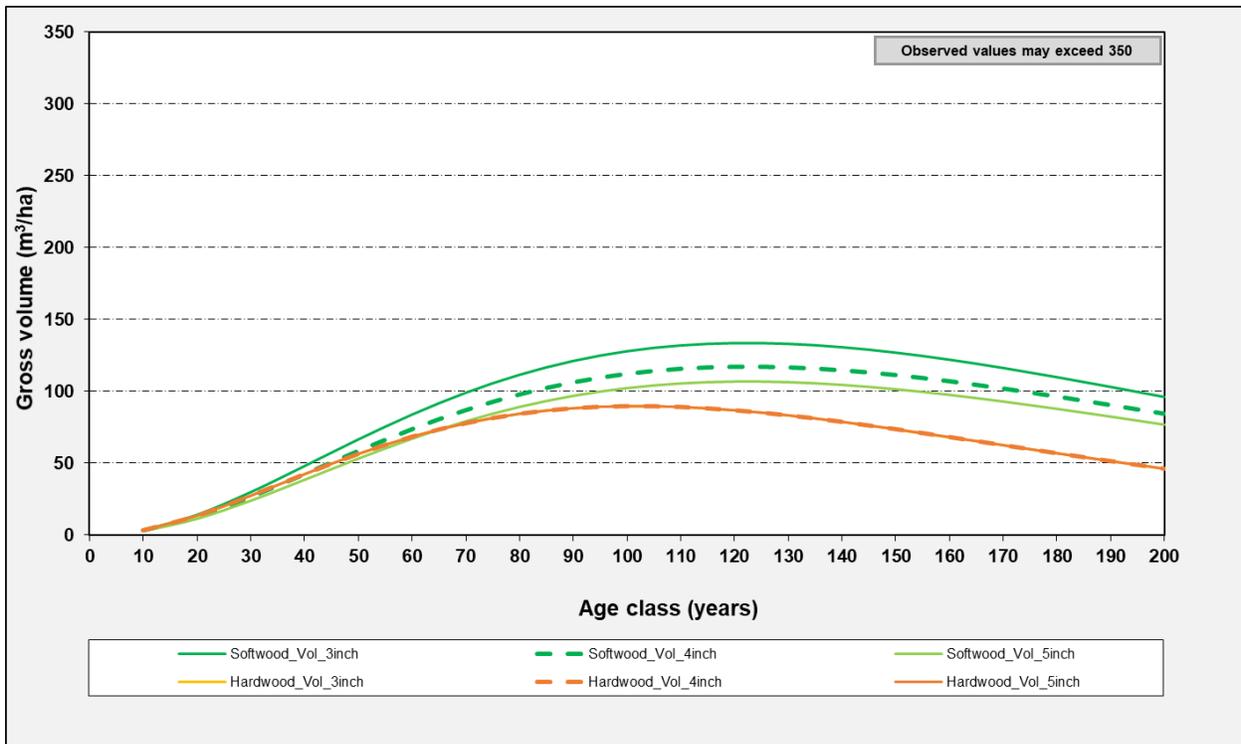




FIGURE 8-9 DEVELOPMENT TYPE 9: SH-WS-A-A

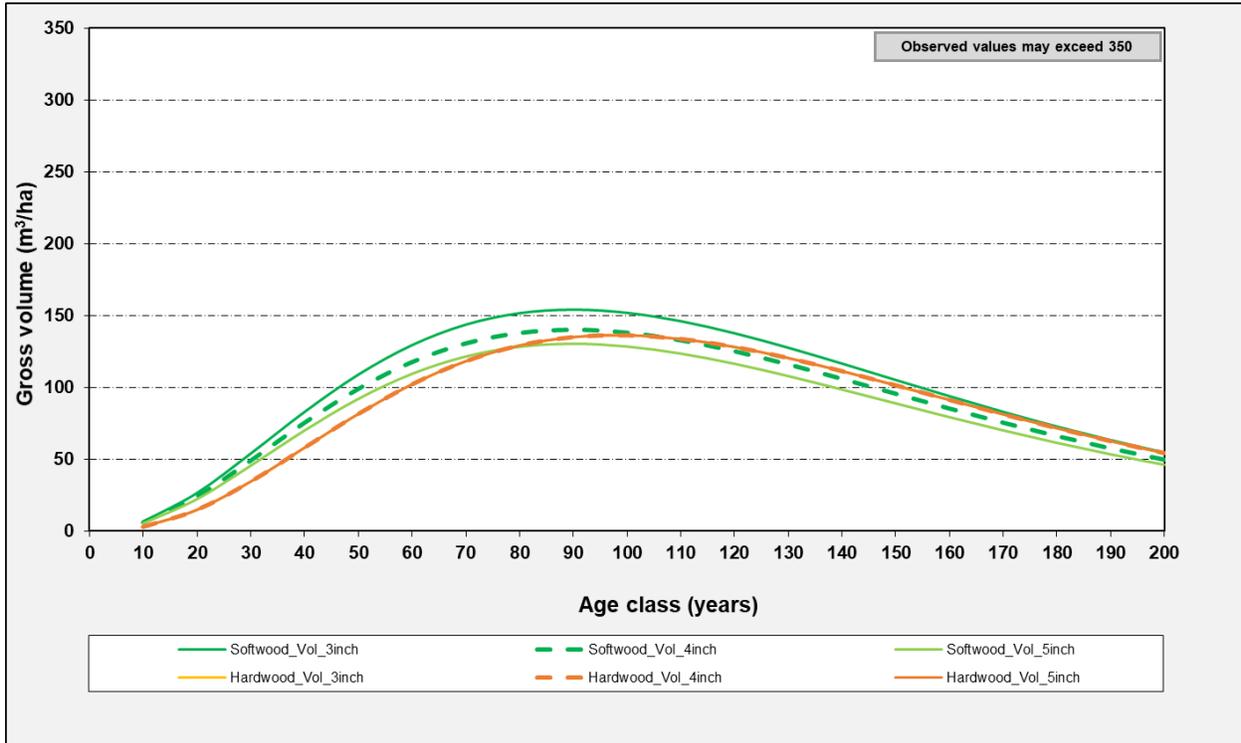


FIGURE 8-10 DEVELOPMENT TYPE 10: HS-WS-A-A

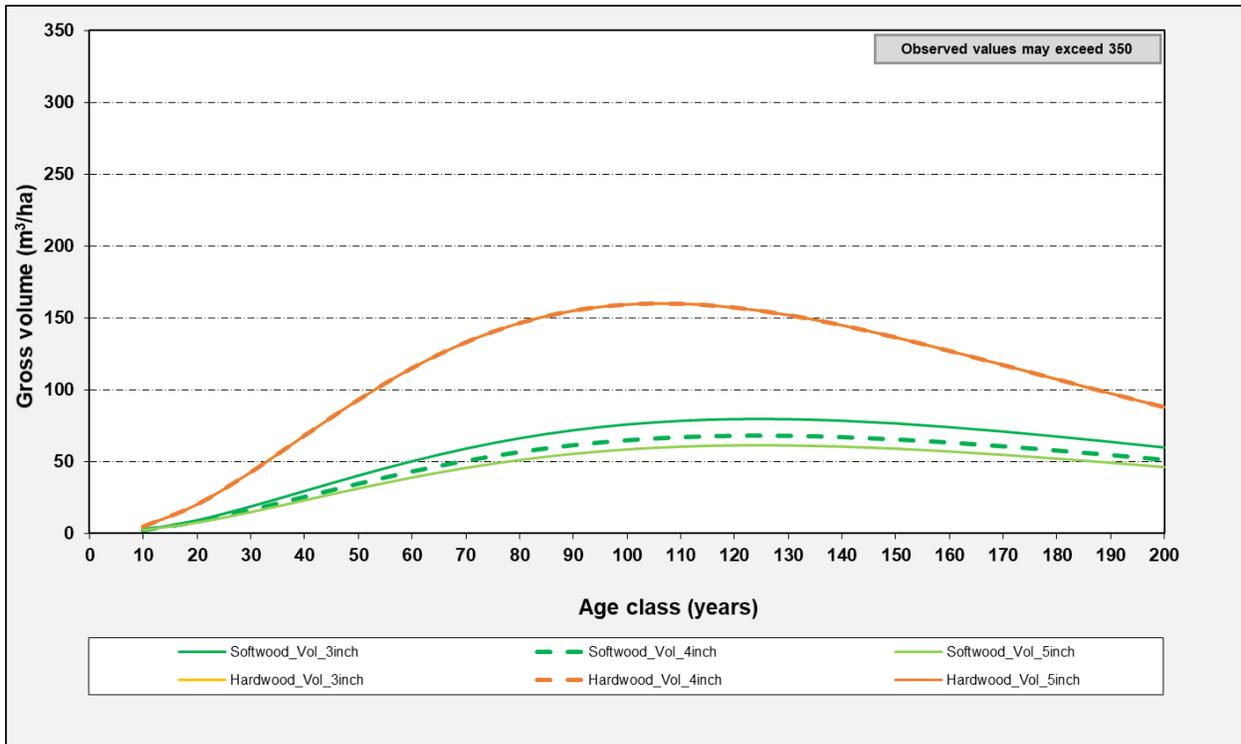




FIGURE 8-11 DEVELOPMENT TYPE 11: HS-JP-A-A

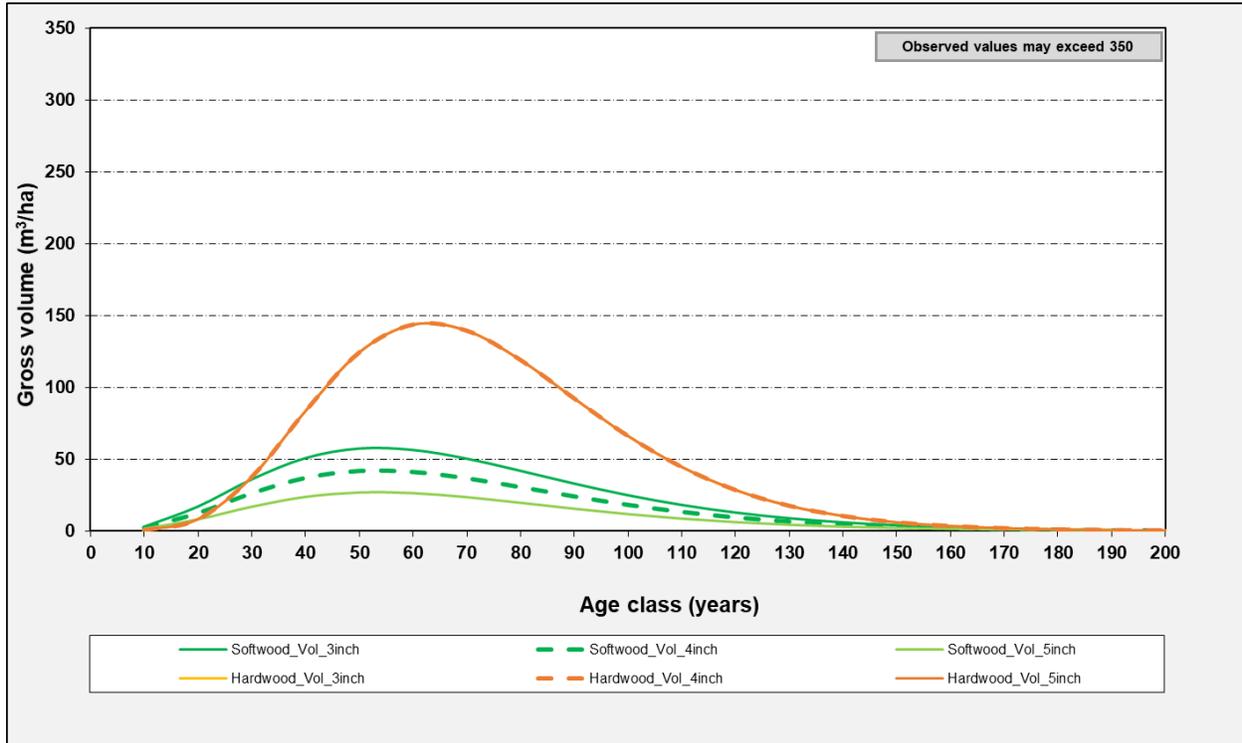


FIGURE 8-12 DEVELOPMENT TYPE 12: H-A-LD-A-1

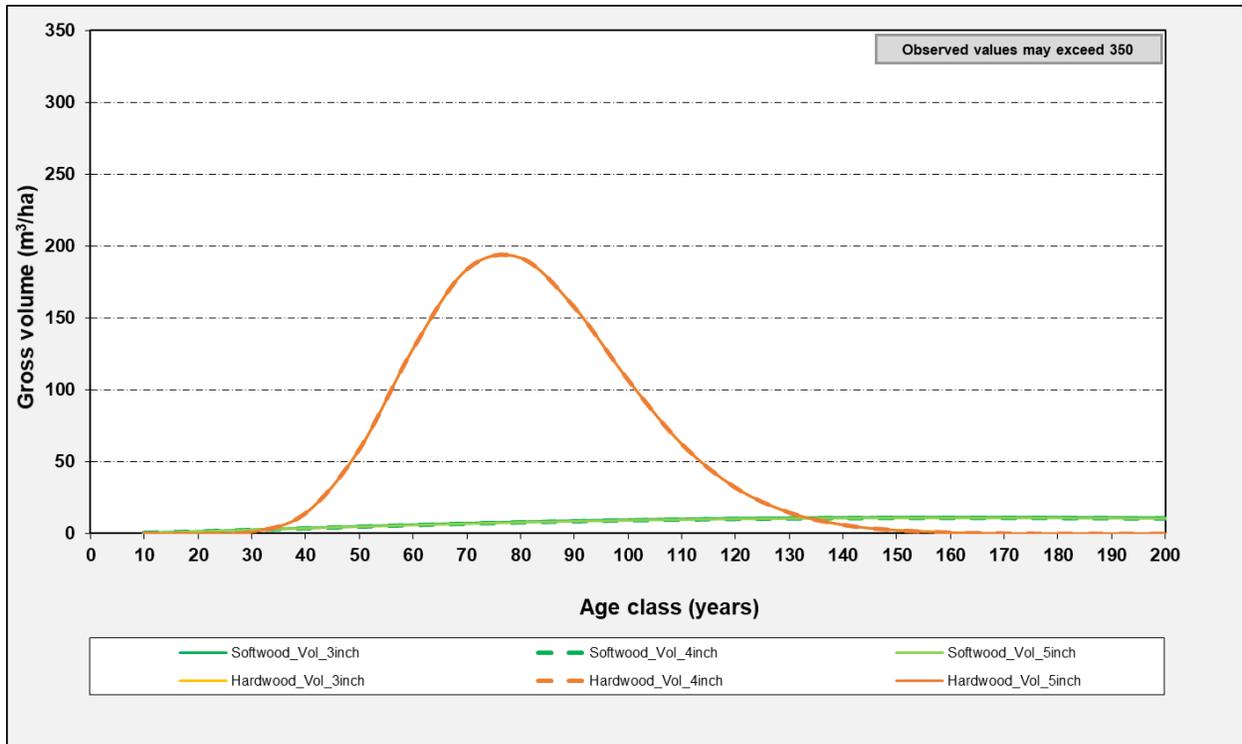




FIGURE 8-13 DEVELOPMENT TYPE 13: H-A-LD-A-2

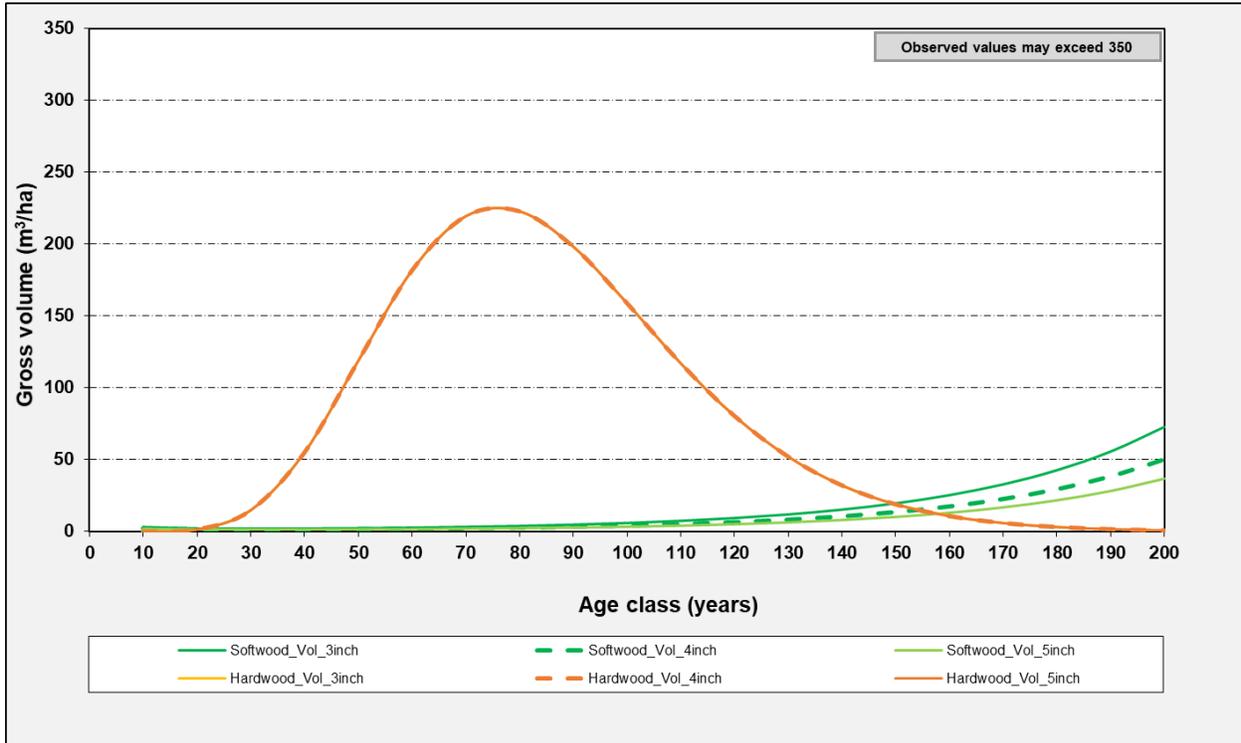


FIGURE 8-14 DEVELOPMENT TYPE 14: H-A-HD-A-1

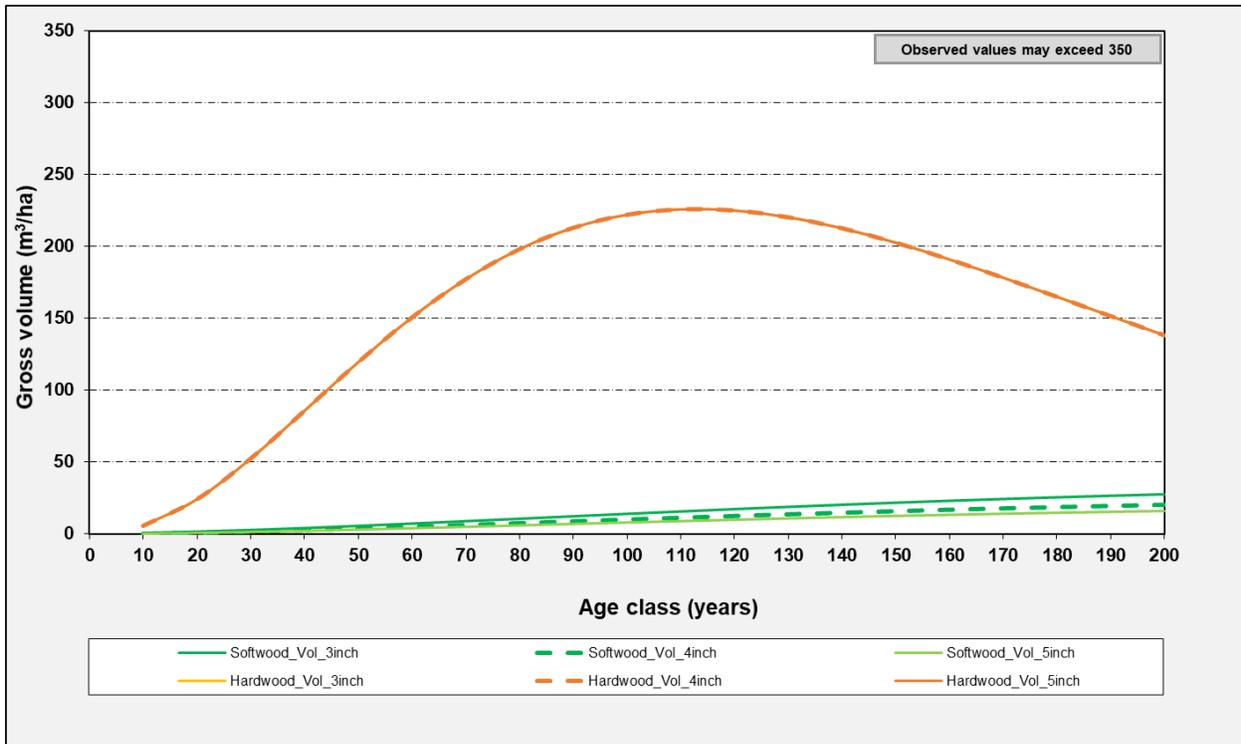




FIGURE 8-15 DEVELOPMENT TYPE 15: H-A-HD-A-2



FIGURE 8-16 DEVELOPMENT TYPE 16: H(S)-A-LD-A

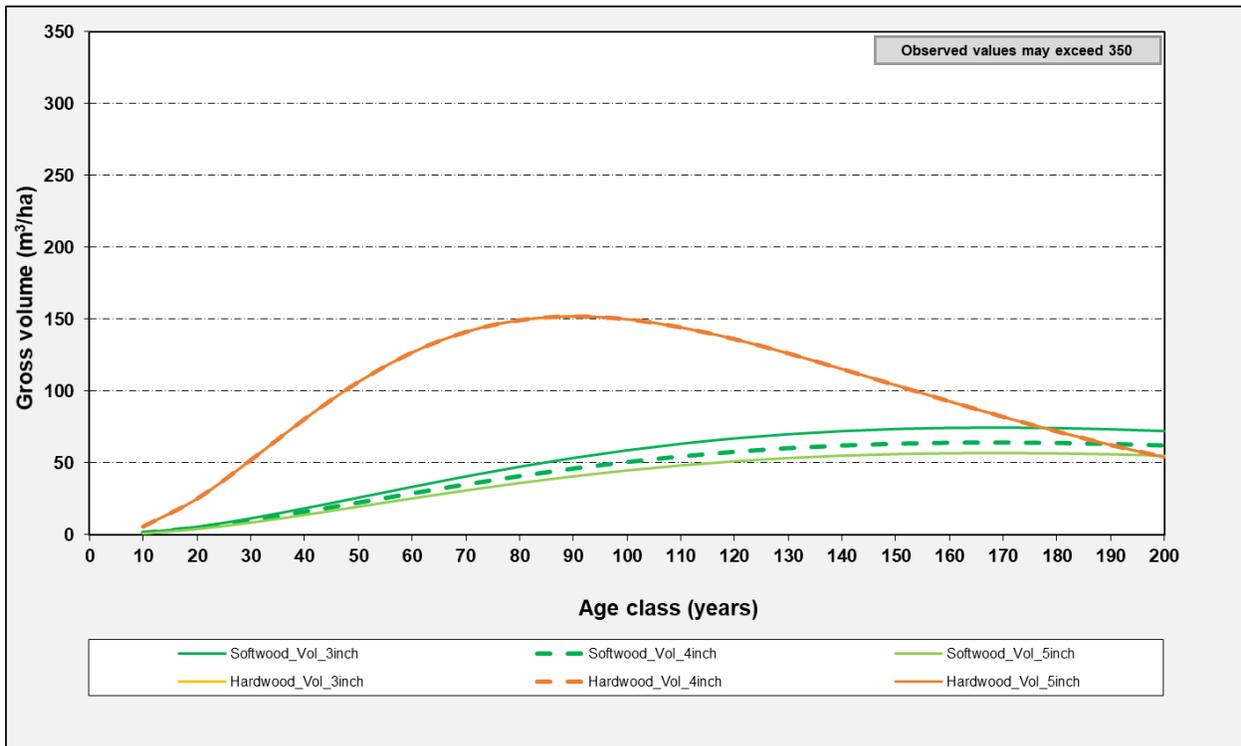
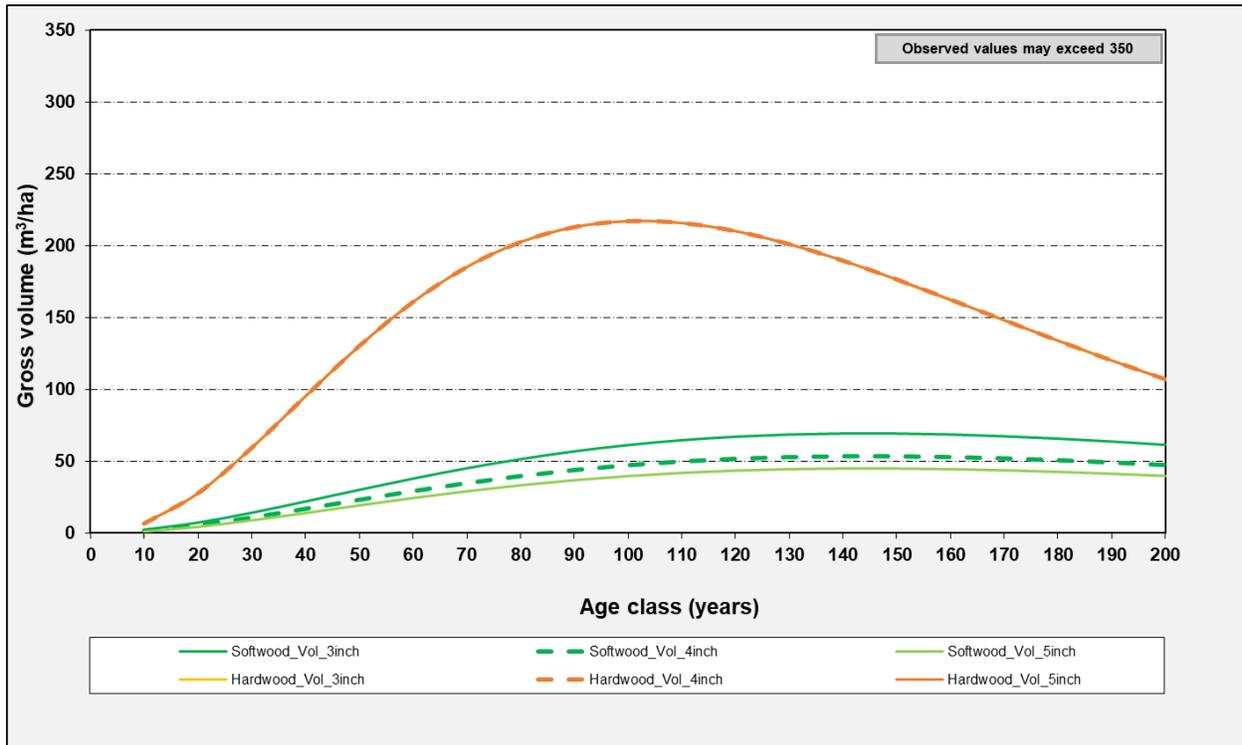




FIGURE 8-17 DEVELOPMENT TYPE 17: H(S)-A-HD-A





Figures 8-18 through 8-34 illustrate the fit of ratio-adjusted 5" softwood curves to the TSP volumes compiled base on a 5" top for softwood as requested by Saskatchewan Environment Forest Service.

FIGURE 8-18 DEVELOPMENT TYPE 1: S-WS-A-A 95% CONFIDENCE INTERVALS AND OBSERVED VALUES ON THE SOFTWOOD 5 INCH CURVE

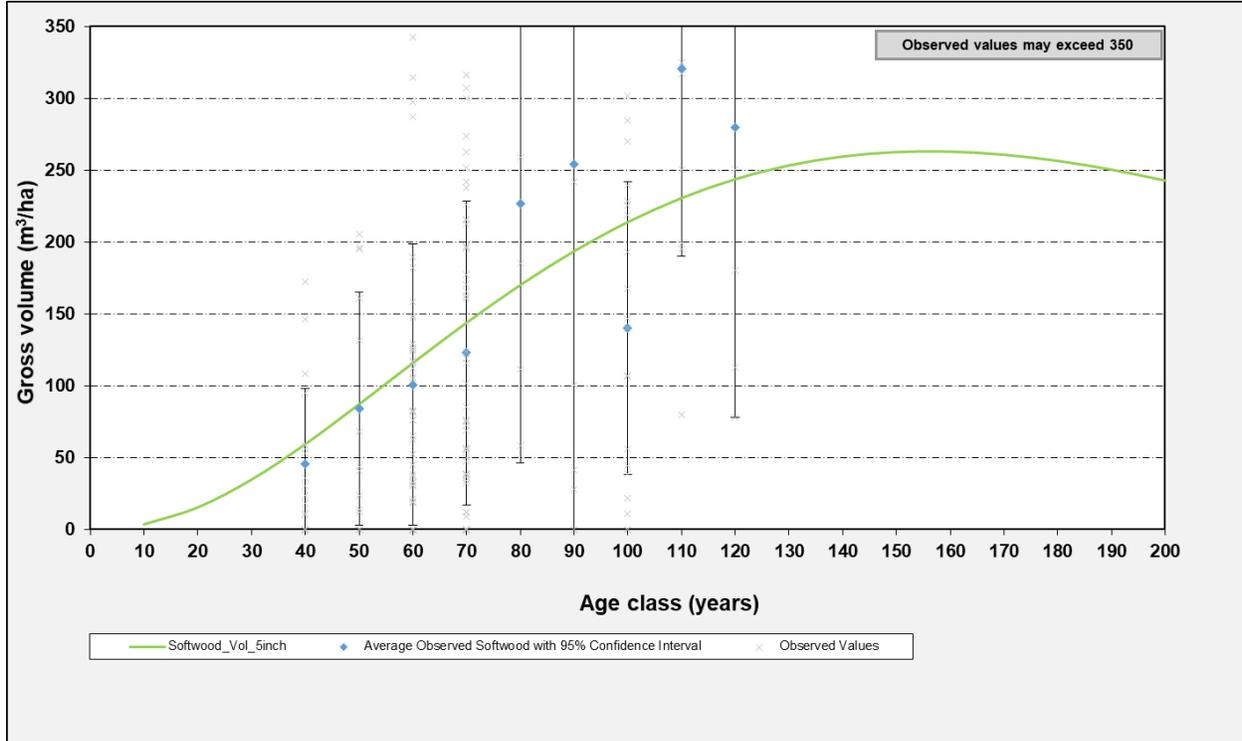




FIGURE 8-19 DEVELOPMENT TYPE 2: S-BS-A-A 95% CONFIDENCE INTERVALS AND OBSERVED VALUES ON THE SOFTWOOD 5 INCH CURVE

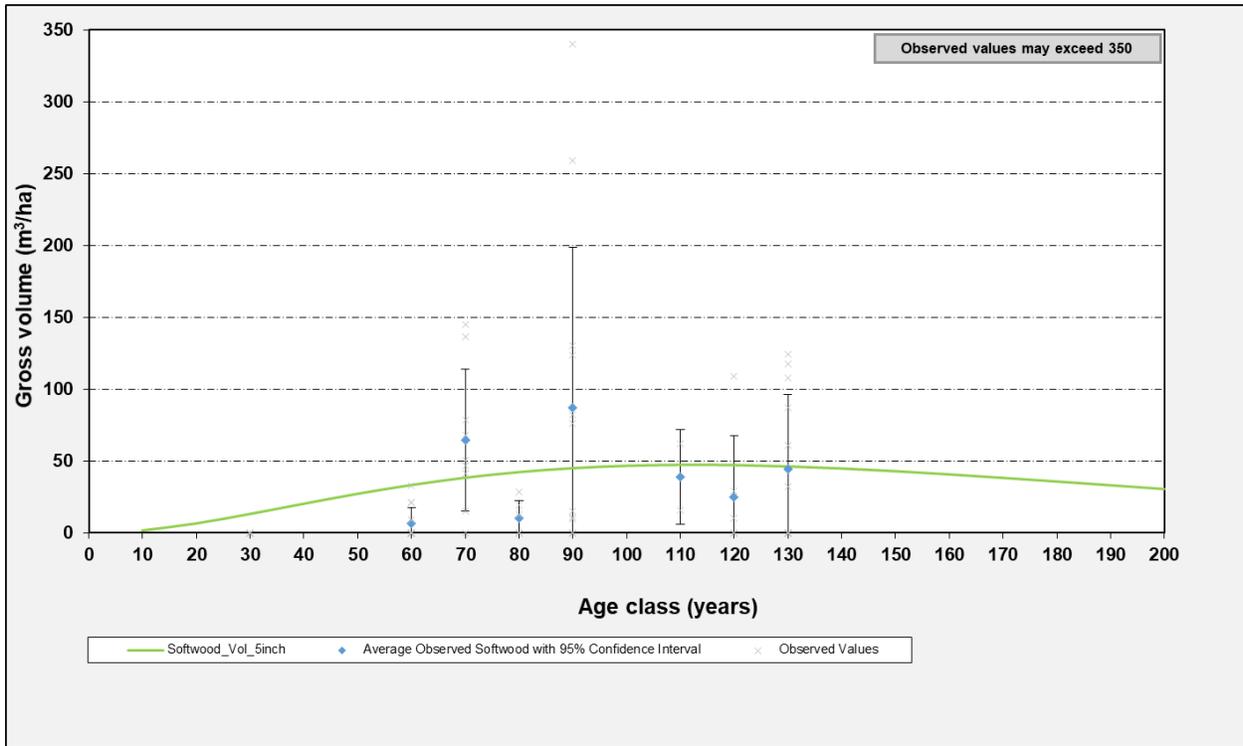


FIGURE 8-20 DEVELOPMENT TYPE 3: S-JP-LD-A-1 95% CONFIDENCE INTERVALS AND OBSERVED VALUES ON THE SOFTWOOD 5 INCH CURVE

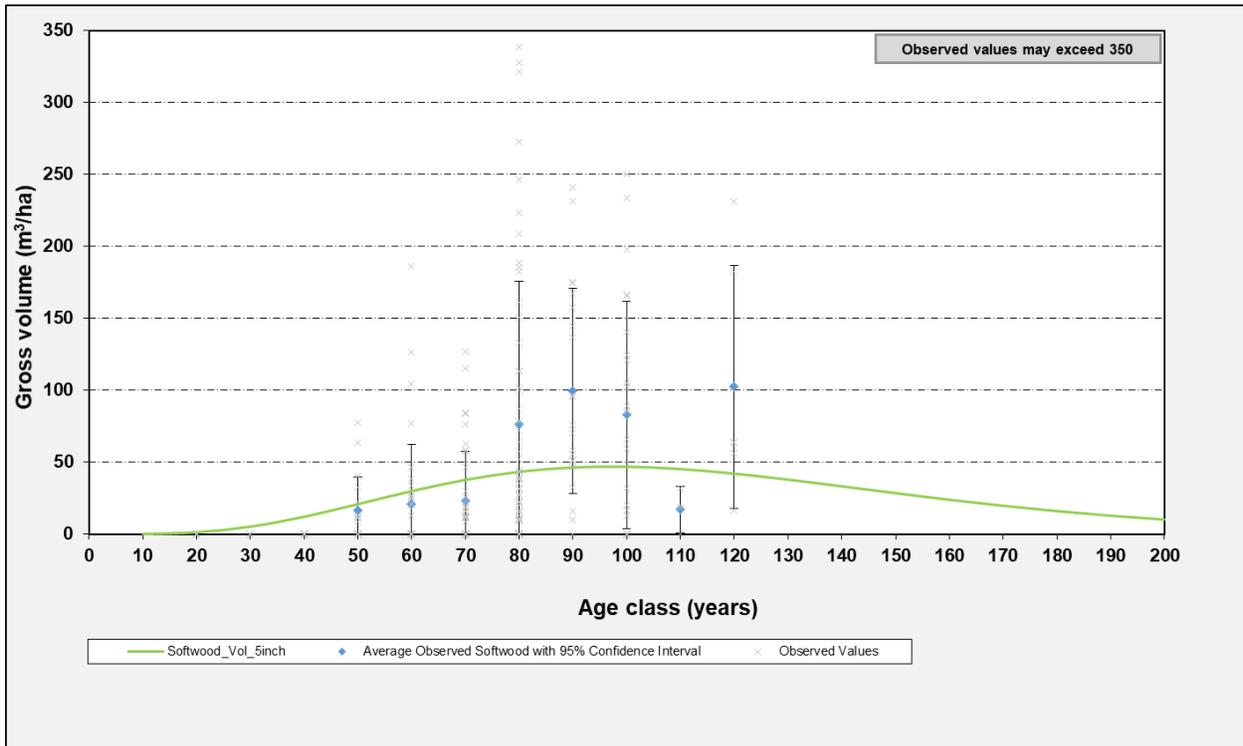




FIGURE 8-21 DEVELOPMENT TYPE 4: S-JP-LD-A-2 95% CONFIDENCE INTERVALS AND OBSERVED VALUES ON THE SOFTWOOD 5 INCH CURVE

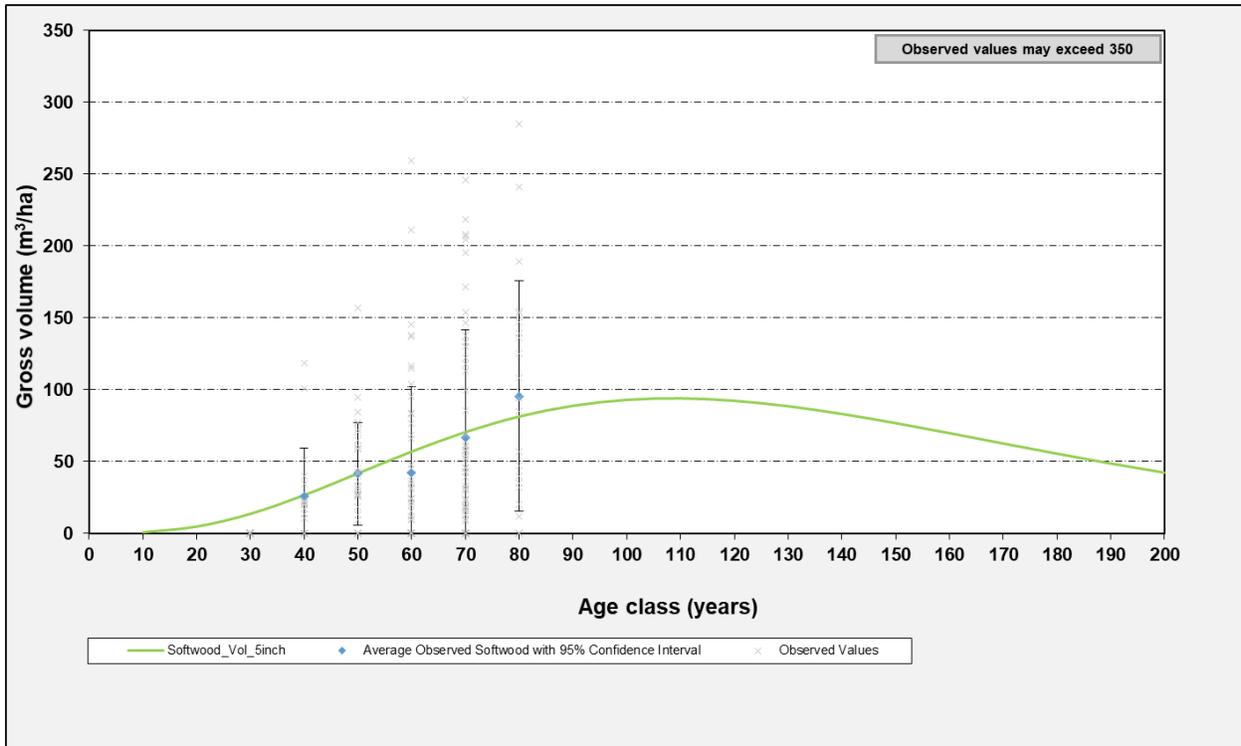


FIGURE 8-22 DEVELOPMENT TYPE 5: S-JP-HD-A-1 95% CONFIDENCE INTERVALS AND OBSERVED VALUES ON THE SOFTWOOD 5 INCH CURVE

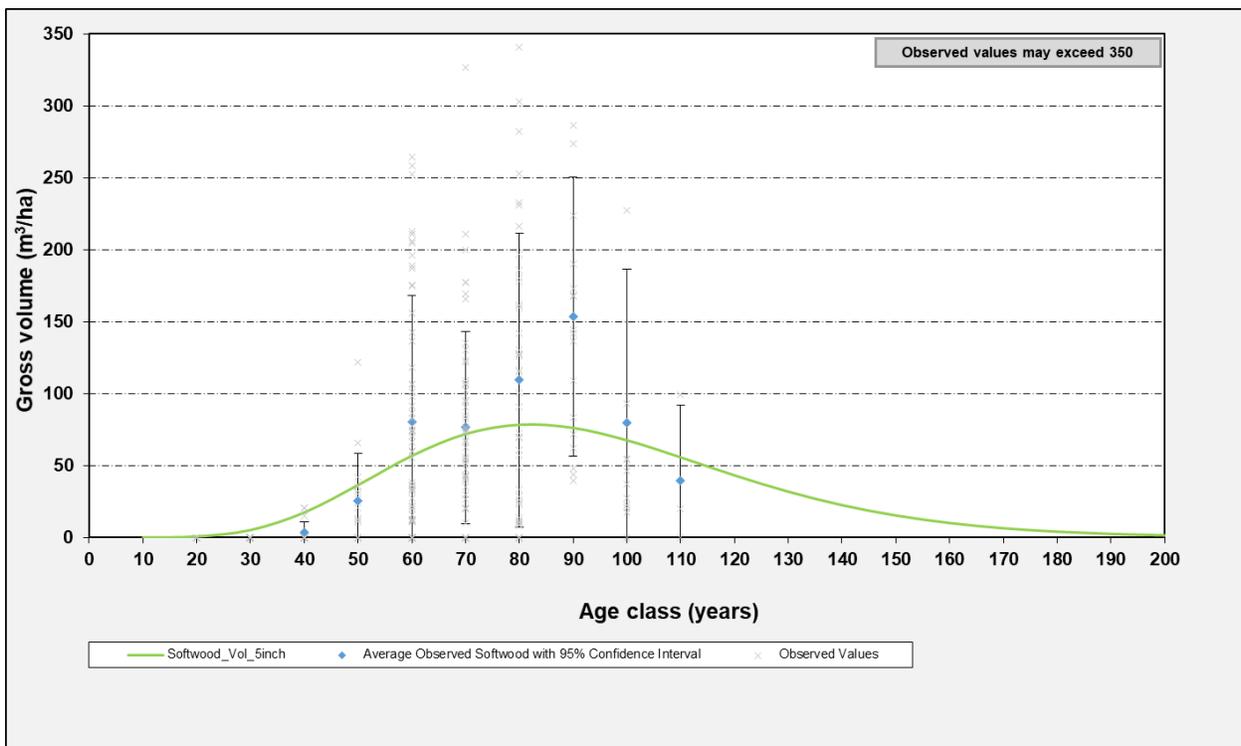




FIGURE 8-23 DEVELOPMENT TYPE 6: S-JP-HD-A-2 95% CONFIDENCE INTERVALS AND OBSERVED VALUES ON THE SOFTWOOD 5 INCH CURVE

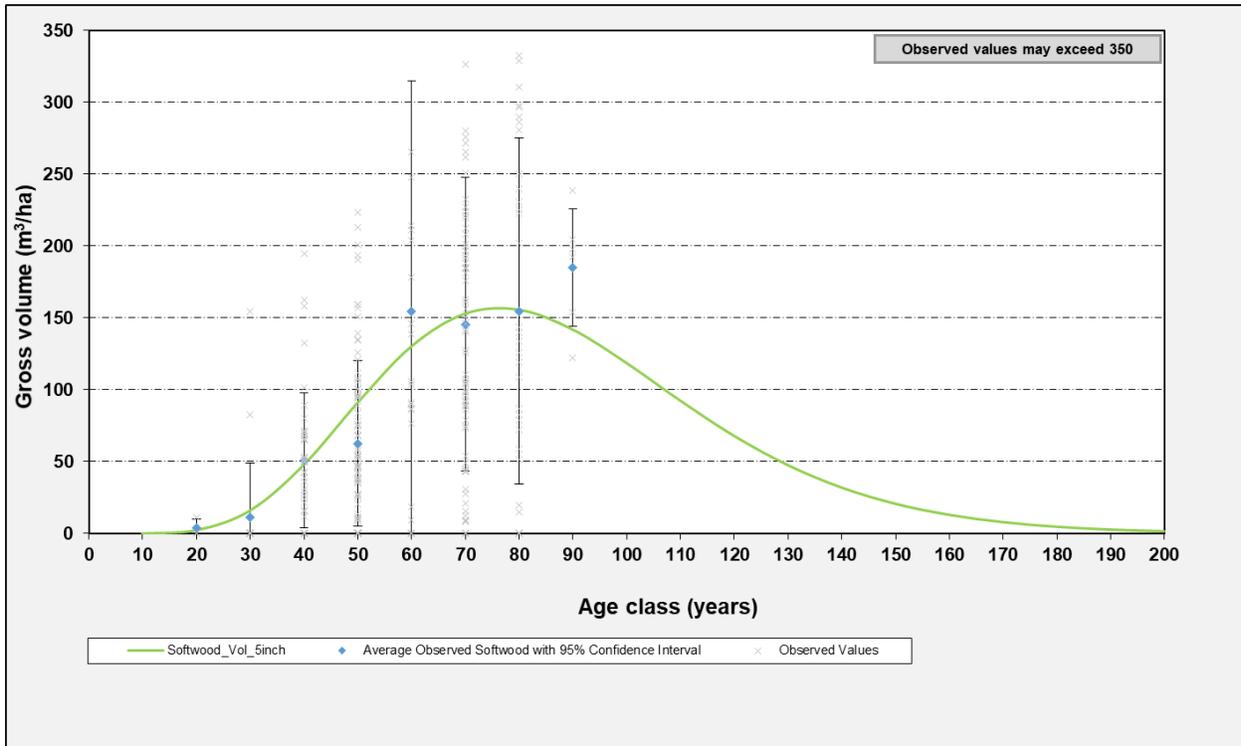


FIGURE 8-24 DEVELOPMENT TYPE 7: S-JP-L&M 95% CONFIDENCE INTERVALS AND OBSERVED VALUES ON THE SOFTWOOD 5 INCH CURVE

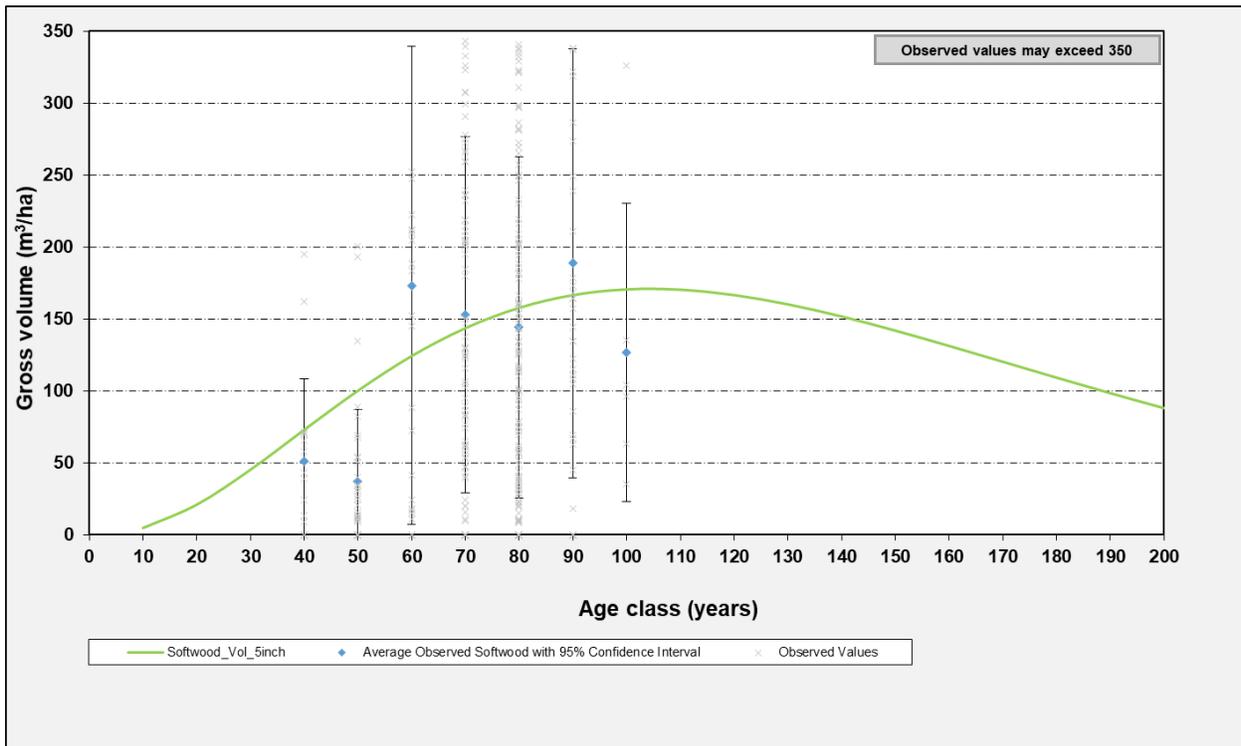




FIGURE 8-25 DEVELOPMENT TYPE 8: SH-JP-A-A 95% CONFIDENCE INTERVALS AND OBSERVED VALUES ON THE SOFTWOOD 5 INCH CURVE

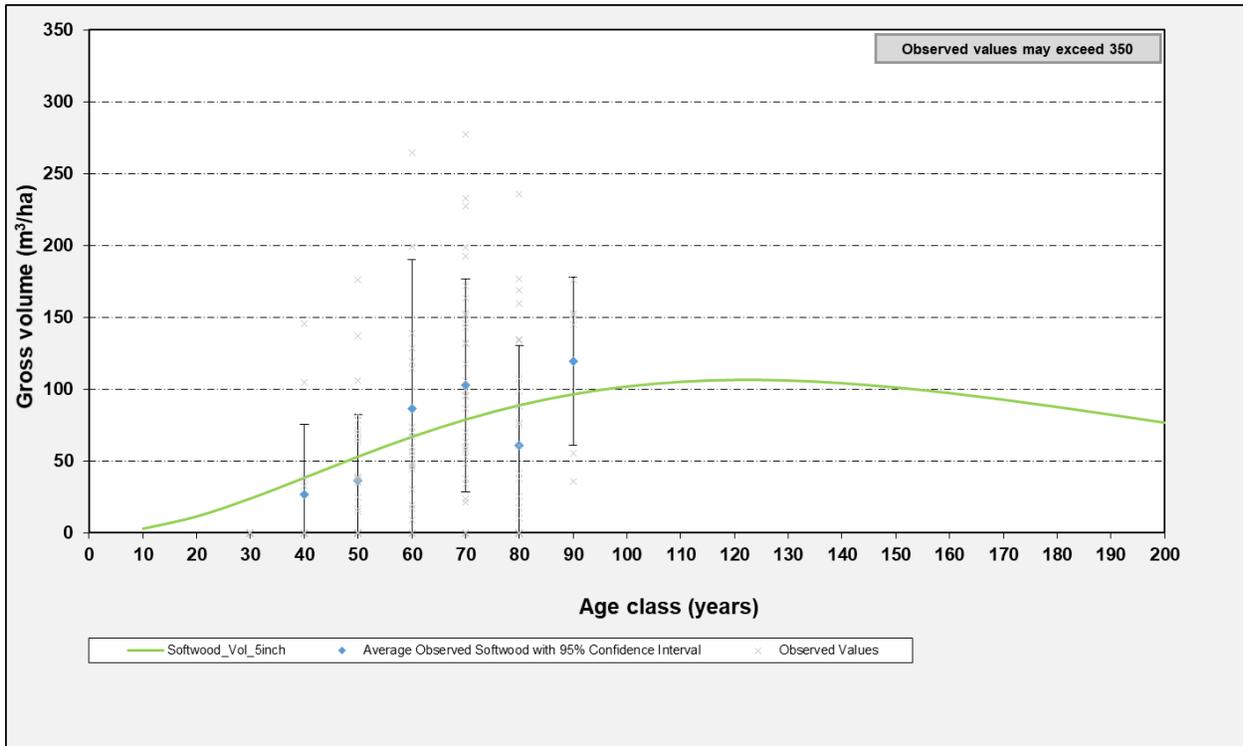


FIGURE 8-26 DEVELOPMENT TYPE 9: SH-WS-A-A 95% CONFIDENCE INTERVALS AND OBSERVED VALUES ON THE SOFTWOOD 5 INCH CURVE

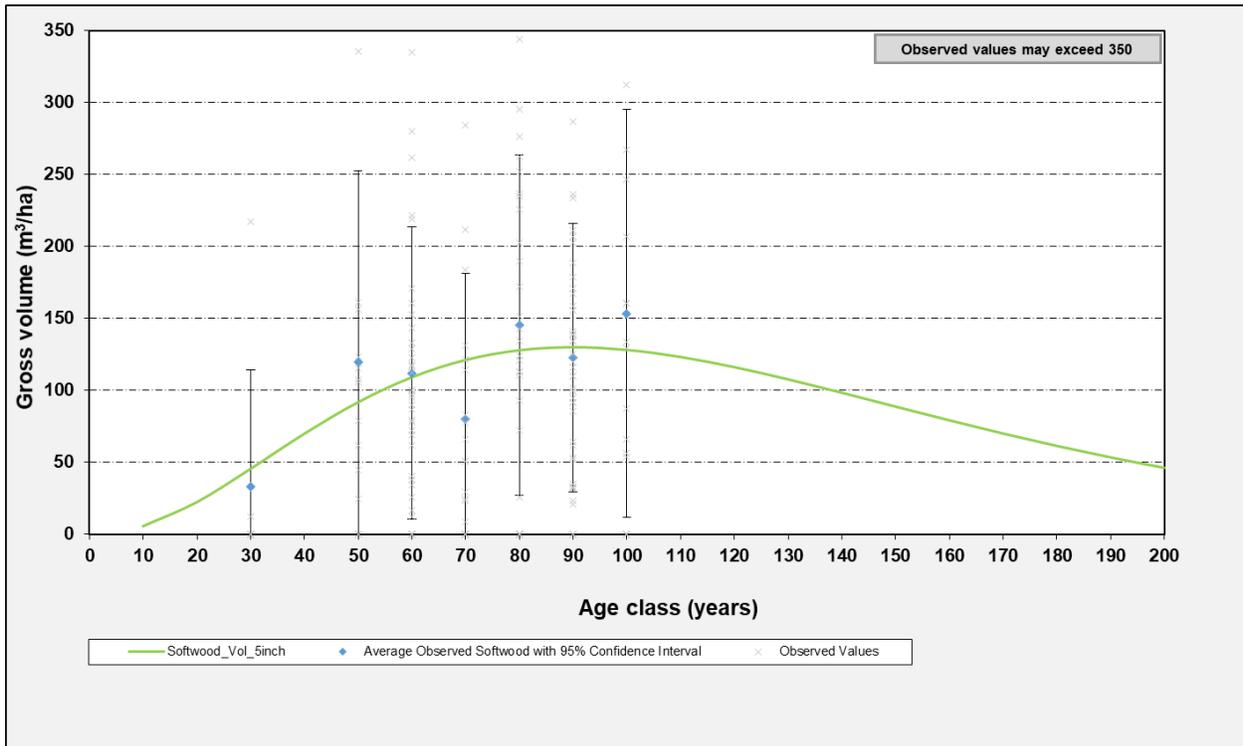




FIGURE 8-27 DEVELOPMENT TYPE 10: HS-WS-A-A 95% CONFIDENCE INTERVALS AND OBSERVED VALUES ON THE SOFTWOOD 5 INCH CURVE

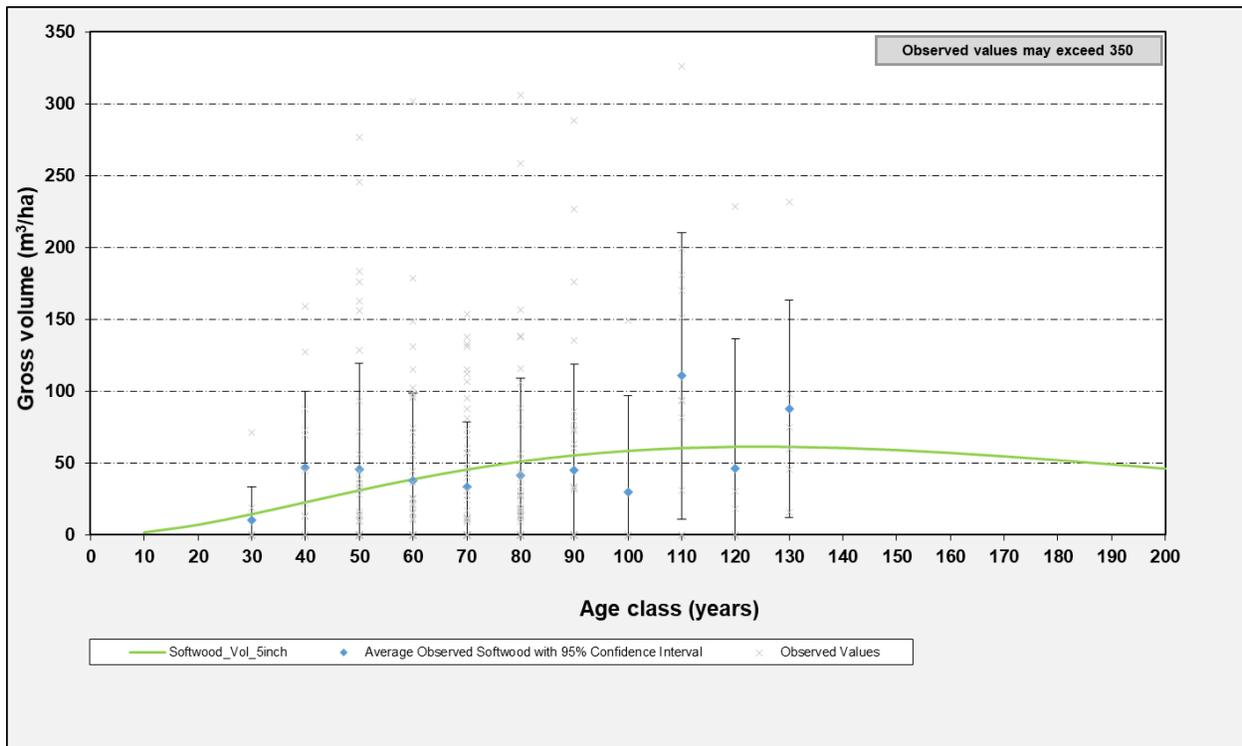


FIGURE 8-28 DEVELOPMENT TYPE 11: HS-JP-A-A 95% CONFIDENCE INTERVALS AND OBSERVED VALUES ON THE SOFTWOOD 5 INCH CURVE

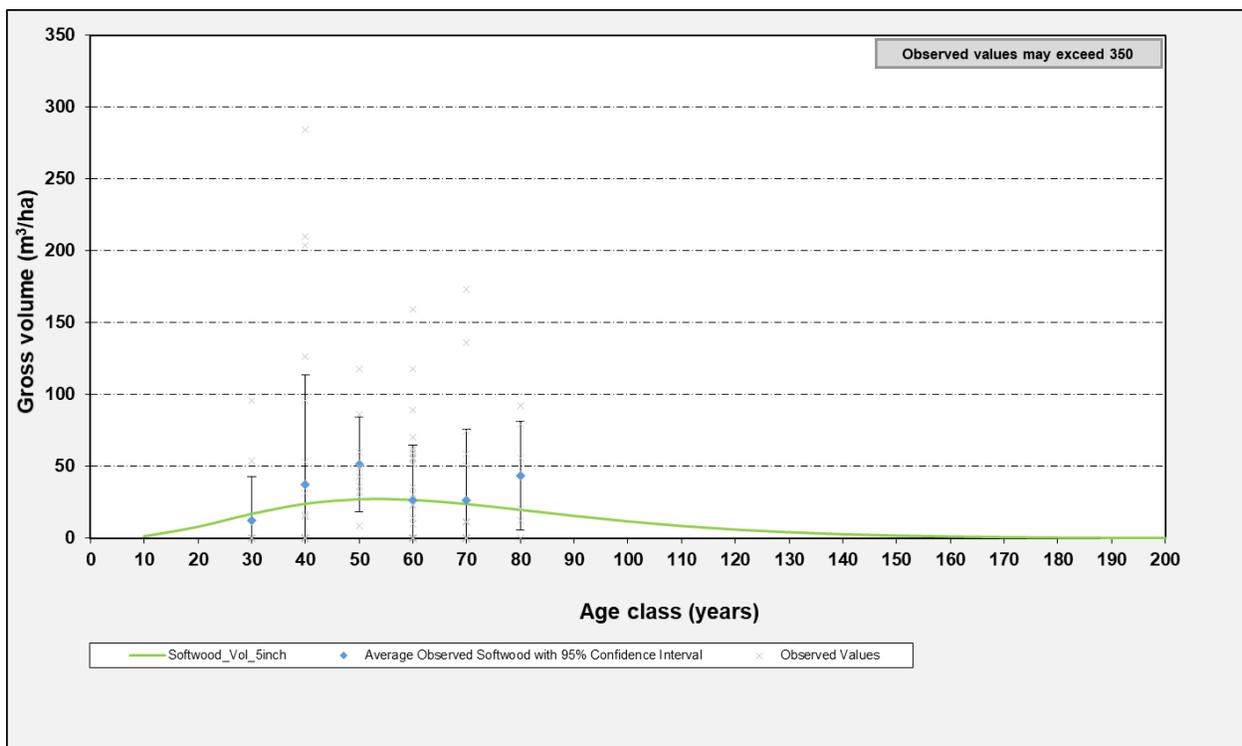




FIGURE 8-29 DEVELOPMENT TYPE 12: H-A-LD-A-1 95% CONFIDENCE INTERVALS AND OBSERVED VALUES ON THE SOFTWOOD 5 INCH CURVE

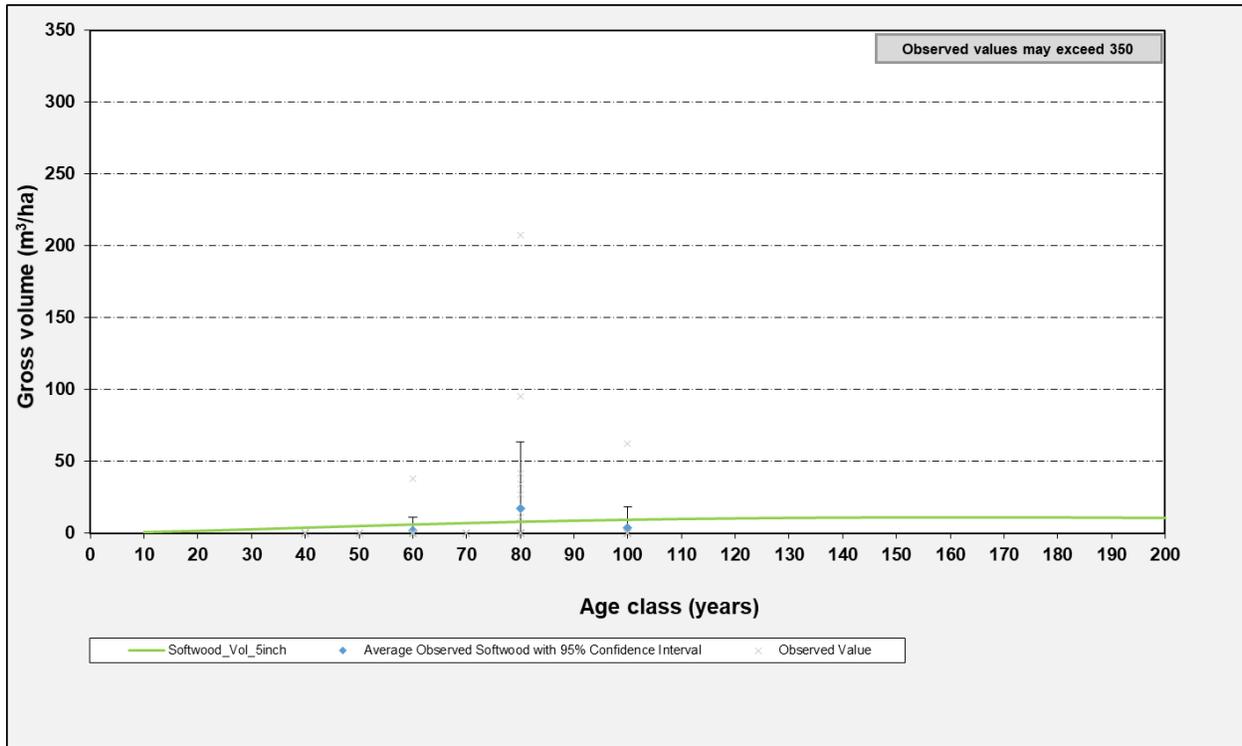


FIGURE 8-30 DEVELOPMENT TYPE 13: H-A-LD-A-2 95% CONFIDENCE INTERVALS AND OBSERVED VALUES ON THE SOFTWOOD 5 INCH CURVE

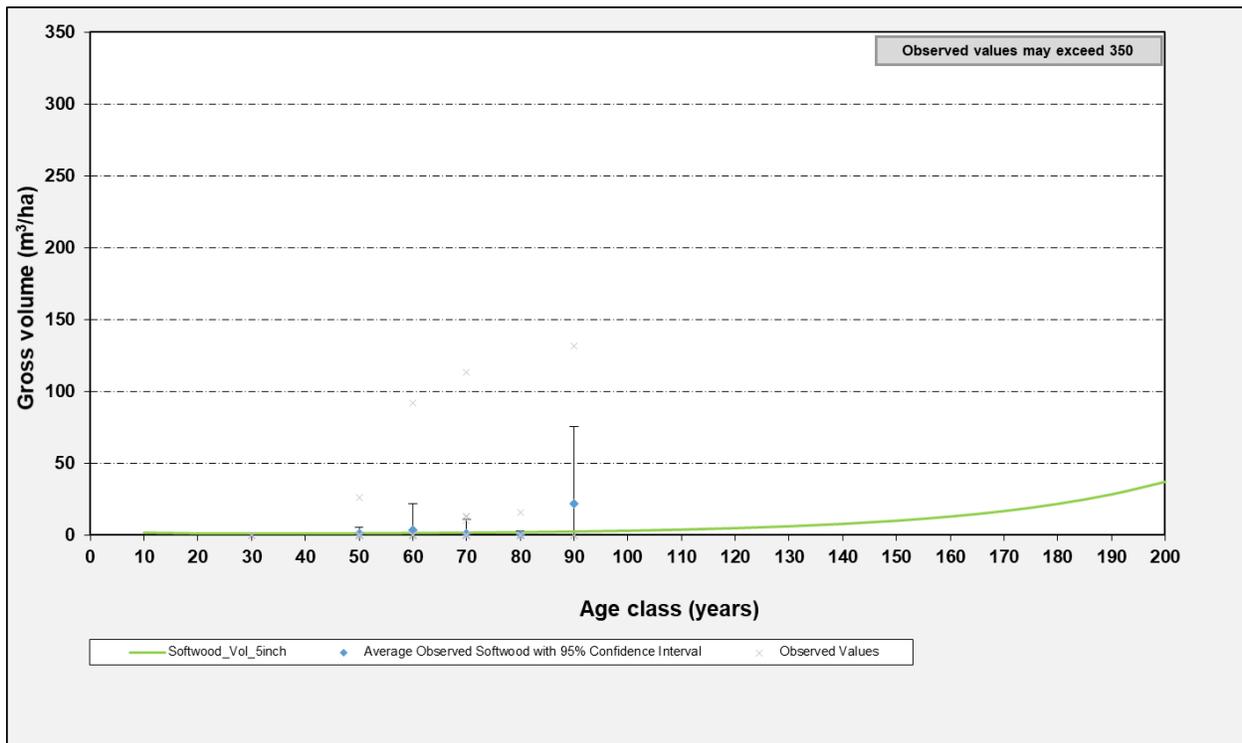




FIGURE 8-31 DEVELOPMENT TYPE 14: H-A-HD-A-1 95% CONFIDENCE INTERVALS AND OBSERVED VALUES ON THE SOFTWOOD 5 INCH CURVE

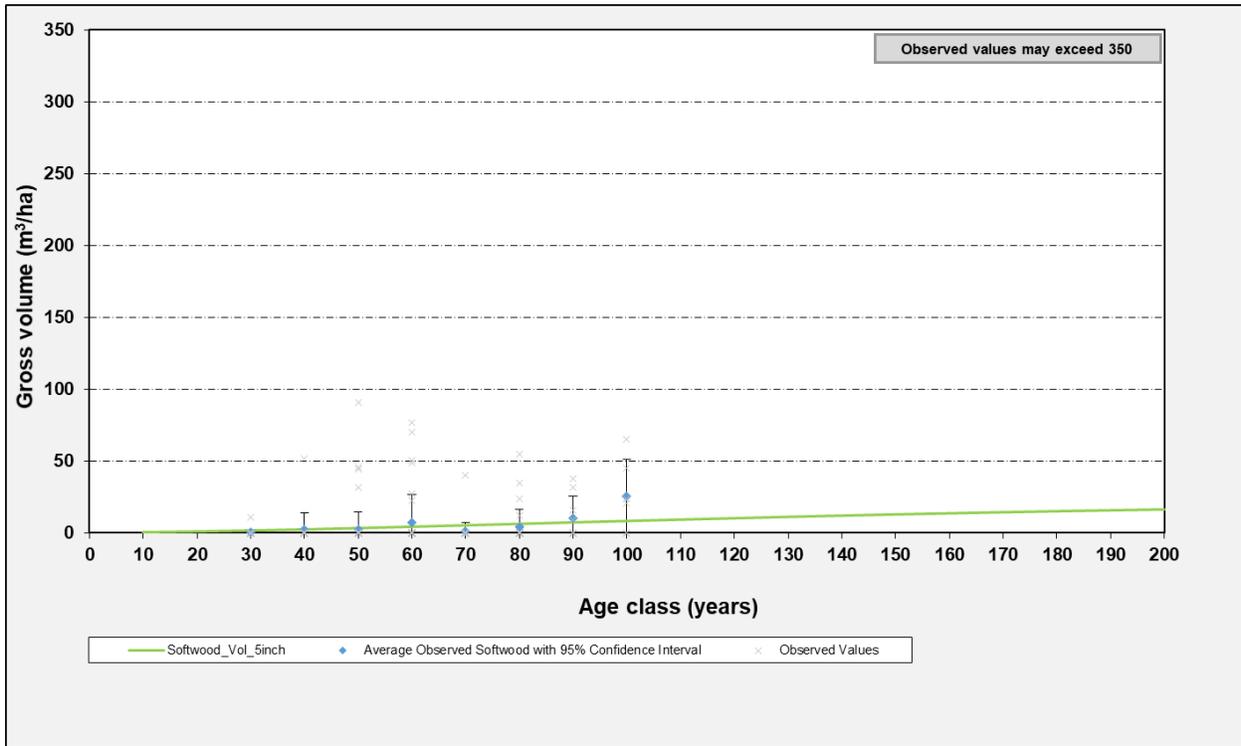


FIGURE 8-32 DEVELOPMENT TYPE 15: H-A-HD-A-2 95% CONFIDENCE INTERVALS AND OBSERVED VALUES ON THE SOFTWOOD 5 INCH CURVE

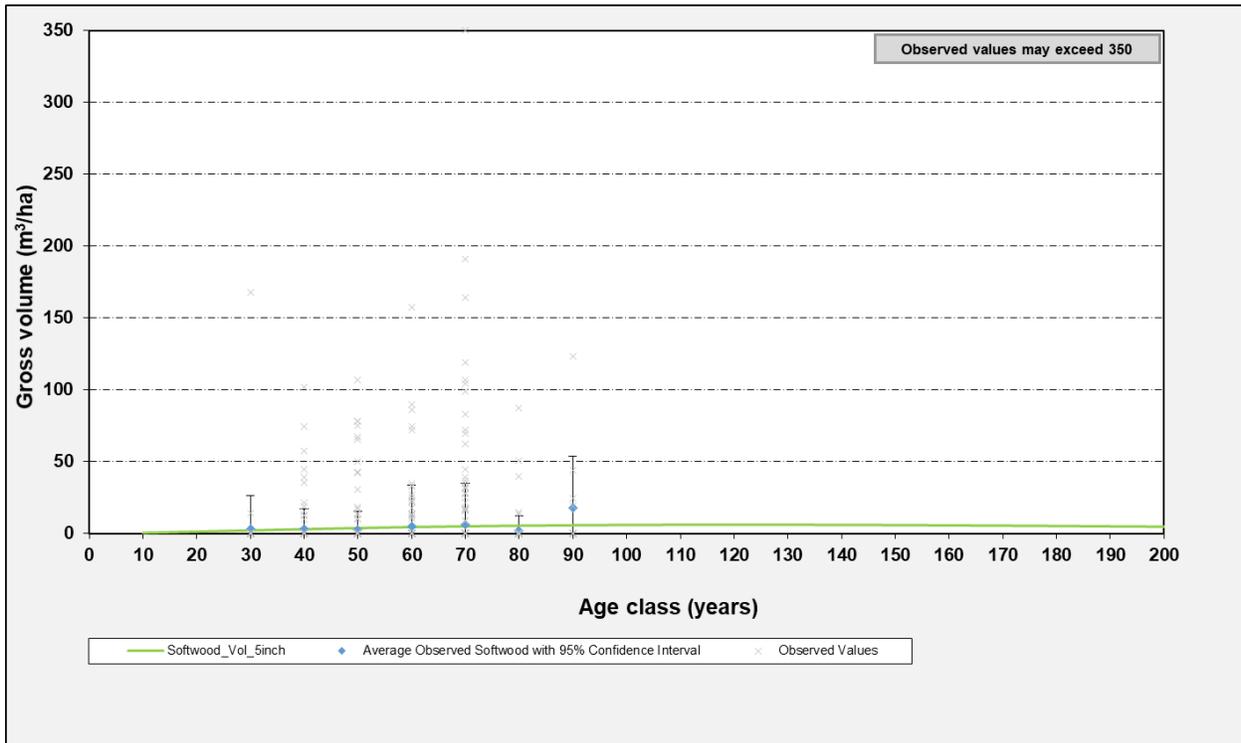




FIGURE 8-33 DEVELOPMENT TYPE 16: H(S)-A-LD-A 95% CONFIDENCE INTERVALS AND OBSERVED VALUES ON THE SOFTWOOD 5 INCH CURVE

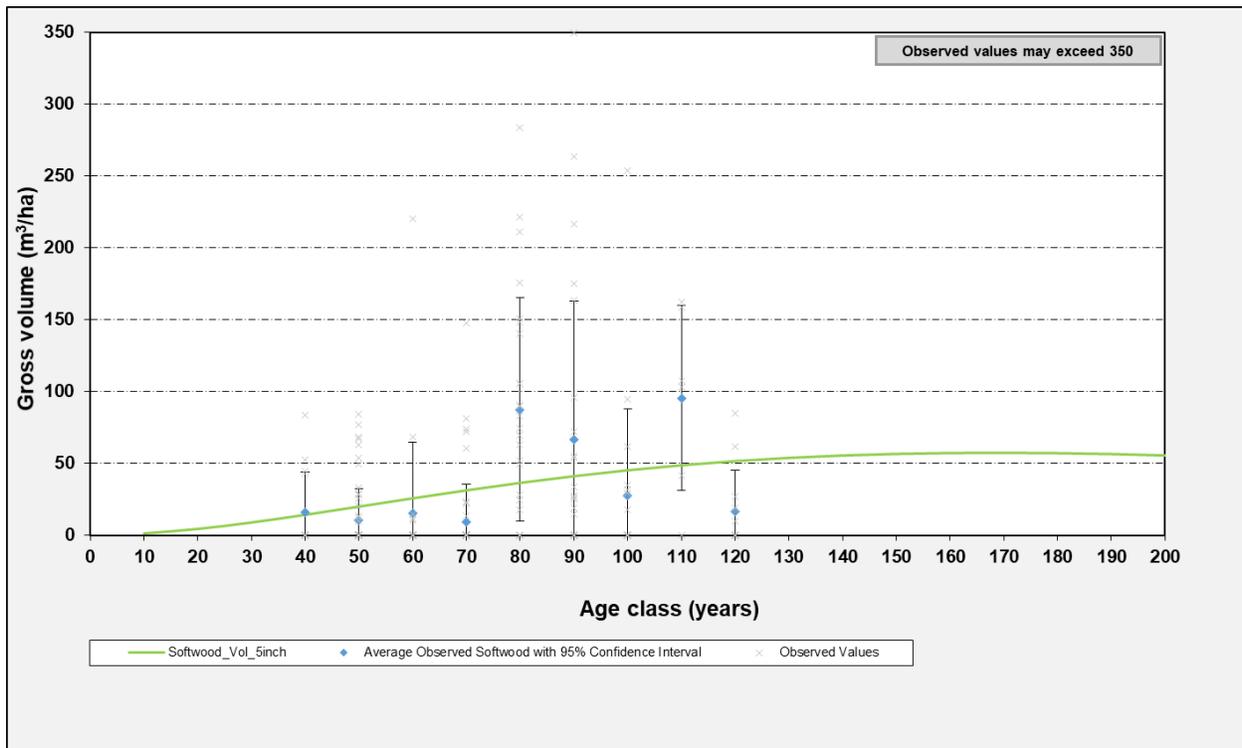


FIGURE 8-34 DEVELOPMENT TYPE 17: H(S)-A-HD-A 95% CONFIDENCE INTERVALS AND OBSERVED VALUES ON THE SOFTWOOD 5 INCH CURVE

