

## ALBERTA SCALING MANUAL

### TREE LENGTH SCALE

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## 5.0 Tree Length Scale

### 5.1 Application of Tree Length Scale

The tree-length scale system has now been adopted for timber harvest accounting but shall be limited to:

- A mill or processing site which has been approved as a scale site and which is:
- Not on weigh scale accounting or
- The mill is on weigh scale accounting but the number of loads to be hauled (from a specific harvest authority or type) is less than twenty-five (25) and the timber profile or harvest standard is such that it cannot be combined with an existing scaling population.

A scale site may include a bush scale site approved by local PLFD staff. Such sites shall only be considered if the trees are not to be hauled in full tree length form and are either merchandized or processed to short wood lengths at the site.

The tree-length volume tables calculate total volume and do not have a small stem (marginal) volume component. Directive 97-06 “Marginal Timber for Sales Based Timber Operations” may apply to the scaled volume.

This scaling methodology applies only to timber measured in tree length form.

All tree length scaling is to be conducted by a full permitted scaler or a scaler with a modified tree length scale permit.

### 5.2 Volume Tables

The volume tables have been constructed from historical tree sectioning data. The tables are provincially based and are species and top diameter specific. Individual localized tables will not be used. The tables are found in section 12 of the Alberta Scaling Manual.

## 5.3 Transition from “Sales” Based Accounting

### 5.3.1 Scale Site Application

The process starts with the completion and submission of “Application for Scale Site” form (Appendix 1 of the Alberta Scaling Manual). The completed form is submitted to the local PLFD office.

A scale site may be either the receiving mill or bush scale. An application must be made for each site if using both mill and bush scale.

#### *Scale Site Application for Mill*

Complete all relevant sections for Non-Mass Scale Sites.

- Inventory: Both a product inventory and round wood inventory is to be provided. The round wood inventory is simply a reasonable estimate; the harvest source must be identified. The product inventory must also have an assigned harvest source; the forest product records should confirm this.
- Date of implementation – Sufficient time is required for PLFD to confirm on-hand inventory and ensure adequate controls of segregation and how the scaling shall occur.

#### *Scale Site Application for Bush Scale*

The application slightly differs from the mill application in that:

1. There is no mill number assigned.
2. Site location is the bush location where the scaling is to occur.
3. There is no existing inventory.
4. Estimated volume (Non Mass Scale Site section) is to be provided and is based on the estimated volume to be scaled at the site.

The application for scale sites shall be forwarded to the provincial scaling supervisor for final approval.

### 5.3.2 On-Hand Inventory

Any product inventory on-hand shall be declared sold and any crown charges required, are to be paid at the time of transition to 100% scale. The round wood inventory may be 100% scaled prior to processing. The method of scale will be determined on the basis of the on-hand inventory.

## **5.4 General Procedure**

### **5.4.1 Log Segregation**

Harvest source segregation is required for un-scaled logs. The logs may only be combined from various sources upon completion of the scale.

The trees shall be scaled prior to bucking or processing. This may be done prior to bucking the trees for processing, or prior to the feed for the cutoff saw if processing tree length, or while the trees are still in decks (however only if each tree can be safely accessed for butt diameter measurement). Scaled trees must be clearly marked (painted) and be kept separate from un-scaled timber.

### **5.4.2 Scaling Requirements**

All timber delivered to the scale site is required to be scaled. A separate scale sheet shall be completed for each harvest source.

The scaling results are to be submitted to the department within 21 days following the month of scaling activity.

### **5.4.3 Timing of Scale**

There is some benefit to a permittee to having the volume scaled quickly as permits may be considered for cancellation where the harvest volume has been accounted and paid for. The department may take action to ensure the scaling occurs prior to having merchantable fiber loss.


## **5.5 Procedures for Tree Length Scale - Individual Trees**

Generally decked timber does not lend itself to accurate measurement simply due to the varying lengths and top diameters existing in the deck. In such situations, consideration should be given to re-sort the deck to common tree dimensions and scale, or to totally spread out the deck and measure each individual tree. There can be significant additional effort required to scale each tree but a the accuracy

## 5.5.1 Scale Form and Header Information

### TREE LENGTH SCALE SHEET – INDIVIDUAL TREE MEASUREMENT

This form is used where individual trees are spread out and all top, butt, and length measurements can be obtained for each piece. There may be a need for more than one sheet therefore all information required on the form must be completed fully for each sheet.

		<b>TREE LENGTH SCALE SHEET</b> for INDIVIDUAL TREE MEASUREMENT				PAGE ___ of ___
HARVEST SOURCE <b>a</b>		MILL# <b>b</b>	MILL NAME OR LOCATION <b>c</b>		LOAD# <b>d</b>	SCALE DATE <b>e</b>
DISPOSITION HOLDER <b>f</b>			SCALER <b>g</b>		PERMIT# <b>h</b>	

GROSS						GROSS						GROSS						GROSS										
LOG NO.	SP	TOP	BUTT	LGTH	VOL	LOG NO.	SP	TOP	BUTT	LGTH	VOL	LOG NO.	SP	TOP	BUTT	LGTH	VOL	LOG NO.	SP	TOP	BUTT	LGTH	VOL					
1						1						1					1						1					
2						2						2					2						2					
3						3						3					3						3					
4						4						4					4						4					
5						5						5					5						5					
6						6						6					6						6					
7						7						7					7						7					
8						8						8					8						8					
9						9						9					9						9					
0						0						0					0						0					
1						1						1					1						1					
2						2						2					2						2					
3						3						3					3						3					
4						4						4					4						4					
5						5						5					5						5					
6						6						6					6						6					
7						7						7					7						7					
8						8						8					8						8					
9						9						9					9						9					
0						0						0					0						0					
Species Volume						Species Volume						Species Volume						Species Volume										
Species Volume						Species Volume						Species Volume						Species Volume										
Species Volume						Species Volume						Species Volume						Species Volume										

<b>CONIFEROUS</b>	<b>DECIDUOUS</b>												
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;"><b>GRAND TOTAL GROSS VOLUME / 1000</b></td> <td style="width: 20%;"></td> </tr> <tr> <td>Less Allowable Defect Deduction (3%)</td> <td style="text-align: right;">0</td> </tr> <tr> <td><b>TOTAL ACCOUNTABLE VOLUME</b></td> <td style="text-align: right;">0</td> </tr> </table>	<b>GRAND TOTAL GROSS VOLUME / 1000</b>		Less Allowable Defect Deduction (3%)	0	<b>TOTAL ACCOUNTABLE VOLUME</b>	0	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;"><b>GRAND TOTAL GROSS VOLUME / 1000</b></td> <td style="width: 20%;"></td> </tr> <tr> <td>Less Allowable Defect Deduction (5%)</td> <td style="text-align: right;">0</td> </tr> <tr> <td><b>TOTAL ACCOUNTABLE VOLUME</b></td> <td style="text-align: right;">0</td> </tr> </table>	<b>GRAND TOTAL GROSS VOLUME / 1000</b>		Less Allowable Defect Deduction (5%)	0	<b>TOTAL ACCOUNTABLE VOLUME</b>	0
<b>GRAND TOTAL GROSS VOLUME / 1000</b>													
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<b>TOTAL ACCOUNTABLE VOLUME</b>	0												
<b>GRAND TOTAL GROSS VOLUME / 1000</b>													
Less Allowable Defect Deduction (5%)	0												
<b>TOTAL ACCOUNTABLE VOLUME</b>	0												

Figure 5.1 – Tree Length Scale Form for Individual Trees

### Tally Header Information

Details on the load or pile to be scaled must be first completed in the upper boxes of the tally sheet.

- a. Harvest Source - Source of harvested timber (crown disposition, private legal location or industrial salvage disposition).
- b. Mill # - Mill number (if applicable) assigned by PLFD.
- c. Mill Name or Location - Enter name of mill or location if bush scaled.
- d. Load # - (Optional) - A load number assigned (in sequence commencing from # 1) for each harvest source scaled during the operating season.
- e. Scale Date - Date scale was conducted.
- f. Disposition Holder - Owner of crown disposition scaled.
- g. Scaler - Name of individual who conducted the scale.
- h. Permit# - Scaler permit number.

### **5.5.2 Species**

The species of each individual tree is recorded in the SP column. Refer to Alberta Scaling Manual Section 2 - Table 2.1 – Species Codes for the correct codes to use. Keep in mind that the volumes tables are species specific.

### **5.5.3 Top Diameter**

The diameter at the small end of each tree is recorded in the Top column. Diameters are to be measured and recorded in 2 cm classes. The procedures for diameter measurement are found in subsection 2.11.1 of the Alberta Scaling Manual.

If the top diameter of the tree is smaller than the utilization standard then the scaler may establish that point where the utilization top does occur and record that top diameter. It is then important to record the tree length to that point where the utilization top diameter occurs.

Example: A timber permit is issued at a 15/10 utilization. This means that the allowable cut is based on the tree volume for a 15 cm butt diameter to a 10 cm top diameter. The tree to be measured has an 8 cm top diameter. The scaler finds and marks the point where the 10 cm top occurs. The tree is recorded as having a 10 cm top with a length corresponding to the measurement to the 10 cm point.

#### **5.5.4 Butt Diameter**

The diameter at the large end for each tree is measured and recorded in the Butt column. Butt diameters are determined in the same manner as top diameters and are also recorded to the nearest 2 cm class. Special consideration is to be given when measuring trees with butt swell. The measurement is done by projecting lines of normal log taper. See subsection 2.11.2 of the Alberta Scaling Manual for Butt diameter measurements.

#### **5.5.5 Length**

The total length to the point of the top diameter will be measured and recorded to the nearest one metre. Lengths over the half metre mark will be rounded up and recorded to the next nearest metre.

#### **5.5.6 Volume**


The volumes per tree tables were built by species and top diameter. Using the recorded species (SP) and top diameter (Top) the scaler looks up the corresponding tree length volume table. The volume for each tree is then obtained from the table using the butt diameter (Butt) and length (Lgth) recorded for the tree and the result is entered in the Vol column. Note: The volumes are expressed in cubic decimeters or 1000 x cubic metres. The volume tables are found in section 12 of the Alberta Scaling Manual.

#### **5.5.7 Tally Sheet Completion**

The tally sheet is completed by adding up the individual tree volumes for each column in the Species Volume field. Individual species volumes may be summarized if required, if not, one total may be entered. The total of all Species Volume columns is calculated and the result put in the Grand Total Gross Volume field and is then divided by 1000 for cubic metres. Note: There are separate entries for Coniferous and Deciduous. The total gross volume is reduced by the allowable defect of 3% for coniferous or 5% for deciduous.

The net volume result is rounded to the nearest whole number to determine the Total Accountable Volume in cubic metres (m<sup>3</sup>).

The following is an example of a completed Tree Length Scale Sheet for individual tree measurement.

		<b>TREE LENGTH SCALE SHEET</b> for INDIVIDUAL TREE MEASUREMENT				PAGE 1 of 1
HARVEST SOURCE		MILL#	MILL NAME OR LOCATION		LOAD#	SCALE DATE
CTPR040044		1	JACK SAWMILL			January 2, 2006
DISPOSITION HOLDER			SCALER		PERMIT#	
ED OWNER			JOHN MEASURE		23	

GROSS						GROSS						GROSS						GROSS					
LOG NO.	SP	TOP	BUTT	LGTH	VOL	LOG NO.	SP	TOP	BUTT	LGTH	VOL	LOG NO.	SP	TOP	BUTT	LGTH	VOL	LOG NO.	SP	TOP	BUTT	LGTH	VOL
1	SW	10	24	9	195	1	SW	12	34	13	512	1	SW	12	26	11	290	1					
2	SW	10	22	11	210	2	SW	12	22	10	208	2	P	12	28	7	218	2					
3	SW	10	30	13	397	3	P	10	28	9	263	3	P	10	32	13	473	3					
4	SW	10	22	9	172	4	P	10	26	9	234	4	P	12	24	9	222	4					
5	SW	10	28	8	220	5	SW	10	36	14	570	5	SW	14	36	12	547	5					
6	SW	10	24	9	195	6	SW	10	18	8	115	6						6					
7	SW	10	24	13	282	7	F	10	18	7	109	7						7					
8	P	10	32	10	362	8	P	12	28	11	342	8						8					
9	P	10	22	8	161	9	P	12	24	7	173	9						9					
0	SW	14	28	9	285	0	P	10	26	13	340	0						0					
1	SW	10	26	12	294	1	SW	12	38	12	562	1						1					
2	SW	12	26	12	316	2	SW	14	32	10	383	2						2					
3	P	12	18	7	115	3	F	10	22	8	167	3						3					
4	SW	10	28	9	247	4	SW	10	24	10	217	4						4					
5	SW	10	24	14	303	5	SW	10	28	9	247	5						5					
6	SW	14	40	10	537	6	SW	10	34	14	520	6						6					
7	P	10	26	13	340	7	SW	12	30	10	326	7						7					
8	P	12	20	14	264	8	SW	14	28	11	347	8						8					
9	P	10	22	9	181	9	P	10	14	5	53	9						9					
0	SW	12	32	11	396	0	SW	12	16	6	84	0						0					
Species Volume	ALL		5472			Species Volume	ALL		5772			Species Volume	ALL		1750			Species Volume					
Species Volume						Species Volume						Species Volume						Species Volume					
Species Volume						Species Volume						Species Volume						Species Volume					

<b>CONIFEROUS</b>	<b>DECIDUOUS</b>												
<table border="1" style="width:100%; border-collapse: collapse;"> <tr><td>GRAND TOTAL GROSS VOLUME / 1000</td><td style="text-align: right;">12994</td></tr> <tr><td>Less Allowable Defect Deduction (3%)</td><td style="text-align: right;">390</td></tr> <tr><td><b>TOTAL ACCOUNTABLE VOLUME</b></td><td style="text-align: right;"><b>13</b></td></tr> </table>	GRAND TOTAL GROSS VOLUME / 1000	12994	Less Allowable Defect Deduction (3%)	390	<b>TOTAL ACCOUNTABLE VOLUME</b>	<b>13</b>	<table border="1" style="width:100%; border-collapse: collapse;"> <tr><td>GRAND TOTAL GROSS VOLUME / 1000</td><td></td></tr> <tr><td>Less Allowable Defect Deduction (5%)</td><td></td></tr> <tr><td><b>TOTAL ACCOUNTABLE VOLUME</b></td><td></td></tr> </table>	GRAND TOTAL GROSS VOLUME / 1000		Less Allowable Defect Deduction (5%)		<b>TOTAL ACCOUNTABLE VOLUME</b>	
GRAND TOTAL GROSS VOLUME / 1000	12994												
Less Allowable Defect Deduction (3%)	390												
<b>TOTAL ACCOUNTABLE VOLUME</b>	<b>13</b>												
GRAND TOTAL GROSS VOLUME / 1000													
Less Allowable Defect Deduction (5%)													
<b>TOTAL ACCOUNTABLE VOLUME</b>													

Figure 5.2– Completed Tree Length Scale Form for Individual Tree




If a volume summary is desired by species the back of the Tree Length Scale Form for Individual Tree may be used.

<b>TREE LENGTH SCALE SUMMARY SHEET</b>													
for INDIVIDUAL TREE MEASUREMENT										PAGE # ___ of ___			
HARVEST SOURCE		MILL #		MILL NAME OR LOCATION			LOAD#		SCALE DATE				
DISPOSITION HOLDER		SCALER				PERMIT#							
PAGE COL.	SPCDPR		SPCDPR		SPCDPR		SPCDPR		SPCDPR		SPCDPR		
	TREES	GROSS	TREES	GROSS	TREES	GROSS	TREES	GROSS	TREES	GROSS	TREES	GROSS	
	1												
	2												
	3												
	4												
	5												
	6												
	7												
	8												
	9												
	10												
	1												
	2												
	3												
4													
5													
TOTAL													
TOTAL GROSS /1000													
LESS ALLOWABLE DEFECT DEDUCTION - 3% CONIFEROUS, 5% DECIDUOUS													
NET SCALE													
SCALER				PERMIT #				SCALED DATE					

**Figure 5.3– Back of Tree Length Scale Form for Individual Tree**

## 5.6 Procedures for Tree Length Scale - Decked Timber

Scaling decked timber is more difficult than individual tree measurement. The accuracy is strongly dependent on the having similar species, top diameters, and lengths. It is recommended that timber decks of varying top diameters and lengths be redistributed by common tree dimension and be piled as such for scaling. The wood shall be decked such that all butts can be safely measured from the ground. The scale form for scaling tree length decks uses a common top size and average length.

		<b>TREE LENGTH SCALE SHEET</b>			PAGE ____ OF ____	
HARVEST SOURCE		MILL #	MILL NAME or LOCATION		LOAD #	SCALE DATE
DISPOSITION HOLDER			TOP	SCALER		PERMIT #
Species		Avg. Length		m		
Butt Diameter	Tally	Piece Count	Piece Vol.	Volume		
10				0		
12				0		
14				0		
16				0		
18				0		
20				0		
22				0		
24				0		
26				0		
28				0		
30				0		
32				0		
34				0		
36				0		
38				0		
40				0		
42				0		
44				0		
46				0		
48				0		
50				0		
				0		
				0		
				0		
				0		
				0		
<b>TOTALS</b>		0		0		

Species		Avg. Length		m		
Butt Diameter	Tally	Piece Count	Piece Vol.	Volume		
10				0		
12				0		
14				0		
16				0		
18				0		
20				0		
22				0		
24				0		
26				0		
28				0		
30				0		
32				0		
34				0		
36				0		
38				0		
40				0		
42				0		
44				0		
46				0		
48				0		
50				0		
				0		
				0		
				0		
				0		
<b>TOTALS</b>		0		0		

<b>GRAND TOTAL GROSS VOLUME</b>	0	A. Total of all volumes and divided by 1000
Less Allowable Defect Deduction	0.000	B. Defect - Coniferous 3% (multiply A. by 0.03) Deciduous 5% (multiply A. by 0.05)
<b>TOTAL ACCOUNTABLE VOLUME</b>	0	C. Subtract B. from A. - record to nearest cubic metre

Figure 5.4 - Tree Length Scale Form for Decked Timber

### **5.6.1 Scale Header Information**

The header information completed is identical to that for the Individual Tree Measurement form with the exception of entering the average top diameter.

### **5.6.2 Species**

If there are different species in the deck, the scaler should attempt to isolate and measure them separately. Where this is not possible, the predominant species shall be recorded and used for volume determinations. The species is recorded in the Species box. Keep in mind that the volume tables are species specific.

### **5.6.3 Top Diameter**

The procedures for obtaining the top diameter are similar to section 5.5.1.2 except a single average top diameter is determined for the entire deck of timber. A deck of timber, which has uniform tree length and top sizes, can be easily measured to determine the average top diameter and tree length. Decked timber, that does not have uniform length and top sizes, requires the scaler to visualize and block the deck out and subjectively determine both the average deck length and average top diameter.

### **5.6.4 Average Length**

For each species in the load, determine the average merchantable length (nearest 1 metre) to the point of average top diameter, and record this value on the tally sheet. If there is more than one distinct length layer (i.e.: difference of 3 metres or greater) for the same species, then a separate tally is required using a different average length.

### **5.6.5 Butt Diameter**

Measure each butt diameter and dot tally under the appropriate butt diameter class. Procedures for diameter measurement are found in subsection 2.11.1 of the Alberta Scaling Manual. A common dot tally system that may be used is found in Cube Scale section 3.3.5.2 of the Alberta Scaling Manual.

Mark each measured log with spray paint or a lumber crayon. If there are butt diameters measured which exceed the 50 cm range of the tally sheet, the additional diameters may be entered below the 50 cm diameter entry.

### **5.6.6 Piece Count**

The total tally is tabulated and entered in the Piece Count box.

### **5.6.7 Piece Volume**

The “Piece Vol.” (volume per piece) is then obtained for each butt diameter class from the corresponding volume table for the species and top diameter. Note that the volumes displayed in the tables are actually 1000 x their actual cubic metre value. Use the volumes under the merchantable length column that match the average length measurement.

### **5.6.8 Volume**

Multiplying the Piece Count by the Piece Vol. will give the Volume in each butt diameter class. The result is entered in the Volume column.

### **5.6.9 Tally Sheet Completion**

Total the piece count and volume columns for each species. Total all volumes, divide by 1000 and enter the result in the Grand Total Gross Volume box.

The gross volume is reduced by an allowable defect percent (3% for coniferous or 5% for deciduous) to obtain the total accountable volume. Round your result to the nearest cubic metre.

On the following page is a sample of a completed tree length scale tally sheet for decked timber.

Alberta SUSTAINABLE RESOURCE DEVELOPMENT		<b>TREE LENGTH SCALE SHEET</b> for DECKED TIMBER			PAGE 1 of 1	
<b>HARVEST SOURCE</b>		<b>MILL #</b>	<b>MILL NAME or LOCATION</b>		<b>LOAD #</b>	<b>SCALE DATE</b>
CTPS020002		2	KINUSO			JAN. 12, 2006
<b>DISPOSITION HOLDER</b>			<b>TOP</b>		<b>SCALER</b>	
JOE HOLDER			10		JAKE SCALER	
					PERMIT #	
					44	
<hr/>						
<b>Species</b> <input type="text" value="WHITE SPRUCE"/>		<b>Avg. Length</b> <input type="text" value="16"/> m				
<b>Butt Diameter</b>	<b>Tally</b>	<b>Piece Count</b>	<b>Piece Vol.</b>	<b>Volume</b>		
10						
12						
14						
16	••	2	195	390		
18	•••	6	229	1374		
20	☒•••	13	265	3445		
22	☒☒•	21	305	6405		
24	☒☒☒☒	40	347	13880		
26	☒••	12	391	4692		
28	•	1	439	439		
30	•	1	488	488		
32						
34	•	1	595	595		
36						
38						
40						
42						
44						
46						
48						
50						
<b>TOTALS</b>		<b>97</b>		<b>31708</b>		
<hr/>						
<b>Species</b> <input type="text" value="BALSAM FIR"/>		<b>Avg. Length</b> <input type="text" value="11"/> m				
<b>Butt Diameter</b>	<b>Tally</b>	<b>Piece Count</b>	<b>Piece Vol.</b>	<b>Volume</b>		
10						
12						
14						
16	☒••	14	145	2030		
18	☒	10	171	1710		
20	☒•	11	200	2200		
22						
24						
26	•	1	295	295		
28						
30						
32						
34						
36						
38						
40						
42						
44						
46						
48						
50						
<b>TOTALS</b>		<b>36</b>		<b>6235</b>		
<hr/>						
<b>GRAND TOTAL GROSS VOLUME</b>		<input type="text" value="37,943"/>		<b>A.</b> Total of all volumes and divided by 1000		
Less Allowable Defect Deduction		<input type="text" value="1.138"/>		<b>B.</b> Defect - Coniferous 3% (multiply <b>A.</b> by 0.03) Deciduous 5% (multiply <b>A.</b> by 0.05)		
<b>TOTAL ACCOUNTABLE VOLUME</b>		<input type="text" value="37"/>		<b>C.</b> Subtract <b>B.</b> from <b>A.</b> - record to nearest cubic metre		

**Figure 5.5 – Completed Tree Length Scale Form for Decked Timber**