REVENUE BRANCH

Coast Logging Waste Measurement Field Guide

September 2006

The original manuscript of this document, including all photos, drawings and comments, was prepared and produced by M & B Forestry Training Services *of Nanaimo, B.C. with funding supplied by the Ministry of Forests and Range, Revenue Branch. The authors wish to thank all those who reviewed the drafts and offered suggestions for improvement. We would also like to thank Judy at Judy Weger & Associates for her invaluable assistance with the format and layout design and for her longsuffering patience with a couple of old computer illiterates.*

Mike Fall & Bob Wassell

Please Note: This Field Guide illustrates the concepts and procedures on the examples given. Waste Surveyors must still be governed by the requirements of the Waste Manual and the Scaling Manual.

Please note also: Throughout this field guide, the term "Waste Manual" refers to the Provincial Logging Residue and Waste Measurement Procedures Manual, the term "Waste Surveyor" refers to a Logging Residue and Waste surveyor and the word "Waste" refers to Logging Waste as defined in the Waste Manual. This field guide is intended to supplement and clarify the Waste Manual. If there is a discrepancy between the field guide and the Waste Manual, the Waste Manual shall take precedence.

If any active Waste Surveyor finds a particularly challenging piece (measurement or classification), please take at least 5 photographs (preferably digital & including the scale stick where appropriate), describe the piece and email it to us (brenton@shaw.ca) and we will put it in the field guide format and submit it (with credit to the submitting surveyor) to the Waste Policy Forester for consideration for addition to the guide.

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Table of Contents

PART	KIND	TOPIC ILLUSTRATED and DISCUSSED	PAGE
1	LOGS and SLABS	INTRODUCTION.	3
		Measurement issues for logs.	4
		Measurement issues for slabs & shatter.	10
		Conditions effecting waste class.	16
		Decay, defects, knots & breaks.	30
2	STUMPS	INTRODUCTION.	72
		Measurement issues for stumps.	73
		Conditions effecting waste class.	86
		In/out determinations for stumps.	108
		Tally/no tally determinations for stumps.	113
		Grading stumps.	119
3	BUCKING WASTE	INTRODUCTION.	124
		Normal Bucking waste.	125
		Trimming at TMS, defects & decay.	131
		Miscellaneous other forms of bucking waste.	149
		Cut or bucked pieces not scaled or tallied.	161
4	BREAKAGE	INTRODUCTION.	168
		Avoidable breakage.	169
		Normal breakage – No tally.	171
		Slabs below TMS minimums – No tally	173
5	STANDING TREES	INTRODUCTION.	178
		Measurement and grading procedures.	179
		Legitimate 'LEAVE TREES' - No tally.	181
6	BROADLEAF SPECIES	Identification	184

PART 1

LOGS & SLABS

A **LOG** is defined as any round or near-round piece with more than half of its original circumference remaining, with an average diameter inside bark (DIB) equal to or greater than the timber merchantability specification (TMS) DIB (for the block being surveyed) and carrying that minimum DIB for at least 3m of length (ie: the gross length). A **SLAB** is defined as any non-round piece with less than half of its original circumference remaining, with a minimum thickness (at right angles to the grain) of 10cm and an average diameter equal to or larger than the TMS DIB and carrying both of those minimums for at least 3.0m of length. The only exception is mature (> 120 yrs) Western Red Cedar on the coast which must always have a slab thickness of 15cm or greater for at least 3.0m of length. Slabs are measured and graded slightly differently than logs but are always recorded as Logs (L). Waste Surveyors are permitted to use the 'short' method for measuring slab DIBs (see the Waste manual, page 5 -16, Figure 5.3). As a general 'rule-of-thumb' the lengths of logs are adjusted to account for missing wood and the diameters of slabs are adjusted to account for missing wood. More details of the procedures are described on the pages to follow.

For Waste surveys, logs and slabs are not pencil bucked to remove defects or deformities and are scaled and graded 'as-is'. The only exception is for logs exceeding 12.8m in length which are pencil bucked at 12.8m and graded according to Appendix 6 of the Waste Manual.

All logs and slabs inside or partly inside Waste Survey plots are scaled and graded according to the procedures described in the British Columbia Log Scaling Manual and the Waste manual. Where a discrepancy exists, the Waste manual takes precedence.

All logs and slabs are normally classified as 'AVOIDABLE' but can be classified as 'UNAVOIDABLE' under the following circumstances:

- When their removal will likely cause severe site disturbance or damage, especially in riparian areas or when their removal would create a safety hazard to workers.

- When the process of their removal will likely result in their breaking up into unmerchantable pieces. Such logs would be classified as unavoidable breakage and not tallies. See section 4 of this guide.

- When they have been impregnated with rock, sand or metal which would likely create a safety hazard during processing.

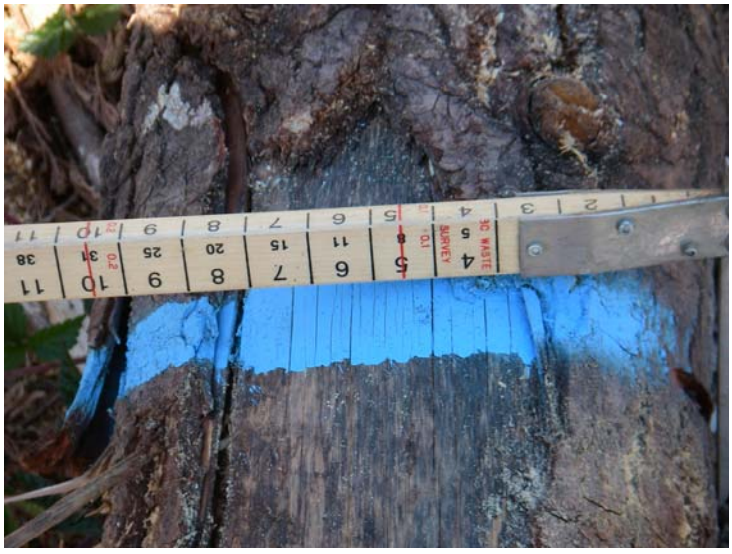
- When they are situated in areas where they are inaccessible to normal logging equipment or unsafe for logging crews to access.

Measurement of Pieces with broken end(s)

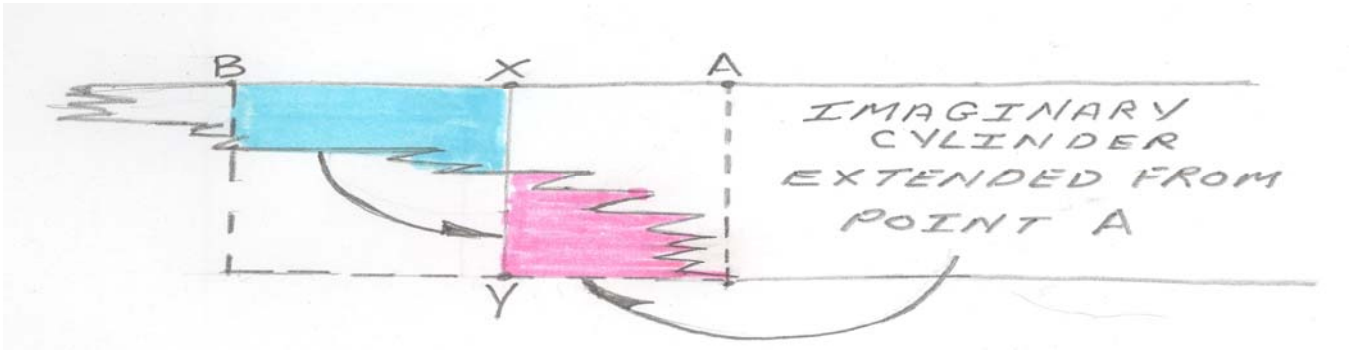
Middle blue line marks the piece net (or folded) length

Point where DIB (or thickness) falls below TMS

Point where piece end is clean & complete



Measurement of Pieces with broken end(s)



Volumes for all pieces scaled and recorded for Waste Surveys are computed using a mathematical formula that assumes the ends are round and complete, in other words, looking just like a cut end (and referred to as a "clean end"). In order to arrive at the correct volume for pieces where the end(s) are not round and complete (ie. broken), Waste Surveyors must adjust the piece dimensions to account for the missing wood involved in the tapered or jagged end(s). As a general 'rule of thumb': for logs (which are generally round or near round) the adjustment is made to the length and for slabs (which are not round or near round) the adjustment (described later in this field guide) is made to the diameter.

For measurement, classification and grading purposes there are three important points on each broken end and they are illustrated in the drawing above as points "A", "B" and "X" (and by the painted blue lines in the photo at the left). They (and their purposes) are described as follows:

- Point "A" is where the end is round and complete. It is referred to as the "clean end" and this is where the DIB (diameter inside bark) is measured. **No** lengths are measured to this spot but it may define the length of a product (which may affect the grade of the piece involved).

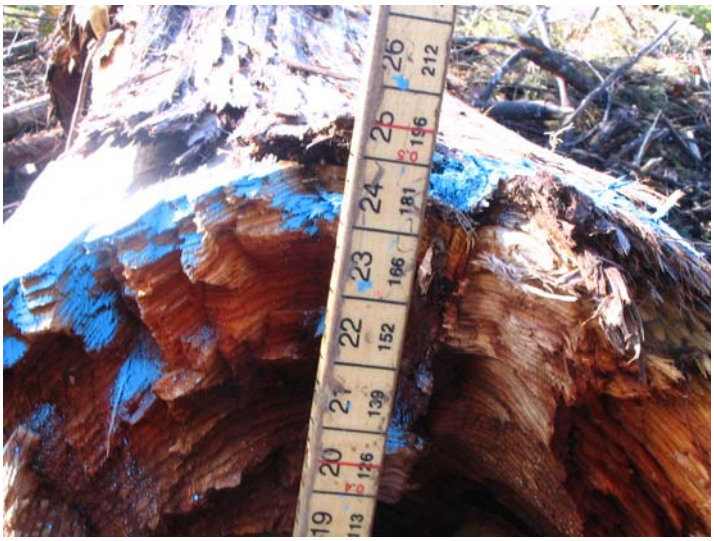
- Point "B" is the last point (along the break) where the DIB (or the thickness) meets the TMS minimum. **GROSS** piece lengths are measured to this point. Gross lengths are used to classify pieces and grade logs but they are not used for volume calculations.

- Point "X" marks the location of an imaginary line ("X – Y"), established by scalers and Waste Surveyors, that crosses an imaginary cylinder (extended from the clean end (point "A") to the TMS end (point "B") at a spot where the volume of missing wood on one side of the line (from "A" to "X", shaded pink) is equal to the volume of wood on the other side of the line (from "X" to "B", shaded blue). The process of establishing this line ("X – Y") is called 'folding' because the wood is (figuratively) folded into the void. The point "X" identifies the folded or **NET** piece length. The difference (in meters) between the gross length and the net length (ie between "A" and "X") is called a **DEDUCTION** which, in the cases of broken ends would be for missing wood. Bluntly broken ends may have points "A", "B" and "X" all virtually in the same location and no adjustment necessary.

NOTE: In actuality, for broken ends, most Waste Surveyors simply record the net length in the gross "LENGTH" column on the tally card (and do not record a deduction). If, however, the net length for a log (which by definition has a gross length of 3.0m or longer) is less than 3.0m, this 'shortcut' may not be used. The procedure for measuring and recording lengths for these short logs is described later in this field guide.

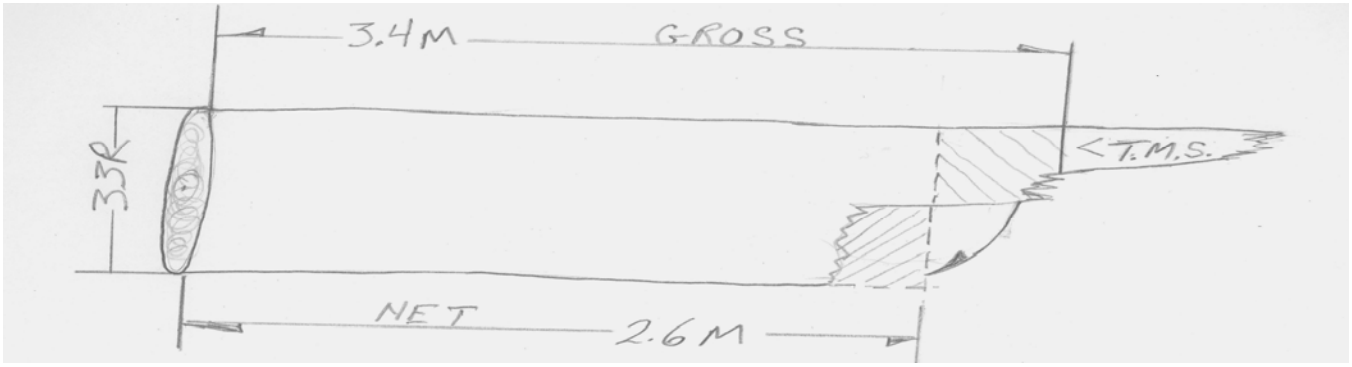
Special Procedure for very short logs with broken end(s)

Point where DIB falls below TMS



Blue paint line marks folded (net) length

Special Procedure for very short logs with broken end(s)



When found in accumulation or dispersed sub populations:

At first glance, the piece illustrated in the photo (at left), would appear to be bucking waste but because the gross piece length exceeds 3.0 m; it meets the definition and would therefore be classified as a log. The 'shortcut' method of accounting for missing wood in broken ends (by simply recording the net length) may not be used for logs where the net length is less than 3.0m because the compilation program will not recognize a log that has a recorded length less than 3.0 m in length unless it is (or you call it) a borderline piece. In these cases the full gross length is recorded and a deduction (in the illustrated example 3.4m – 2.6m = 0.8m) is recorded to account for the missing wood (decay code "M"). These are the only instances where Waste Surveyors are required to actually record a deduction for missing wood in broken ends. The proper recording of the piece illustrated in the photo (at left) and in the drawing (above) is shown on the tally card below as piece D01.

Proper entry of piece(s) on FS 161 (Plot tally card)

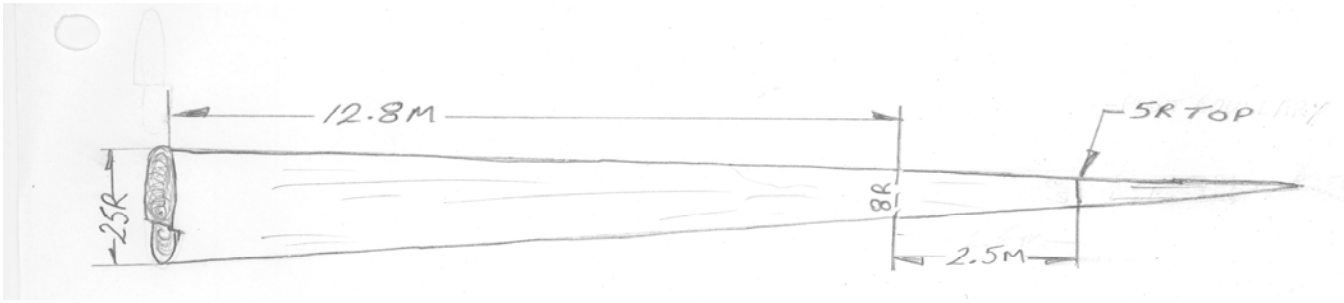
Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
					0		0								
D	01	C	E	L	A	034	0	31	B	0	33	C	X	I	08				M	
					0		0								

Special Procedure for very long logs

DIB at 12.8m = 16 rads

Residual segment beyond 12.8m

Special Procedure for very long logs



When found in accumulation or dispersed sub populations:

Current scaling procedures require logs over 12.8m long to be pencil bucked into 12.8m segments (starting at the butt). See piece D01 below. This is the only instance when logs may be pencil bucked for Waste Surveys and will apply to almost all standing stems (see Part 5 if this guide). If the residual section beyond the pencil buck at 12.8m is less than 3.0m long (to the TMS minimum DIB), in order to pass the edit checks in the compilation program, it must be recorded as follows:

1. Record as a borderline log (with one natural end code). In the case of the log illustrated in the drawing above, the TMS minimum top DIB is 5.0 rads (second growth). See piece D02 below. OR

2. Record as bucking waste but graded as if 5 m long (with the butt end cut). See piece D03 below.

The DIB of the log illustrated in the **photo (left)** at 12.8 m is 16 rads, too small for an "H" so the grade is "J" or "U". The residual log is only 4.5 m (to the 7.5 rad TMS minimum DIB for old growth) but is graded as if it were 5 m long (Appendix 6) so the grade will be "J" or "U".

Proper entry of piece(s) on FS 161 (Plot tally card)

Piece No.			Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code	
						LENGTH	TOP		E	BUTT	E			LEN	TOP	BUTT	D		
In accumulation sub populations or dispersed sup populations																			
							0			0									
D	0	1	F	I	L	A	1	2	8	0	0	8	P	0	2	5	U	J	I									S	1
							0			0									
D	0	2	F	I	L	A	0	2	5	0	0	5	N	0	0	8	P	U	B									S	2
	OR						0			0									
D	0	3	F	I	W	A	0	2	5	0	0	5	N	0	0	8	C	U	I									S	2
							0			0									

Correct measurement of Old Growth Red Cedar slabs

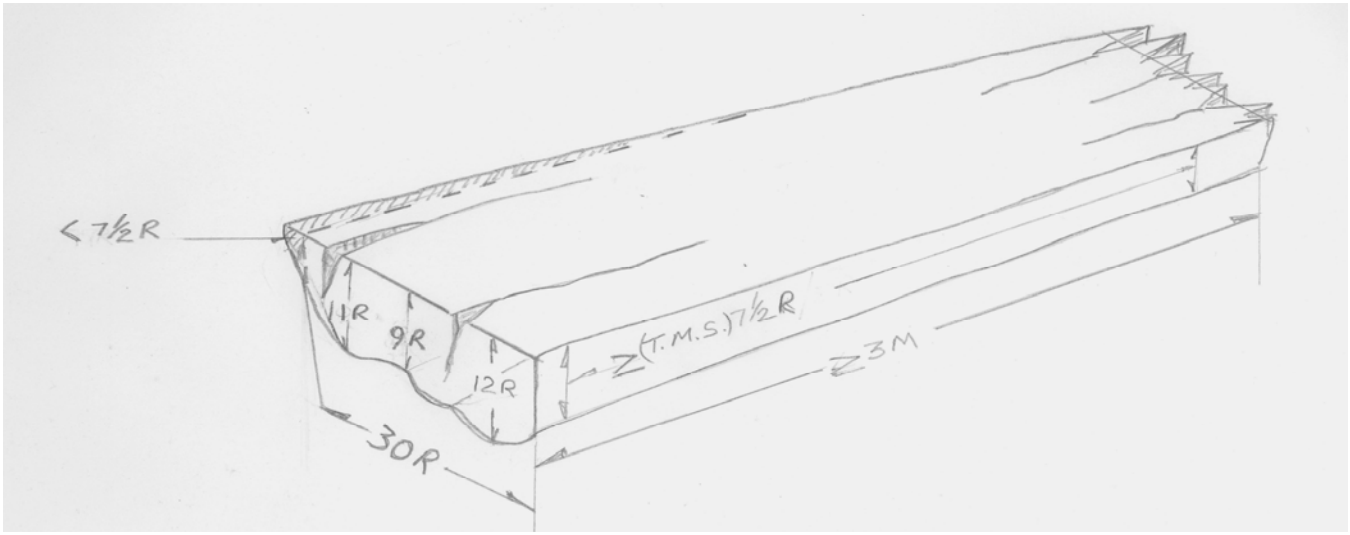
Left edge trimmed at TMS = 7.5 rads

Right edge trimmed at TMS = 7.5 rads

Thickness at center = 9.5 rads

Slab width between TMS edges = 11.5 rads

Correct measurement of Old Growth Red Cedar slabs



When found in accumulation or dispersed sub populations:

For Waste Surveys, a slightly simpler (than described in the Scaling Manual) method of measuring slab diameters is permitted. The procedure requires the measurement and averaging of 3 thicknesses between the TMS minimum thickness edges. In the case of the photos (left) the minimum (for old growth Cedar) is 7.5 rads. The average thickness for the slab end in the photos (7.5+9.5+7.5 divided by 3) is 8.2 rads. This average thickness is then averaged with the width between the minimum TMS thickness (8.2+11.5 divided by 2) to arrive at the DIB which is 10 rads. Note; DIBs are measured to the nearest half rad and rounded to the nearest whole rad for recording (after all averaging has been done). For the old growth Cedar illustrated in the drawing above, the DIB is 20 rads. See piece D01 below.

If the DIB of a slab increases of decreases between the end and the middle, measure the difference and adjust the end diameter(s) accordingly.

Proper entry of piece(s) on FS 161 (Plot tally card)

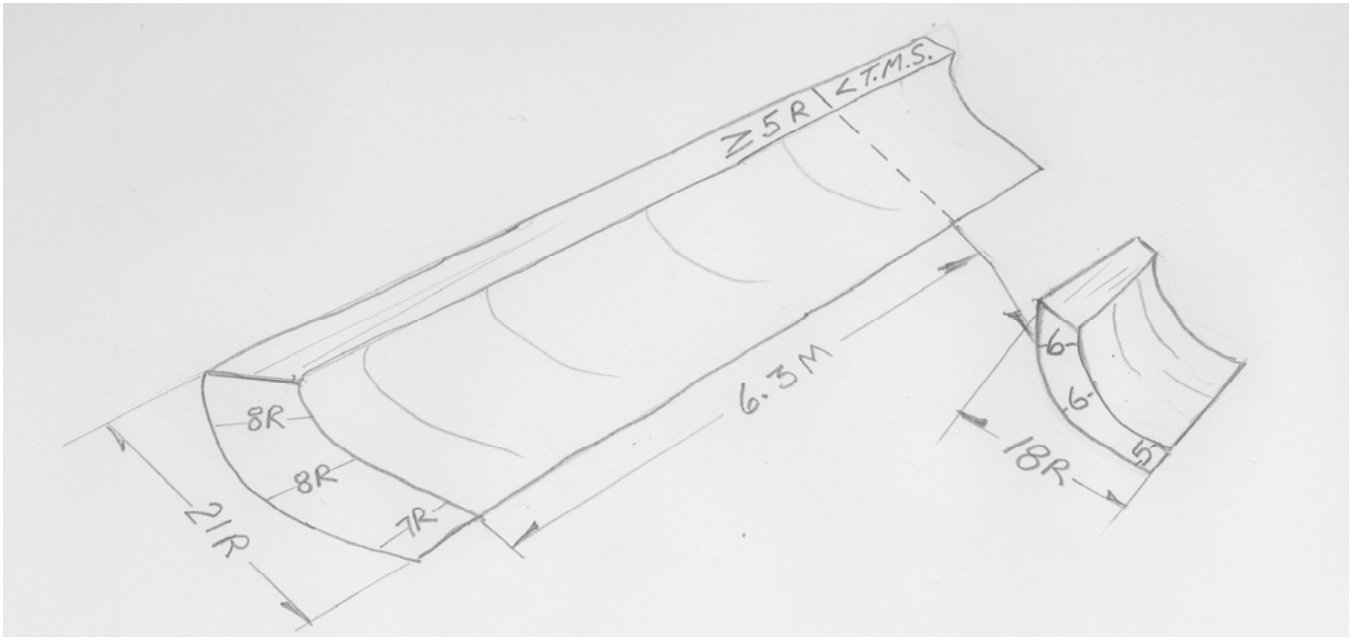
Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
					0		0								
D	01	C	E	L	A	040	0	20	C	0	25	B	M	I							S	L
					0		0								
					0		0								

Measurement of other old growth slabs and second growth slabs

Left edge trimmed at 5 rad TMS

Right edge trimmed at 5 rad TMS

Measurement of other old growth slabs and second growth slabs



When found in accumulation or dispersed sub populations:

For old growth slabs other than Cedar, the minimum TMS thickness is 5 rads and the minimum average top DIB is 7.5 rads. The procedure still requires the measurement and averaging of 3 thicknesses between the TMS minimum thickness. In the case of the drawing above, the average thickness for the slab top (5+6+6, divided by 3) is 6 rads. This average thickness is then averaged with the width between the minimum TMS thickness (18.0+6, divided by 2) to arrive at the average DIB which is 12 rads. See piece D01 below.

The procedure is the same for second growth except that the TMS minimum (average) DIB is 5 rads not 7.5 rads as it is for old growth.

Proper entry of piece(s) on FS 161 (Plot tally card)																													
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT										GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES								Comm Code	
							LENGTH			TOP			E	BUTT		E			LEN		TOP		BUTT		D			
In accumulation sub populations or dispersed sup populations																													
										0				0															
D	0	1	F	I	L	A	0	6	3	0	1	2	C	0	1	4	C	U	I								S	L
										0				0															

Heavily fractured Slabs – "Y" Grade or Unavoidable Breakage (No Tally)?

Butt end of above slab

Top end of above slab

Heavily fractured Slabs – "Y" Grade or Unavoidable Breakage = No Tally?

When found in dispersed or accumulation sub populations:

Assuming there is no evidence of careless machine operations, heavily fractured pieces (usually Red Cedar slabs) can be classified in one of three ways.

1. If the fractures are so long and deep that the individual pieces can be pulled apart with ones bare hands, they should be classified and scaled as separate pieces. Those parts below the TMS minimums would be considered normal breakage and therefore not scaled and/or tallied. Those parts larger than the TMS minimums would be classified as avoidable waste and graded according to their individual characteristics.

2. If the fractures are tight and the pieces can not be separated by hand, the piece should be scaled as one single piece and the fractures will only impact the grade. Remember, merchantable lumber can not be manufactured from fractured wood so many of these pieces will be grade "Y" (if from dead trees, they are grade 5, and therefore; not scaled or tallied)

3. If fractured pieces are situated in rugged terrain and, in the opinion of the Waste Surveyor, would not withstand the rigors of yarding and loading without breaking into unmerchantable pieces, they will be considered to be unavoidable breakage and therefore not scaled and/or tallied.

The piece illustrated in the photos at the left was already on the roadside and the top was not nearly as badly shattered as the butt so it would fall into category 2 (above). It did not, however, contain enough shatter free material to meet the requirements for the "X" grade and would therefore be graded "Y". The tally of the illustrated piece is shown below as piece A01 with the comment code SH (for shatter) to explain the "Y" grade.

Proper entry of piece(s) on FS 161 (Plot tally card)

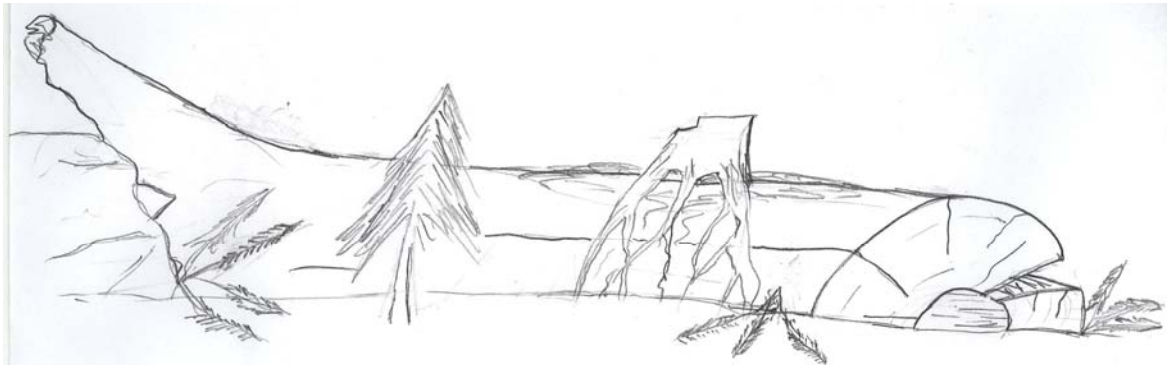
Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
					0		0								
A	0	1	C	E	L	A	0	7	3	0	1	6	B	0	2	2	C	Y	I							S	H
					0		0								

Very old Cedar windfall partially embedded in ground

Top end of above log

Butt end of above log

Very old Cedar windfall partially embedded in ground



A – When found in accumulation sub populations:

Partially buried logs are occasionally found in roadside strata and where significant site disturbance or degradation will occur if they are removed by logging equipment, they may be classified as unavoidable (regardless of grade) and scaled for cut control only. See piece A01 on the Plot Tally Card below.

B – When found in dispersed sub populations:

In addition to the potential site disturbance and/or damage, in rough terrain these logs are frequently smashed into numerous small slabs and slivers by the yarding and loading process. Much of the volume then ends up as breakage either scattered over the dispersed strata or in the roadside burn piles, consequently they may be classified as unavoidable regardless of grade and scaled for cut control. The lower left photo (left) illustrates where an attempt to recover the second log resulted in a significant amount of breakage and wasted shake material. See piece D01 below. The comment “BR” signifies the log is buried or partially buried.

Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT										GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES								Comm Code	
							LENGTH		TOP		E	BUTT		E					LEN		TOP		BUTT		D			
In accumulation sub populations or dispersed sub populations:																												
A	*0*	*1*	*C*	*E*	*L*	*U*	*1*	*2*	*0*	*1*	*1*	*0*	*C*	*1*	*3*	*0*	*N*	*M*	*I*			*0*	*3*	*0*	*4*	*H*	*B*	*R*
										0				*0*														
D	*0*	*1*	*C*	*E*	*L*	*U*	*1*	*2*	*0*	*1*	*1*	*0*	*C*	*1*	*3*	*0*	*N*	*M*	*I*			*0*	*3*	*0*	*4*	*H*	*B*	*R*
										0				*0*														

Culvert logs still under road

Culvert log in partially de-built road

Rock imbedded in log

Culvert logs still under road

A – When found in accumulation sub populations:

Often the ends of buried culvert logs will be in roadside strata plots. They normally have rock ground into the wood which can not easily be removed. This rock presents a safety hazard if these logs were ever cut with a chain saw or processed in a sawmill. Consequently, they are all classified as unavoidable with the comment 'CULVERT LOG" (CL) unless they have been protected with a geotechnical fabric. Occasionally the first one or two shorter slabs and chunks used for the 'lid' of the culvert are also situated in an accumulation plot. If the 'lid' pieces are less than 3.0m long and are cut at both ends so they would be classified as unavoidable bucking waste. See piece A01. See the section covering bucking waste in Part #3 of this guide.

B – When found in dispersed sub populations:

Culvert logs are seldom found in dispersed strata plots but if one were, the same logic and procedures (as above) would apply.

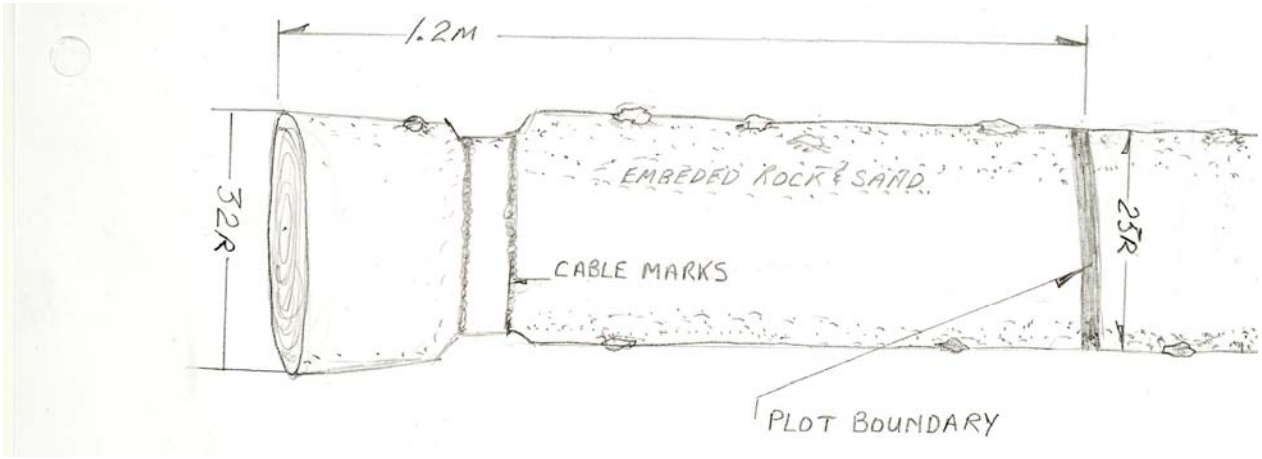
Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT										GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code	
							LENGTH			TOP		E	BUTT		E				LEN	TOP	BUTT	D		
In accumulation sub populations																												
										0				0														
A	0	1	C	E	L	U	0	2	1	0	7	0	C	0	7	0	N	U	B							C	L
										0				0														

Culvert logs from debuilt roads

Imbedded rock in Cedar culvert log

Imbedded rock in Cedar culvert log

Culvert logs from debuilt roads



A – When found in accumulation sub populations:

When Waste plots are established after road deactivation, wooden culvert parts are sometimes found in accumulation plots. They normally have rock ground into the wood which can not easily be removed. This rock presents a safety hazard if these logs were ever cut with a chain saw or processed in a sawmill. Consequently, they are classified as unavoidable with the comment 'CULVERT LOG' (CL). See piece A01. If the culvert parts have been protected with geotechnical fabric and there are no indications of impregnated rock, they should be classified as avoidable. See piece A02. Usually 'lid' pieces are less than 3.0m long and are cut at both ends so they would be classified as bucking waste, not logs (but still unavoidable if impregnated with rock and/or sand). See the section covering bucking waste in Part #3 of this guide.

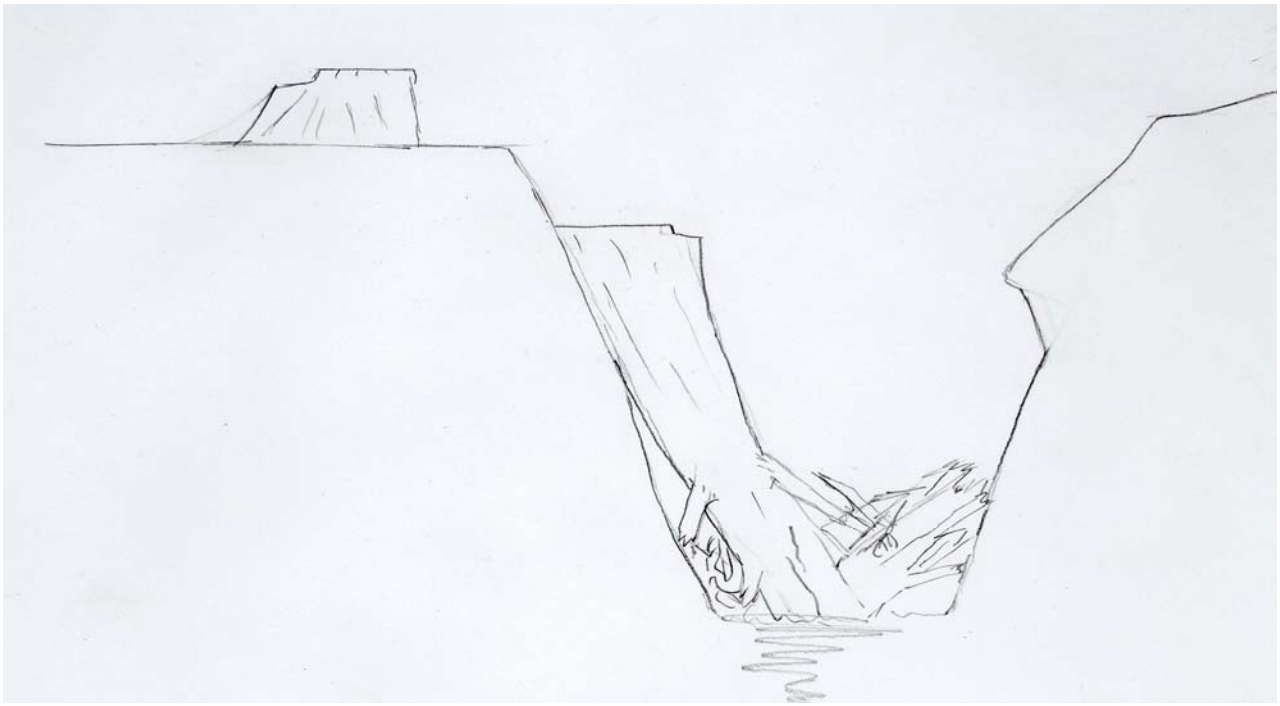
B – When found in dispersed sub populations:

Culvert logs are seldom found in dispersed strata plots but if one were, the same logic (as above) would apply.

Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT									GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code	
							LENGTH		TOP		E	BUTT		E				LEN		TOP		BUTT		D			
In accumulation sub populations																												
											0				0													
A	0	1	B	A	L	U		1	2	0	2	5	N	0	3	2	C	H	B							C	L
										0				0													

Inaccessible log in canyon (drawing will be replaced with a photo)

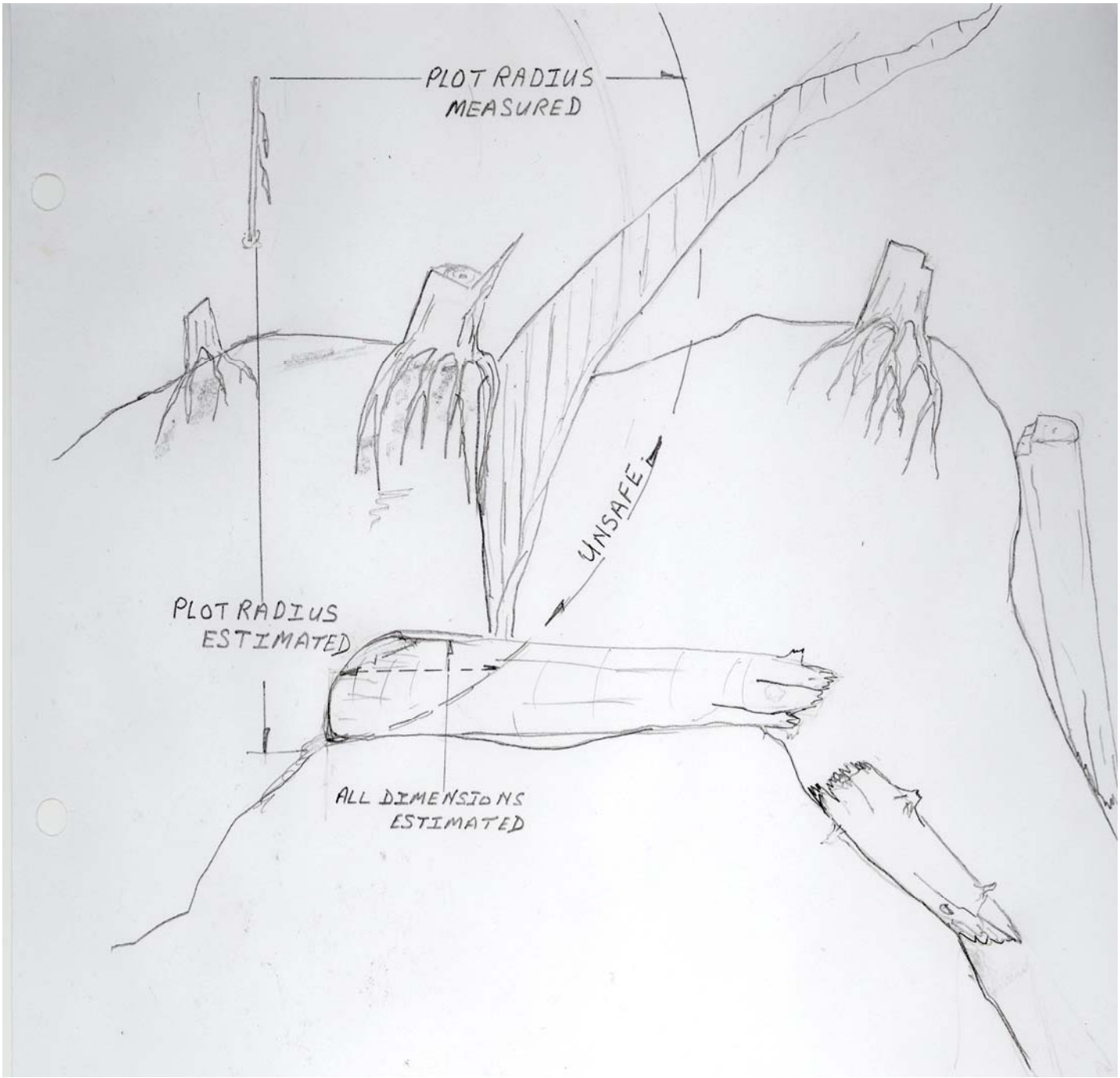
Inaccessible log in canyon



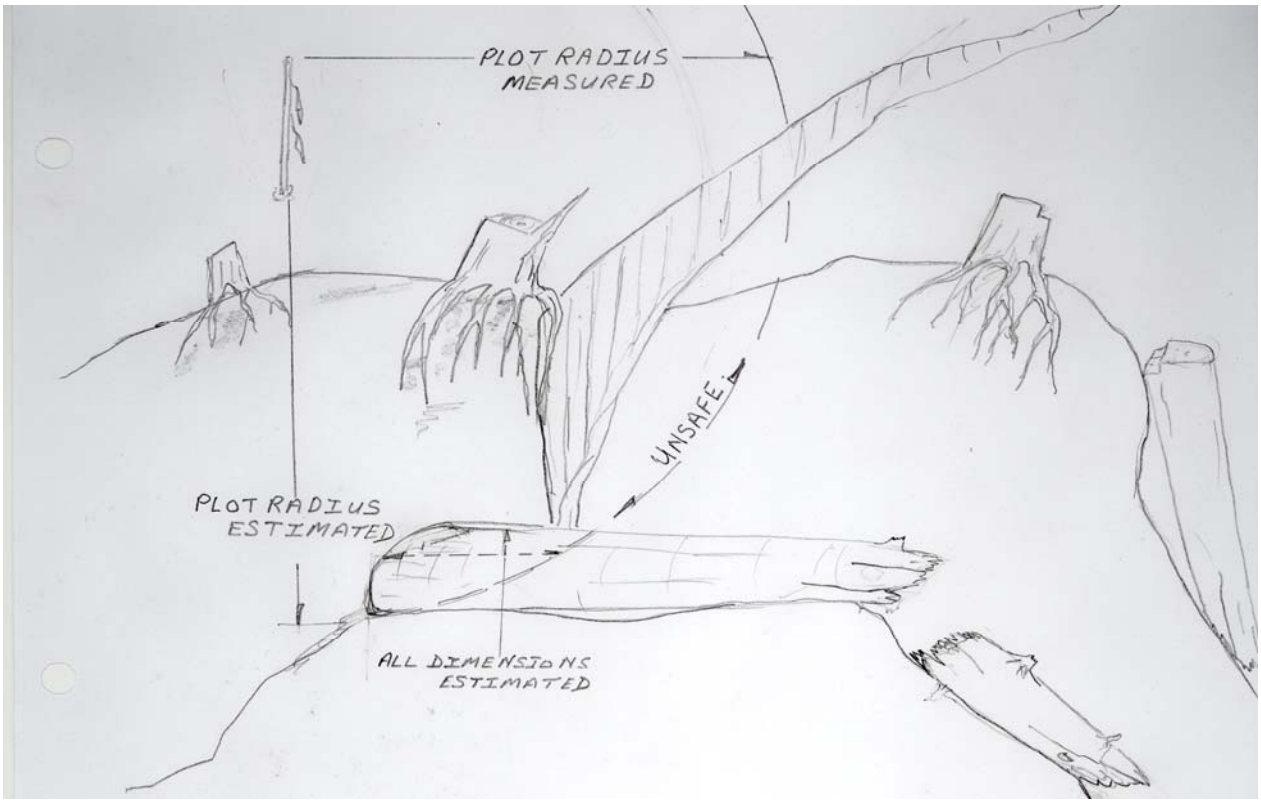
On rare occasions, trees and or logs fall into canyons where the harvesting equipment simply can not recover them or it is unsafe to try. If such trees or logs are encountered in a dispersed plot, they tallied as unavoidable waste with UNSAFE (US) or INACCESSIBLE (IN) in the comment column. See piece D01 and D02 below.

Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT									GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code	
							LENGTH		TOP		E	BUTT		E				LEN		TOP		BUTT		D				
In dispersed sub populations																												
										0				0														
D	0	1	H	E	L	U	1	2	8	0	2	5	P	0	3	7	U	H	I								I	N
										0				0														
D	0	2	H	E	L	U	1	0	0	0	0	8	N	0	2	5	P	U	I								I	N
										0				0														

Logs on extreme terrain (Drawing will be replaced with a photo)



Logs on extreme terrain



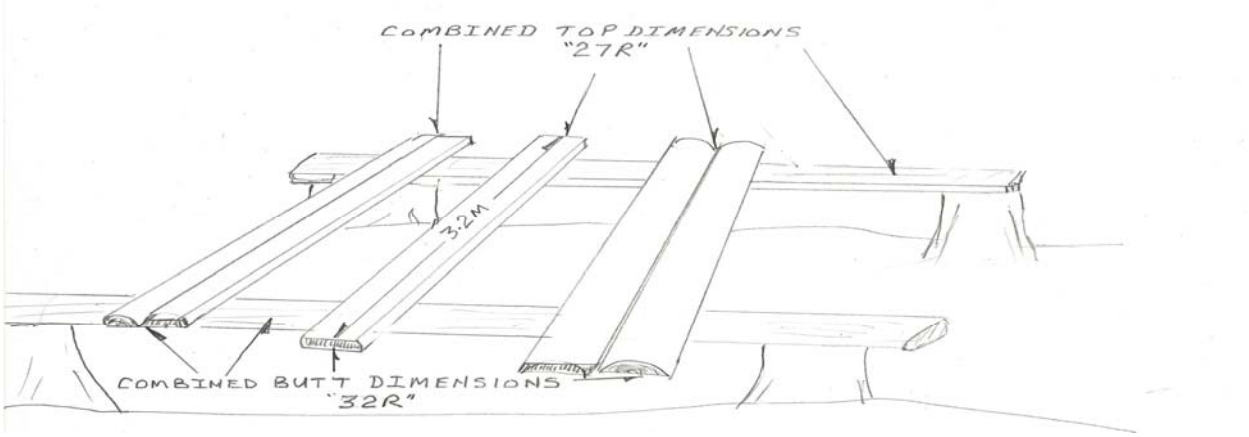
In extreme terrain, logs are occasionally 'hung up' on rock ledges or other places where it would be dangerous for workers to attempt attaching a choker to them (Heli or High Lead). It is usually also unsafe for Waste Surveyors to measure them and their dimensions must therefore be estimated. Under these and any other hazardous conditions, such logs are always classified as unavoidable. See piece D01.

Proper entry of piece(s) on FS 161 (Plot tally card)

Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
				0			0								
D	01	C	E	L	U	050	0	44	U	040	N	H	B		US
				0			0								

Logs in Heli pads

Logs in Heli pads



When found in dispersed sub populations:

Heli pads are a necessity for access and safety when workers are working long distances from the roads. They are normally constructed with a number of intentionally created high stumps and some poles or ripped logs. All parts of any heli pad are classified as unavoidable and recorded with the comment code HELI PAD (HP).

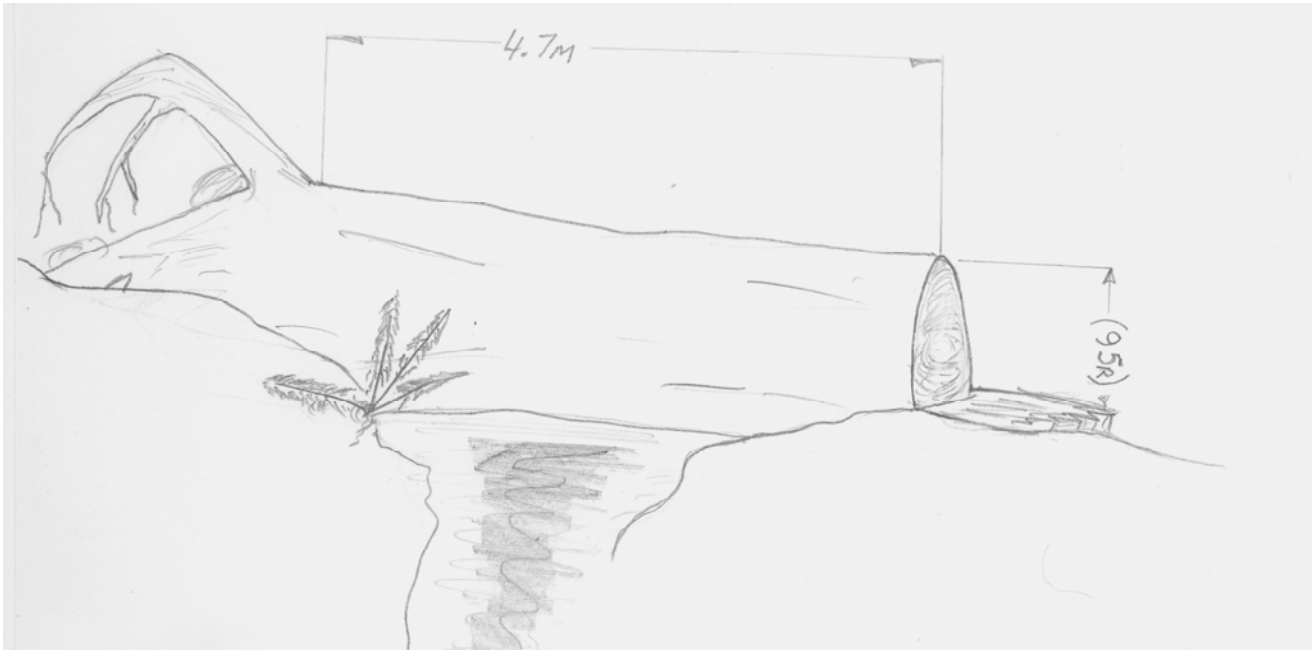
In some instances, the 'spots' available for the construction of a heli pad are limited and one must be built on or over top of a merchantable log or logs. Since recovery of these logs would most likely damage or destroy the heli pad, they must be left undisturbed therefore they will also be classified as unavoidable and recorded with the comment code HELI PAD (HP).

Ripped logs may be figuratively 'put back together' for measurement purposes. See piece D01 below. Do not scale or tally pieces that did not meet the minimum TMS prior to being ripped. Scaling and recording the stumps and pieces less than 3.0m long will be described in further sections of this guide.

Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.	Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code	
					LENGTH	TOP		E	BUTT	E			LEN	TOP	BUTT	D		
In accumulation sub populations or dispersed sup populations																												
						0			0																			
D	0	1	C	E	L	U	0	3	2	0	2	7	C	0	3	2	C	U	I								H	P
						0			0																			

Environmental concerns – Log over stream.

Environmental concerns – Log over stream.



When found in accumulation or dispersed sub populations:

Whenever logs are situated over or near a stream in such a position where their removal would cause damage to the stream bed or bank and have been left in place to avoid that potential damage, they are classified as unavoidable with the comment code EV (environmental concern). For this classification, it is not necessary for fish to be present in the stream or creek as downstream water quality is just as important to protect as the actual fish habitat its self. If there are no riparian concerns and the harvesting plan allows yarding across that stream, then the piece is classified as 'avoidable' waste. All environmental concerns should be noted on the Waste Survey plan map but in actuality, they are often overlooked. See piece D01 below for the tally of the log illustrated above.

Proper entry of piece(s) on FS 161 (Plot tally card)

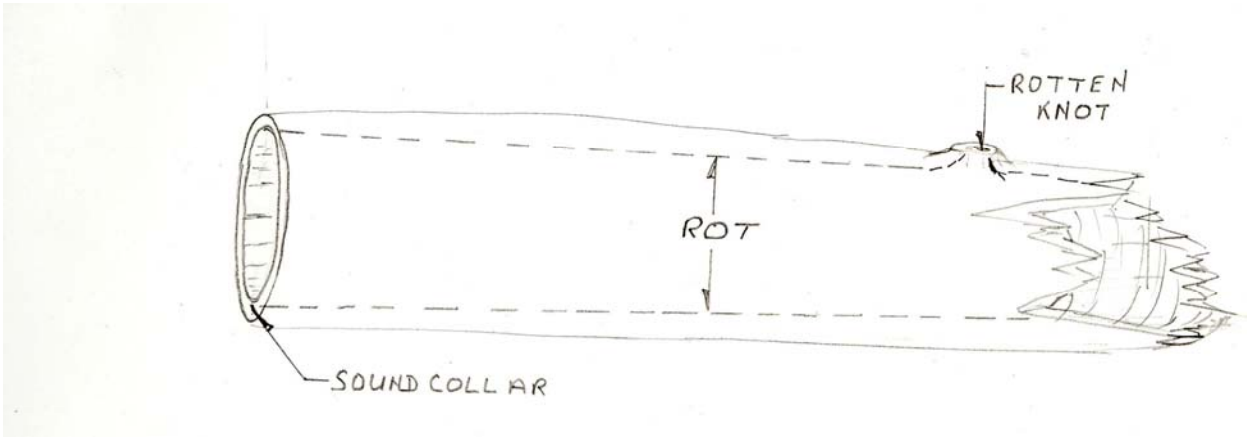
Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
					0		0								
D	O	1	C	E	L	U	0	4	7	0	9	5	E	1	2	0	E	H	I							E	V
					0		0								

Heavy internal decay (heart rot) < 50% Sound - Z Grade – No Tally

Butt end

Top end

Heavy internal decay (heart rot) < 50% Sound - Z Grade – No Tally



When found in accumulation or dispersed sub populations:

Whenever a log, being scaled in a waste plot, has heart rot or a hole running through it's entire length and the diameter of that heart rot or hole exceeds two thirds of the log DIB, the soundness % must be checked to see if the log is "Z" grade. When conducting Waste Surveys, "Z" grade logs are not tallied. One of the 3 definitions of a "Z" grade log applicable to Waste Surveys is: "A log where heart rot or hole runs the entire length of the log and the residual collar of firmwood constitutes less than 50 percent of the gross scale of the log." (B.C. Scaling manual, page 6-107). The log illustrated above and left has a gross DIB of 37 rads (UV = 430dm3) and the hole is 33 rads (UV = 342dm3). Using the unit values (UVs) for those diameters, this log is 80% decay or 20% sound, clearly making this a "Z" grade log. This calculation should be done at both ends of the log and the results averaged.

The other two definitions of "Z" grade logs that are applicable to Waste Surveys will be described later in this guide.

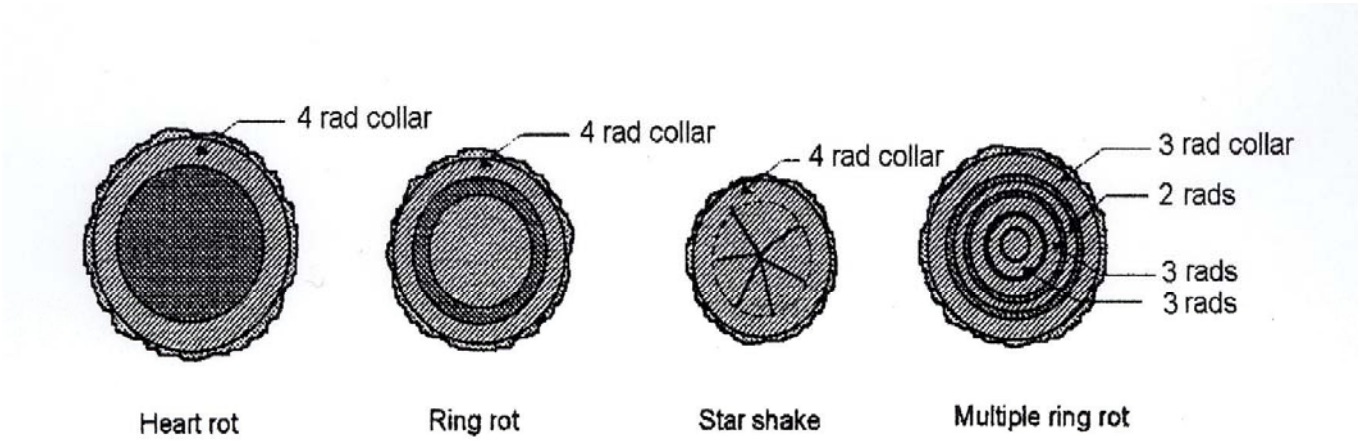
Proper entry of piece(s) on FS 161 (Plot tally card)																													
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT									GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES								Comm Code		
							LENGTH			TOP			E	BUTT		E				LEN		TOP		BUTT		D			
In accumulation sub populations or dispersed sup populations																													
										0				0															
N	O		S	C	A	L	E			0				0		N	O		T	A	L	L	Y					
										0				0															

Internal decay (heart rot) > 50% Sound – Y Grade - insufficient collar

Heart rot = 14 rads

Collar = 3.5 rads

Internal decay (heart rot) > 50% Sound – Y Grade - insufficient collar



1. Examples of logs with entire collars too thin to produce lumber

When found in accumulation or dispersed sub populations:

The log illustrated at the left has heart rot running the full length of the log. At the top, the gross DIB is 24 rads (UV = 181dm3) and the diameter of the decay is 14 rads (UV = 62dm3). Assuming the butt (not shown) has the same proportion of decay, the log is 66% sound so it contains enough soundwood to meet the requirements of the "X" grade but the collar of soundwood is not thick enough for the cutting of lumber so the grade is "Y". It is recommended that Waste Surveyors record comments for all unavoidable pieces and all "Y" grade logs. The comment for this log would be INSUFFICIENT COLLAR (IS). See piece D01 below.

The drawings above illustrate other examples of logs that have insufficient collar for the manufacture of lumber and are consequently "Y" grade. The ring rot example illustrated above (second from left) may meet the requirements for the "X" grade if the volume of the soundwood core exceeds 33% of the log volume. Refer to the BC scaling manual, section 6.4.2.1 for a more complete description of "Determining Grade Reduction for Collars."

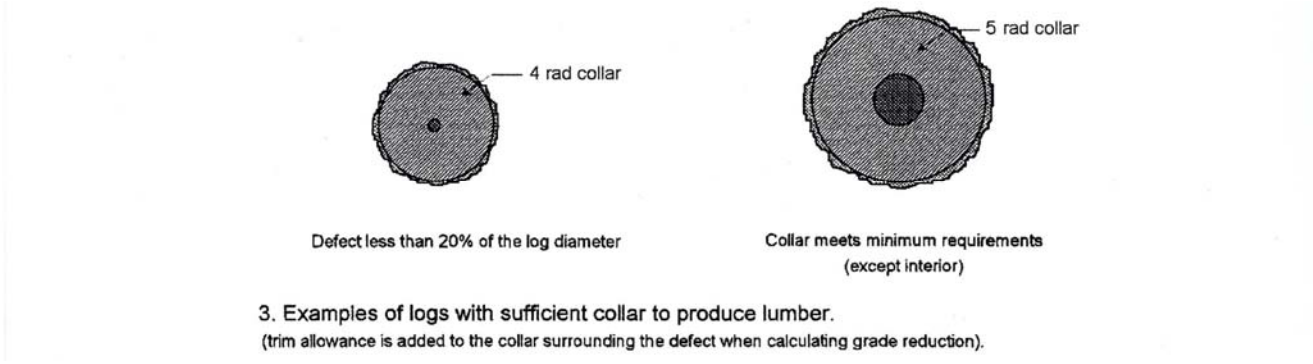
Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.			Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT										GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code	
						LENGTH			TOP			E	BUTT		E			LEN		TOP		BUTT		D		
In accumulation sub populations or dispersed sup populations																												
										0				0														
D	0	1	F	I	L	A	0	6	4	0	2	4	C	0	3	2	U	Y	I			0	5	1	2	H	I	S
										0				0														

Minor internal decay (heart rot) > 50% Sound - Sawlog Grade(s)

Gross DIB = 28 rads, decay = 12 rads

Gross DIB = 32 rads, decay = 8 rads

Minor internal decay (heart rot) > 50% Sound – Sawlog Grade(s)



3. Examples of logs with sufficient collar to produce lumber.
(trim allowance is added to the collar surrounding the defect when calculating grade reduction).

When found in accumulation or dispersed sub populations:

Excluding the size and number of knots, small logs with minor amounts of heart rot need to have sufficient collar to produce lumber. Trim allowance is NOT considered when measuring collar thickness. Once it has been determined there is sufficient collar thickness, the trim allowance (2 rads) is added to the diameter of the decay to compute the % of the log volume available for the cutting of lumber. If we assume the log above (left) has a gross DIB of 10 rads (UV = 31dm3) with 2 rads (UV = 1dm3) of heart rot, the log is 97% sound and 84% of the log will produce lumber. The volume of decay is so small no diameter deduction can be made but a length deduction of 0.2m would account for the decay. See piece A01 below. If we assume the log above (right) has a DIB of 14 rads (UV = 62dm3) with 4 rads (UV = 5dm3) of heart rot. The log is 94% sound. The rot core plus the trim however, is 6 rads (UV = 11dm3) in diameter which means 82% of the log can be cut into lumber. See piece A02 below. Again, a length deduction is more appropriate than a diameter deduction. As logs get larger and the 5 rad collar is maintained, the percent lumber decreases to where the grade drops from "U" to "X" (at about 28 rads gross DIB) and eventually to "Z" (at about 35 rads). The log illustrated in the photo (left) is 88% sound and has 82% of its volume available for lumber, more than enough for a sawlog grade. This log is tallied below as piece A03 using diameter deductions to account for the decay.

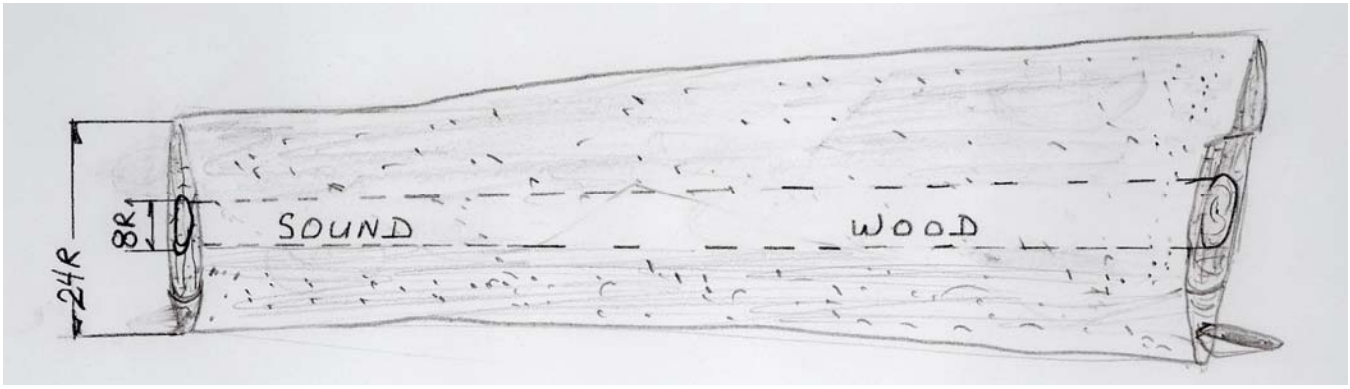
Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT										GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES					Comm Code	
							LENGTH			TOP			E	BUTT		E			LEN		TOP		BUTT	D		
In accumulation sub populations or dispersed sup populations																												
A	0	1	F	I	L	A	0	5	5	0	1	0	C	0	1	1	C	U		0	2							
										0				0														
A	0	2	F	I	L	A	0	5	5	0	1	4	C	0	1	5	C	U		0	4							
										0				0														
A	0	3	F	I	L	A	0	3	3	0	2	8	C	0	3	2	U	X				0	3	0	1	H		
										0				0														

Heavy external decay (sap rot) - Dead "Y" or "Z" Grade – No Tally

Sap rot depth = 8 rads

Gross log diameter = 24 rads

Heavy external decay (sap rot) - Dead "Y" or "Z" Grade – No Tally



When found in accumulation or dispersed sub populations:

The sap rot on the outside of the log illustrated above and to the left is 8 rads deep. The gross diameter of the log is 24 rads which leaves a soundwood core of only 8 rads (24 – [8 + 8] = 8). The unit value for the 8 rad soundwood core is 20dm3 and the unit value for the gross log (the full 24 rads) is 181dm3 24/181 = 11%). In order to meet the requirements of the "X" grade, a log must be capable of producing 33.3% of its gross volume in lumber. Including a trim allowance, this log will only produce less than 10% so it is "Y" grade. It is quite obvious this log was from a dead tree and "Y" grade logs from dead trees are not tallied for Waste Surveys. In order for a log like this, with heavy sap rot, to meet the minimum requirements for the "X" grade it would need a soundwood core that was at least 34% of the gross log volume PLUS at least a 2 rad trim allowance. (34% of 181dm3 = 62 = 14 rads) For this log, that is about a 16 rad core which leaves 8 rads for sap rot or 4 rads on each side.

One of the definitions of a "Z" grade log applicable to Waste Surveys is a log with sap rot that has a net length less than 1.2m. If we assume the mid point (average) gross DIB of the log illustrated above is 30 rads, with a soundwood core of only 8 rads, it would need a gross length of over 17m in order for it NOT to be a "Z" grade. (1.2 X 283dm3 = 340dm3 / 20dm3 = 17.0m). "Z" grade logs are also not tallied. The third definition of a "Z" grade log is a log where the diameter of the soundwood core at the butt end is less than 5 rads. The log illustrated above does not meet that definition.

Proper entry of piece(s) on FS 161 (Plot tally card)

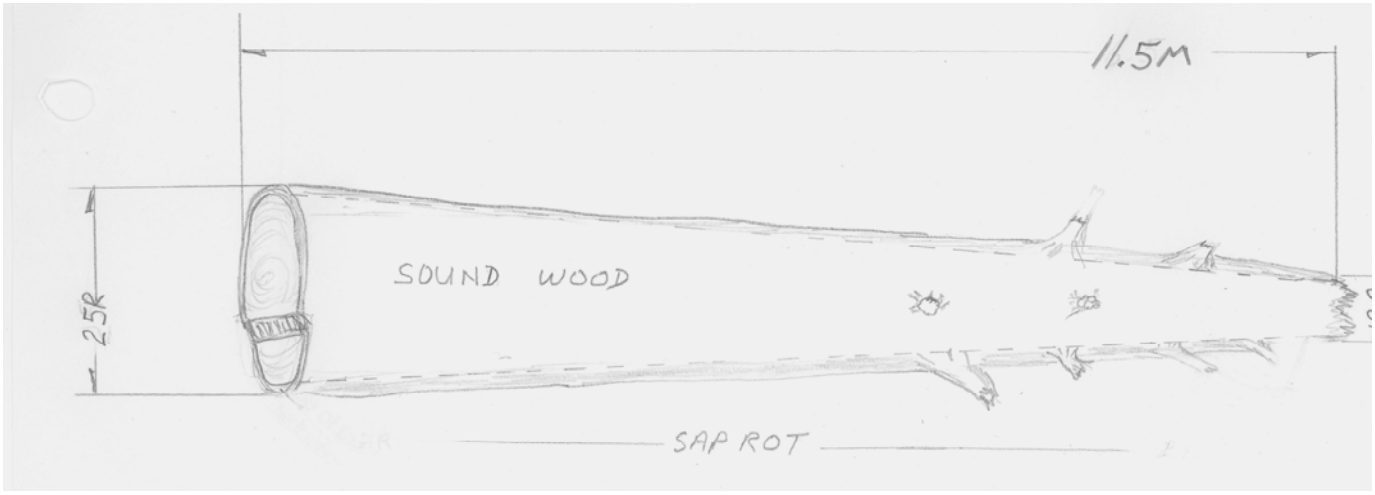
Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
					0		0								
N	O		S	C	A	L	E		0			0		N	O		T	A	L	L	Y					
					0		0								

Minor external decay (sap rot) - Sawlog Grade(s)

Log DIB = 16 rads

Sap rot depth = 1 rad (2cm)

Minor external decay (sap rot) > 50% Sound – Sawlog Grade



When found in accumulation or dispersed sub populations:

The log illustrated above and left has a minor amount of sap rot and has the dimensions and other requirements to make the "U" grade. Waste Surveyors are required to identify grades "J" (for Hemlock and Balsam only), "U", "X", "Y", and "Z". The deductions for sap rot are recorded as double the sap rot depth and in the photo (left) we have measured the sap rot depth in the middle of the log in order to reduce the number of illustrations. In practice it must be done at both ends and the deduction computed separately for each end. This log is approximately 70% sound and with a 12 rad top, easily meets the requirements for the "U" grade. See piece D01 below.

All logs from dead trees should be chopped into (or prodded with a knife or carpenters awl) and inspected for the presence of sap rot. For small diameter logs, even a minor amount of sap rot can have a serious impact on the log grade. For example, a log with a DIB of 9 rads with a sap rot depth of 2 rads is only 32% sound.

Proper entry of piece(s) on FS 161 (Plot tally card)

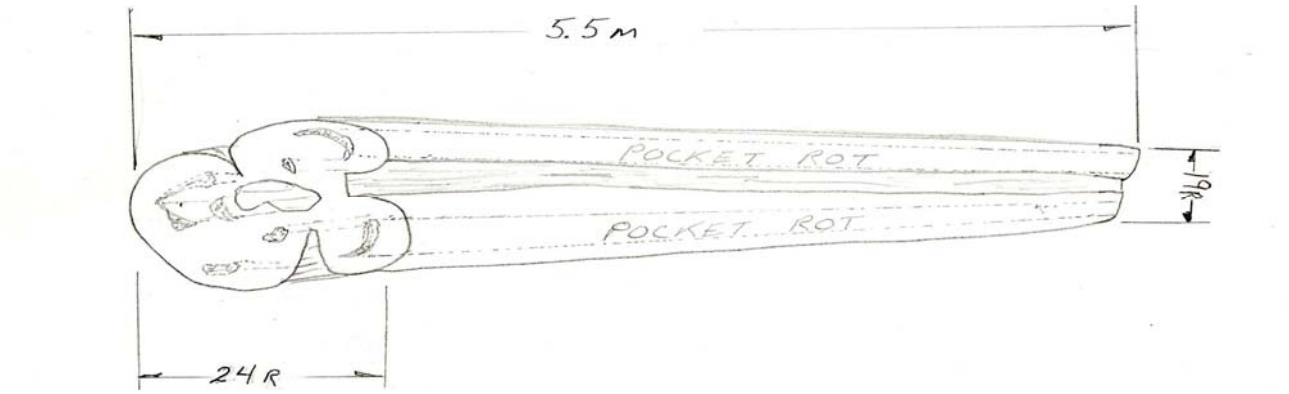
Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
					0		0								
D	01	C	E	L	A	11	5		0	12	B	0	23	U	U	I			02	04	S		
					0		0								

Pocket Rot – Y Grade

Top end with heart rot and bird holes

Butt end with irregular decay

Pocket Rot – Y Grade



When found in accumulation or dispersed sub populations:

Pocket rot normally has as a major impact on grade but only a minor impact on volume. Pockets of decay are not permitted in merchantable lumber which is a requirement of all sawlog grades. In the drawing above, there are 8 pockets of decay roughly 2 rads each in diameter and 1 pocket of heart pot 4 rads in diameter. The UV for 2 rads is 1.3 dm3 therefore 8 would have a UV of 10 dm3 which added to the heart rot (5 dm3) gives a total of 15 dm3. The UV for the gross butt is 181, less the 15 = 166 which converts back to a net diameter of 23 rads giving a deduction of 2 rads. See piece D01 below.

In this example, the pockets of decay are scattered throughout the log and there is insufficient unaffected wood to produce the percentage of merchantable lumber required to make the sawlog grades therefore this log is "Y" grade. If the pockets of decay were confined to one third or one half of the log it may meet the requirements for a sawlog grade. The log illustrated in the photo (left) most likely had insects living in the pockets of decay hence the numerous woodpecker holes.

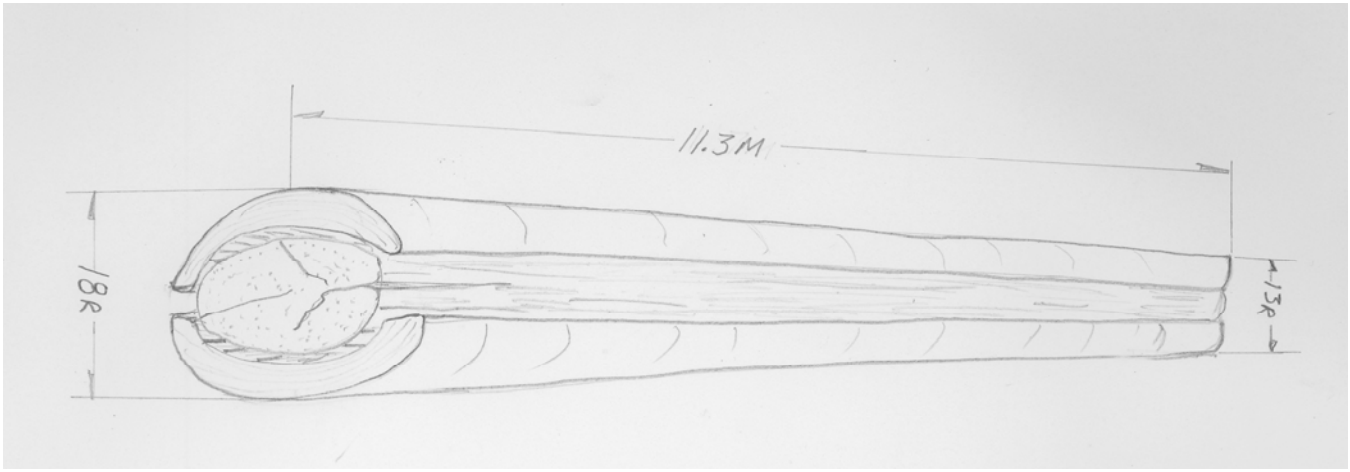
Proper entry of piece(s) on FS 161 (Plot tally card)																													
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT									GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES							Comm Code	
							LENGTH			TOP			E	BUTT	E			LEN		TOP		BUTT		D		
In accumulation sub populations or dispersed sup populations																													
										0				0															
D	0	1	C	E	A	L	0	5	5	0	1	9	C	0	2	4	C	Y	I					0	2	P		
										0				0															

Separated Cat Face – Y Grade

Butt segments all unsuitable for lumber

Top segments also unsuitable for lumber

Separated Cat Face – Y Grade



When found in accumulation or dispersed sub populations:

The log illustrated above and left has a gross butt DIB of 18 rads which is separated into 3 pieces of roughly 6 rads each. Logs with separated cat face like this, unless very large, will not produce the percentage of merchantable lumber required to meet any of the sawlog grades. Waste Surveyors must consider the effect of any checking (in the center core) which often occurs on exposed heart wood caused by the cat face. Waste Surveyors must also account for the missing wood in the separation if it is significant enough to warrant a diameter deduction.

A much larger log could possibly produce the required merchantable lumber from each segment. Each log with separated cat face must be assessed for grade based on its own characteristics and other defects. For the tally of the above log, see piece D01. The comment CF (cat face) indicates the reason for the "Y" grade.

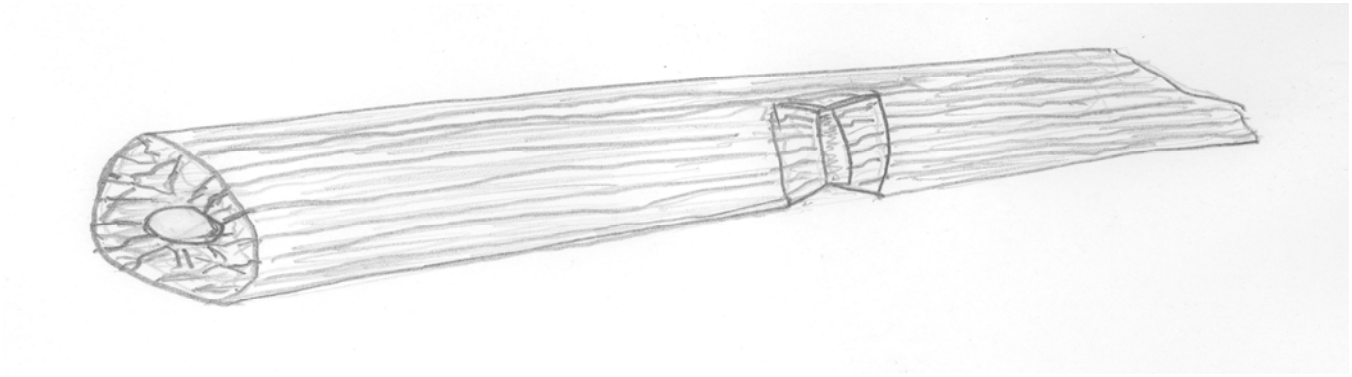
Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT										GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES							Comm Code	
							LENGTH			TOP			E	BUTT		E			LEN		TOP		BUTT		D		
In accumulation sub populations or dispersed sup populations																												
										0				0														
D	0	1	C	E	L	A	1	1	3	0	1	3	C	0	1	8	C	Y	I					0	1	M	C	F
										0				0														

Separated Grain, Delamination or "Onion Skin".

Grain separation deep into log or slab

Wood completely unsuitable for lumber

Separated Grain, Delamination or "Onion Skin".



When found in accumulation or dispersed sub populations:

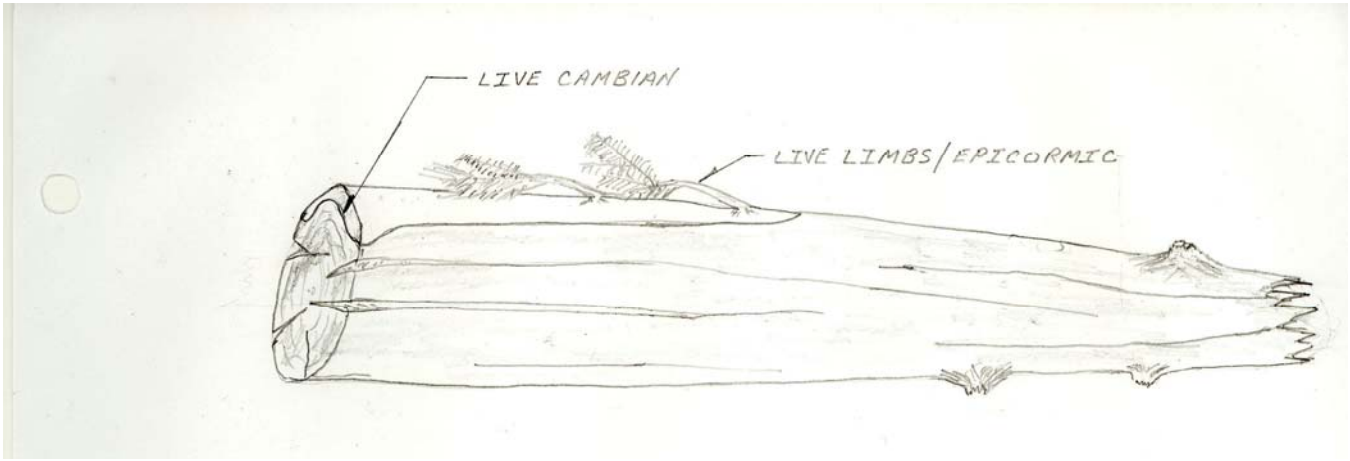
The log illustrated in the photo (left) and the drawing (above) is being decayed by a pathogen unique to Western Red Cedar (probably a relative of *Phellinus weirii)* Most commonly, this type of decay takes place in very wet conditions. As the photo and the drawing show, the wood begins to delaminate along the annual rings and when advanced, this delamination can penetrate deep into a log or slab. Because the wood is basically still sound, this type of decay is not deducted (as diameter or length deduction to reduce volume) in the normal manner and is treated as fractured wood. These fractures have a major impact on grade so Waste Surveyors must chop into pieces that exhibit this type of decay to determine the percentage of the log volume affected in order to determine the grade. Often the decay is only found where the log or slab is in contact with the ground so chopping must be done in several locations and the depth of the delamination averaged.

The logs illustrated in the photos and the drawing show very deep penetration of the decay and would therefore not produce a large enough percentage of their gross volume in lumber to meet the requirements of the "X" grade and therefore be "Y" grade. Quite obviously from a dead tree (grade 5), and would not be scaled or tallied.

Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT									GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES							Comm Code	
							LENGTH		TOP		E		BUTT		E			LEN		TOP		BUTT		D		
In accumulation sub populations or dispersed sup populations																												
									0				0															
N	O		S	C	A	L	E		0				0		N	O		T	A	L	L	Y					
									0				0															

Grey Ghost – Deep sun checks – From top of Live tree - Y Grade

Grey Ghost – Deep sun checks – Dead top from a live tree - Y Grade



When found in accumulation or dispersed sub populations:

The deep sun checks in most grey ghosts cause them to be "Y" grade so the classification issue is not 'billable' vs non-billable but scale vs no scale for cut control volume. The proper definition of a dead "Y" grade (no scale) log is *a "Y" grade log from a dead tree* and not simply *a dead "Y*" therefore, the Waste Surveyor must decide whether a grey ghost has originated from a live or a dead tree. The log illustrated in the photo (left) and the drawing above has some evidence (live bark and/or live branches) of having come from a live tree but many do not. For those grey ghosts that have no evidence of live material, Waste Surveyors must scan the surrounding forest and estimate the proportion of Cedar (and sometimes Cypress) trees that are live trees with a dead top as opposed to completely dead trees. That proportion then can be used to decide how many grey ghosts should be scaled. For example, if roughly half of the surrounding Cedar or Cypress trees were completely dead, the Waste Surveyor would scale every second one. See piece D01 below. The comment GG (grey ghost) indicates the reason for the "Y" grade.

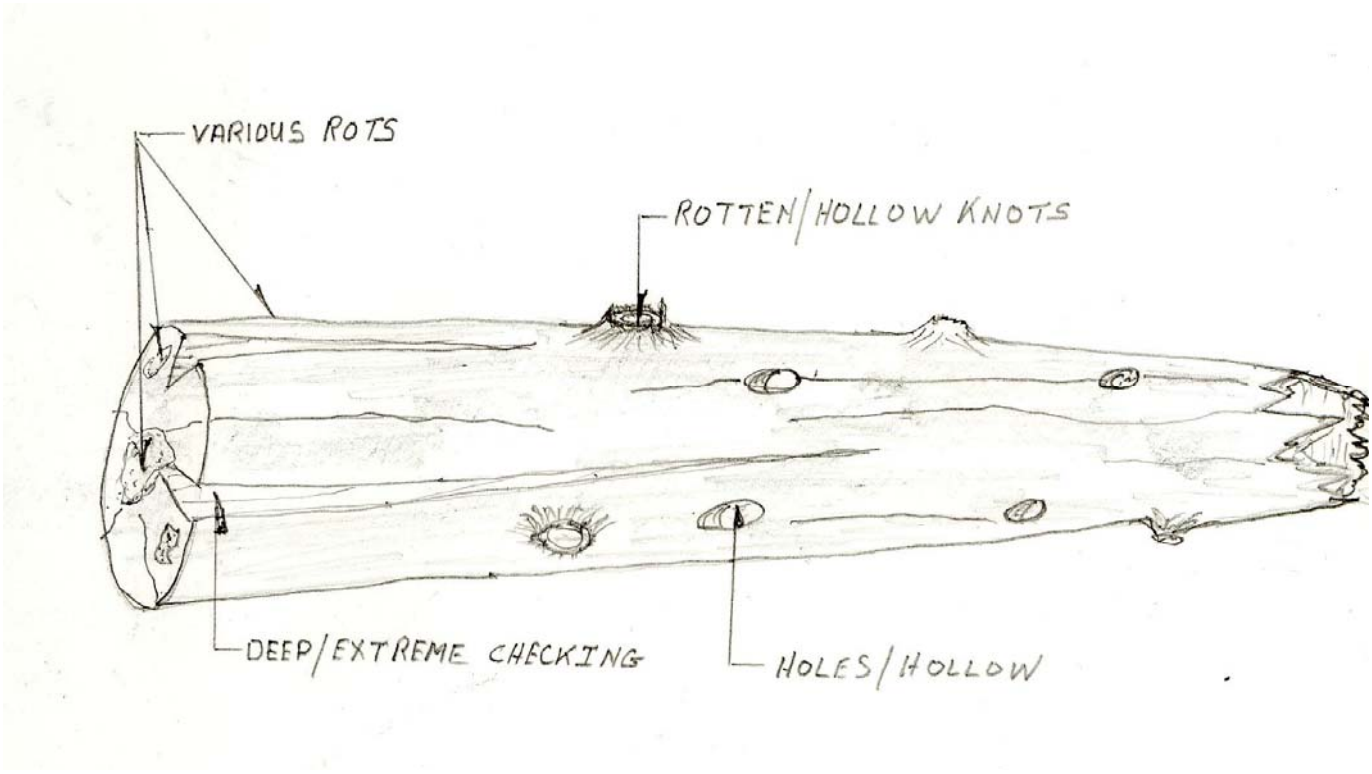
Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT									GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES							Comm Code	
							LENGTH			TOP			E	BUTT	E			LEN		TOP		BUTT		D		
In accumulation sub populations or dispersed sup populations																												
										0				0														
										0				0														
D	0	1	C	E	L	A	0	6	3	0	1	0	B	0	1	6	C	Y	I							G	G
										0				0														

Grey Ghost - From dead tree – Dead Y Grade - No Tally

Rotten (hollow) knot on Grey Ghost

Deep Sun Check on Grey Ghost

Grey Ghost - From dead tree – Dead Y Grade - No Tally



When found in accumulation or dispersed sub populations:

Using the same procedure and/or logic described for the previous grey ghost, we will assume this one came from a dead tree which means it fits the definition of a dead grade "Y" (grade 5) and is therefore not scaled or tallied. See tally card below.

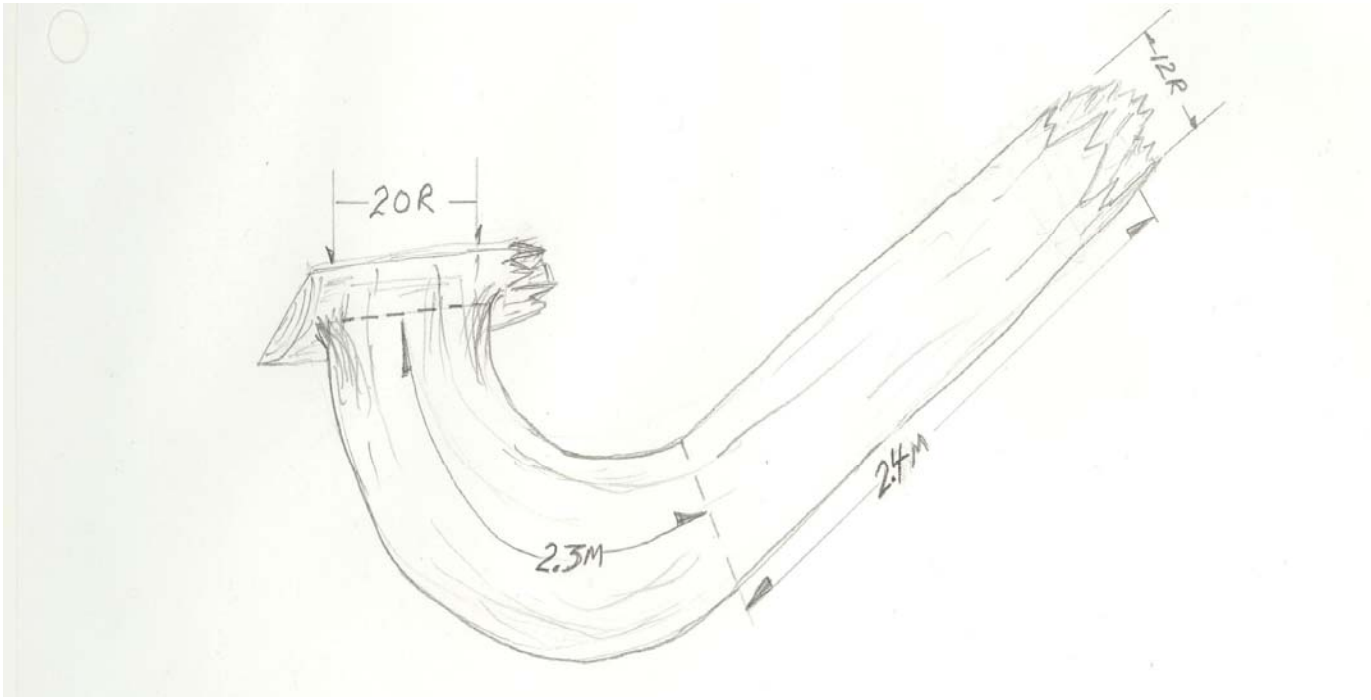
Proper entry of piece(s) on FS 161 (Plot tally card)																													
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT									GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES								Comm Code		
							LENGTH			TOP			E	BUTT	E			LEN		TOP		BUTT		D				
In accumulation sub populations or dispersed sup populations																													
										0				0															
N	O		S	C	A	L	E			0				0		N	O		T	A	L	L	Y					
										0				0															

Candelabra - No straight lumber - Y Grade

Top of Candelabra Log

Butt of Candelabra log

Candelabra - No straight lumber - Y Grade



When found in accumulation or dispersed sub populations:

Candelabras are a form of branch most typical, but not exclusive to Western Red Cedar. When a candelabra, such as the one illustrated left and above, does not contain a straight, shatter free section 2.5m long (or longer), the merchantable lumber requirements for a sawlog grade can not be met therefore the grade must be "Y". If a candelabra does contain a straight and shatter free section over 2.5m long, the volume of that section must also constitute over 33 % of the entire piece in order to make the sawlog grade "X". See piece D01 below. The comment CA (candelabra) indicates the reason for the "Y" grade.

Proper entry of piece(s) on FS 161 (Plot tally card)

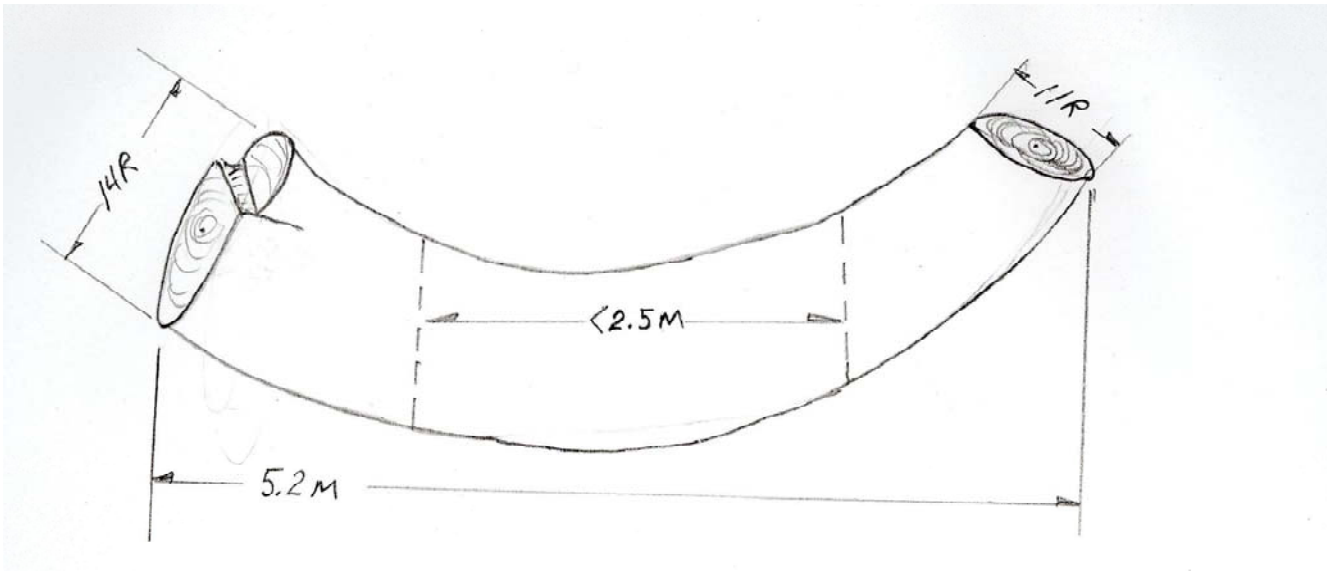
Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
				0			0								
D	01	C	E	L	A	047	0	12	B	0	20	B	Y	I							CA
				0			0								

Major sweep – No straight lumber – Y Grade

Top end – only 1.5m of straight wood

Butt end – only 2.0m of straight wood

Major sweep – No straight lumber – Y Grade



When found in accumulation or dispersed sub populations:

Logs that have severe sweep must contain at least one straight section 2.5m (or longer) that represents a minimum of 33% of the volume of the entire piece and 35% of which must produce merchantable lumber. For logs with multiple straight sections (2.5m or longer), it is the sum (of the volume) of these straight sections that determines the percent of the log available for the manufacture of lumber (which in turn may determine the grade). See pages 6-48 and 6-49 of the provincial scaling manual for a complete description of lumber loss due to sweeps and crooks. See piece D01 for the tally of the piece illustrated in the drawing above. The comment SW (sweep) indicates the reason for the "Y" grade.

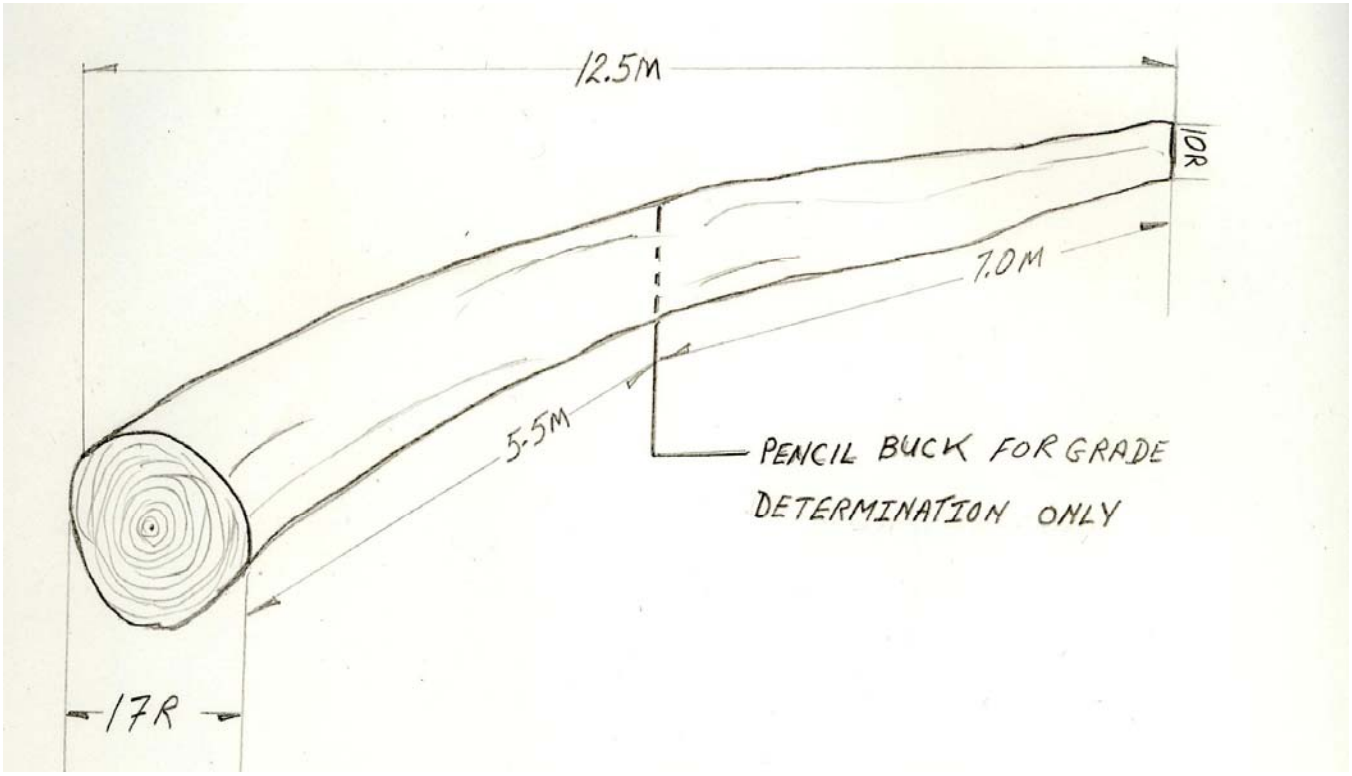
Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT										GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code	
							LENGTH			TOP			E	BUTT		E			LEN	TOP	BUTT	D		
In accumulation sub populations or dispersed sup populations																												
										0				0														
D	0	1			L	A	0	5	2	0	1	1	C	0	1	4	U	Y	I							S	W
										0				0														

Minor sweep – Sufficient lumber for sawlog grade(s)

Minor double sweep with straight sections

Minor pistol grip with straight sections

Minor sweep – Sufficient lumber for sawlog grade(s)



When found in accumulation or dispersed sub populations:

Logs with minor sweep that contain a section or sections longer than 2.5m that will produce 33% lumber of which 35% is merchantable or better will be graded as sawlog (“X+”) See piece D01 below.

Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT									GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES					Comm Code	
							LENGTH			TOP			E	BUTT	E			LEN		TOP		BUTT	D		
In accumulation sub populations or dispersed sup populations																												
										0				0														
D	0	1	F	I	L	A	1	2	5	0	1	0	C	0	1	7	C	U	I									
										0				0														

Minor Spiral Grain (Twist) – Sawlog or shingle Grade

Defection = 2 rads or 3% of log top DIB

Log top DIB = 60 rads

Minor Spiral Grain (Twist) – Sawlog or shingle Grade

The amount of twist permitted for a particular grade is expressed as a percentage of log diameter according to the grade rules. Figure 6.22 demonstrates placing the scale stick, and Figure 6.23 shows one method for reading the deflection.

Specific twist requirements by grade are described in Section 6.5 (coast) and Section 6.6 (interior).

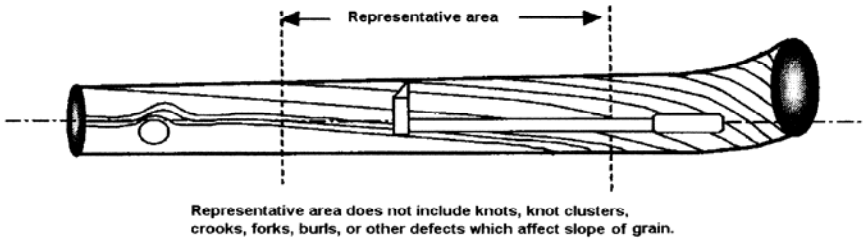


Figure 6.22 Measuring twist - placing the stick.

As shown in Figure 6.22, orient the scale stick parallel with log's longitudinal axis on an area where the grain deflection is representative.

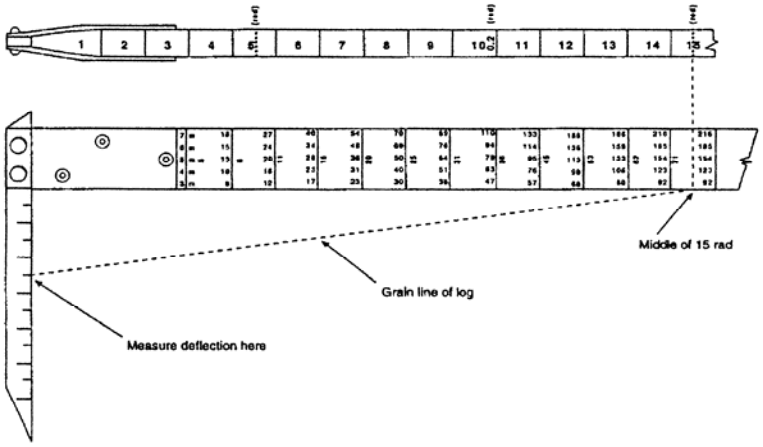


Figure 6.23 Measuring twist - reading the deflection.

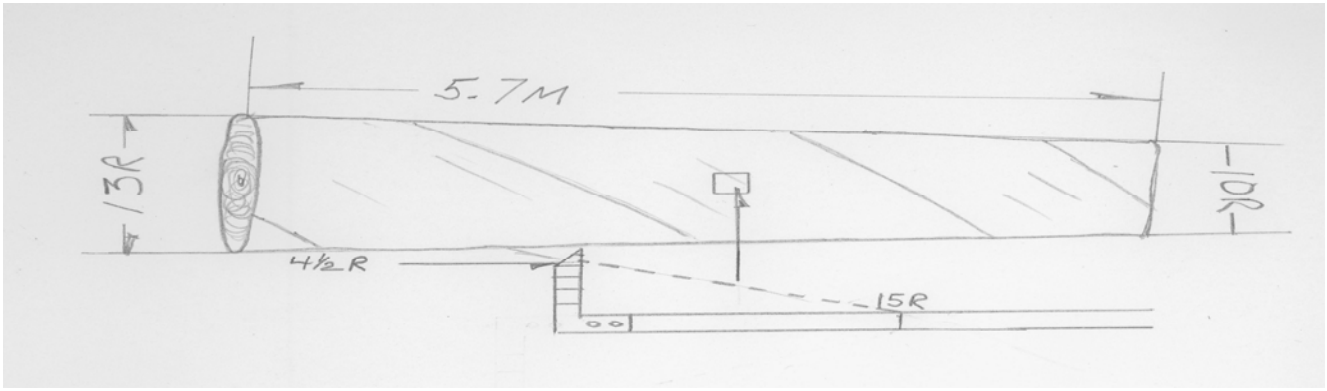
With its shaft parallel to the log's central axis, the stick is positioned such that one of the log's grain lines passes right through the middle of the 15 rad class. The point where this grain line intersects the tine is the deflection. The deflection is then read where the grain line intersects the tine. Here, it reads as 5 cm or 2.5 rads. Note: the tine of this stick is graduated in centimetres. Although not a requirement, scalers often mark them out to improve accuracy.

Severe Spiral Grain (Twist) - Y Grade

Deflection = 1.5 rads or 17% of log top DIB

Log top DIB = 9 rads

Severe Spiral Grain (Twist) - Y Grade



MAXIMUM TWIST ALLOWED BY GRADE

Maximum twist allowed	**4%**	**7%**	**10%**	**10%**	**13%**	**> 13%**
Maximum deflection allowed	**3 rads**	**4 rads**	**4.5 rads**	**1.8 rads**	**6.5 rads**	**> 6.5 rads**

ALLOWABLE GRADES	**D,E,F,G S/L**	**H S/L**	**I S/L**	**J S/L**	**U & X S/L**	**Y CHPR**
	K Shg.	**L & M Shg.**	**DECID S/L.**			

The log illustrated in the drawing above has an average twist (4.5 rads on a 10 rad top = 45%) well over the maximum allowed for sawlog grade(s). See piece D01 below for the tally of the log illustrated above. The twist on the log illustrated in the photo (left) is less severe but still enough (17%) to prohibit a sawlog grade. See piece D02 below for the tally. Twist should be measured at a location on the log where the grain deflection is representative.

Proper entry of piece(s) on FS 161 (Plot tally card)

Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
					0		0								
D	01	HEL	A	057	10	C	013	C	Y	I					SG
					0		0								
D	02	HEL	A	046	09	B	012	B	Y	I					SG
					0		0								

Pistol Grip (Butt) - Y Grade

NEED PHOTO

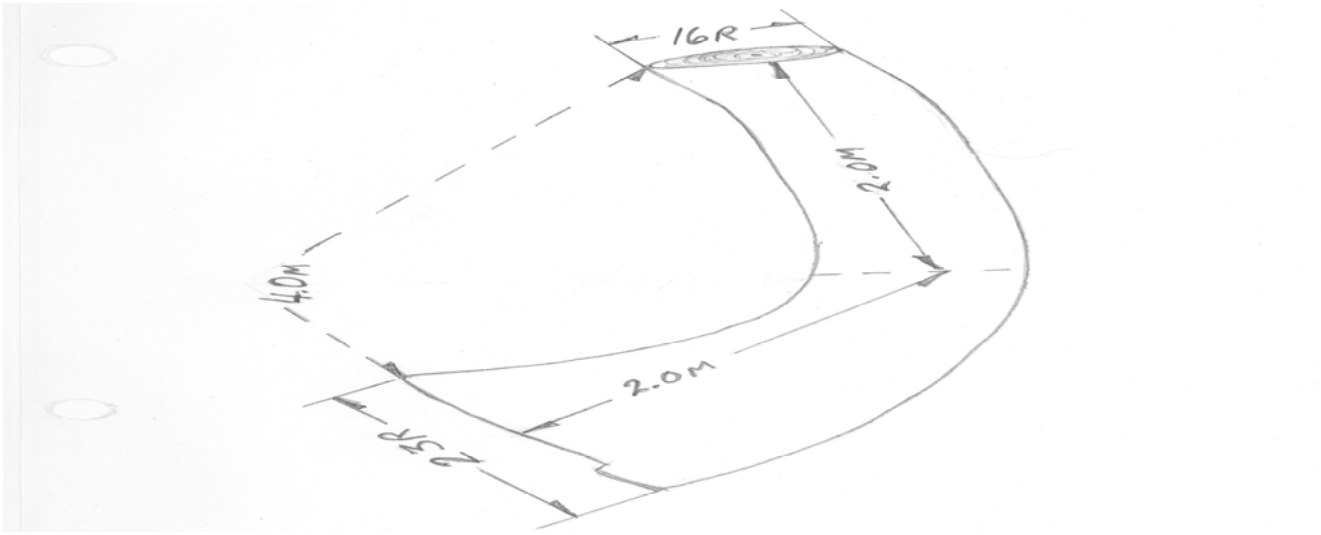
Butt DIB = 16 rads

Top DIB = 13 rads

NEED PHOTOS

NEED PHOTOS

Pistol Grip (Butt) - Y Grade



When found in accumulation or dispersed sub populations:

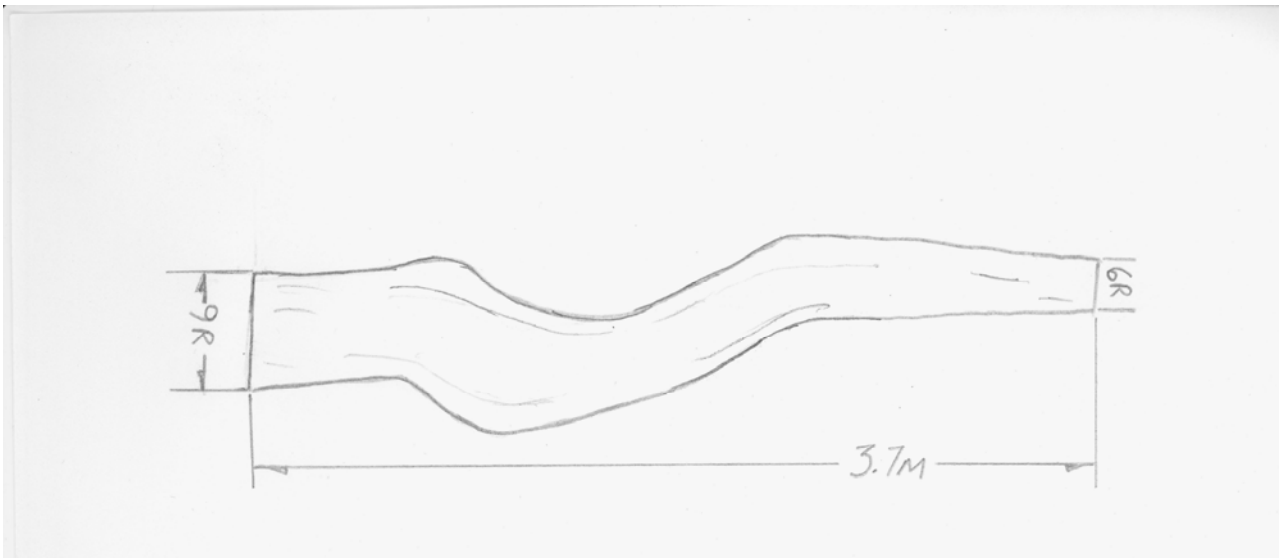
Under certain conditions, mainly unstable slopes, trees will develop a pronounced crook at the butt. This defect is commonly called “Pistol Grip” because the shape is similar to the handle of a revolver. It is also called a pistol butt. The pistol grip illustrated in the drawing (above) is typical of many stems found growing on steep unstable slopes where the soil is constantly ‘creeping’ downhill. Pistol grips are also commonly found in avalanche areas where trees growing in the chute are occasionally pushed over by the snow but recover and attempt to grow upright again. For the tally of the pistol grip illustrated in the drawing (above) see piece D02 below. The comment PG (pistol grip) indicates the reason for the “Y” grade.

The details for piece D01 will be added when a good example for a pistol butted log can be found for a photo.

Proper entry of piece(s) on FS 161 (Plot tally card)																											
Piece No.			Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT									GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES					Comm Code	
						LENGTH		TOP		E	BUTT		E				LEN		TOP		BUTT		D		
In accumulation sub populations or dispersed sup populations																											
										0				0													
D	0	1								0				0													
										0				0													
D	0	2	H	E	L	A	0	4	0	0	1	6	C	0	2	3	U	Y	I						P	G
										0				0													

Deformed Log – Grade "Y"

Deformed Log – Grade "Y"



When found in accumulation or dispersed sub populations:

The logs illustrated in the photos (left) and the drawing (above) are so crooked and deformed that none of them have enough volume in straight sections to meet the requirement for even the lowest sawlog grade. They are all "Y" grade and are tallied below with the comment code "DE" for deformed to indicate why the "Y" grade was assigned.

Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT										GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES							Comm Code	
							LENGTH			TOP			E	BUTT			E			LEN		TOP		BUTT		D		
In accumulation sub populations or dispersed sup populations																												
										0				0														
D	0	1	F	I	L	A	0	3	6	0	0	8	B	0	1	0	C	Y	I								D	E
										0				0														
D	0	2	A	R	L	A	1	1	7	0	0	5	N	0	1	6	U	Y	I								D	E
										0				0														
D	0	3	H	E	L	A	0	3	7	0	0	6	C	0	0	9	C	Y	I								D	E
										0				0														

Knots – Size and frequency effecting log grades.

Red Cedar knot – 5 rads including shoulders

Same knot – 4 rads excluding shoulders

Balsam knot – 4 rads including shoulders

Same knot – 2 rads excluding shoulders

Knots – Size and frequency effecting log grades.

The BC log grading rules are 'two part' rules. Log grades are determines by the quantity and the quality of the product (that can be manufactured from a log). The rules (or minimum requirements) are referred as "the quantity rule" and the "quality rule". The main defects that affect the quantity are decay, missing wood, deformities and fractures (because no product can be made from any of these). The main defects that affect the quality are twist and knots (because excessive twist and knots do not produce good quality lumber (or shingles). For the lower grades a simplified method of determining the product quality has been developed over the past 20 years and it is called the "Knot Guide". This guide lists the minimum requirements for each grade (by species) including the size of knots allowed (for different log top DIBs) and it lists the tolerances for OLK's (Occasional Larger Knots), twist and other defects. These guides are available in condensed form, on a plasticized card; it is recommended that Waste Surveyors carry one for reference in the field.

The only criterion not covered in the knot guide is the frequency of knots. For sawlog grades, knots should be 'well spaced' but there is no definition for 'well spaced' and scalers are reluctant to define it. Norm Shaw of BCIT has suggested the following may be a reasonable.

- Knot indicators & knots less than 1 cm in diameter – any number.
- Knots between 1 cm and half the maximum diameter (allowed for the log top DIB) – 4 or 5 per meter.
- Knots between half the maximum diameter and the maximum diameter – 1 or 2 per meter.

The section of the Scaling manual dealing with knots is quoted below (edited):

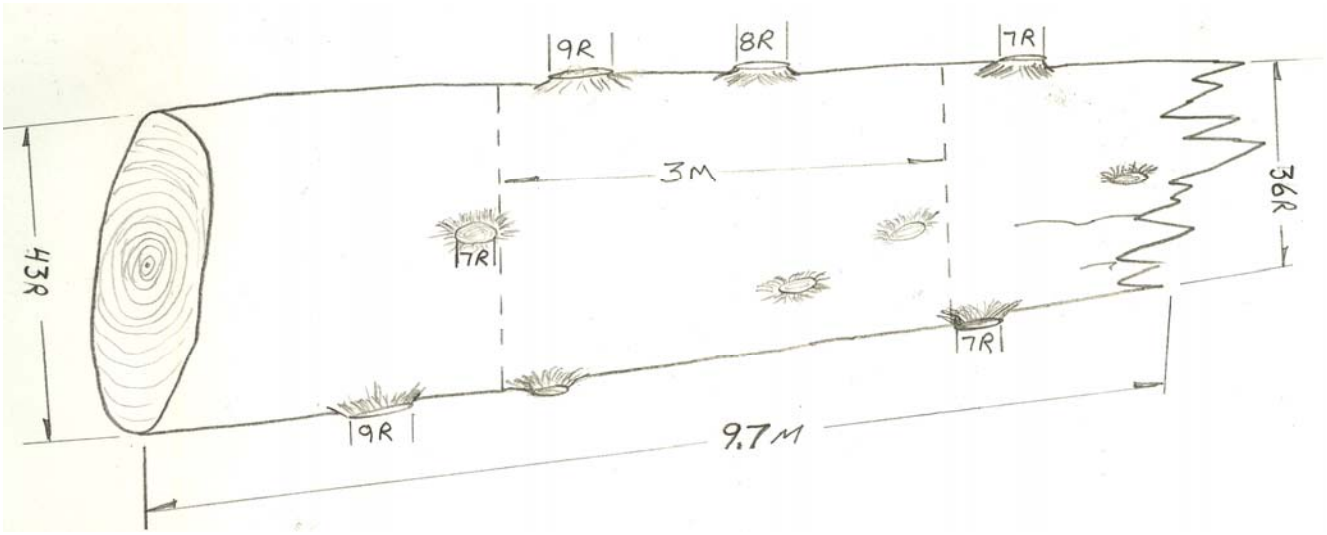
The size, type, and distribution of knots have a significant impact on lumber quality and are a key consideration in applying the grade rules. Knots larger than 1 rad will lower the strength of lumber and hence the amount of merchantable lumber cut. The larger the knot size, the greater the grain deflection, causing cross grain in the region of the knot. Extremely large knots will make the cutting of merchantable lumber impossible. Knot size (excluding the shoulders) is measured in centimetres or rads of diameter. See the photos (left) illustrating knots with shoulders and with shoulders exposed. Where the Grade Rule requirements stating maximum knot sizes and/or location are met, the merchantable and/or clear lumber percentage requirement for the grade will be satisfied. Individual grade requirements specify the maximum knot sizes by top diameter class. Knots may be tight or loose, and lumber sawn from logs with sound, tight knots is generally of a higher quality than lumber with loose knots or rotten knots. The distribution of knots in logs is determined by the growth characteristics of the tree. After a tree reaches mature height, additional branch whorls are still added each year but the branches are much closer together. Sometimes trees produce a number of branches in a bunch, resulting in a cluster of knots in the wood. A close grouping of knots (cluster knots or bunch knots) reduces the strength of the lumber cut from that portion of the log containing the cluster or bunch of knots. In general, a cluster or bunch knot occurs where the knots are so close together that the grain of the wood is deflected around the knots rather than between them. Bunches or clusters of knots are to be encircled with the smallest diameter circle or oval that will encompass the grouping. The average diameter of this circle or oval is then taken as the effective bunch knot diameter. Knot specifications for specific coast grades are found in Sections 6.5 of the Scaling Manual.

Large Knots on Large logs – Marginal Grade

Top DIB = 36 rads

Knot diameter = 5.5 rads

Large Knots on Large logs – Marginal Grade



When found in accumulation or dispersed sub populations:

The log illustrated left and above has a top DIB of 36 rads. The knot size guide allows logs up to 37 rads to have well spaced knots up to 6 rads with occasional larger knots allowed at a frequency of 1 per 3m of log length for the "U" grade and 2 per 3m of length for the "X" grade when the top is greater than 25 rads (occasional larger knots are referred to as "OLK's"). This log has 6 OLK's which is too many for the "U" grade but because it is over 25 rads top DIB and almost 10m long the 6 OLK's do not exceed the knots allowed for the "X" grade. This is a marginal "X" grade log and if the knot frequency or size were any more severe it would be downgraded to a "Y". Waste Surveyors must take care when measuring knot diameters. See piece D01below.

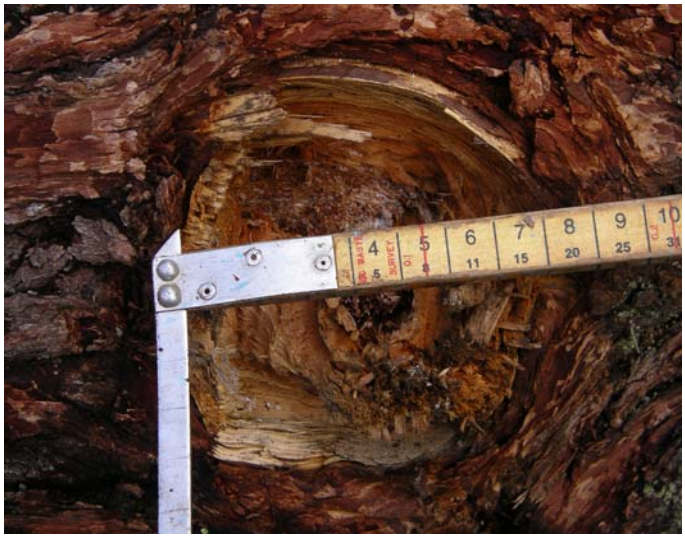
Note: Some species, especially Western Hemlock, develop a significant 'shoulder' around each knot which is not considered as part of the knot. Refer to the provincial scaling manual, pages 6-53 to 6-58 for detailed information regarding knot allowances and proper measurement.

Proper entry of piece(s) on FS 161 (Plot tally card)

Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
				0			0								
D	01	C	E	L	A	097	0	36	B	043	C	X	I		L	K
				0			0								

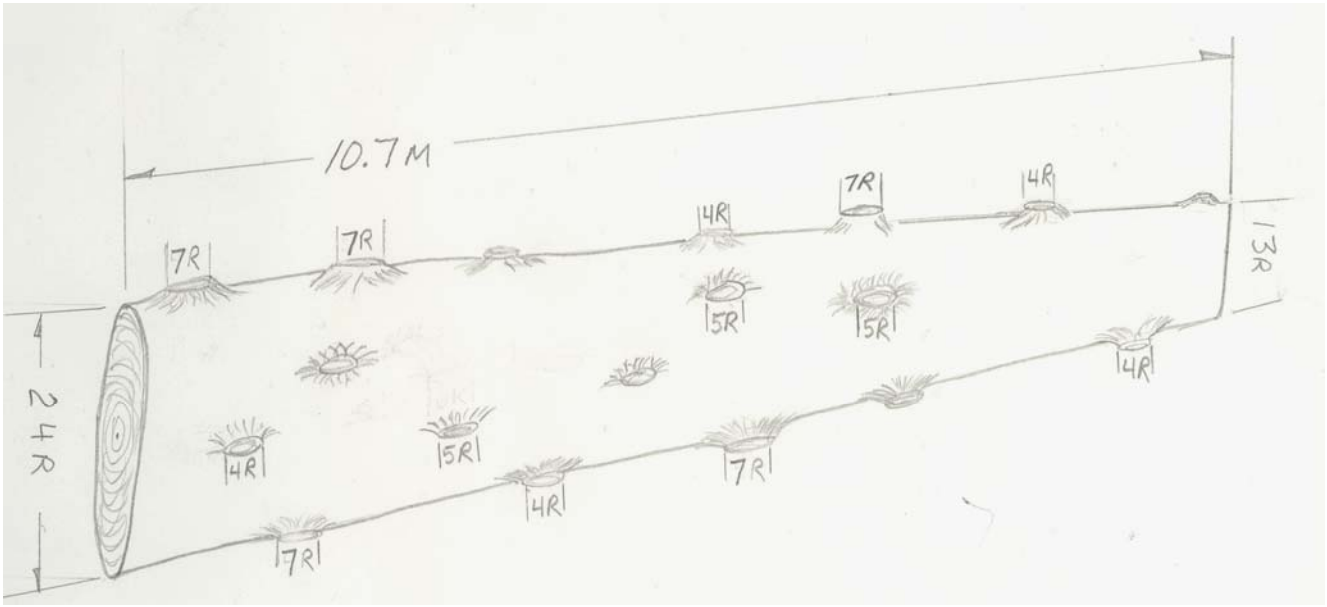
Excessive Knots - Y Grade

Knot over full length = 7 rads



Top DIB = 11 rads

Excessive Knots - Y Grade



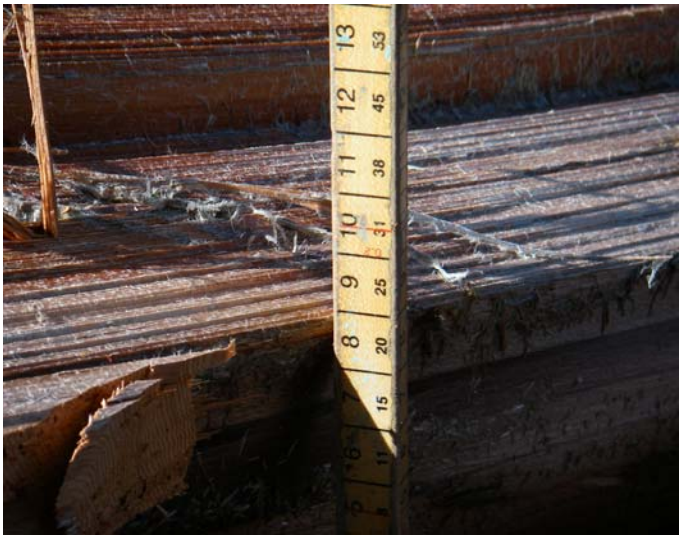
When found in accumulation or dispersed sub populations:

The Fir log illustrated in the photo (left) is very rough. The knot size and frequency far exceeds the maximum allowed for the "X" grade. The maximum knot size allowed for the "X" sawlog grade where the top DIB of the log being graded is between 8 and13 rads is 3 rads. The logs illustrated in the photo (left) and the drawing (above) have numerous knots well over the 3 rad limit and are therefore not marginal and are clearly "Y" grade. The log illustrated in the photo (left) is recorded below as piece D01 and the Hemlock log illustrated in the drawing above is recorded below as piece D02.

Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT									GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code	
							LENGTH	TOP			E	BUTT			E			LEN	TOP	BUTT	D		
In accumulation sub populations or dispersed sup populations																												
										0				0														
D	0	1	F	I	L	A	1	1	5	0	1	1	B	0	3	2	U	Y	I								L	K
										0				0														
D	0	2	H	E	L	A	1	0	7	0	1	3	C	0	2	4	C	Y	I								L	K
										0				0														

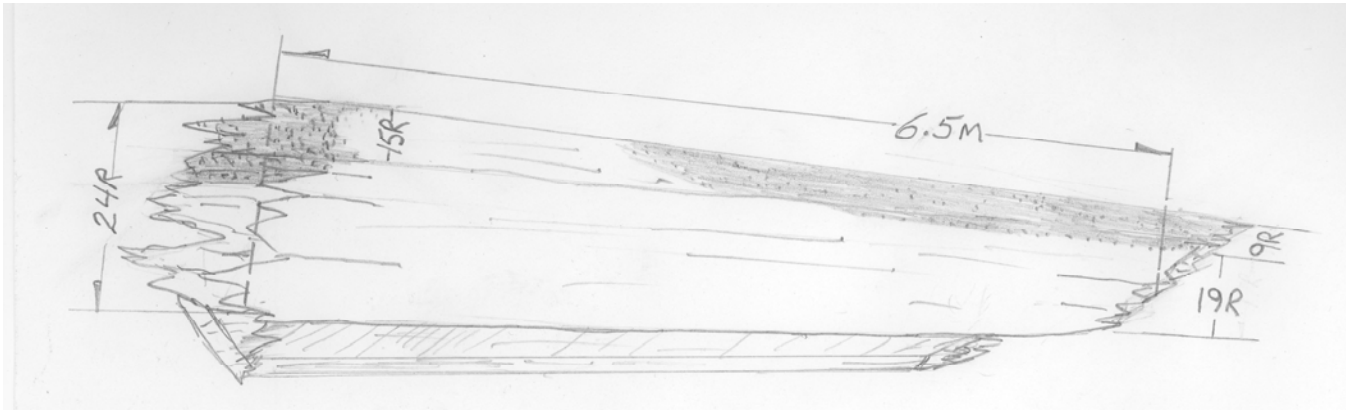
Grading Slabs

Average thickness at top = 9 rads



Average width at top = 22 rads

Grading Slabs



MINIMUM THICKNESS & MEAN TOP DIB FOR SLABS BY GRADE

SLABS	D, F & K	H & I	L	M	U	X
Minimum Thickness	19 rads	19 rads	13 rads	8 rads	8 rads	5 rads*
Minimum mean DIB	25 rads	19 rads	19 rads	13 rads	8 rads	5 rads*

The table above lists the minimum thickness and the minimum mean DIB requirements for all the sawlog and shingle grades. The slab illustrated in the drawing above has a thickness of 9 rads and a mean DIB of 14 rads at the top end which, for a Hemlock slab, the grade must be "U". (Slabs are not permitted for the "J" grade) The Cedar slab illustrated in the photo (left) has a thickness of 9 rads and a mean DIB of 15 rads so it would meet the requirements for the "M" shingle grade. These slabs are tallied below as pieces D01 and D02.

Proper entry of piece(s) on FS 161 (Plot tally card)

Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
				0			0								
D	01	HEL	A	065	014	B	019	B	U	I					SL
				0			0								
D	02	CEL	A	087	015	B	018	B	M	I	02				SL
				0			0								

PART 2

STUMPS

A stump is defined as any round or near-round piece with more than half of its original circumference remaining, attached to roots and less than 3.3m long measured from 'high ground' (excluding any obstructions, loose debris or forest duff).

Stump length (or height) is measured from high ground to the top of the 'back cut'. The volume in the 'under cut' is included with the stump and the pieces of under cuts found on the ground are not tallied. The exceptions are nurse log stumps which are measured from POG as they have no 'high ground'.

Stumps that are less than 0.3m in length, measured from high ground, are not tallied. Only the portion of the stump above the TMS stump length (usually 30cm) is measured and recorded.

The butt DIB, for stumps, is not recorded (the "BUTT" column of FS 161 is left blank).

Pieces of stumps that are detached and have less than half of their original circumference remaining are not tallied. Stumps that have pieces missing but are more than half of their original circumference remaining are measured as if they were complete (ie; no deductions are made for the missing portions).

The top DIB for stumps that are 1.3m long or longer is measured (or estimated), inside bark, at 1.3m from high ground. This is the same point where timber cruisers measure the Diameter at breast height (DBH) but DBH is outside bark and DIB is not.

Stumps are never measured or recorded as borderline pieces. They are, using a set of procedures (described in this section of the guide), either 'IN' or 'OUT'.

Stumps may be pencil bucked if there is more than one waste class in an individual stump.

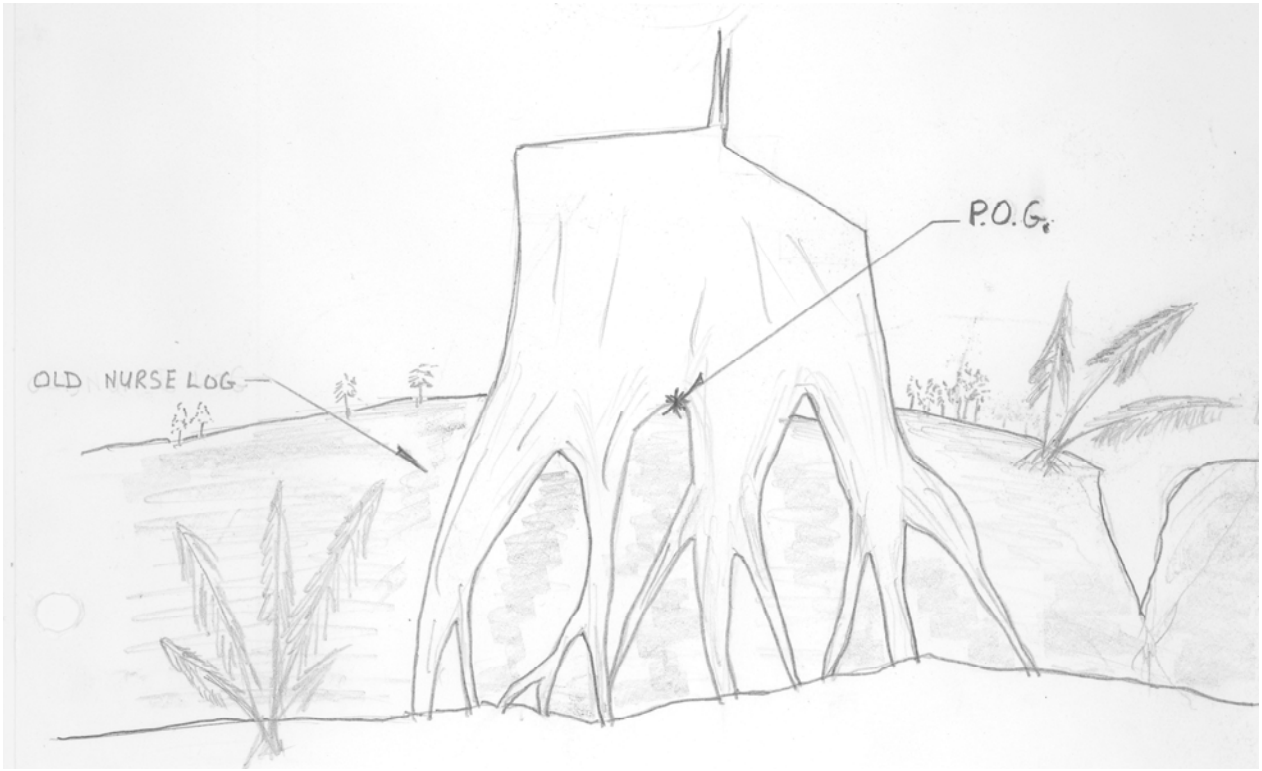
Prior to May 1st 2006 stumps were not graded (and defaulted to sawlog grade during compilation). Changes to timber pricing now requires some grades to be billed at different rates which has necessitated the grading of stumps (and bucking waste, see part 3 of this guide). Stumps are not graded 'as-is', they are graded using a set of procedures (see the Waste Manual, Appendix 6, pages A-24 and A-25). The intent is to assign the same grade to avoidable waste in stumps that would have been assigned to the log the wasted piece should have been attached to. On rare occasions (usually severely deformed pieces) the log or piece that came off the stump is still present in the slash in which case the stump should be given the same grade as that log or piece.

Nurse log stump

Blue paint dot marks POG

Blue paint line marks TMS Stump height

Nurse log stump



When found in accumulation or dispersed sub populations:

Since trees that have grown on a nurse log are not actually attached to the ground in the normal manner, it is not correct to measure their length from the high ground. In these cases, POG (Point of germination) is substituted for high ground. The nurse log stump illustrated on the left shows a blue paint dot that marks the POG. The blue paint line marks 0.3m above POG. This stump is obstructed by a second stump next to it making the waste class unavoidable. See piece D01 below.

Proper entry of piece(s) on FS 161 (Plot tally card)

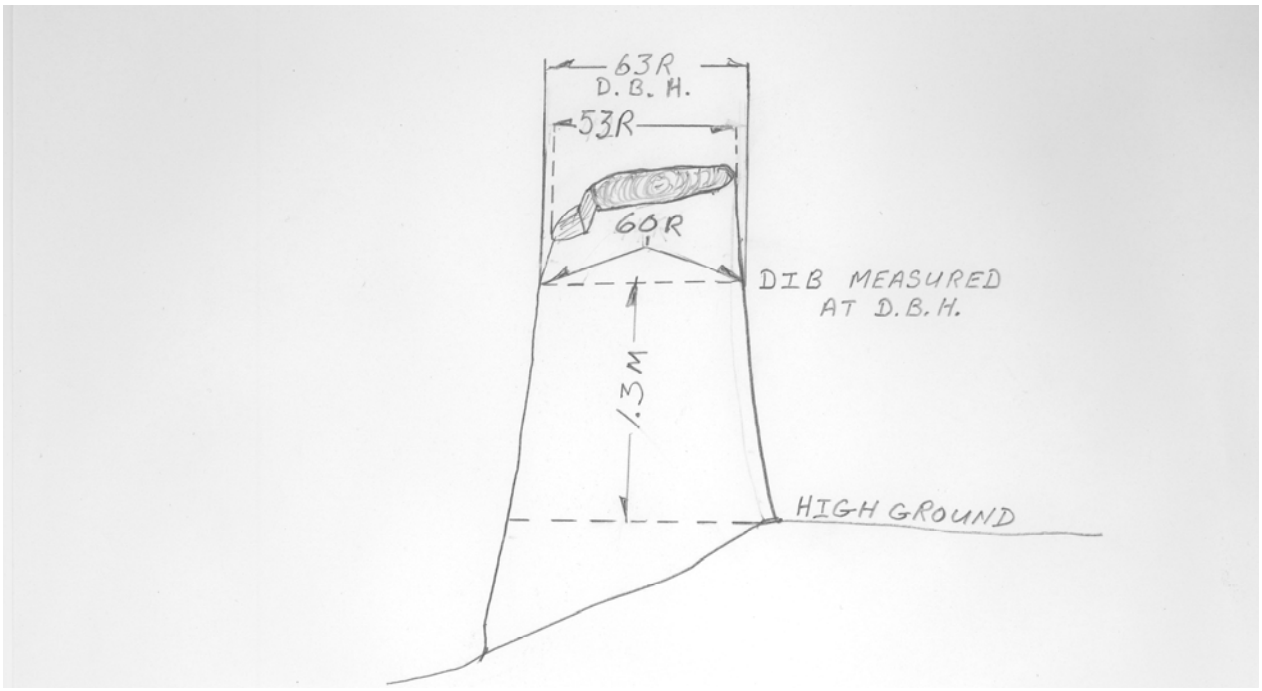
Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
				0			0								
D	0	1	H	E	S	U	0	5	0	3	2	U	0	H	I					O	B
				0			0								

Stump exceeding 1.3m in length

Stump DIB measured at DBH line

DIB at cut top and adjusted to DBH

Stump exceeding 1.3m in length



When found in accumulation or dispersed sub populations:

The top DIB for stumps that exceed 1.3m in length (measured from high ground to the top of the back cut) is measured at the DBH line rather than at the cut top. The DBH line is 1.3m from high ground. This is done because the volume of stumps is calculated based on the volume of a cylinder (hence the butt DIB is not required). Measuring the top DIB at the cut top, for long stumps (1.3m to 2.9m) would therefore underestimate the volume. In actuality, for very large stumps, it is often very difficult to measure an accurate top DIB at the DBH line so what many experienced Waste Surveyors do is measure the top DIB at the cut top and estimate an adjustment to that measurement to make it equivalent to DIB at DBH. See piece D01 below for the recording of the tall stump illustrated in the drawing above. Stump in the pictures on the previous page is unavoidable due to safety,

Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT									GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code						
							LENGTH			TOP		E		BUTT	E			LEN		TOP		BUTT		D				
In accumulation sub populations or dispersed sup populations																												
										0				0														
D	0	1	H	E	S	U	0	2	0	0	6	0	N	0				H	I									

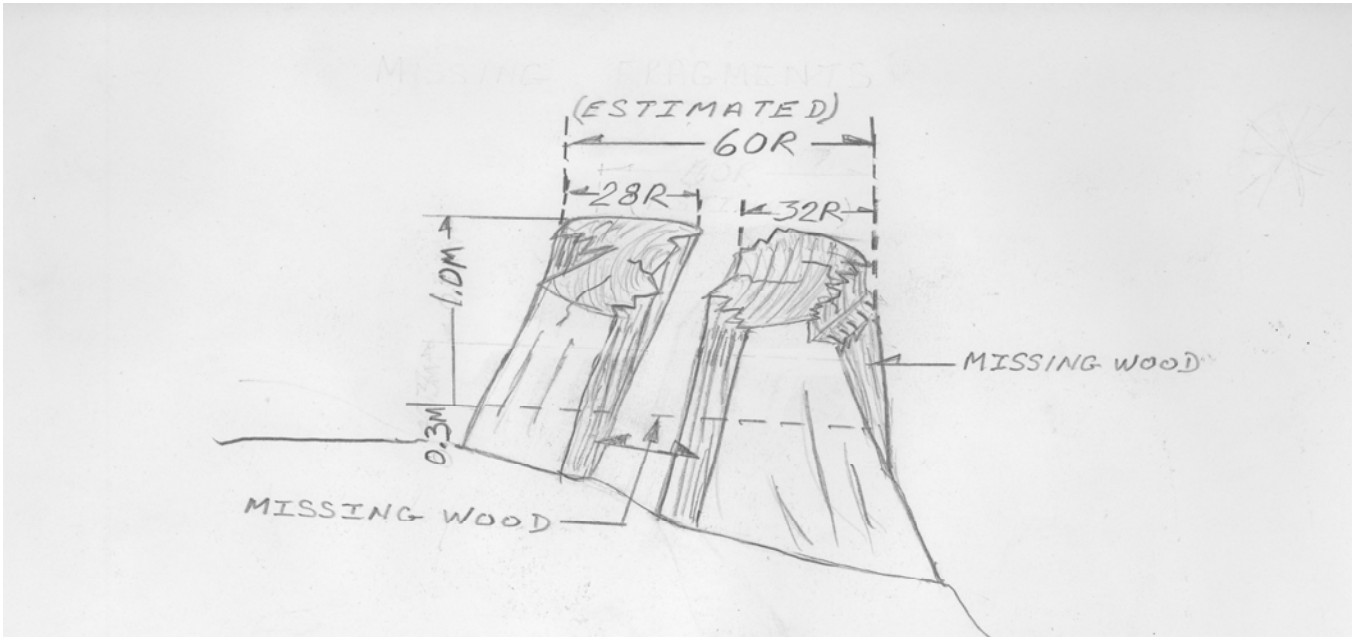
										0				0													

Stump with missing fragment(s)

Stump in 3 parts, 1 is missing

Missing part not tallied if found alone

Stump with missing fragment(s)



When found in accumulation or dispersed sub populations:

Stumps that are missing fragments but still have more than 50% of their original circumference present are measured as if they were complete. The top DIB is measured or estimated for the original whole stump. Stumps and uprooted stump fragments that have less than 50% of their original circumference remaining are not tallied. The fractured stump illustrated in the photos (left) and the drawing (above) is recorded below as piece D01.

Proper entry of piece(s) on FS 161 (Plot tally card)

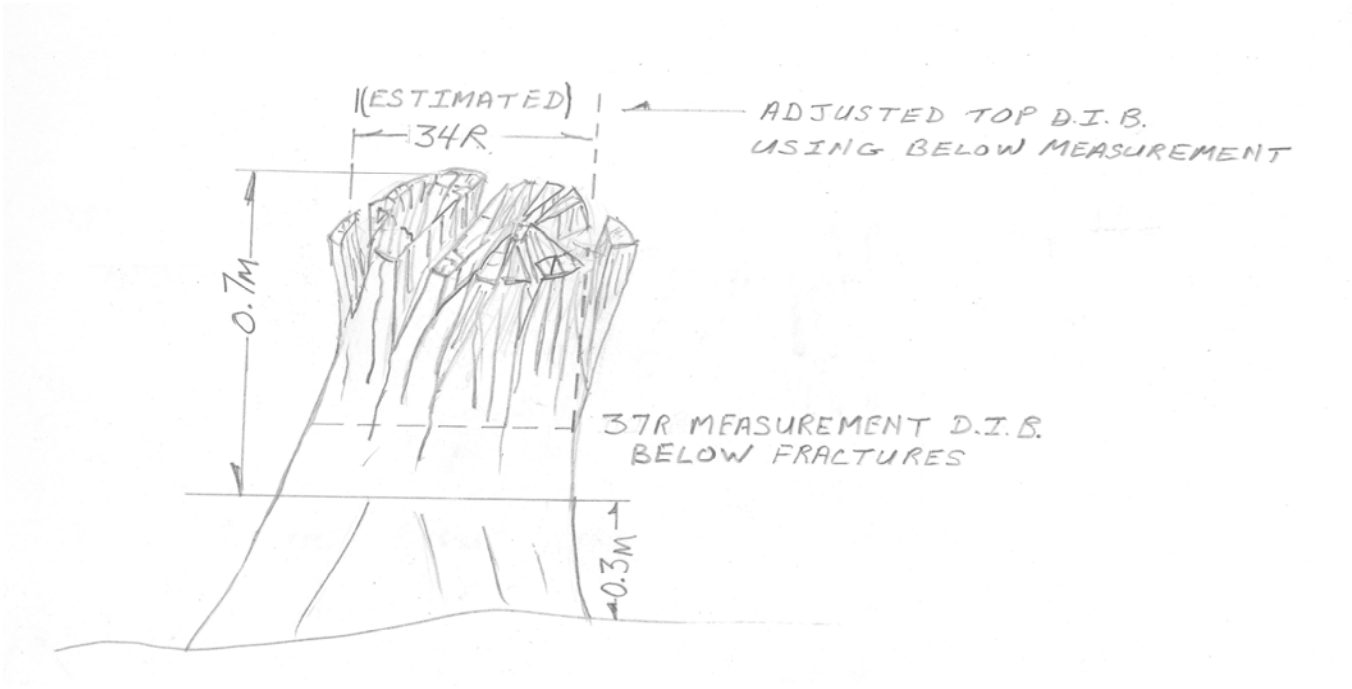
Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
				0			0								
D	01	C	E	S	A	010	0	U	0		H	I			S H
				0			0								
				0			0								

Stump top DIB measurement difficulties

Top DIB not measurable

Best estimate below breakage = 15 rads

Stump top DIB measurement difficulties



When found in accumulation or dispersed sub populations:

Occasionally stumps are broken and/or crushed by heavy equipment and the top DIB is not easily measured. In these instances, a Waste Surveyor must estimate the measurements. It is always more accurate to estimate an adjustment to a measurement taken near the correct location than it is to estimate the entire dimension. The shattered stump illustrated in the drawing above is recorded below as piece D01.

Proper entry of piece(s) on FS 161 (Plot tally card)

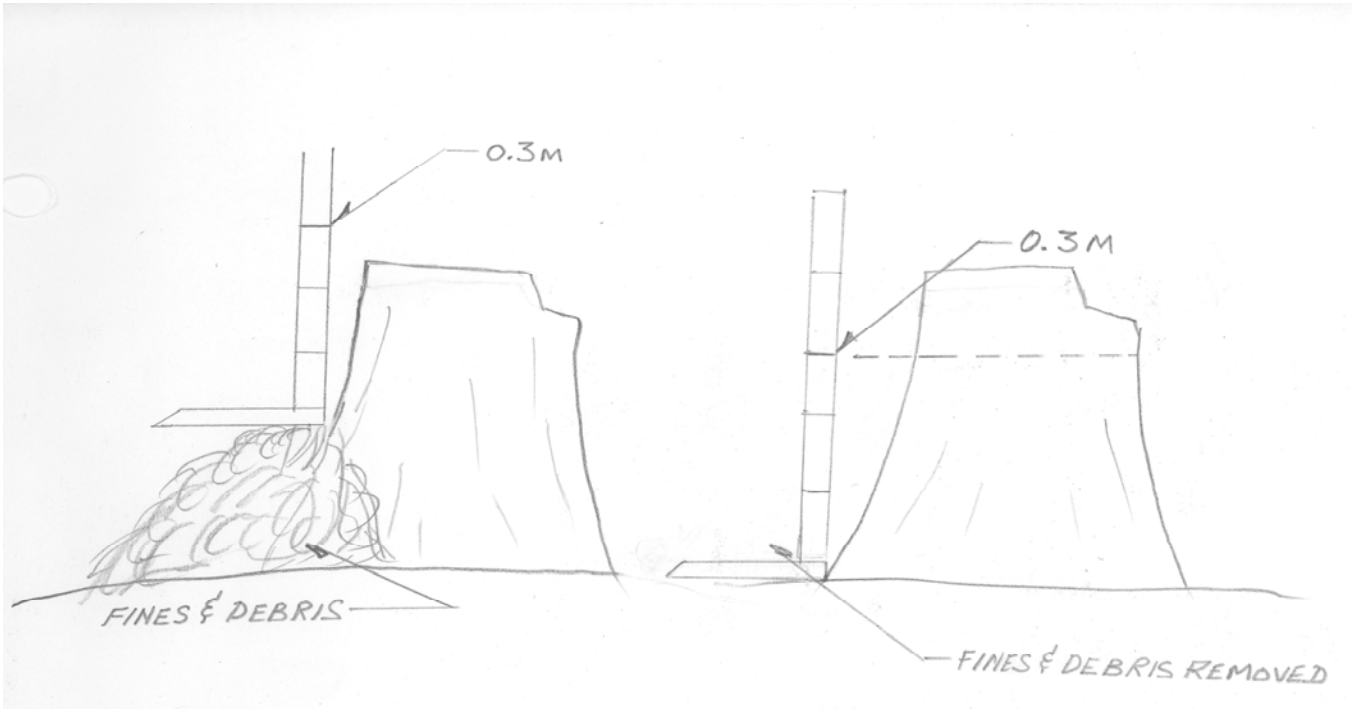
Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
				0			0								
D	0	1	F	I	S	A	0	0	7	0	3	4	U	0				H	I							S	H
				0			0								
				0			0								

Determination of 'High Ground'

Remove loose material

Down to (black) soil

Determination of 'High Ground'



When found in accumulation or dispersed sub populations:

Often, especially on steep ground, there will be a significant amount of loose debris and forest duff adjacent to stumps. Stump lengths (heights) are measured from the ground level at the high or uphill side. The definition of ground for the purpose of measuring stump length (and tree DBH) is actual soil (mineral or organic) which does not include non decomposed forest litter. Other items that are ignored for determining the location of high ground include buttress roots, old logs and boulders. See piece D01 below.

Proper entry of piece(s) on FS 161 (Plot tally card)

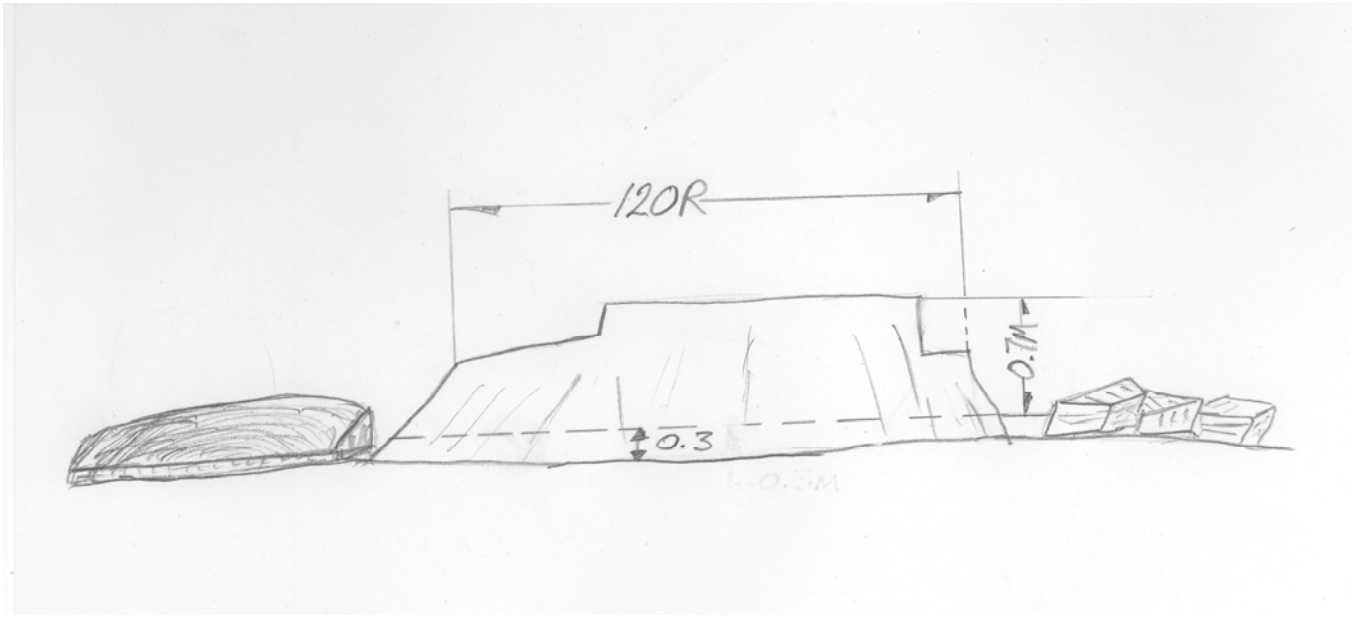
Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
					0			0							
D	01	CE	S	A	001	0	14	U	0	J	I				
					0			0							

Determination of stump length

Pieces from undercut

Cut-out at back for jacks

Determination of stump length



When found in accumulation or dispersed sub populations:

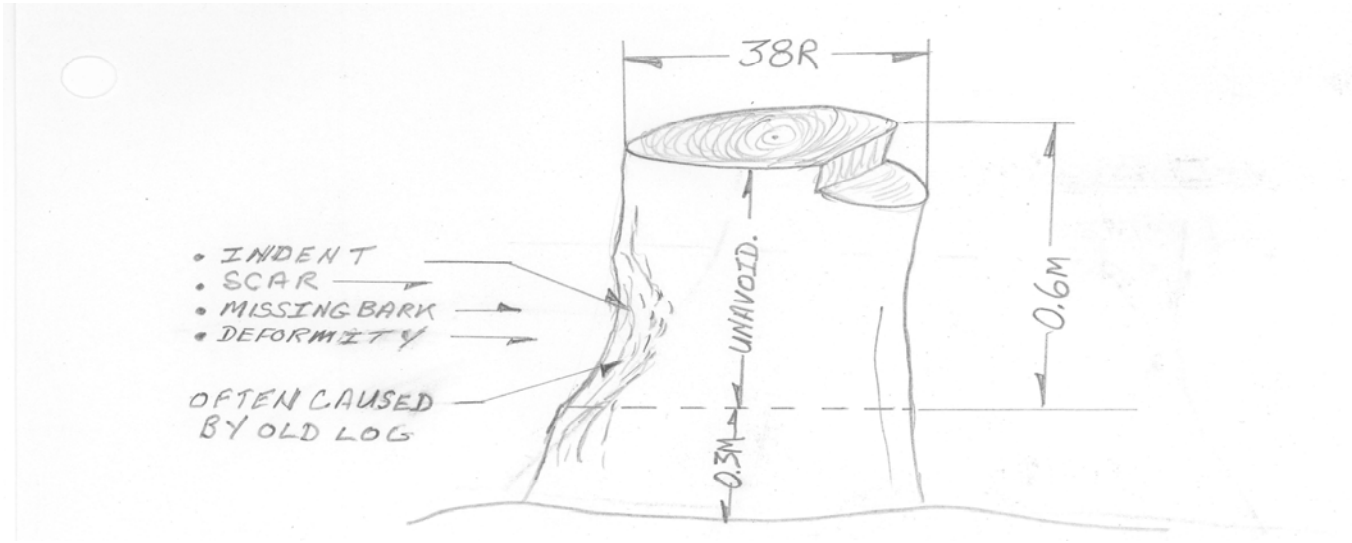
Stump length (height) is always measured to the top of the back cut and is never reduced to account for the missing volume removed in the form of undercut wedges or cut-outs for timber tippers (jacks). In the photo (left) the correct stump length is indicated by the horizontal stick that transposes the highest point of the back cut across to the scale stick. By measuring stump length in this manner, the volume involved in the undercut wedges and the cut-outs is accounted for in the stump and therefore it is not necessary to measure those pieces separately. The drawing (above) and the photo (left) illustrate a stump with a large undercut wedge and a cut-out for a jack and is recorded below as piece D01.

Proper entry of piece(s) on FS 161 (Plot tally card)

Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
					0		0								
D	0	1	C	E	S	A	0	0	7	1	2	0	U	0				K	I							
					0		0								

Obstructed stump – Obstruction no longer present

Obstructed stump – Obstruction no longer present



When found in accumulation or dispersed sub populations:

When scaling and classifying high stumps, Waste Surveyors need to be very observant and often must do some detective work to determine the waste class (avoidable or unavoidable). Most of the time all of the evidence has been disturbed or removed by the yarding process and the waste class defaults to avoidable. Occasionally, some evidence is still present when the Waste Survey is done. In these cases, the benefit of any doubt will be given to the faller. This is especially true in cut blocks where the vast majority of the stumps are cut at or below the TMS and just the occasional stump is cut significantly higher. The stump (and its neighbour) in the photo (left) is an excellent example of this principle. It stands alone in a sea of good stumps and the tiny scar on its side would suggest that at the time of falling, there was an obstruction of some sort preventing the faller from cutting it lower. As a result of this evidence, this stump should be classified as unavoidable. See piece D01 below.

Proper entry of piece(s) on FS 161 (Plot tally card)

Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
					0			0							
D	01	H	E	S	U	006	0	38	U	0	H	I			OB
					0			0							

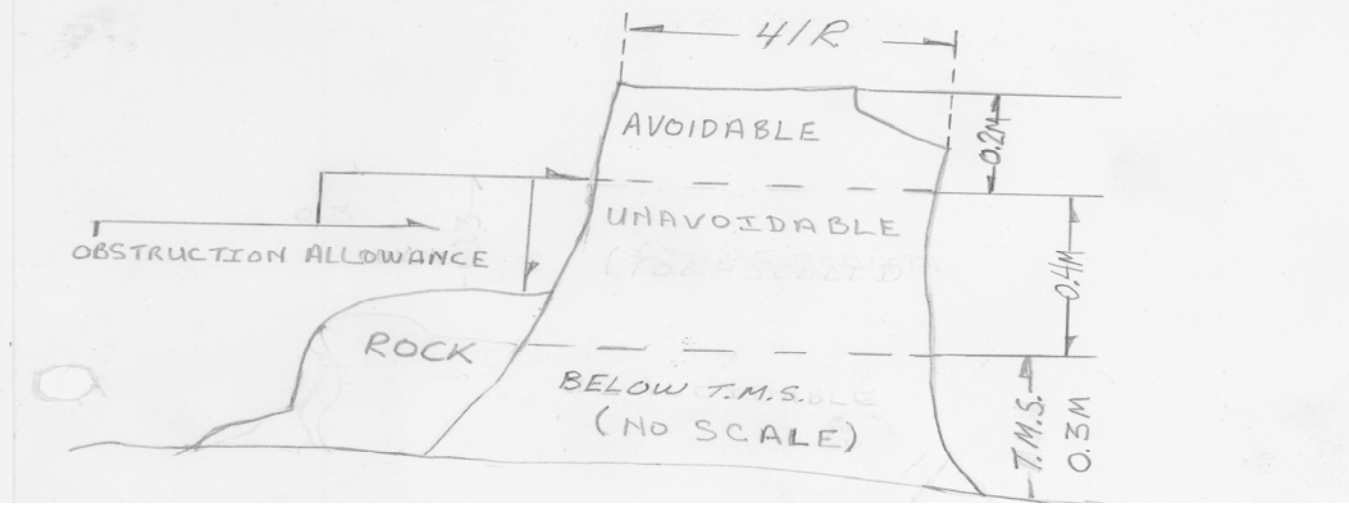
Obstructed stump – Obstruction still present

Obstructed by a second stump

Obstructed by rock

NEED PHOTO

Obstructed stump – Obstruction still present



When found in accumulation or dispersed sub populations:

Stumps that have been obstructed by any non moveable object which prevent the faller from cutting at the TMS or present a safety hazard if cut at the TMS will be classified as unavoidable and the comment code "OB" recorded in the comment column. These obstructions can include other trees, windfalls (new or old) or boulders etc. There is no fixed or suggested allowance above the top of the obstruction and it is the responsibility of the Waste Surveyor to determine if there is any avoidable waste above the unavoidable portion. When the timber is small and the ground is flat a 0.1m allowance would likely be appropriate. When the ground is steep however, the faller must stand on the uphill side of the tree (which is normally where the obstruction is) and will need room for the engine of his saw above the obstruction. In this case, an allowance of at least 0.3m would be appropriate. The stump in the drawing above is obstructed by a rock but still has some avoidable waste in it. The Waste Surveyor in this instance has decided that a 0.2m allowance above the obstruction was appropriate. It is recorded below as pieces D01 and D02.

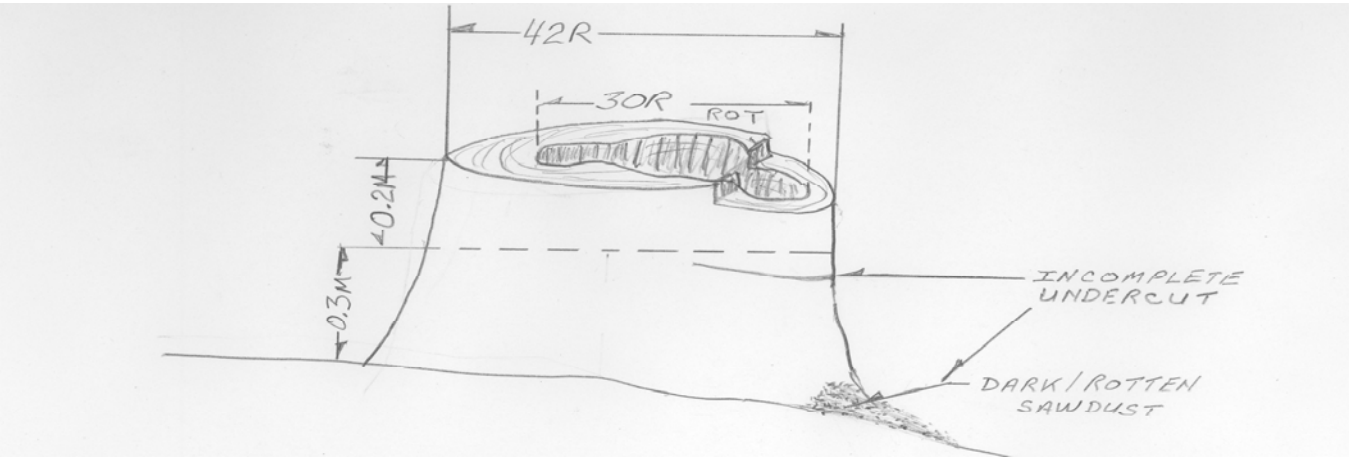
Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT										GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES							Comm Code	
							LENGTH			TOP		E	BUTT	E					LEN		TOP		BUTT		D		
In accumulation sub populations or dispersed sup populations																												
										0				0														
D	0	1	H	E	S	U	0	0	4	0	4	2	N	0				H	I							O	B
D	0	2	H	E	S	A	0	0	2	0	4	1	N	0				H	I							S	2
										0				0														

Decayed stumps – Safety issue.

Hemlock stump with visible decay

Cedar stump with visible decay

Decayed stumps – Safety issue



When found in accumulation or dispersed sub populations:

Trees that have internal decay near the stump will often present a significant safety hazard to the faller. In order for the faller to control the direction a tree falls, there must be solid wood on both sides of the back cut. This is called “holding wood”. Usually decay near the stump is conical with the base of the cone being at or below the ground level. When decay such as this is visible, fallers will often cut well above the TMS in order to increase the thickness of the holding wood. Such stumps are always classified as unavoidable with the comment code “US” (unsafe). Occasionally when the internal decay is not visible from the outside fallers will suspect its presence by the colour of the sawdust, stop cutting at that location and begin cutting again at a higher location. These stumps (with an incomplete cut near the TMS) are also classified as unavoidable for safety reasons. The three stumps illustrated in the photos (left) all have external signs of significant internal decay and were felled where the faller deemed safe. They would all be classified as unavoidable for the entire length above the TMS because it is impossible to determine where a safe height would be with the tree no longer present. The faller is the only person qualified to decide what is safe and what is unsafe for each individual stump under the existing conditions and is governed by guidelines provided by the Workers Compensation Board. The stump illustrated in the drawing above is classified as unavoidable due to the presence of an incomplete undercut and extensive internal decay. It is recorded below as piece D01.

Proper entry of piece(s) on FS 161 (Plot tally card)

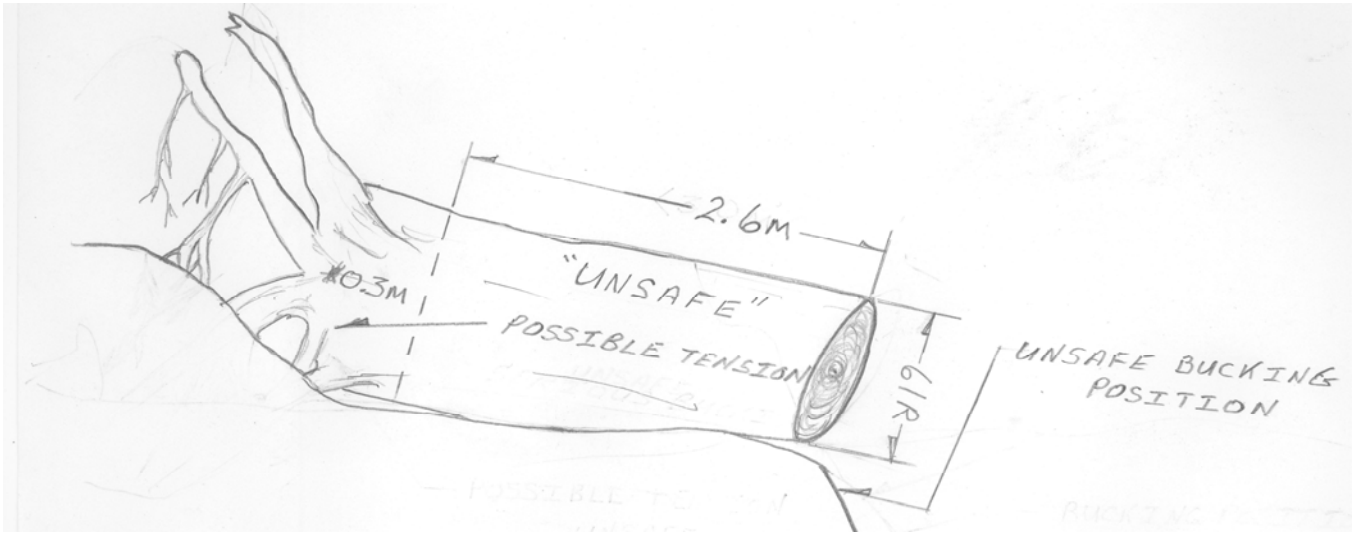
Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
					0		0								
D	01	B	A	S	U	002	0	42	U	0				H	I			13			H	U	S
					0		0								

Windfall stumps – No undercut and roots pulled up on back side

Flipped back windfall stumps

Flipped back windfall stumps

Windfall stumps – No undercut and roots pulled up on back side



When found in accumulation or dispersed sub populations:

The butt log of windfalls can be very dangerous to separate from the stump because of the tension in the roots that are folded over and still in the ground. This tension often causes the stump, when separated from the log, to flip back up presenting a serious safety hazard to the faller/bucker. The procedure used to minimize this hazard is to separate the log from the stump a few meters away from the roots. This results in a long stump which Waste Surveyors must scale and classify. Windfall stumps are easily identified by the lack of any sort of undercut and due to the serious hazard they present to the faller/buckers, they are all classified as unavoidable with the comment code "US or WF". The top photo (left) illustrates a windfall stump that has partially flipped back up. The lower photos illustrate windfall stumps that have completely flipped back to the vertical position. This 'flipping' took place as the faller/bucker was separating the log from the stump and the strip ripped off the side of the stump indicates the cut was not complete when it happened. Occasionally windfall stumps are found in a group where several stems had an interconnected root wad. The lower right photo illustrates a second stump that was in the same root wad as the large stump

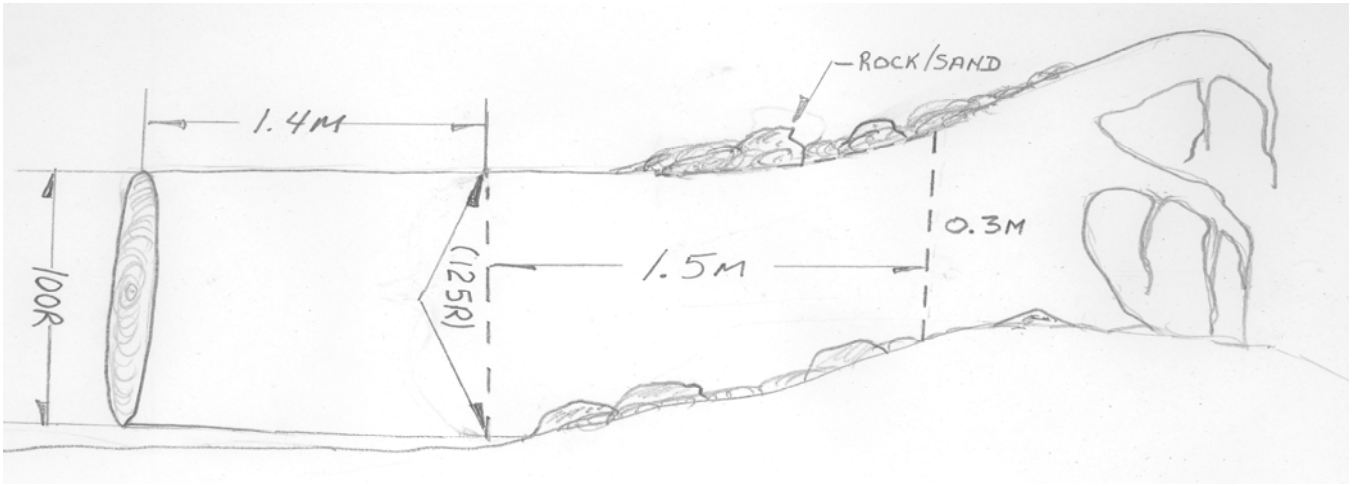
Waste Surveyors should be aware that when windfalls are scattered sporadically throughout standing timber, they will often lie beside a standing tree and become an obstacle to falling that standing tree at the TMS, and in effect, create an additional unavoidable stump. Waste Surveyors working in windfall areas should look for bruises at the base of high stumps and for windfall stumps pointing in the direction of high stumps to identify and correctly classify these additional unavoidable stumps. Waste Surveyors should also be aware of the extreme hazards faced by faller/buckers when working in windfall areas and consistently give these workers the benefit of any doubt when deciding on the waste class of all stumps in them. The safety issues identified above do not apply to areas felled by machine but the windfall stems may still present an obstacle to falling some standing trees at or below the TMS. See the discussion regarding machine falling and hand falling later in this guide.

Windfall stumps with an avoidable portion

Avoidable portion

Unavoidable portion

Windfall stumps with an avoidable portion



When found in accumulation or dispersed sub populations:

On very rare occasions, a Waste Surveyor may be able to determine that a windfall stump has been bucked off longer than required. Care must be taken to examine the circumstances fully before making this determination to insure the stump has not been moved from its original location and that objects preventing the faller from bucking the stump shorter have not been dragged away from the site. The windfall stump illustrated in the photo (left) and the drawing (above) has an avoidable 1.4m section that could have been left on the log without presenting a hazard to the faller (in the opinion of the Waste Surveyor(s). The tally of this two part stump is shown below as pieces D01 and D02 below. If the piece illustrated in the drawing above had been 0.1 m longer, it would have met the definition and been tallied as a log. Because it is not permitted to pencil buck logs, it would be scaled & tallied as one single piece and the Waste Surveyor would determine the waste class depending on whether the log could have been separated from the stump safely or whether the entire piece (including the roots) could have been yarded to the roadside.

Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT										GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES							Comm Code	
							LENGTH			TOP			E	BUTT		E			LEN		TOP		BUTT		D		
In accumulation sub populations or dispersed sup populations																												
										0				0														
D	0	1	C	E	S	A	0	1	4	1	0	0	C	0				H	I							W	F
										0				0														
D	0	2	C	E	S	U	0	1	5	1	2	5	P	0				H	I							S	2
										0				0														

Machine vs Hand falling

Machine head obstructed by rock

Diameter exceeds machine capability

Machine vs Hand falling

When found in accumulation or dispersed sub populations:

As a general rule of thumb, all waste created by the limitations of a machine (that could have been avoided by using a worker) is classified as avoidable.

The top photo (left) illustrates a pair of high stumps in a machine felled area. A hand faller may not have been able to fall these trees at or below the TMS but most likely would have been able to fall them much lower than the machine did. In this case it may be appropriate to classify half of the Fir stump and none of the Cedar stump as avoidable waste. Waste Surveyors must assess each situation independently and decide where a hand faller could have safely made the falling cuts. These stumps are recorded below as pieces D01, D02, and D03.

The stump illustrated in the lower left photo was near a small rock bluff and there was no room for the head of the falling machine in behind the stump so the operator made the felling cut above the rock. In this instance, a hand faller would have been able to fall this little tree at the TMS so this entire stump would be classified as avoidable waste. See piece D04 below.

The large Cedar stump illustrated in the lower right photo has a diameter well above the maximum capacity of the felling machine. This stump was not obstructed in any way and it is most likely a hand faller could have cut it at the TMS. This stump also is entirely avoidable waste. See piece D05 below.

Proper entry of piece(s) on FS 161 (Plot tally card)

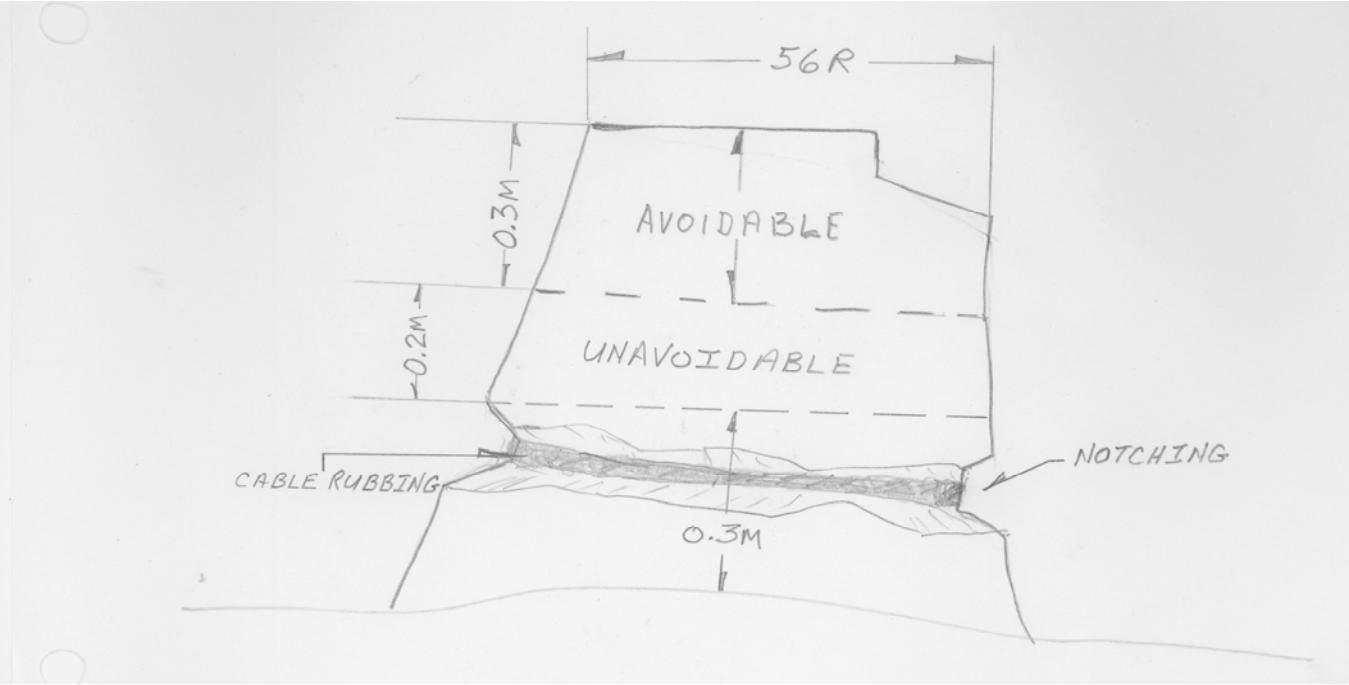
Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
				0			0								
D	01	F	IS	A	005	045	U	0	H	I					
D	02	F	IS	U	005	046	P	0	H	I					OB
D	03	CE	S	U	007	050	U	0	H	I					OB
				0			0								
D	04	F	IS	A	008	009	U	0	U	I					
				0			0								
D	05	CE	S	A	012	088	N	0	H	I					
				0			0								

Guy line Stumps

Hemlock stump notched for guy lines

Cedar stump notched for guy lines

Guy line Stumps



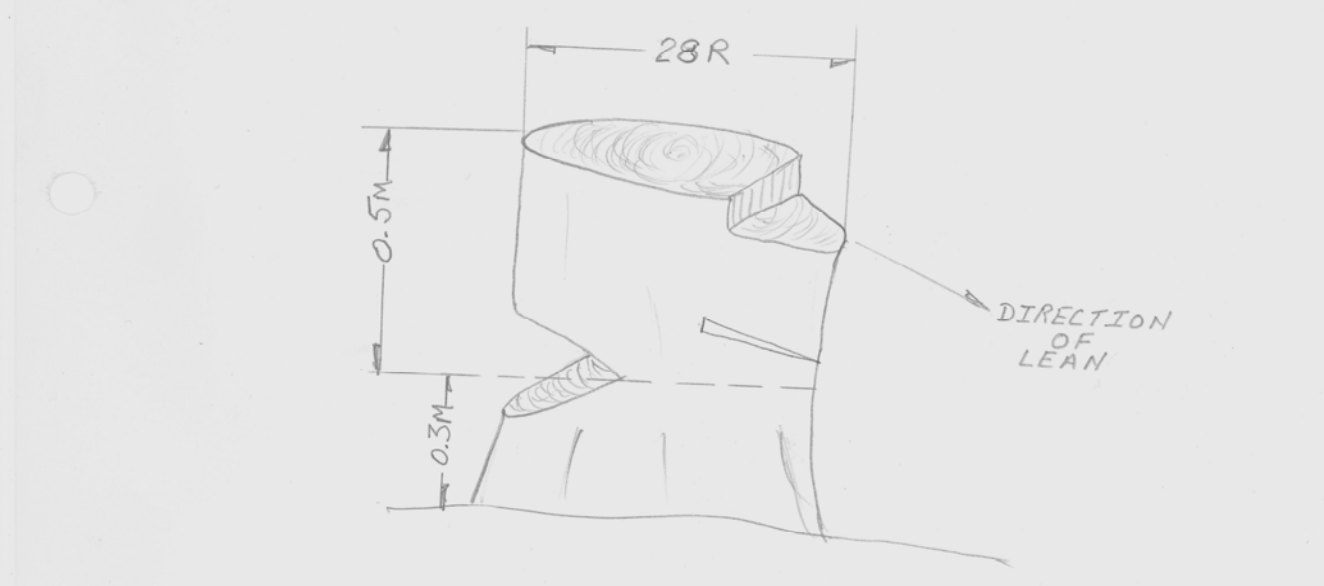
When found in accumulation or dispersed sub populations:

When not excessively high, stumps that are notched for guy lines are classified as unavoidable whether actually used or not. The guy line stumps illustrated in the lower photos (left) are both well made and the waste has been minimized so they would both be classified as unavoidable. The upper photo however illustrates a stump that is a little excessive and would have an avoidable segment on the top. The drawing above illustrates another guy line stump with some avoidable waste above a reasonable allowance for the guy line notches. See pieces D01 and D02 below.

Proper entry of piece(s) on FS 161 (Plot tally card)																													
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT									GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES							Comm Code	
							LENGTH			TOP		E	BUTT	E				LEN		TOP		BUTT		D		
In accumulation sub populations or dispersed sup populations																													
										0				0															
D	0	1	H	E	S	A	0	0	3	0	5	6	U	0				H	I										
D	0	1	H	E	S	U	0	0	2	0	5	7	P	0				H	I								G	L	
										0				0															

Lean-back stump – Double cut

Lean-back stump – Double cut



When found in accumulation or dispersed sub populations:

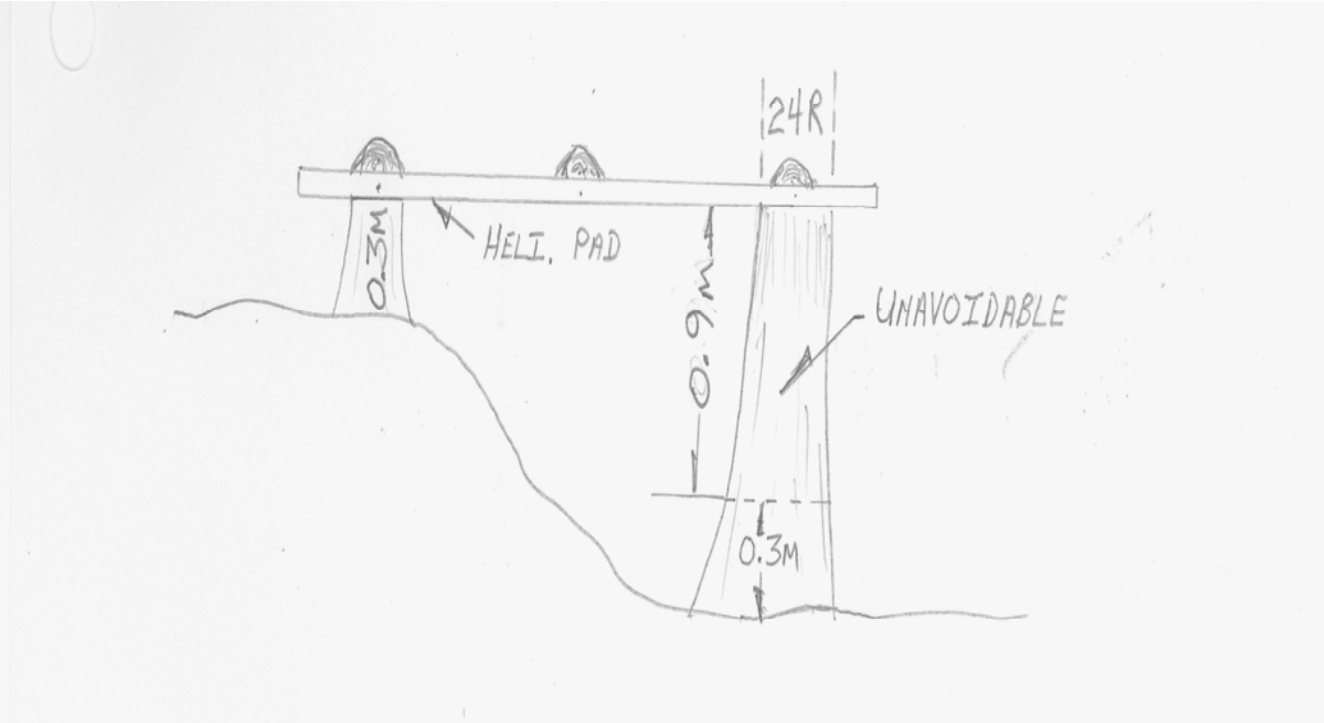
Occasionally a faller will misjudge the branch weight or the lean of a tree and it will lean back and pinch the bar of the saw. If the tree is large, the problem can usually be corrected with falling wedges but for small stems there is insufficient room (before the tip of the wedge hits the saw bar) to drive a wedge in far enough to tip the tree back and release the bar. In these cases, the faller must unbolt the bar from the saw and fall the tree (with a spare bar and chain) in the direction of the lean. The result is a "double cut" stump. The presence of the double cut should alert the Waste Surveyor to the safety issue involved and therefore he/she should classify them as unavoidable. The stump in the photo (left) and the drawing (above) illustrate lean back or double cut stumps. See piece D01 below for the recording of the stump in the above drawing.

Proper entry of piece(s) on FS 161 (Plot tally card)

Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT									GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES					Comm Code	
							LENGTH			TOP		E	BUTT		E			LEN	TOP	BUTT	D			
In accumulation sub populations or dispersed sup populations																								
										0				0										
D	0	1	B	A	S	U	0	0	5	0	2	8	U	0				J	I					U	S
										0				0										
										0				0										

Stumps in Heli pads

Stumps in Heli pads



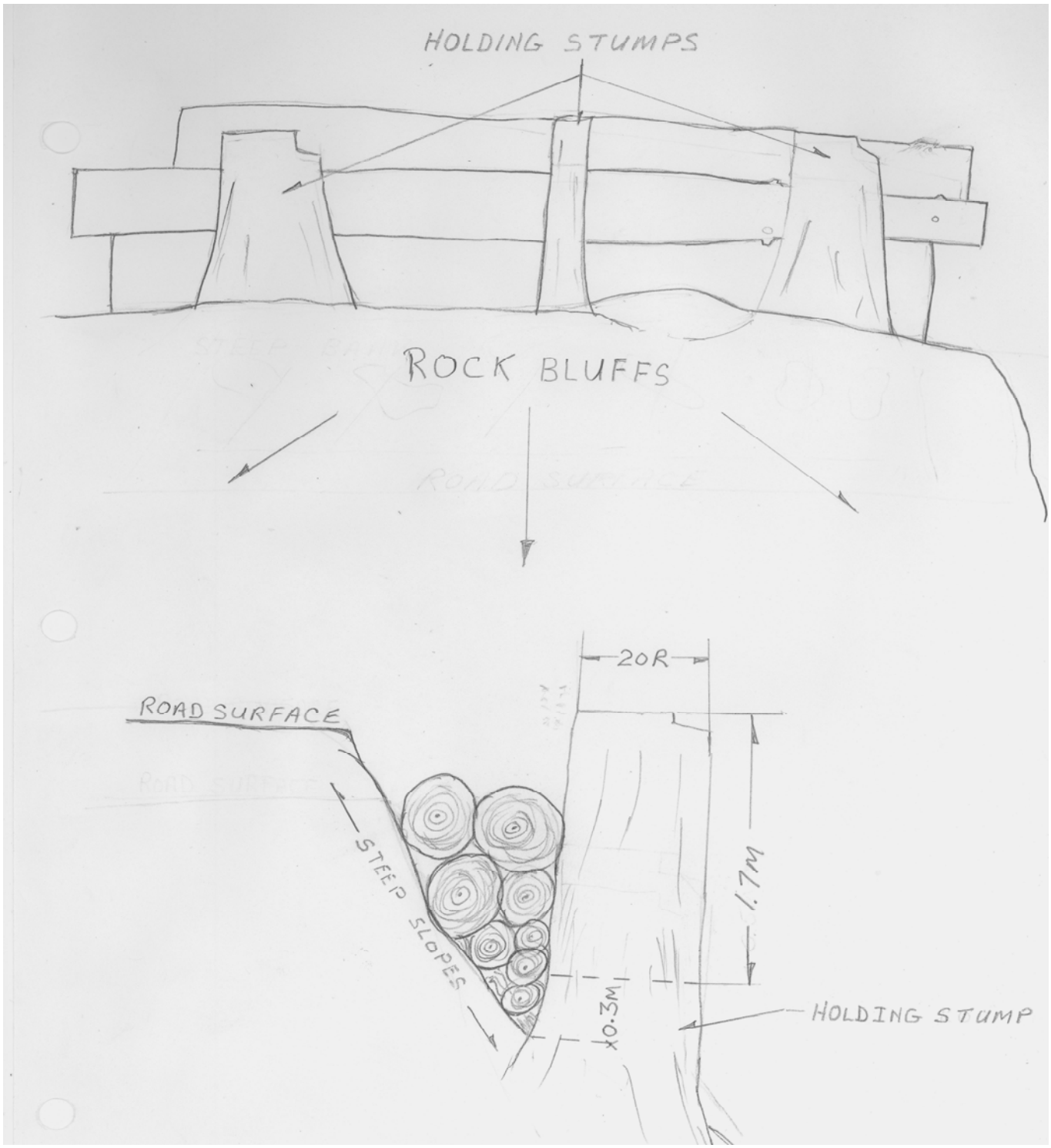
When found in dispersed sub populations:

Heli pads are a necessity for access and safety when workers are working long distances from the nearest road. They are normally constructed with a number of intentionally created high stumps and some poles or ripped logs. All parts of any heli pad are classified as unavoidable and recorder with the comment code HELI PAD (HP). The stump in the drawing above is recorded below as piece D01.

Proper entry of piece(s) on FS 161 (Plot tally card)

Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT								GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code	
							LENGTH			TOP		E	BUTT	E			LEN	TOP	BUTT	D		
In accumulation sub populations or dispersed sup populations																						
										0			0									
D	0	1	B	A	S	U	0	0	9	0	2	4	U	0			J	I					H	P
										0			0									

Stumps holding logs on hillside and off road



Stumps holding logs on hillside and off road

When found in accumulation or dispersed sub populations:

On very steep ground it is sometimes necessary to leave high stumps in order to hold logs and trees on the hillside and prevent them from rolling down hill. A professional logging engineer or forester will normally document the need for high stumps in certain locations and will identify those locations in the logging plan and good logging personnel are expected to make 'on the spot' decisions for individual stumps. Such stumps are often found in the following situations:

- Where a heli block is above second growth and rolling logs will damage the small trees below. This is a legitimate reason for leaving high stumps in strategic locations and Waste Surveyors should classify them as unavoidable.
- Where there are rock bluffs and rolling logs will fall over the bluff and become smashed below. This is also a legitimate reason for leaving high stumps and these will also be classified as unavoidable.
- Any location on steep ground where rolling logs could become a safety hazard to workers below. Safety is always a legitimate reason for classifying stumps (and other types of waste) as unavoidable.
- Where there is no room, or it is unsafe to place R/W (right-of-way) logs above the road and they are stacked up against standing trees below the road. When the remainder of the cut block is felled and these logs are still being held on the hillside by trees, it is impossible (without being crushed by rolling logs) to fall those trees anywhere below the top log in the stack. This is not a legitimate reason for leaving high stumps as the R/W logs could be loaded out prior to felling the block therefore Waste Surveyors should classify them as avoidable.

The stump in the lower drawing (left) is recorded below as piece D01

Proper entry of piece(s) on FS 161 (Plot tally card)

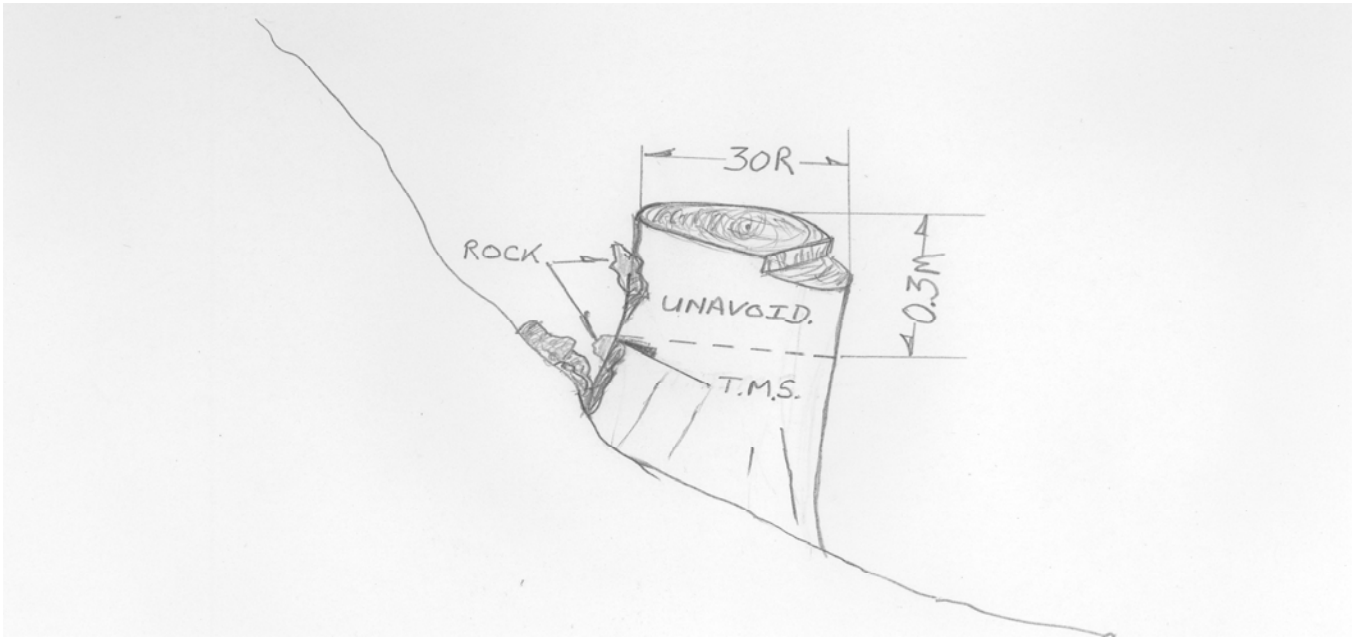
Piece No.			Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
						LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations																	
							0		0								
							0		0								
D	0	1	F	I	S	A	0	1	7	0	2	0	U	0			J	I									
							0		0								

Stump with scar on uphill side and imbedded rock in scar

Enlargement of scar

Enlargement of rock imbedded in scar

Stump with scar on uphill side and imbedded rock in scar



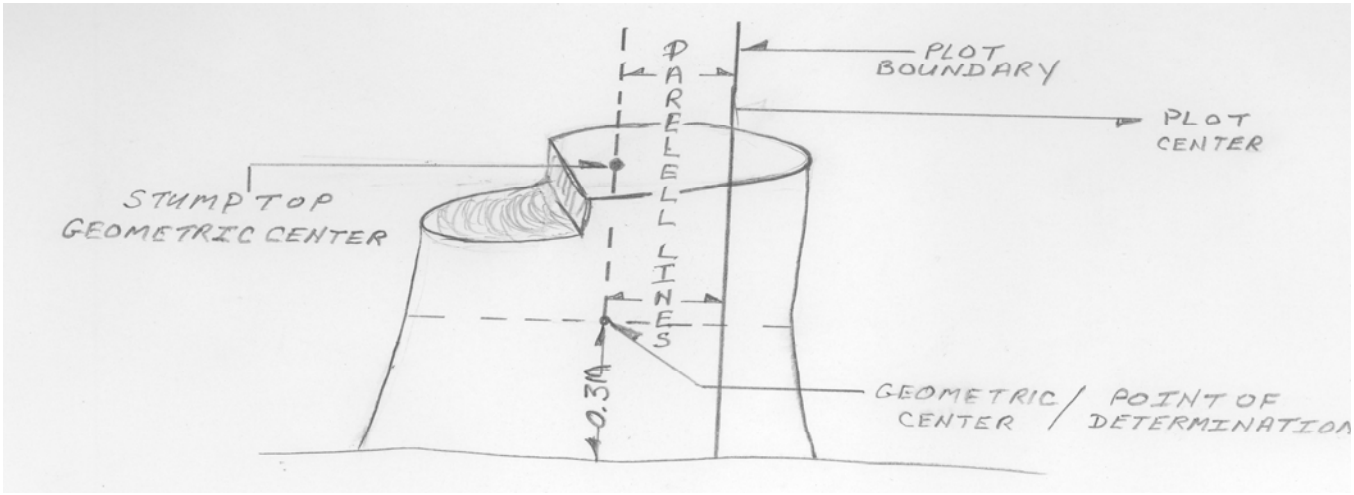
When found in accumulation or dispersed sub populations:

On steep ground (usually over 70 %) in areas containing rock slides, successive rock falls and/or talus slopes, trees are often hit by the falling rock causing scarring on the uphill side of the tree. Often, these scars have fragments of rock imbedded in the wood and/or bark. The rock fragments present a serious hazard to the faller when cutting such trees and to avoid the hazard, the falling cuts must be placed well above the scars (regardless of the visible presence of rock or not). These high stumps are always classified as unavoidable for this safety consideration. The stump in the drawing above is recorded below as piece D01.

Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT									GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES								Comm Code	
							LENGTH			TOP		E	BUTT		E			LEN			TOP		BUTT		D		
In accumulation sub populations or dispersed sup populations																												
										0				0														
D	0	1	H	E	S	U	0	0	3	0	3	0	U	0				H	I								U	S
										0				0														

Vertical stumps near plot boundary – IN or OUT?

Vertical stumps near plot boundary – IN or OUT?



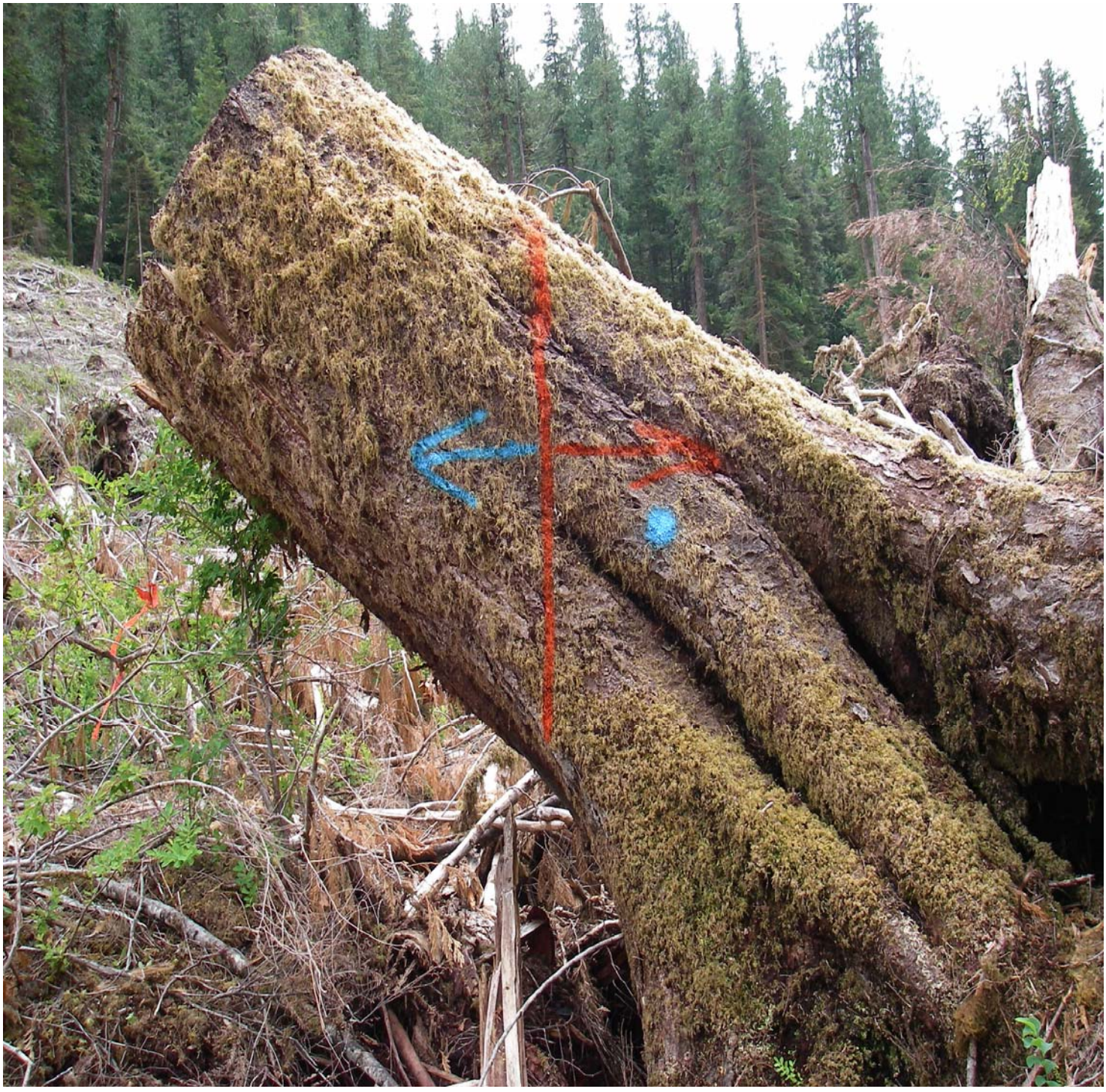
When found in accumulation or dispersed sub populations:

Stumps are never recorded as borderline; they are either “IN” or “OUT”. This determination is made by the location of a spot situated at the geometric center of the stump exactly 0.3m above high ground. This spot is called “The Point of Determination”. For vertical stumps, the point is directly below the geometric center of the top of the stump and as plot boundaries are always represented by a vertical line, the point at the top can be used as the point of determination. In the photo (left) the small blue dot on the center of the stump top identifies the geometric center and the orange paint line identifies the plot boundary. If the plot center is located to the left of the stump (as indicated by the blue arrow), the blue dot (and therefore the point of determination) is outside the plot and the stump would not be tallied. If the plot center is located to the right of the stump (as indicated by the orange arrow) the blue dot (and therefore the point of determination) is inside the plot so the stump would be scaled and tallied. The drawing above illustrates a stump that is “OUT” and therefore is not tallied (as indicated on the tally card below).

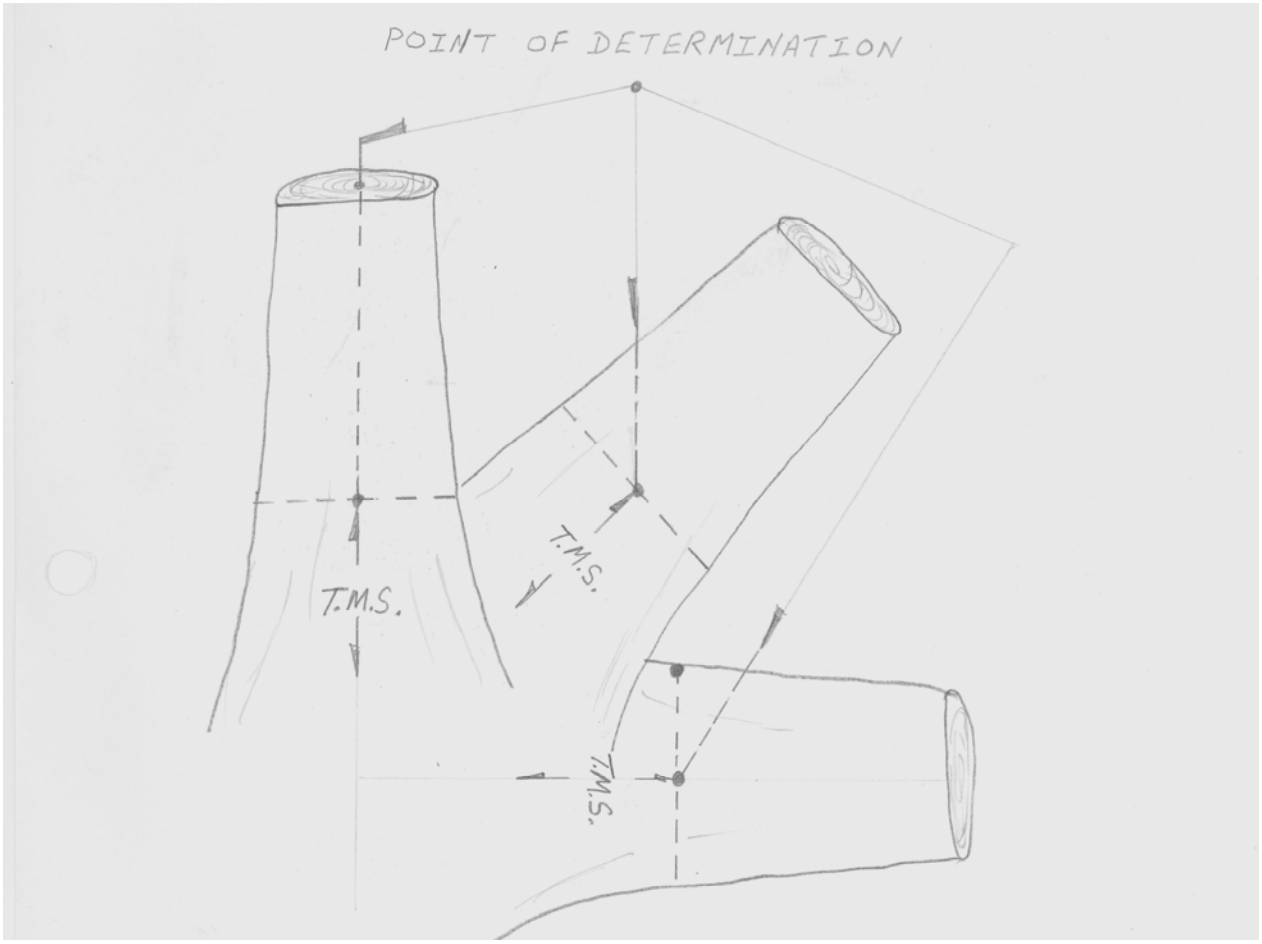
Proper entry of piece(s) on FS 161 (Plot tally card)

Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
					0		0								
NO		SCALE			0		0		NO		TALLY				
					0		0								
					0		0								

Leaning stumps near plot boundary – IN or OUT?



Leaning stumps near plot boundary – IN or OUT?

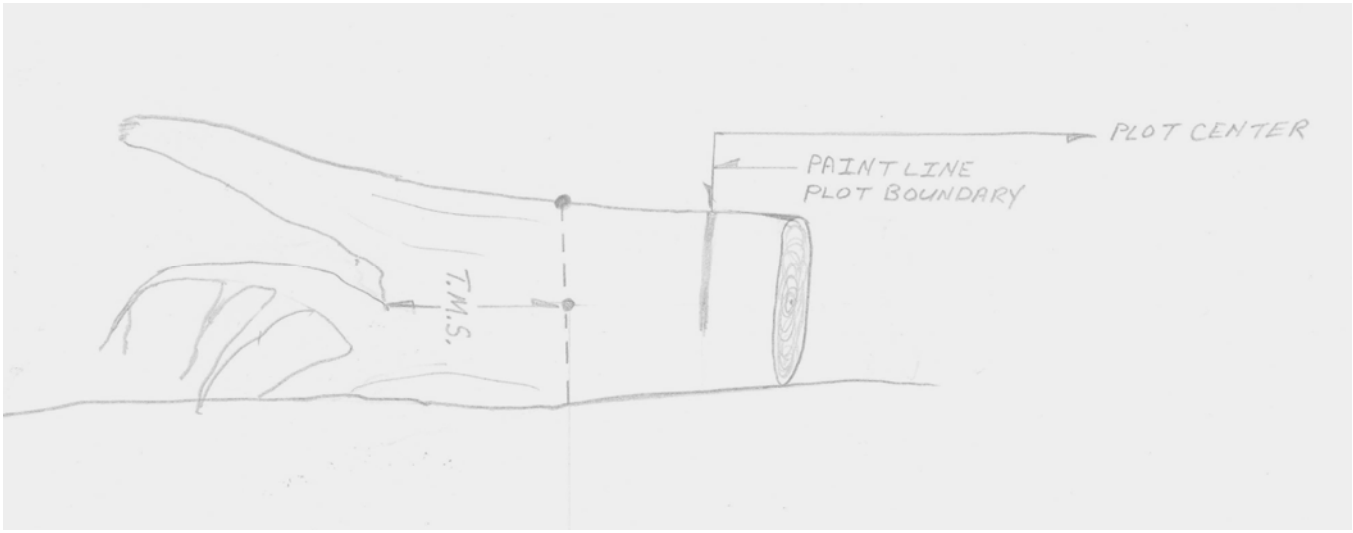


When found in accumulation or dispersed sub populations:

In the photo (left) the small blue dot on the center of the side of the stump identifies the geometric center and the orange paint line identifies the plot boundary. In this case the point of determination is still inside the stump but the blue dot is now on the same horizontal line as the point of determination (as opposed to being on the same vertical line like the vertical stump). If the plot center is located to the left of the stump (as indicated by the blue arrow), the blue dot (and therefore the point of determination) is outside the plot and the stump would not be tallied. If the plot center is located to the right of the stump (as indicated by the orange arrow) the blue dot (and therefore the point of determination) is inside the plot so the stump would be scaled and tallied. The point of determination for leaning stumps will follow an arc as the lean moves from vertical to horizontal as illustrated in the drawing above. The most accurate way to mark it for leaning stumps is on the side of the stump as shown in the photo and the drawing.

Horizontal stumps near plot boundary – IN or OUT?

Horizontal stumps near plot boundary – IN or OUT?



When found in accumulation or dispersed sub populations:

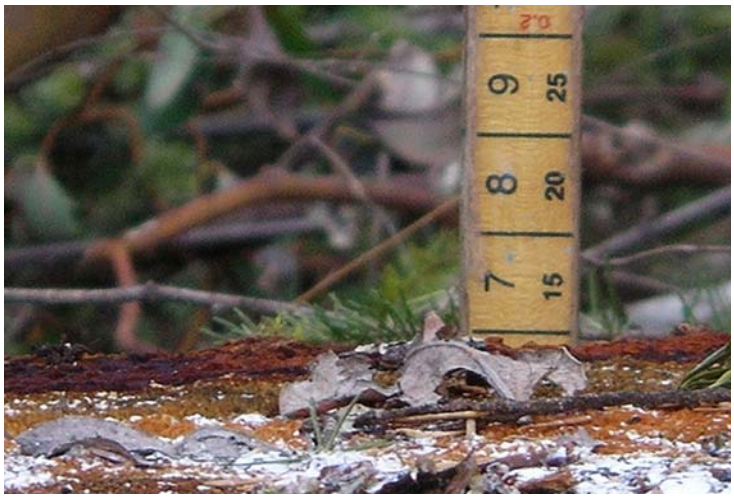
In the photo (left) the small blue dot on the top side of the stump identifies the geometric center and the orange paint line identifies the plot boundary. In this case the point of determination is still inside the stump but the blue dot is now on the same vertical line as the point of determination. If the plot center is located to the left of the stump (as indicated by the blue arrow), the blue dot (and therefore the point of determination) is outside the plot and the stump would not be tallied. If the plot center is located to the right of the stump (as indicated by the orange arrow) the blue dot (and therefore the point of determination) is inside the plot so the stump would be scaled and tallied. The point of determination for the horizontal stump in the drawing above is outside the plot boundary so there is no tally.

Proper entry of piece(s) on FS 161 (Plot tally card)																													
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT									GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES							Comm Code	
							LENGTH			TOP			E	BUTT		E				LEN		TOP		BUTT		D		
In accumulation sub populations or dispersed sup populations																													
										0				0															
N	O		S	C	A	L	E			0				0		N	O		T	A	L	L	Y					
										0				0															

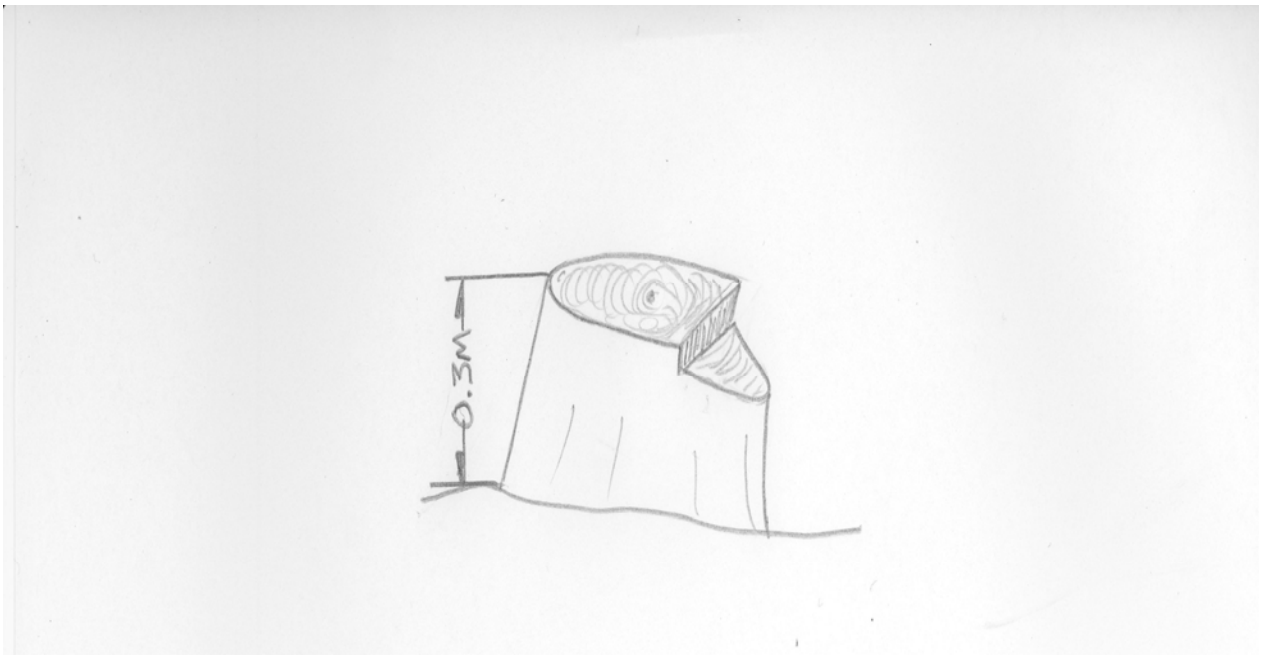
Stumps > TMS (stump height) – NO TALLY

Scale stick tine at high ground

Stump length < 0.3m = NO SCALE



Stumps > TMS (stump height) – NO TALLY



When found in accumulation or dispersed sub populations:

When stumps have been cut at or below the TMS stump height (usually 0.3m from high ground) there is no volume to be scaled so there is nothing to tally. Waste Surveyors should paint a dot on the stump top to show anyone that follows the stump has been looked at but not tallied. Any stump that is less than 0.35m in length (and therefore can not be rounded up to 0.4m) is not tallied. Do not measure stumps in immature stands that were left from the original old growth logging. Measure logs that meet TMS specs.

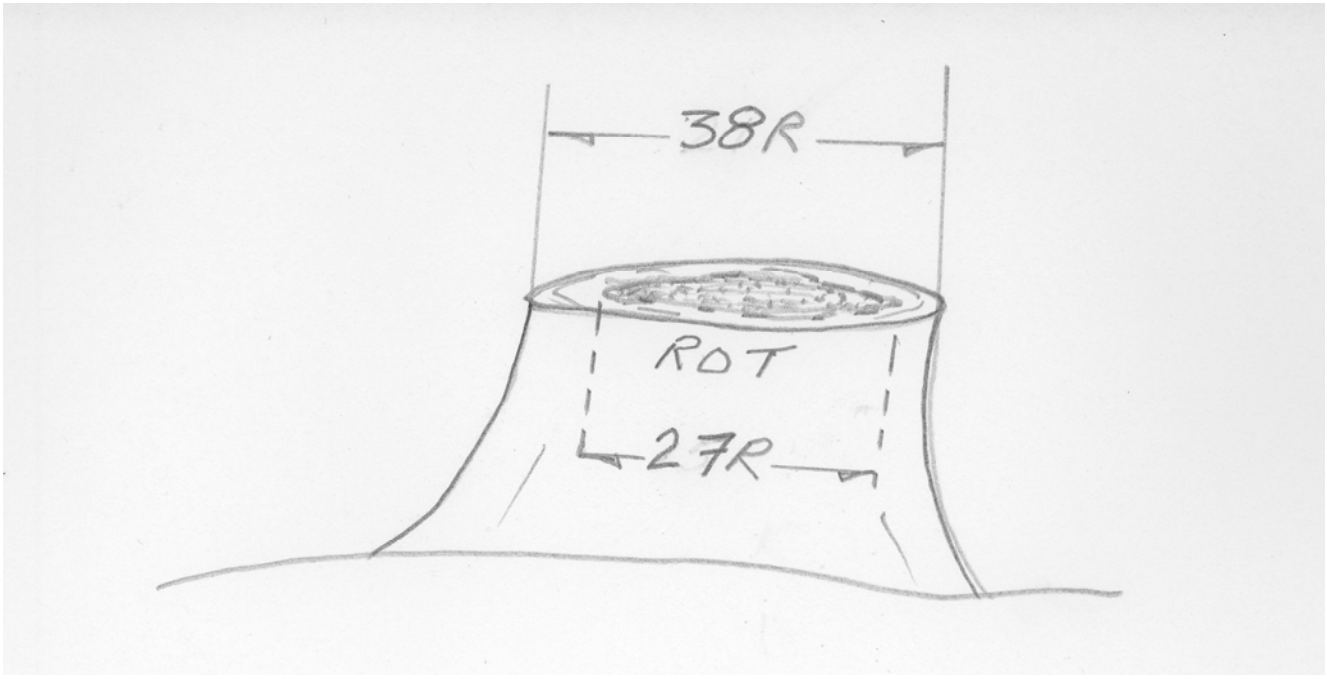
Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT									GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES							Comm Code	
							LENGTH		TOP		E	BUTT		E				LEN		TOP		BUTT		D		
In accumulation sub populations or dispersed sup populations																												
										0				0														
N	O		S	C	A	L	E			0				0		N	O		T	A	L	L	Y					
										0				0														

Stumps < 50% sound – NO TALLY

Gross DIB = 21 rads

Decay Diameter = 15 rads

Stumps < 50% sound – NO TALLY



When found in accumulation or dispersed sub populations:

Stumps that are less than 50% sound are not tallied. Stumps are roughly 50% sound when the diameter of the decay inside the stump approaches 70% of the gross DIB of the stump. The UV's for the gross DIB and the decay are used to make the final determination. For example (see drawing above) a stump with a gross DIB of 38 rads (UV = 454 dm3) with a 27 rad (UV = 229 dm3) heart rot hole is slightly less than 50% sound and would not be tallied. The percent sound is computed by dividing the UV of the decay by the UV of the gross stump DIB. The stump in the photos (left) has a gross DIB of 21 rads (UV = 139 dm3) and a heart rot hole of 15 rads (UV = 71 dm3). 71 is more than half of 139 so the stump is less than 50% sound and therefore would not be tallied.

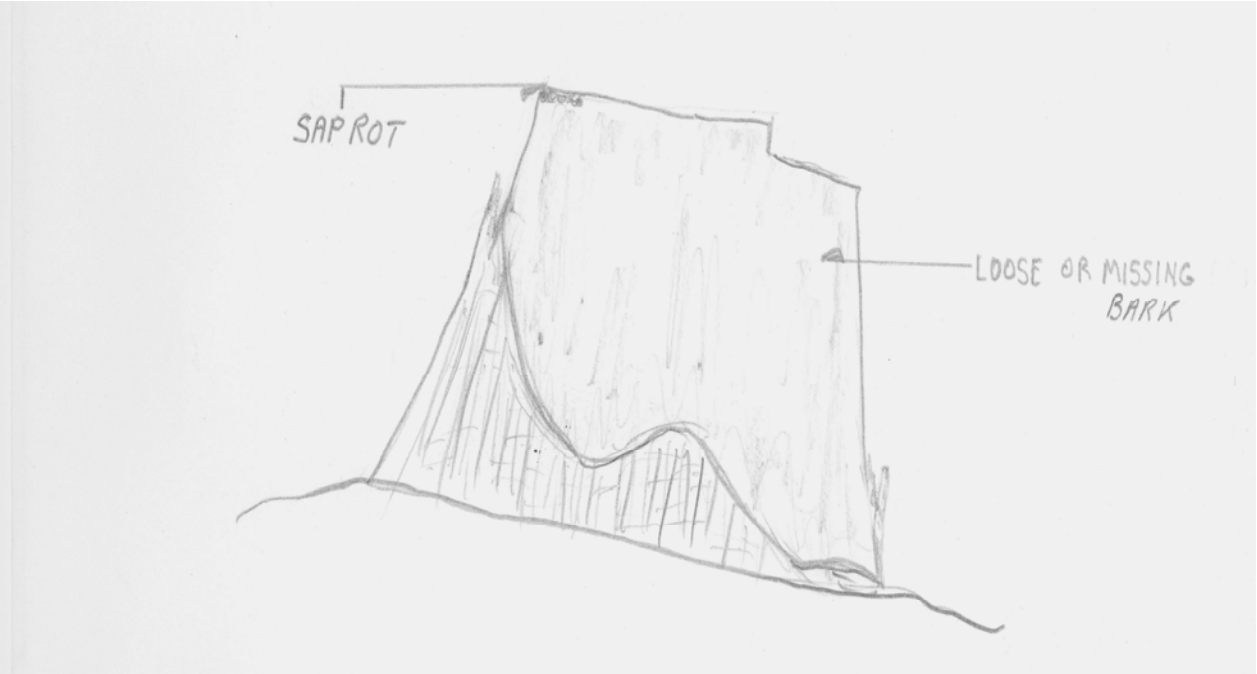
Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT										GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES								Comm Code	
							LENGTH			TOP		E	BUTT		E				LEN		TOP		BUTT		D			
In accumulation sub populations or dispersed sup populations																												
										0				0														
N	O		S	C	A	L	E			0				0		N	O		T	A	L	L	Y					
										0				0														

Stumps – Dead (not CE, YE or WH) – NO TALLY

Dead Cedar stump – Scale and tally

Dead White Pine stump – Scale and tally

Stumps – Dead (not CE, YE or WH) – NO TALLY



When found in accumulation or dispersed sub populations:

Dead stumps, except Cedar, Cypress (also called Yellow Cedar) and White Pine are not tallied. See the Waste Manual (page 5-17) for the definition of dead stumps (for the conduct of Waste Surveys). The logic for not scaling and tallying dead stumps is that all dead trees (or snags) are very dangerous to fall and therefore the stumps of all snags would be classified as unavoidable (and are therefore not billable waste). Most inventories do not include the volume of dead trees and therefore the volume from dead trees should not be included in the cut control calculation. It is, then, not necessary to scale and tally the volume of dead stumps.

Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT									GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES							Comm Code	
							LENGTH			TOP			E	BUTT		E				LEN		TOP		BUTT		D		
In accumulation sub populations or dispersed sup populations																												
										0				0														
N	O		S	C	A	L	E			0				0		N	O		T	A	L	L	Y					
										0				0														

Old Growth Stumps – Too small for log or grade (Measured at 0.3m).

Old Growth Stump < 10 rads

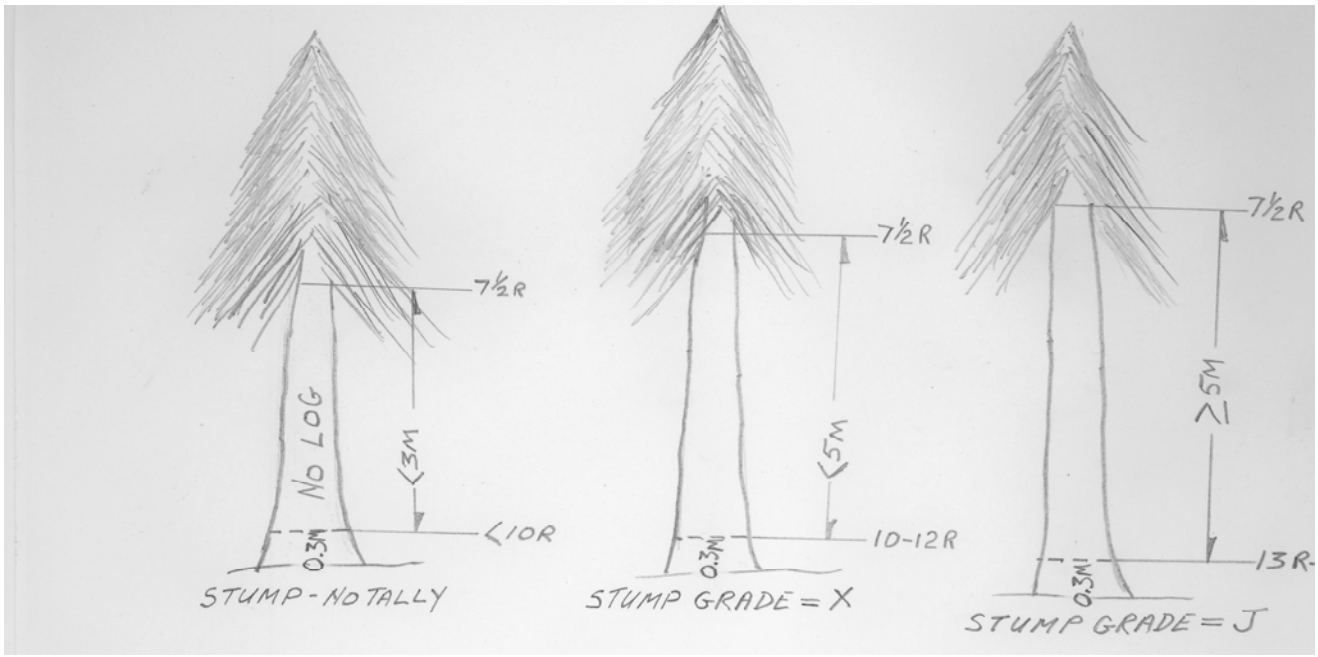
Too small for 3m log at TMS - NO TALLY

Old Growth Stump – 10-12 rads

Too small for 5m "J" at TMS – Grade = U

Old Growth Stump > 12 rads 8 rads+ at 5.0m – Grade = J	Old Growth Stump – parent log present Grade as per parent log
NEED PHOTO	

Old Growth Stumps – Too small for log or grade (Measured at 0.3m).



When found in accumulation or dispersed sub populations:

In old growth timber, for all species, stumps that do not have a 3m log (to the 7.5 rad minimum TMS top DIB) above them are not avoidable waste and therefore are not scaled. For old growth cut blocks, the smallest stump that could have a 3m log to the 7.5 rad TMS top DIB is approximately 10 rads (measured at 0.3m from high ground). Stumps smaller than 10 rads are not usually tallied unless, in the opinion of the Waste Surveyor, the timber was very tall and/or had very little taper.

- Grades for old growth stumps (unless the parent log is still present and can be used to assign a grade to the stump) will default as per Appendix 6 of Waste Manual.
- Old growth stumps between 10 and 12 rads (top DIB at 0.3m) will default to “U” grade
- Old growth stumps greater than 12 rads (top DIB at 0.3m) will default to “J” grade.

Second Growth Stumps - Too small for log or grade (Measured at 0.3m).

Second Growth Stump < 7 rads

Too small for 3m log at TMS - NO TALLY

Second Growth Stump 7 – 9 rads

Too small for 5m "J" at TMS – Grade = "U"

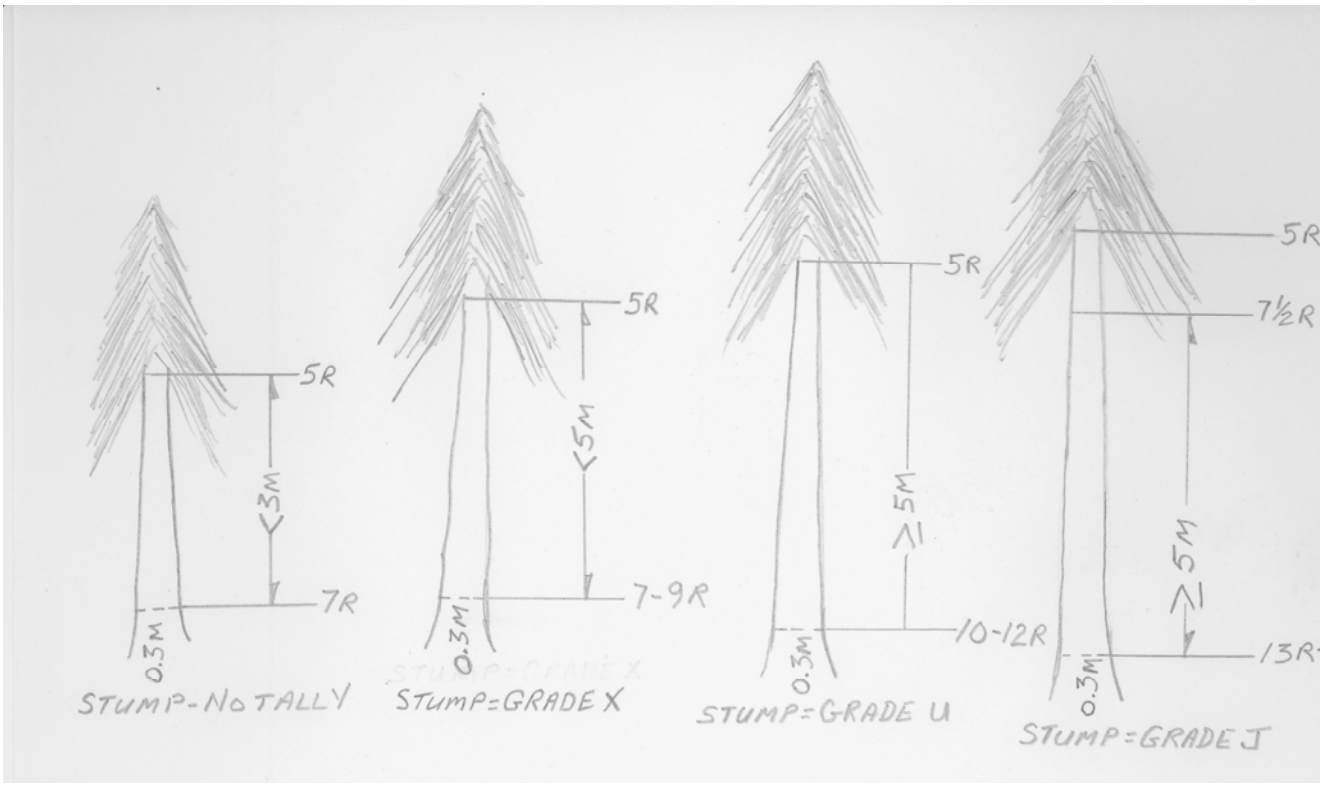
Second Growth stump 10 – 12 rads

DIB too small at 5m for "J" – Grade = "U"

Second Growth Stump > 12 rads

8 rads+ at 5.0m – Grade = "J"

Second Growth Stumps - Too small for log or grade (Measured at 0.3m).



When found in accumulation or dispersed sub populations:

In second growth timber, for all species, stumps that did not have a 3m log (to the TMS) above them are not avoidable waste and therefore are not scaled. For second growth cut blocks, the smallest stump that could have a 3m log to the 5 rad TMS top DIB is approximately 7 rads DIB (measured at 0.3m from high ground). Stumps smaller than 7 rads are not tallied unless, in the opinion of the Waste Surveyor, the timber was very tall and/or had very little taper.

Grades for second growth stumps (unless the parent log is still present and can be used to assign a grade to the stump) will default as follows:

- Grades for second growth stumps (unless the parent log is still present and can be used to assign a grade to the stump) will default as per Appendix 6 of Waste Manual.
- Second growth stumps between 7 and 12 rads (top DIB at 0.3m) will default to “U” grade
- Second growth stumps greater than 12 rads (top DIB at 0.3m) will default to “J” grade.

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PART 3

BUCKING WASTE

Bucking waste is defined as any piece, bucked at one or both ends and less than 3.0m in length that has been created through poor bucking practices. For the purpose of this definition an undercut (ie: off the stump) is not considered to be a buck. The one exception is pieces, in dispersed sub populations only, which have been bucked at the small end and are broken at the large end. The reason for this anomaly will be described in section 4 of this guide. Some examples of bucking waste are; tops and slabs bucked off at a DIB greater than the TMS, excessive trim (> 0.1m) when ridding logs of breaks and some defects and excessive long butting where the long butt is > 50% sound.

Prior to May 1st 2006 bucking waste was generally not graded and defaulted to sawlog grade ("U" or better) during compilation. Changes to timber pricing requires some grades to be billed at different rates which has necessitated the grading of bucking waste (and stumps, see part 2 of this guide). Pieces of bucking waste are not graded 'as-is', they are graded using the procedures documented in the Waste Manual, Appendix #6, pages A-24 and A-25, which states:

- *Old Growth: No change other than grade defaults to "J".*
- *Second Growth: Bucking Waste with less than 8 rad top DIB, grade defaults to "U".*
- *Bucking Waste with an 8 rad or larger top DIB, grade defaults to "J".*

The intent is to assign the same grade to bucking waste that would have been assigned to the 'parent log' (ie, the log the wasted piece should have been left attached to). On rare occasions when the 'parent log' is still present in the slash, the piece of bucking waste should be given the same grade. The only defects that can be considered when grading bucking waste is excessive twist (because twist normally affects all or most of a tree) and oversize knots (if they appear to be continuous).

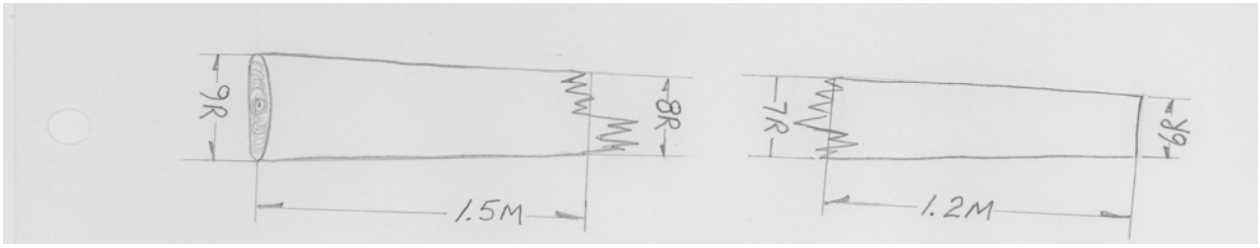
Severely deformed pieces must be removed from logs for a number of legitimate reasons. When attached to logs, they cause a great deal of difficulty (and is some instances a safety hazard) when the logs are handled, loaded, transported and processed. Consequently, severely deformed pieces are always classified as unavoidable waste. They may, however, have some avoidable waste attached to them (excessive trim) which must be scaled and tallied separately. For this reason it is permissible to pencil buck bucking waste for classification purposes. Descriptions and illustrations of these types of pieces are included in this section of the Field Guide.

Normal Bucking Waste – Cut at one end only

Top end of above piece

Butt end of above piece

Normal Bucking Waste – Cut at one end only



A – When found in accumulation sub populations:

In all accumulation strata, any piece less than 3.0m in length with one or more bucked ends is scaled and classified as avoidable bucking waste (unless severely deformed) regardless of which end is bucked or broken. See pieces A01 and A02 below for the recording of the pieces in the drawing above.

B – When found in dispersed sub populations:

In dispersed strata, for the reason given in the BREAKAGE section of this guide (section 4), only those pieces that have the large end bucked are considered to be bucking waste. The piece on the right in the drawing above, in dispersed strata, therefore would be classified as unavoidable breakage and not be scaled and/or tallied. Undercuts are not considered to be bucks (because the faller/bucker had little or no choice as to the placement of the cut) so pieces <3m in length that have one end broken and the other end undercut (identified by a small lip across the end and slivers of 'stump pull') are also classified as unavoidable breakage and are not scaled and/or tallied. The piece on the left in the drawing is tallied below as piece D01, the piece on the right as D02 and the piece in the photo (left) as D03.

Proper entry of piece(s) on FS 161 (Plot tally card)

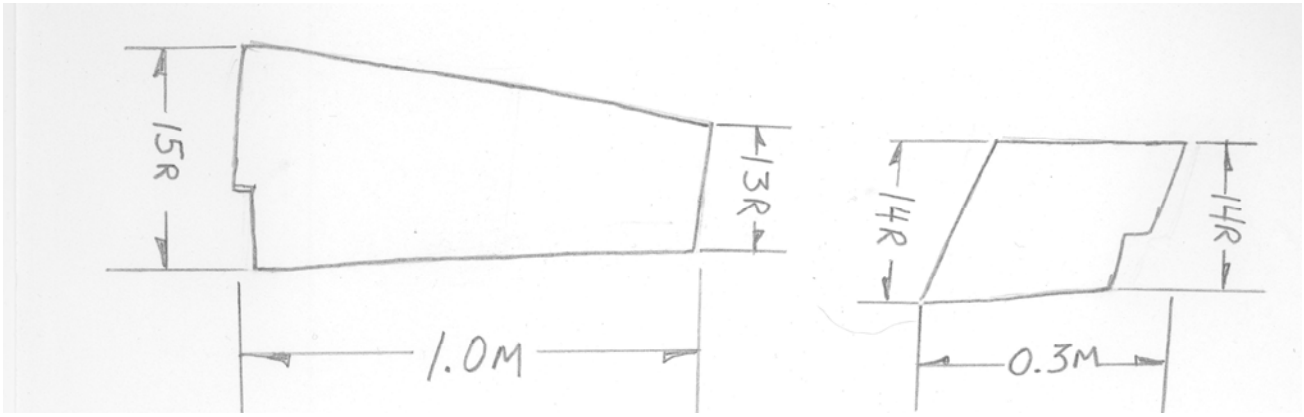
Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
A01	SP	W	A	015	085	B	097	C	J	I					
A02	SP	W	A	012	066	C	077	B	U	I					
				0	0		0								
D01	SP	W	A	015	085	B	097	C	J	I					
D02	B	R	E	AKA	GE		NO	T	A	L	L	Y			
D03	CE	W	A	026	017	B	021	C	J	I					

Normal Bucking Waste Cut at both ends

Butt end of above piece

Top end of above piece

Normal Bucking Waste – Cut at both ends



When found in accumulation or dispersed sub populations:

All pieces, excluding severe deformities and defects, that are either bucked at both ends or bucked at one end and undercut at the other (and less than 3.0m long) are scaled and tallied as avoidable bucking waste. Pieces with an undercut butt and a bucked top (called long butts) have been removed from the butt end of a bottom log. Pieces with an undercut top and a bucked butt have been removed from the top of a stump.

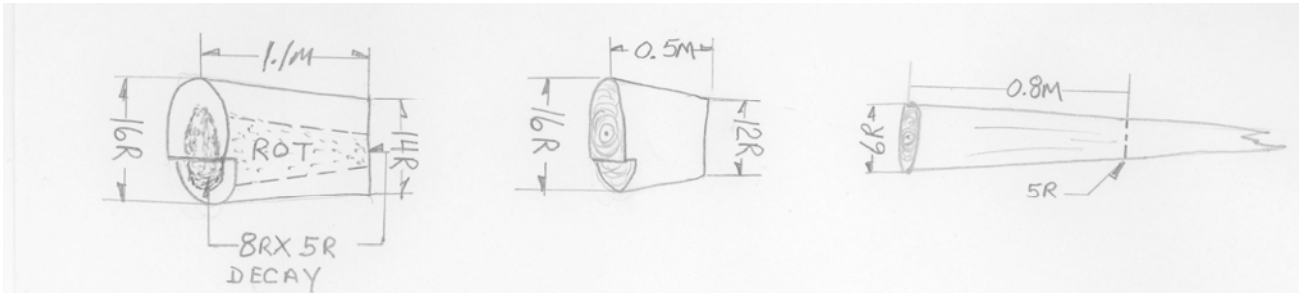
Grades are assigned according to the procedures documented at the front of this section of the field guide. The piece illustrated in the photo (left) is tallied below as piece D01 and the pieces illustrated in the drawing above are tallied below as pieces D02 and D03.

Proper entry of piece(s) on FS 161 (Plot tally card)

Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
				0			0								
D	01	B	A	W	A	014	024	C	025	C	J	I			
				0			0								
D	02	B	A	W	A	010	013	C	015	U	J	I			
				0			0								
D	03	B	A	W	A	003	014	U	014	C	J	I			
				0			0								

Processor Bucking Waste

Processor Bucking Waste



When found in accumulation or dispersed sub populations:*

Processor bucking waste, bucked at both ends (or bucked at the top and undercut at the butt), less than 3.0m long with no major defect removed is usually caused by the creation of preferred log lengths, the removal of butt flair or by the removal of minor (>50% sound) amounts of butt or root rot. It is commonly found in great quantities not far from the roadside where a log processor was situated. Pieces of processor bucking waste are all classified as avoidable and are graded according the procedures described in the Waste Manual, Appendix 6, pages A-24 and A-25.

*Note: When large volumes of processor bucking waste are found 25m to 30m from the road edge the waste surveyor should consider creating a 25m to 30m roadside stratum up to the processor waste and then another 10m to 15m accumulation stratum which includes the processor waste.

See 3 pieces in drawing above and the tally of those pieces below (A01, A02 and A03)

Proper entry of piece(s) on FS 161 (Plot tally card)

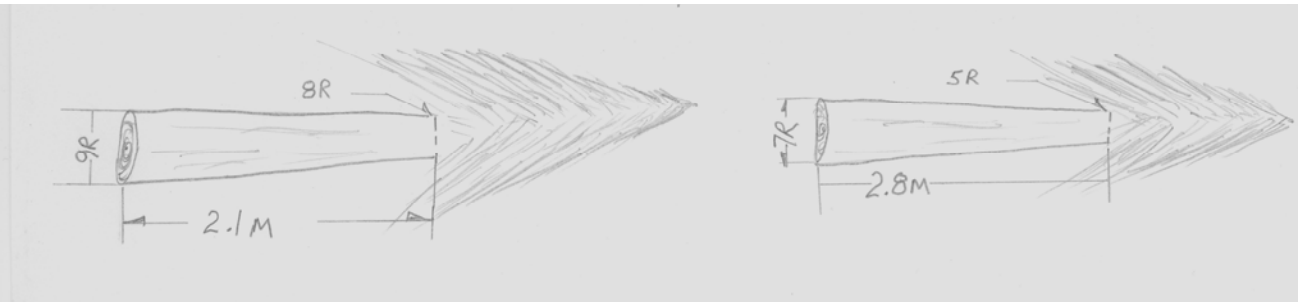
Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
A01	FI	W	A	011	014C	016	U	J	I			0	1	0	2B	
				0		0									
A02	FI	W	A	005	012C	016	U	J	I						
				0		0									
A03	FI	W	A	008	05N	006	C	U	I						
				0		0									

Bucking Waste in Tops

Old growth top

Second growth top

Bucking Waste in Tops



When found in accumulation or dispersed sub populations:

Bucking waste in tops is bucked at the large end and tapers (in less than 3.0m) to the TMS at the small end. This type of bucking waste is commonly found when the operator wishes to produce logs with a preferred log length or logs with a larger top DIB than the TMS. Very large quantities of bucking waste in tops can often be found where log processors have been utilized and set to trim off the tops at a DIB larger than the TMS for the site. When measuring the length of these pieces, Waste Surveyors must find the last occurrence of the TMS top DIB (often found at a branch whorl). Waste Surveyors should paint a line at the TMS, as illustrated in the two lower photos (left). Improperly and/or wastefully bucked tops are classified as avoidable waste and are graded as follows:

- Old Growth: Normally, TMS top DIB = 7.5 rads and grade defaults to “J”.
- Second Growth: Normally, TMS top DIB = 5.0 rads and grade defaults to “U”.

On those rare occasions where the parent log is still present in the slash, the grade of the parent log may be assigned to the piece of bucking waste that came off it.

See illustrations above and left and pieces D01 (old growth TMS) and D02 (second growth TMS) below.

Proper entry of piece(s) on FS 161 (Plot tally card)

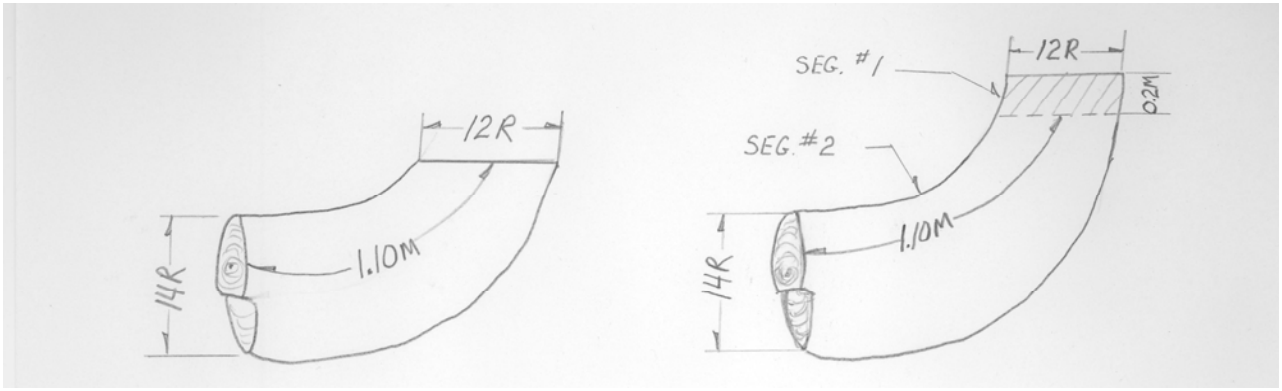
Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
D01FIWA	021			0	0	8	N	0	09	C	J	I			
				0				0							
D02FIWA	028			0	0	5	N	0	07	C	U	I			
				0				0							

Wasteful trimming of defects - Pistol Butts

Butt end of above piece = 16 rads

Top end of above piece = 13 rads

Wasteful trimming of defects - Pistol Butts



When found in accumulation or dispersed sub populations:

Severely deformed pieces such as pistol butts must be removed from logs for the reasons described at the beginning of this section of the field guide. The piece illustrated at the left in the drawing above has been removed from a log cleanly and contains no avoidable portion. The piece illustrated at the right in the drawing above has not been removed from a log cleanly and therefore contains an avoidable portion. The deformed and unavoidable portion will produce no lumber and therefore may be graded "Y". The avoidable portion should be given the same grade as the log it was cut from (ie the parent log). The parent log will seldom be present so they can be graded based on the butt DIB (of the avoidable portion) and an assumed taper of 3 rads in 5 meters. The illustrated piece (above right) has an estimated butt DIB of 13 rads so the top DIB 5 meters above the deformity would be approximately 10 rads and therefore would meet the requirements for the "J" grade. If, however, the butt DIB of the avoidable portion was 10 rads, the DIB 5 meters above would be 7 rads which would not meet the requirements for the "J" grade and should be graded "U". The piece illustrated in the photo (left) has at least 1.0m of avoidable bucking waste attached to the top end of the pistol butt.

See pieces D01, D02 and D03 below for the tally of the pieces illustrated in the drawing above.

Proper entry of piece(s) on FS 161 (Plot tally card)

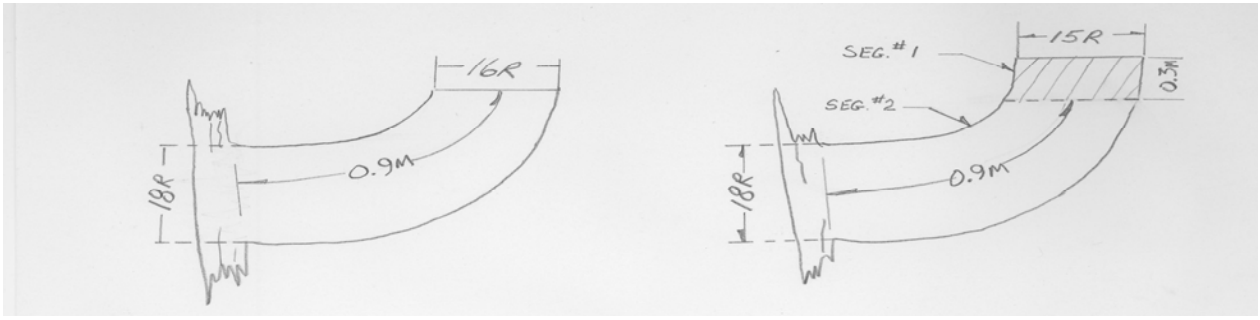
Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
D 01	CE	W	U	01	11	0	12	0	Y	I					DE
				0			0								
D 02	CE	W	U	01	11	0	13	P	Y	I					S1
				0			0								
D 03	CE	W	A	00	22	0	12	C	J	I					S2

Wasteful trimming of defects - Candelabras

Wasteful trimming of log from candelabra

Blue line shows proper location of buck

Wasteful trimming of defects - Candelabras



When found in accumulation or dispersed sub populations:

In many respects, bucking waste in candelabras is very similar to bucking waste in pistol grips (see previous 2 pages). The primary difference is that a pistol butt usually comes off a stump and candelabras come off a stem because they are a form of branching. Most often, candelabras will break off the main stem during the falling process so the butt end is usually broken. Occasionally they need to be bucked off the main stem and when they are, that cut should be viewed as an undercut because the bucker has little or no choice regarding the placement of the cut (ie much like a stump). When this is the case the resulting piece of bucking waste can not be classified as avoidable because the piece was not created by careless or wasteful bucking practiced (see definition of bucking waste at the front of this section of the guide). For recording the piece illustrated above (left) see piece D01 below. For recording the pieces illustrated above (right) see pieces D02 and D 03 below.

Proper entry of piece(s) on FS 161 (Plot tally card)

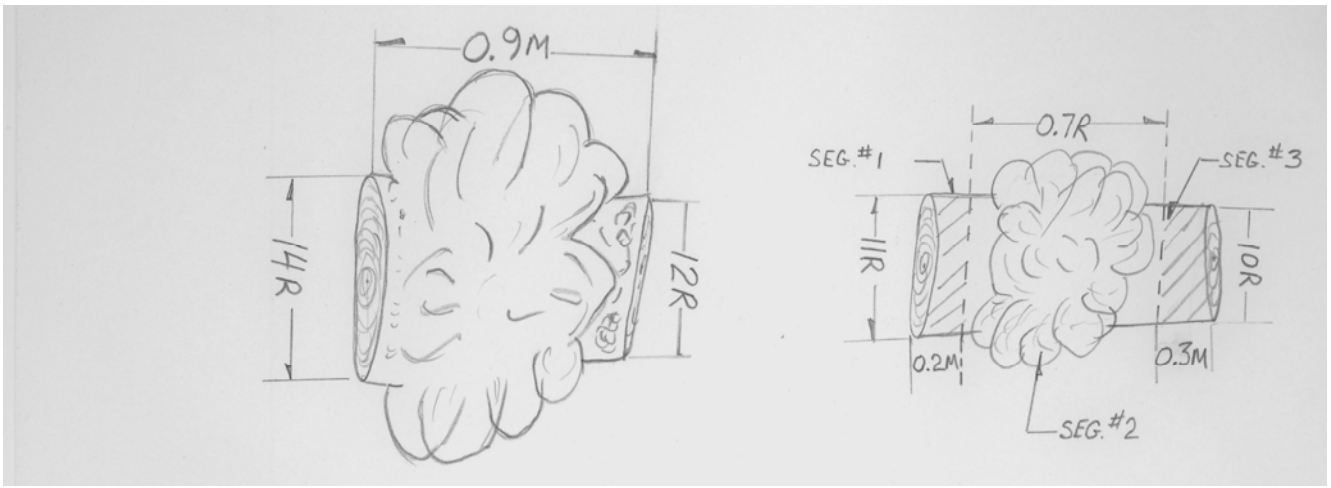
Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
D01CEWU	009	0160	180	B	Y	I									CA
		0	0												
D02CEWU	009	1650	160	P	Y	I									S1
		0	0												
D03CEWA	003	1650	160	P	J	I									S2
		0	0												

Wasteful trimming of defects - Galls and Burls

Top DIB of wasted portion = 39 rads

Length of wasted portion = 1.1m

Wasteful trimming of defects - Galls and Burls



When found in accumulation or dispersed sub populations:

Large galls and burls need to be bucked from logs for the reasons described at the front of this section of the guide. So long as they have been bucked off the logs cleanly, there is no avoidable waste. See piece D01 below. If, however, they were bucked off the log carelessly or wastefully there may be avoidable waste on one or both ends. See piece D02, D03 and D 04 below. The large Cedar burl illustrated in the photo (left) has roughly 1.1m of wasted log attached to it.

Proper entry of piece(s) on FS 161 (Plot tally card)

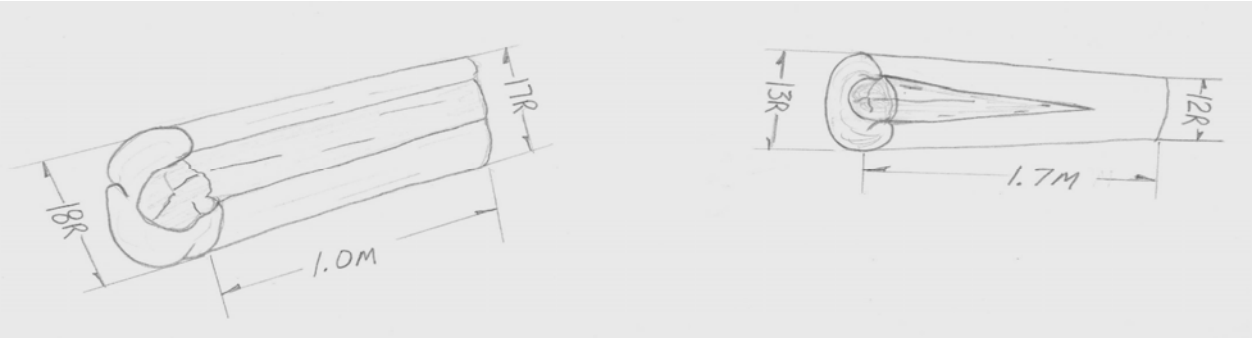
Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
D01		W	U	009	0	12	C	0	14	C	Y	I			DE
					0			0							
D02		W	A	002	0	11	C	0	11	P	J	I			S1
					0			0							
D03		W	U	007	0	10	P	0	11	P	Y	I			S2
					0			0							
D04		W	A	003	0	10	C	0	10	P	U	I			S3
					0			0							

Wasteful trimming of defects - Cat Face

Top end of above piece

Butt end of above piece

Wasteful trimming of defects - Cat Face



When found in accumulation or dispersed sub populations:

Catfaces normally start at the ground or at least near the base of a tree and they run up the butt log for a number of meters depending on the severity of the injury that caused the catface in the first place. Some even travel the entire length of the tree. Where the catface is severe and the live wood has separated form the dead (see “catface” in section 1 of this guide) and the dead wood is sun checked, no lumber can be produced from the log and therefore the grade is “Y”. Pieces bucked off such logs should also be graded “Y” but most of the time the log is no longer present and only the bucked off piece remains. If the bucked off piece (bucking waste) is severely catfaced and the defect shows no sigh of cleaning up or tapering out (within roughly 5 meters), it is reasonable to assume it continues up that missing parent log and it would have been “Y” grade. In this case, the piece of bucking waste can also be graded “Y” even though there is no apparent reason for the piece to have been removed from the log. See illustration above (left) and piece D01 below. If, however, the catface on the bucking waste appears to be ending, it is reasonable to assume the parent log was free of defect and would have been a sawlog and the bucker was just making a cleaner sawlog but wasted volume in the process. In this case the bucking waste would be graded “J” so long as there was enough diameter at the base of the piece to have a 8 rad top 5.0m above that base. See piece D02 below.

Proper entry of piece(s) on FS 161 (Plot tally card)

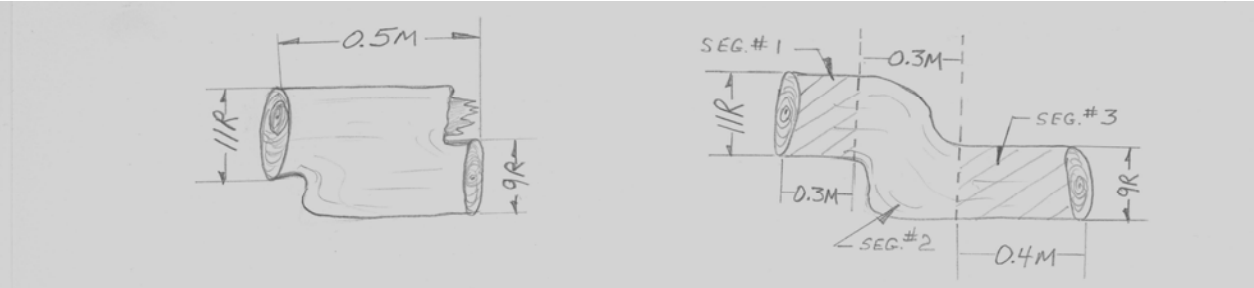
Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code	
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D		
In accumulation sub populations or dispersed sup populations																
D01CEWA	0	1			0	1	0	0	1	7	C	0	1	8	C	Y	I								C	F
								0				0														
D01CEWA	0	1			0	1	7	0	1	2	C	0	1	3	C	J	I								C	F
								0				0														

Wasteful trimming of defects - Severe Crook

Wastefully trimmed crook

Line shows proper location of buck

Wasteful trimming of defects - Severe Crook



When found in accumulation or dispersed sub populations:

Like other deformed portions of logs that create handling difficulties and potential safety considerations, it is not considered to be wasteful to remove them from logs so long as they are bucked out cleanly. The drawing above (left) illustrates a crook that has been bucked out cleanly and contains no avoidable waste. See piece A01 below. The piece above (right) illustrates a crook that has not been bucked out cleanly and does contain some avoidable waste. See pieces A02, A03 and A04 below for the proper recording of those pieces.

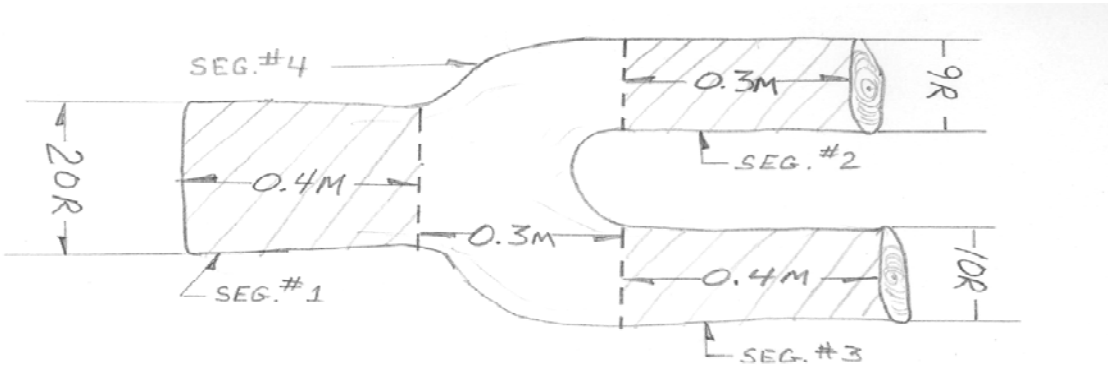
When determining the waste class of any deformed piece, the Waste Surveyor must always be diligently observant and constantly be on the lookout for any possible safety concerns the bucker may have been faced with and that may have influenced the final location of the buck. These pieces are not automatically avoidable when safety and/or environmental issues may have been the cause of their creation.

Proper entry of piece(s) on FS 161 (Plot tally card)

Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
A01		WU		005	09	C	0	11	C	Y	I				CR
					0		0								
A02		WA		003	11	P	0	11	C	J	I				S1
					0		0								
A03		WU		003	10	P	0	11	P	Y	I				S2
					0		0								
A04		WA		004	09	C	0	10	P	U	I				S3
					0		0								

Wasteful trimming of deformities - Schoolmarm

Wasteful trimming of deformities - Schoolmarm



When found in accumulation or dispersed sub populations:

A schoolmarm is a crotch or a fork in a tree trunk that has a pronounced swelling at the junction of the three or more parts. They are usually the end result of a broken or damaged leader where two or more branches (from the first whorl below the damaged leader) have turned upwards and become new leaders which eventually create two or more separate logs. Forks that do not have the pronounced swelling and separation of the sub stems are simply referred to as forks. For the reasons described at the front of this section of the guide, it is not considered wasteful to remove these pronounced swellings from the logs they are attached to. The schoolmarm illustrated in the photo to the left and the drawing above was not removed from the log(s) cleanly and therefore contain some avoidable waste but the swelling itself is not considered to be avoidable waste. See pieces D01, D02, D03 and D04 below for the recording of the four segments. Note: the dimensions in the drawing are intentionally smaller than the dimensions of the piece illustrated in the photo to show an example of a piece that would not have contained a 5m log with an 8 rad top and therefore not meet the requirements for the “J” grade.

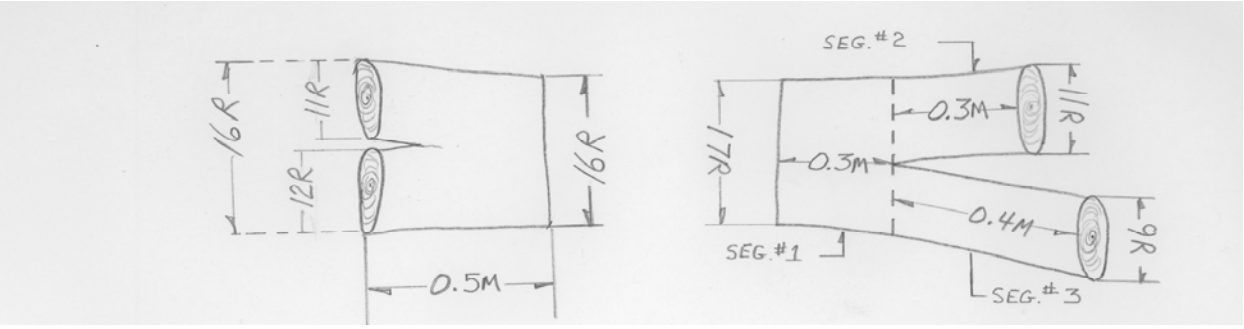
Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.	Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT									GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES					Comm Code	
					LENGTH		TOP		E	BUTT		E				LEN		TOP		BUTT		D		
In accumulation sub populations or dispersed sup populations																												
D	*0*	*1*	*F*	*I*	*W*	*A*	*0*	*0*	*4*	*0*	*2*	*0*	*C*	*0*	*1*	*9*	*P*	*H*	*I*								*S*	*1*
										0				*0*														
D	*0*	*2*	*F*	*I*	*W*	*A*	*0*	*0*	*3*	*0*	*0*	*9*	*C*	*0*	*1*	*0*	*P*	*U*	*I*								*S*	*2*
										0				*0*														
D	*0*	*3*	*F*	*I*	*W*	*A*	*0*	*0*	*4*	*0*	*1*	*0*	*C*	*0*	*1*	*1*	*P*	*J*	*I*								*S*	*3*
										0				*0*														
D	*0*	*4*	*F*	*I*	*W*	*U*	*0*	*0*	*3*	*0*	*1*	*9*	*P*	*0*	*1*	*9*	*P*	*Y*	*I*								*S*	*4*

Wasteful trimming of deformities - Forks

Line shows proper location of buck

Two logs are separated with single buck

Wasteful trimming of deformities - Forks



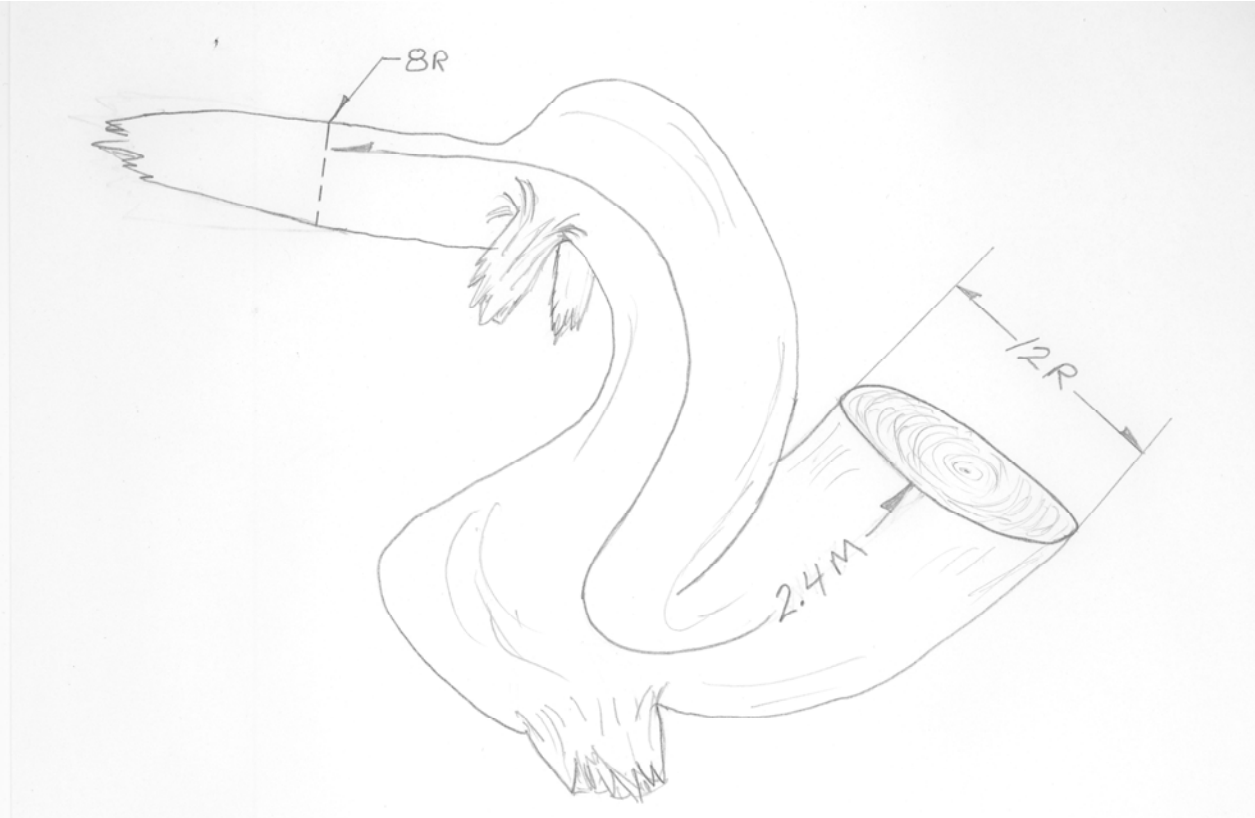
When found in accumulation or dispersed sub populations:

There should be no bucking waste created when forks are bucked off where there is no pronounced swelling. One cut should be sufficient to sever the forked piece into its three parts. For example, for the piece illustrated at the right in the drawing above a single buck could be placed along the vicinity of the dotted line separating segment #1 from the other two segments. The log below that single buck may contain two piths but that is only a grade consideration and has nothing to do with waste class or safety. Since the three segments of this piece are not all the same grade, they must be scaled and tallied separately. See the photos (left) and pieces D01, D02 and D03 below. The left piece illustrated in the drawing above is all the same waste class and grade so it can be scaled as three separate pieces or as one piece. Combine the unit values of the two small tops to correctly determine the top DIB. (UV for 11 rads = 38 dm3 and the UV for 12 rads = 45 dm3, 38 + 45 = 83 dm3 = 16 rads. See piece D04 below.

Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT										GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES							Comm Code	
							LENGTH			TOP			E	BUTT		E			LEN		TOP		BUTT		D		
In accumulation sub populations or dispersed sup populations																												
D	0	1			W	A	0	0	3	0	1	7	P	0	1	7	C	J	I								S	1
										0				0														
D	0	2			W	A	0	0	3	0	1	1	C	0	1	1	P	J	I								S	2
										0				0														
D	0	3			W	A	0	0	4	0	0	9	C	0	0	9	P	U	I								S	3
										0				0														
D	0	4			W	A	0	0	5	0	1	6	C	0	1	6	C	J	I								F	K
										0				0														

Wasteful trimming - Severe Deformities

Wasteful trimming - Severe Deformities



When found in accumulation or dispersed sub populations:

For the reasons discussed at the front of this section of the guide, severely deformed pieces, as illustrated in the photo (left) and the drawing (above) may be bucked off logs and when scaled in Waste plots, will be classified as unavoidable bucking waste and graded “Y”. The comment code DE (deformed) helps describe the piece. See piece D01 below.

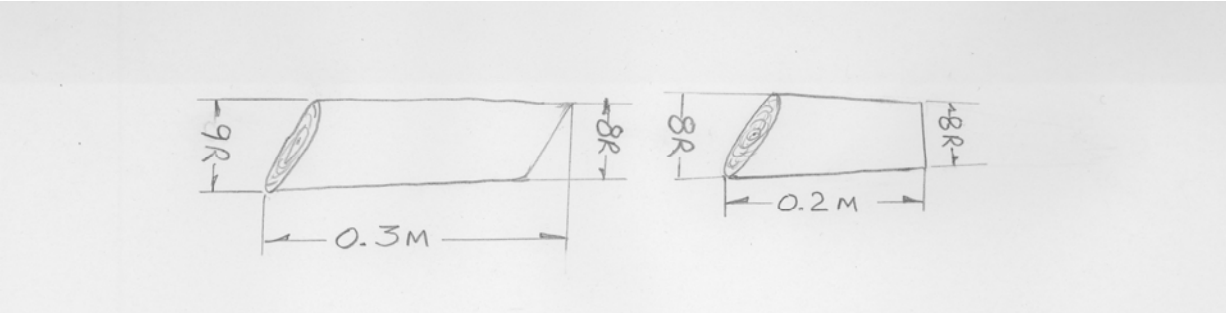
Proper entry of piece(s) on FS 161 (Plot tally card)																													
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT									GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code	
							LENGTH			TOP		E	BUTT		E			LEN		TOP		BUTT		D		
In accumulation sub populations or dispersed sup populations																													
										0				0															
D	0	1	H	E	W	U	0	2	4	0	0	8	N	0	1	2	C	Y	I								D	E
										0				0															

Bucking waste created for safety

Small stem bucked up for escape route

Note oblique cuts

Bucking waste created for safety



A – When found in dispersed sub populations:

Common sense and safety regulations demand that a faller have an unobstructed escape route to use in case a tree falls in the wrong direction or a limb or other part falls out of the tree. Occasionally there are small stems or saplings that may obstruct this route and the faller must cut a pathway through them. This is especially true in windfall areas. In the process, small, short pieces of bucking waste are created and they usually have ends that are not cut perpendicular to the piece (called oblique cut). When found in the open slash or other dispersed sub populations, they are classified as unavoidable with the comment US (unsafe). See pieces D01 and D02.

B – When found in accumulation sub populations:

It may be unlikely that these small oblique cut short pieces of bucking waste would ever be yarded into a landing or to roadside intentionally but it is possible they could have been dragged downhill from the slash or that they were created during the felling of the right of way. Unless there are a large number of them it is reasonable and fair to give the benefit of any doubt to the faller and classify them as unavoidable waste.

Proper entry of piece(s) on FS 161 (Plot tally card)

Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
					0		0								
D	01	C	E	W	U	003	08	C	U	I					US
					0		0								
D	02	C	E	W	U	008	08	C	U	I					US

Stream Cleanout – Unavoidable Bucking Waste

Stream Cleanout Chunks

Stream Cleanout Chunks

Stream Cleanout – Unavoidable Bucking Waste

When found in accumulation or dispersed sub populations:

When yarding across small streams and water courses is permitted, it is often on the condition that the affected stream or water course is cleaned out when the logging process is completed. Much of this stream cleanout is done by hand and frequently some of the debris is too heavy for a person to carry or throw out of the stream bed. When this occurs, these heavy pieces are bucked up into smaller pieces in order to make them transportable by hand. When short pieces of bucking waste are found in Waste plots that have been created by this stream cleaning process they are classified as avoidable waste unless they come from breakage or removal of the log would have caused environmental damage. The comment code EV indicates they were created for environmental reasons. See pieces D01, D02, D03, D04 and D05 below.

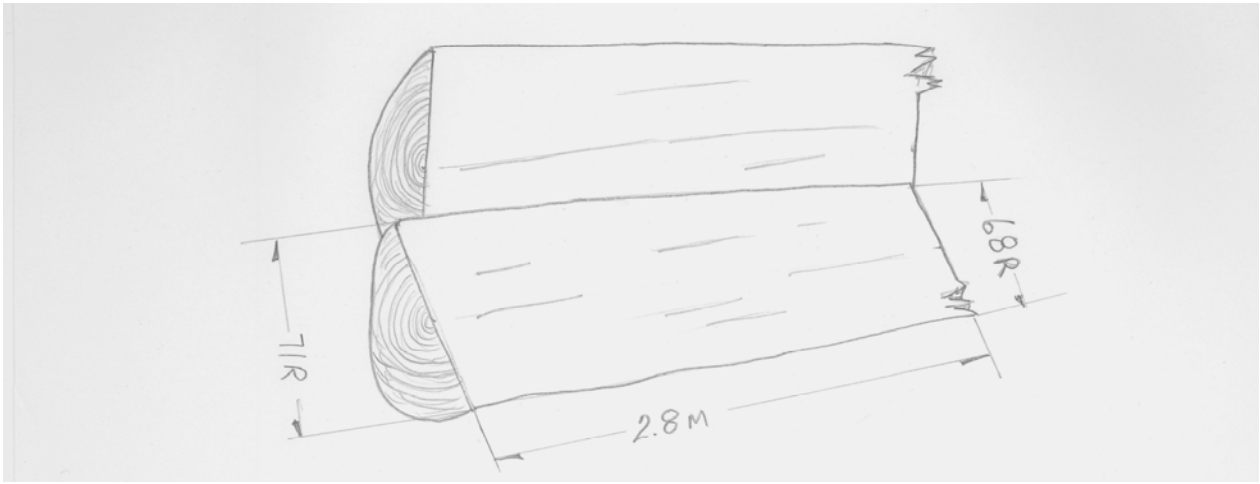
Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT										GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES							Comm Code	
							LENGTH			TOP		E	BUTT			E			LEN		TOP		BUTT		D		
In accumulation sub populations or dispersed sup populations																												
D	0	1	C	E	W	U	0	0	6	0	1	0	C	0	1	0	C	J	I								E	V
D	0	2	B	A	W	U	0	0	4	0	1	2	C	0	1	2	C	J	I								E	V
D	0	3	B	A	W	U	0	0	6	0	0	9	B	0	1	0	C	J	I								E	V
D	0	4	C	E	W	U	0	0	5	0	0	9	C	0	0	9	C	J	I								E	V
D	0	5	H	E	W	U	0	0	7	0	0	8	N	0	0	8	C	J	I								E	V

Bucking Waste (for weight) in Heli Blocks

DIB of above piece = 62 rads

Piece length = 1.7m

Bucking Waste (for weight) in Heli Blocks



A – When found in accumulation sub populations:

Will seldom occur but if found in an accumulation, treat the same as in dispersed.

B – When found in dispersed sub populations:

In large timber, occasionally a faller/bucker will create a log that is too heavy for the helicopter to lift. Often, these logs are shortened to reduce the weight and the result is a piece of bucking waste. It is the responsibility of the operator (the faller/bucker) to buck logs that can be lifted by the equipment being used or to rip very large logs lengthwise to reduce the weight. This type of bucking waste is always classified as avoidable and the grade will always default to "J" or better because the diameters are always quite large. The heli bucking waste illustrated in the photos to the left and in the drawing above split into two pieces when it was separated from the original log that was too heavy for the machine to lift. The two pieces have been scaled as one piece for simplicity and accuracy. See pieces D01 below.

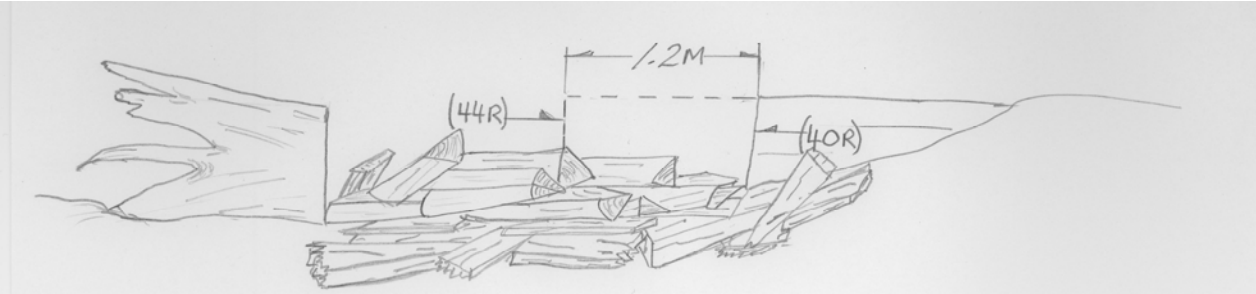
Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.			Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT									GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code	
						LENGTH		TOP		E	BUTT		E				LEN		TOP		BUTT		D					
In accumulation sub populations or dispersed sup populations																												
										0				0														
D	0	1	C	E	W	A	0	2	8	0	6	8	C	0	7	1	C	H	I									
										0				0														

Bucking Waste from Shake Cutting

Completed shake bolts

Completed shake bolts and waste material

Bucking Waste from Shake Cutting



A – When found in accumulation sub populations:

Will seldom occur but if found in an accumulation, treat the same as in dispersed.

B – When found in dispersed sub populations:

Shake cutting is not supposed to take place until after the Waste Survey is done but in reality is occasionally done prior to the survey. When bucking waste that was created by shake cutting is encountered in a Waste Survey plot, it is classified as avoidable bucking waste and graded accordingly. Most of the time it is the unwanted material that is found in the slash but occasionally the completed shake bolts are also present. Waste Surveyors are not required to scale and record every little piece individually and are permitted to place all the pieces in an imaginary pile and estimate the dimensions of that pile for scaling purposes. In the drawing above, the completed bolts are estimated to be roughly equivalent to half the section bucked out of the log and the small pieces of waste equivalent to the other half. The wasted material can be classified as avoidable bucking waste (see piece D01 below) with a comment ST (shake trim). The finished shake bolts can be classified as avoidable special product (see piece D02 below) with a comment SB (shake bolt). Normally one of the shingle grades would be appropriate.

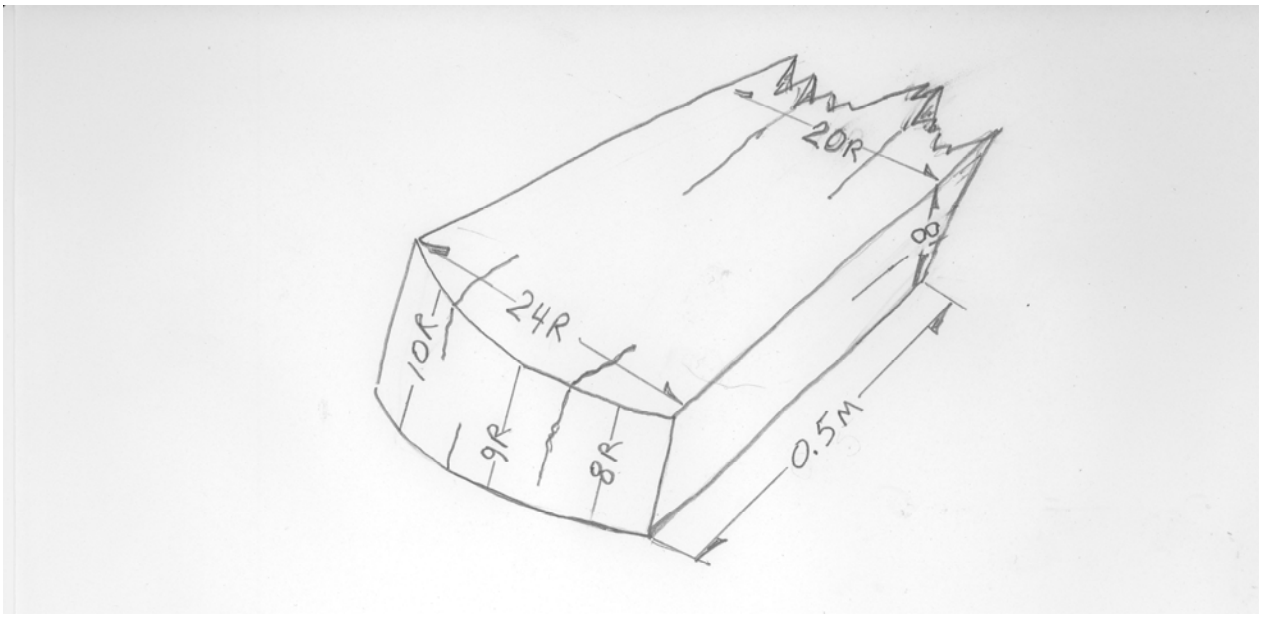
Proper entry of piece(s) on FS 161 (Plot tally card)																											
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT										GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES							Comm Code	
							LENGTH			TOP		E	BUTT		E				LEN		TOP		BUTT		D		
In accumulation sub populations or dispersed sup populations																											
										0				0													
D	0	1	C	E	W	A	0	1	2	0	4	0	C	0	4	4	C	M	I							S	T
										0				0													
D	0	2	C	E	W	A	0	1	2	0	4	4	C	0	4	6	C	M	I							S	B
										0				0													

Bucking Waste from slabs

Average thickness at butt = 9 rads

Width at butt = 24 rads

Bucking Waste from slabs



When found in accumulation or dispersed sub populations:

With the exception of the measurement procedure, bucking waste from slabs is treated no differently than bucking waste from logs.

Often there is more shatter involved with slabs and the rule of thumb is; if the pieces bucked off a slab have fallen apart, they may be considered as breakage and not tallied.

See piece D01 for the tally of the bucking waste (from a slab) illustrated in the photo (left) and the drawing (above).

Proper entry of piece(s) on FS 161 (Plot tally card)

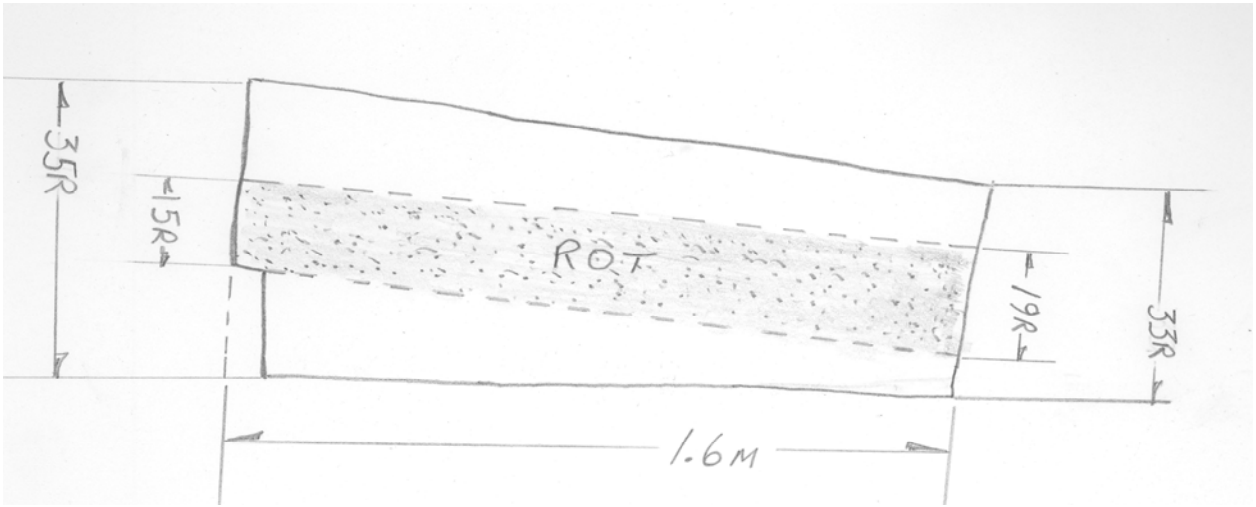
Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
					0		0								
D	01	C	E	W	A	005	0	14	B	0	16	C	M	I								S	L
					0		0								

Long Butts > 50% sound

Top end of above piece

Butt end of above piece (undercut)

Long Butts > 50% sound



When found in accumulation or dispersed sub populations:

Logging crews are expected to know how to estimate where a rotten butt exceeds 50% sound along its length. The removal of ends (top or butt) that are less than 50% sound is permitted and the resulting pieces are not scaled in Waste Surveys. In many instances however, they are bucked incorrectly and the resulting pieces exceeds 50% sound. These pieces are scaled as avoidable waste (with the appropriate deduction for the decay). The piece illustrated in the photos and the drawing has gross dimensions of 33 rads X 35 rads X 1.6m (volume = 0.581m3). The decay dimensions are 15 rads X 19 rads X 1.6m (volume = 0.147m3) which is roughly 25% of the gross piece volume making the piece 75% sound. As a 'rule of thumb', for pieces (or ends) to be less than 50% sound, the diameter of the decay should exceed 70% of the gross diameter which in the case of the illustrated piece would be roughly 24 rads. The tally of the piece is shown below as piece D01.

Proper entry of piece(s) on FS 161 (Plot tally card)

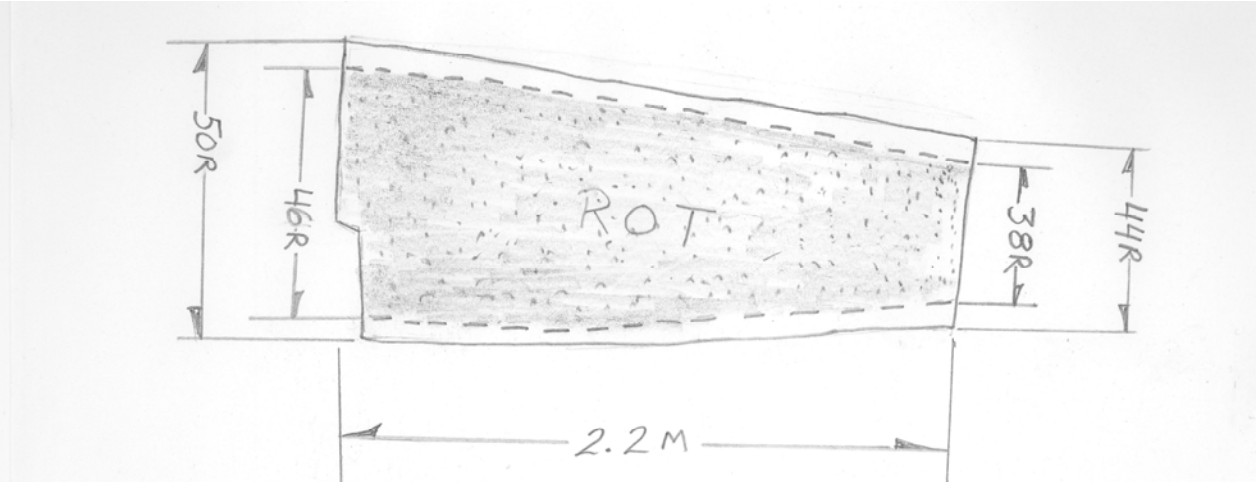
Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
					0		0								
D	0	1	B	A	W	A	0	1	6	0	3	3	C	0	3	5	U	H	I			0	6	0	3	H	L	B
					0		0								

Long Butts < 50% sound – No Tally

Top end of above piece

Butt end of above piece

Long Butts < 50% sound – No Tally



When found in accumulation or dispersed sub populations:

It is deemed acceptable to trim off ends that are less than 50% sound. These pieces are better left in the woods as coarse woody debris than ending up at the sort yard or sawmill where they have to be burned or otherwise disposed of. The piece illustrated in the photo at the left has an 11 rad hole in a 15 rad DIB at the top (73%) and an 11 rad hole in a 16 rad DIB (69%) making it very close to 50% sound, too close to use the 70% 'rule of thumb". The best way to determine the exact % soundness of this piece is to use the UV values on the side of the scale stick or compute the volumes with a calculator. The volume of the gross piece (15 rads X 16 rads X 0.9m) is 0.6796 m3. The decay volume (11 rads X 11 rads X 0.9m) is 0.342m3 which is very slightly more than half of the gross piece volume and therefore the piece is slightly under 50% sound and would not be scaled and/or tallied. The piece illustrated in the drawing above is not as borderline, the decay diameter as a percent of the gross DIB is 86% at the top and 92% at the butt, well over 50% decay. This piece would also not be scaled and/or tallied.

Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT									GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES								Comm Code	
							LENGTH			TOP		E	BUTT		E			LEN		TOP		BUTT		D		
In accumulation sub populations or dispersed sup populations																												
										0				0														
N	O		S	C	A	L	E			0				0		N	O		T	A	L	L	Y					
										0				0														

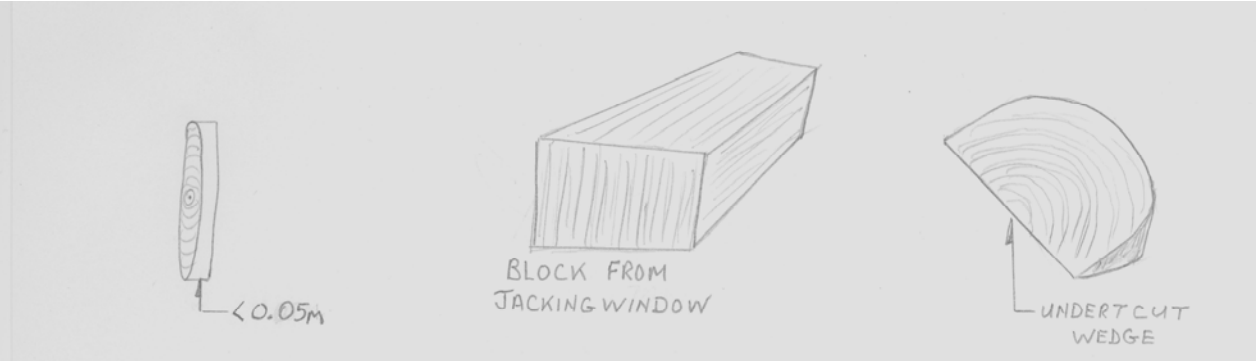
Miscellaneous 'No Tally' Bucked Pieces

1 - Undercuts

2 - Window for Falling Jack

3 - Cookie < 0.05m

Miscellaneous 'No Tally' Bucked Pieces



When found in dispersed or accumulated sub populations:

There are a number of small bucked pieces found in Waste plots that are not scaled. Some of them are:

1. Wedges from undercuts. (volume accounted for in stump). See photo left and drawing above.
2. Blocks from tree jacking. (volume accounted for in stump). See photo left and drawing above.
3. Cookies less than 0.05m long. (too short to round up to 0.1m) If more than one is found in a plot, these may be stacked on top of each other and scaled as one piece. See photo left and drawing above

Proper entry of piece(s) on FS 161 (Plot tally card)																											
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT									GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES							Comm Code	
							LENGTH			TOP			E	BUTT	E			LEN		TOP		BUTT		D		
In accumulation sub populations or dispersed sup populations																											
										0				0													
N	O		S	C	A	L	E			0				0		N	O		T	A	L	L	Y				
										0				0													

Miscellaneous 'No Tally' Bucked Pieces (continued)

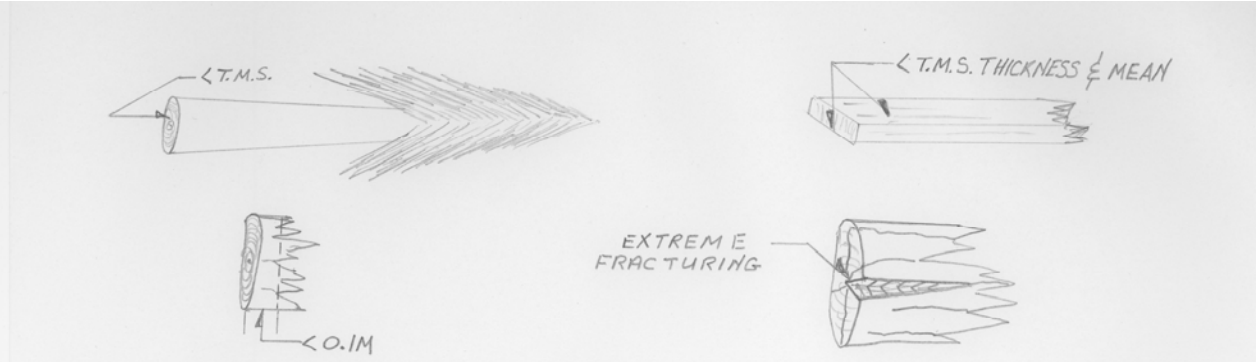
4 – Top cut at or below TMS

5 – Slab trimmed at or below TMS

6 – Allowable trim (<0.1m)

7 – Shattered trim

Miscellaneous 'No Tally' Bucked Pieces (continued)



When found in dispersed or accumulated sub populations:

4. Tops bucked at or below the MS for the block being surveyed. See photo left and drawing above.

5. Slab bucked at or below the TMS for species being tallied and block being surveyed. See photo left and drawing above.

6. Allowable trim (where 0.1m allowance has not been exceeded). See photo left and drawing above.

7. Fractured trim where little effort would be required to break the piece into numerous pieces all below the TMS for the block being surveyed. See photo left and drawing above.

Proper entry of piece(s) on FS 161 (Plot tally card)

Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D	
In accumulation sub populations or dispersed sup populations															
					0		0								
N	O		S	C	A	L	E		0			0	N	O		T	A	L	L	Y					
					0		0								

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PART 4

BREAKAGE

Breakage is defined as any piece with a top DIB larger than the TMS (for the block being surveyed), less than 3.0m in (gross) length and broken at both ends **OR** any split piece that does not contain a 3.0m section with a continuous DIB (for the 3.0 m) equal to or larger than the TMS (for the block being surveyed). For the purpose of this definition, an undercut (ie off the stump) is not considered to be a buck. The only exceptions are pieces, in dispersed sub populations, that are bucked on the small end and broken on the large end. These are the only bucked pieces that are deemed to be breakage. This is a method of classifying a portion of bucked pieces (roughly half) as unavoidable breakage to account for breaks that occurred after bucking took place (ie. during yarding) and therefore can not be bucking waste because they were NOT created by careless or wasteful bucking practices. Pieces that are broken in the landing or at the roadside are deemed to be avoidable and therefore must be scaled and recorded as bucking waste.

Breakage is classified as either avoidable or unavoidable:

- AVOIDABLE BREAKAGE

  Avoidable breakage is exactly as the name suggests; it is breakage that could have been avoided. Avoidable breakage is scaled and tallied as avoidable logs (if over 3.0m in gross length) or avoidable bucking waste (if less than 3.0m in gross length and has one bucked end). Waste Surveyors must be very sure (based on some tangible evidence) before they consider classifying breakage as avoidable. Examples of this are given in this section of the field guide.

- UNAVOIDABLE BREAKAGE

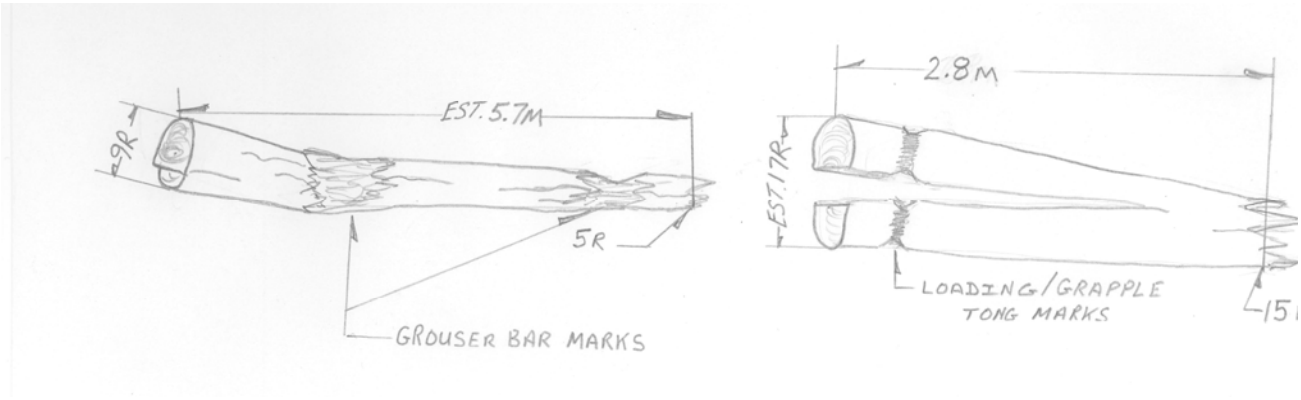
  Unavoidable breakage (also called normal breakage) is exactly as the name suggests; it is breakage that is created by the normal falling and yarding process. Unavoidable breakage is not normally scaled and/or tallied. See section 5.3.6 of the Waste Manual.

Avoidable (machine) Breakage

Log shattered by equipment

Grapple tong marks on a Cedar log

Avoidable (machine) Breakage



A – When found in accumulation sub populations:

The most common type of avoidable breakage found in accumulations is material that has been shattered or snapped by rough handling. Most of the time it is impossible to identify the cause of the breakage but when it is deemed (with some evidence) to be by carelessness, the pieces should be scaled and tallied as a logs or bucking waste (depending on length) with the comment code MB (machine breakage). The most common evidence of rough handling a Waste Surveyor may observe are tong marks and grouser bar (track) marks. See drawing above (right) and piece A01 below.

B – When found in dispersed sub populations:

When excavators and processors are moving through the slash, occasionally the operators do not make the effort to pick up and move smaller logs in their path and they are crushed under the weight of the machine. In the large photo (left), there are at least 7 logs that are now broken into small pieces. All of these logs should be scaled, graded and tallied ignoring all of the breaks. One example of those 7 logs is illustrated above (left). The grouser bar marks are normally about 2m apart. The tally of this piece is shown below (piece D 01).

Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT									GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code	
							LENGTH			TOP		E	BUTT		E			LEN	TOP	BUTT	D		
In accumulation sub populations or dispersed sup populations																												
A	0	1	C	E	W	A	0	2	8	0	1	5	B	0	1	7	C	J	I								M	B
										0				0														
D	0	1	B	A	L	A	0	5	7	0	0	5	B	0	0	9	U	U	I								M	B
										0				0														

Unavoidable (normal) Breakage – No Tally

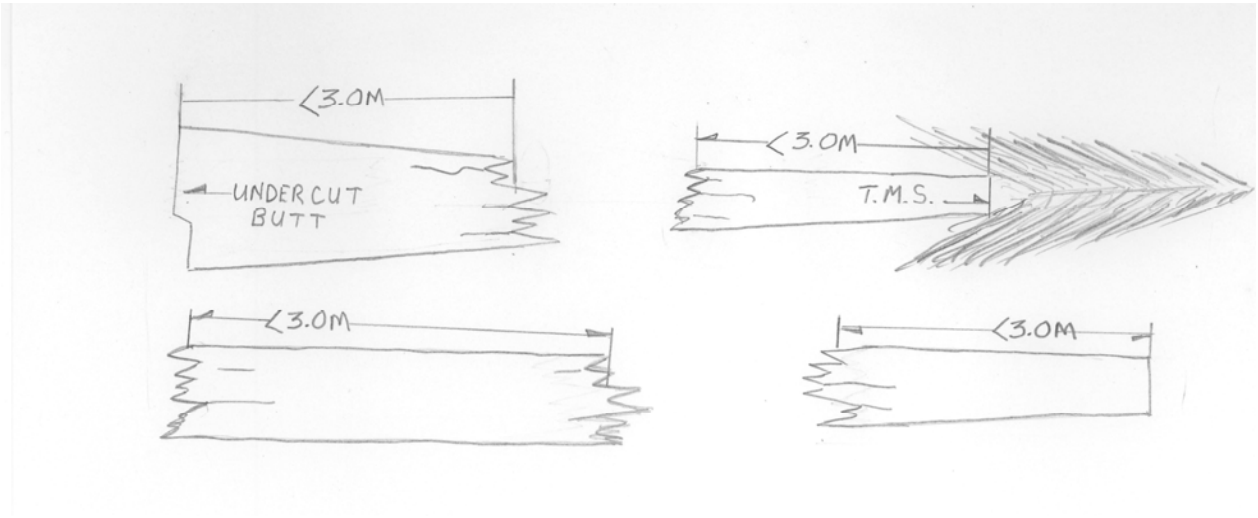
Undercut butt, broken top & < 3.0m

Broken butt, top = TMS & < 3.0m

Broken butt, broken top & <3.0m

Broken butt, cut top & < 3.0m in dispersed

Unavoidable (normal) Breakage – No Tally



A – When found in accumulation sub populations:

Assuming there is no evidence of careless machine operations and with the exception of the one piece with a bucked top (lower right piece above), all of the pieces illustrated in the photos (left) and the drawing (above), when encountered in any accumulation strata are classified as unavoidable breakage and are not scaled and/or tallied.

B – When found in dispersed sub populations:

Assuming there is no evidence of careless machine operations, all of the pieces illustrated in the photos (left) and in the drawing (above), when encountered in any dispersed strata are classified as unavoidable breakage and are not scaled and/or tallied. The piece with the bucked top (lower right) is referred to by some as yarding breakage.

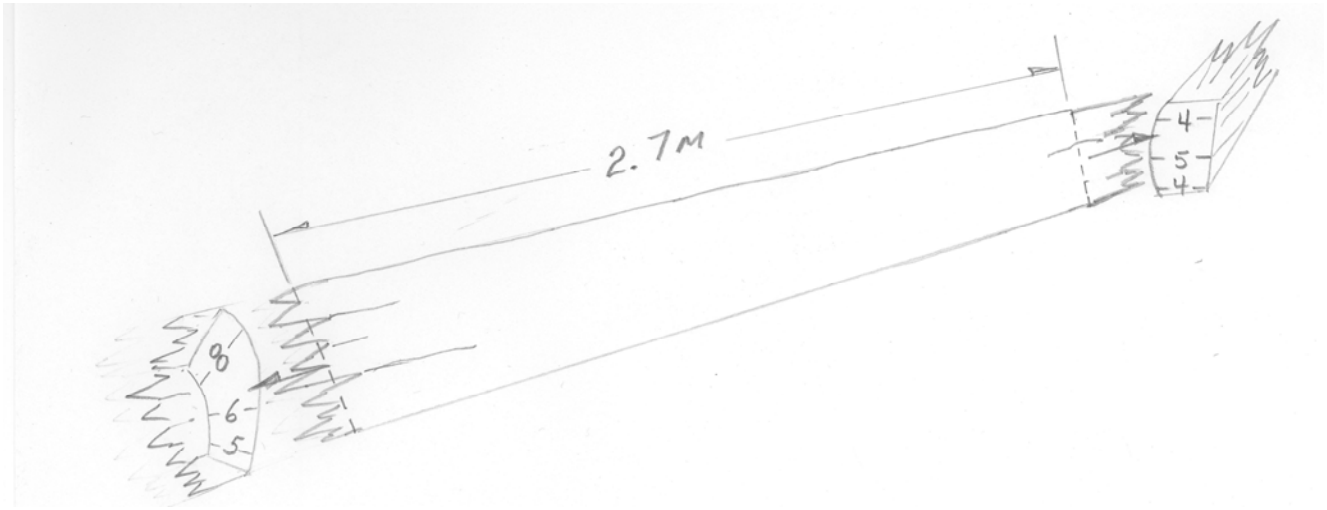
Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT									GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES								Comm Code	
							LENGTH			TOP			E	BUTT	E			LEN			TOP			BUTT		D		
In accumulation sub populations or dispersed sup populations																												
										0				0														
N	O		S	C	A	L	E			0				0		N	O		T	A	L	L	Y					
										0				0														

Old Growth Cedar Slabs – Less than TMS – Breakage - No Tally

Slab butt thickness = 7 rads = < TMS

Slab top thickness = 6 rads = < TMS

Old Growth Cedar Slabs – Less TMS – Breakage - No Tally



When found in accumulation or dispersed sub populations:

Old growth Red Cedar slabs, for Waste Surveys, are somewhat of an anomaly. Red Cedar is the only species where the slabs must have a minimum thickness (7.5 rads across the grain) and a minimum average DIB (also 7.5 rads) for 3.0m of length. Old Growth Red Cedar slabs that do not meet all three of these minimums are considered to be breakage and are not scaled and/or tallied.

Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT									GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES							Comm Code	
							LENGTH			TOP			E	BUTT		E				LEN		TOP		BUTT		D		
In accumulation sub populations or dispersed sup populations																												
										0				0														
										0				0														
N	O		S	C	A	L	E			0				0		N	O		T	A	L	L	Y					
										0				0														

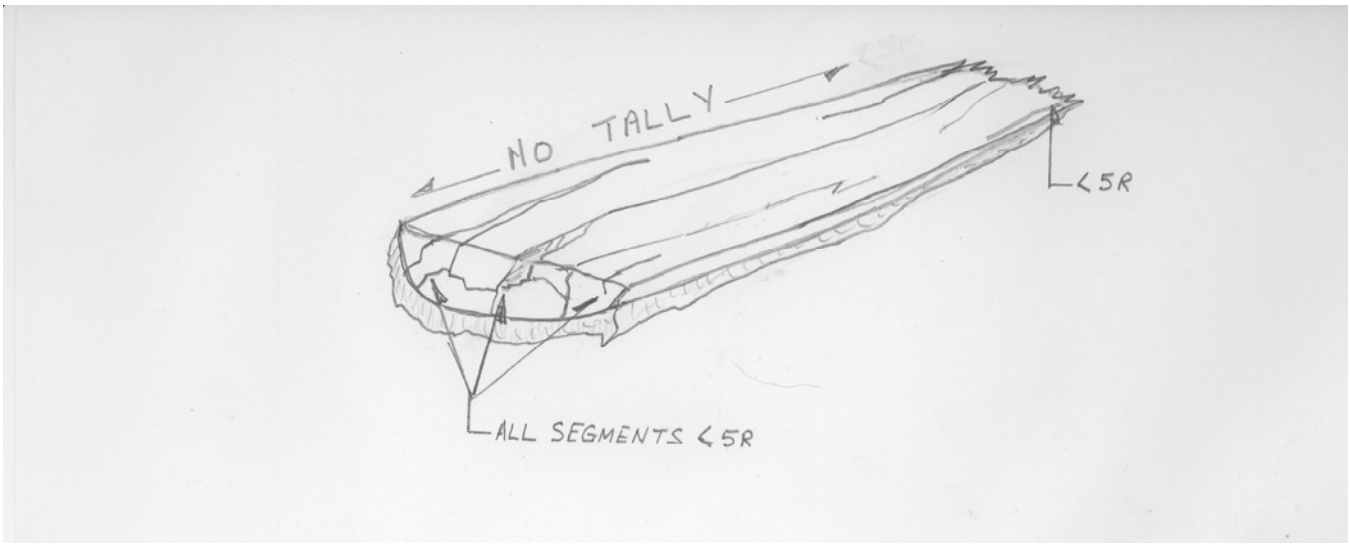
Other Species - Slabs – Less than TMS – Breakage - No Tally

At butt - Slab thickness < 5 rads

No segments > TMS minimums

`

Other Species - Slabs - Less than TMS - No Tally



When found in accumulation or dispersed sub populations:

In old growth, slabs (other than Red Cedar) with less than 5 rads of thickness (for 3.0m) OR with an average DIB that is less than 7.5 rads (for 3.0m) are considered to be normal breakage and are not scaled and/or tallied.

In second growth, slabs (other than old growth Red Cedar that may exist in a second growth cut block) with less than 5 rads of thickness OR average DIB (for 3.0m) are considered to be normal breakage and are not scaled and/or tallied.

Any slabs, in the opinion of the Waste Surveyor (backed up with some evidence) that have been created by sloppy or rough handling, may be classified as avoidable and tallied as logs and/or bucking waste.

Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT									GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES							Comm Code	
							LENGTH			TOP			E	BUTT		E			LEN		TOP		BUTT		D		
In accumulation sub populations or dispersed sup populations																												
										0				0														
										0				0														
N	O		S	C	A	L	E			0				0		N	O		T	A	L	L	Y					
										0				0														

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PART 5

STANDING TREES

Scattered individual trees left standing inside the marked and traversed boundaries of a cut block are to be measured and tallied according to the procedures described on pages 5-14 and 5-15 of the Waste Manual. This is a '100%' survey which means all such standing trees must be measured and tallied regardless of whether they are inside a Waste Plot or not. Those standing trees that are inside the boundary of a plot should be tallied in the 100% survey and not in the plot tally. The length of standing trees is measured using standard timber cruising methods between the top of a 30cm stump and the estimated location of the TMS top DIB for the block being surveyed. With the exception of the top log, standing trees are graded in 12.8m sections. If the top log is greater than 3.0 m record as a log and if less than 3.0m record as bucking waste. The grade for top logs in second growth, regardless of length (or kind of wood), will always be "U". Trees with severe lean or rot that could not be safely felled into the harvested area may be classified as unavoidable.

The following standing trees are NOT scaled and/or tallied:

- Individual standing trees, inside a cut block boundary, which are clearly marked (flagging and/or paint) as 'LEAVE TREES'. Examples are wildlife trees, wildlife stubs, retention for biodiversity and 'leave trees' in thinning operations.

- Individual standing trees of a species that was reserved and left standing (for any forest management reason). Waste Surveyors should be provided with the appropriate documents to make this determination prior to commencing a survey.

- Individual standing trees that have been left standing by 'faller choice'. These include trees that were not previously marked for retention and the faller or feller operator was given the responsibility to decide which trees were to be harvested and which trees were to be left.

- Standing trees inside SMZ's (Streamside Management Zones) where selective cutting has taken place to minimize windthrow. Only waste from felled trees is scaled and tallied in these zones.

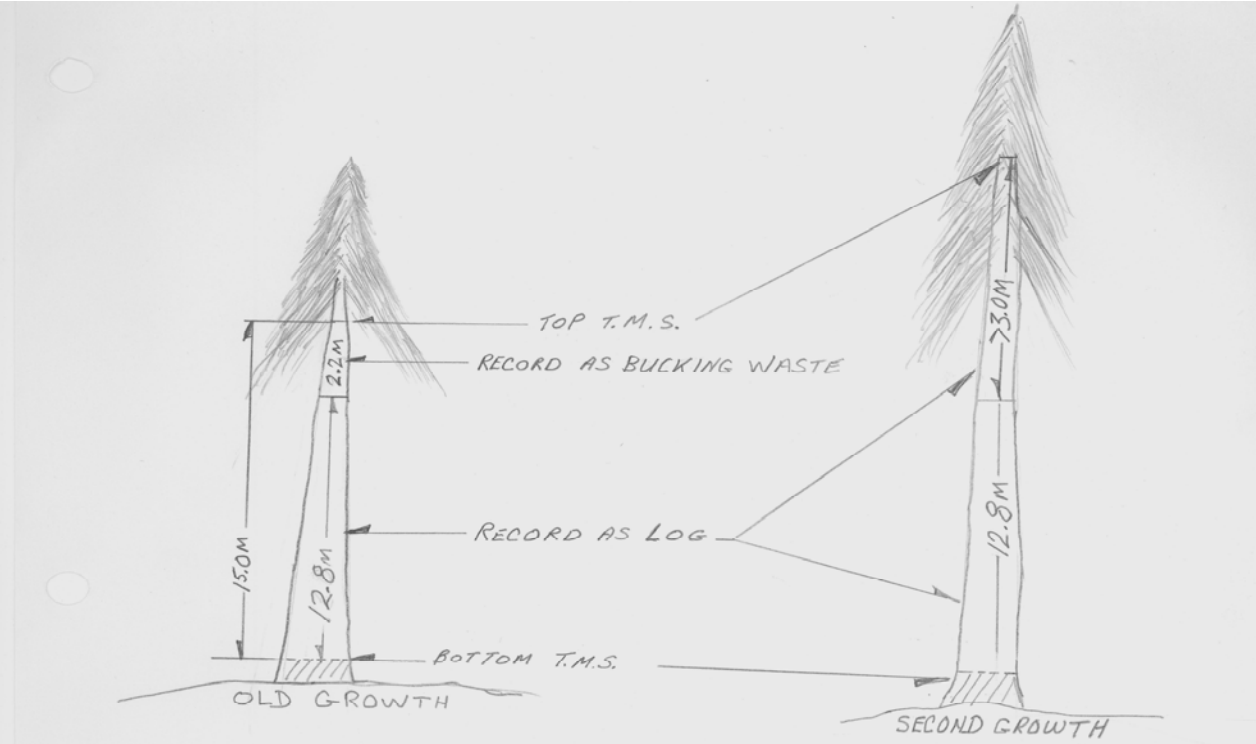
- Standing trees inside a flagged and traversed 'NO HARVEST' zone. The reason for the zone (eg: biodiversity, silviculture, wildlife etc.) is irrelevant and the area (ha) of such zones must be deleted from the net area of the Waste Surveyed block. No part of a Waste Survey plot should encroach into one of these zones and the proper plot moving procedures must be followed in order to avoid this encroachment. All 'NO HARVEST' zones should be identified on the Waste Survey plan map by the licensee.

Standing tree inside block boundary and NOT marked.

Standing Tree – Old Growth

Standing Tree – Second Growth

Standing tree inside block boundary and NOT marked.



When found in accumulation or dispersed sub populations:

Both of the trees in the photos (left) are inside the cut block as defined by the flagging.

Measure and tally left tree (above and photo left) as per pieces D01 and D02 below and the right tree (above and photo left) as per pieces D03 and D04 below. The comment code “PT” indicates the pieces are parts of entire trees.

Proper entry of piece(s) on FS 161 (Plot tally card)

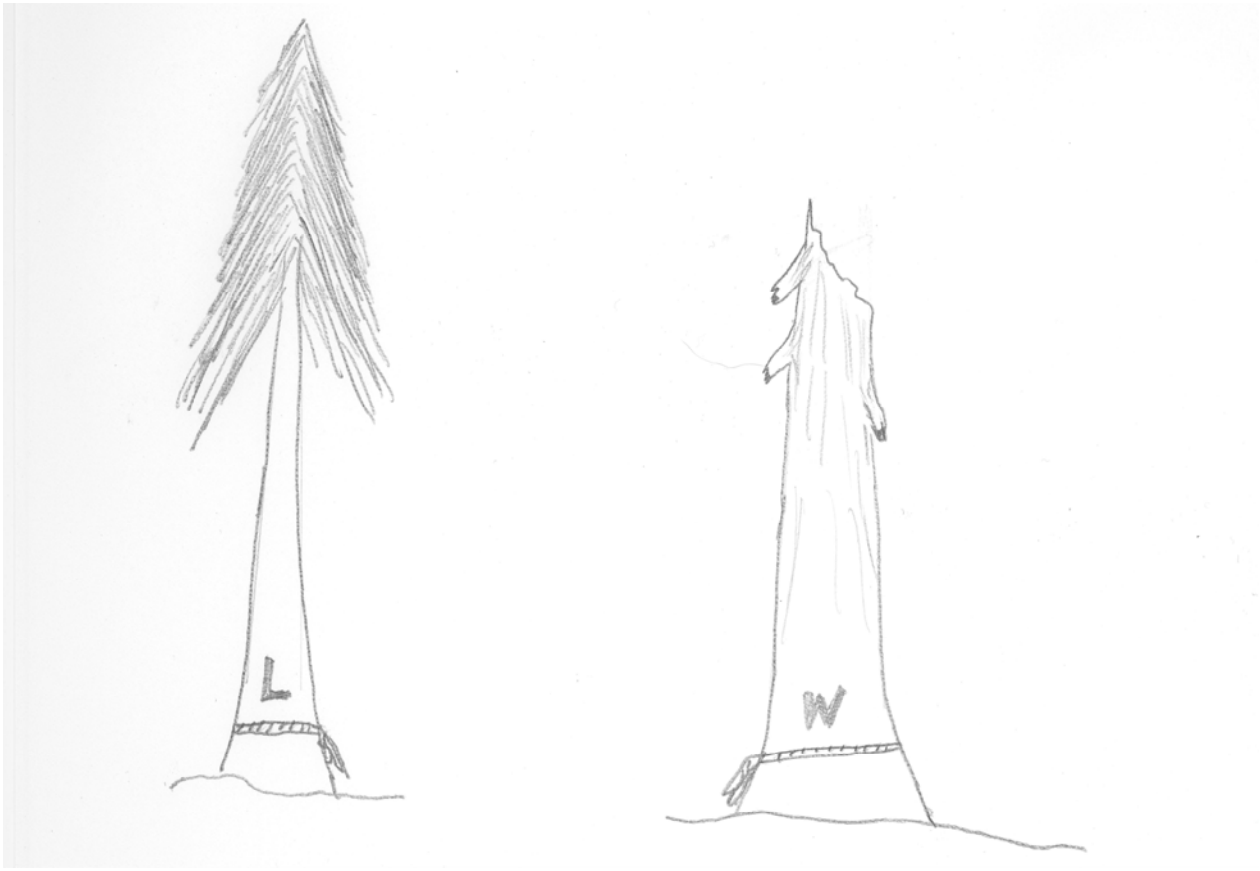
Piece No.	Species	KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT					GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES				Comm Code	
				LENGTH	TOP	E	BUTT	E			LEN	TOP	BUTT	D		
In accumulation sub populations or dispersed sup populations																
D01			L	A	1 2 8	0	1 0	P	0	2 5	P	J	I								P	T
D02			W	A	0 2 2	0	0 8	N	0	1 0	P	J	I								P	T
D03	F	I	L	A	1 2 8	0	0 9	P	0	2 0	P	J	I								P	T
D04	F	I	L	A	0 8 5	0	0 5	N	0	0 9	P	U	I								P	T

Standing tree inside block boundary marked – No Tally

Standing Leave Tree

Wildlife Snag

Standing tree inside block boundary marked – No Tally



When found in accumulation or dispersed sub populations:

These marked trees and/or snags illustrated in the photos (left) and the drawing (above) have been left standing intentionally for wildlife and/or biodiversity and would therefore not be scaled, measured and/or tallied for Waste Surveys.

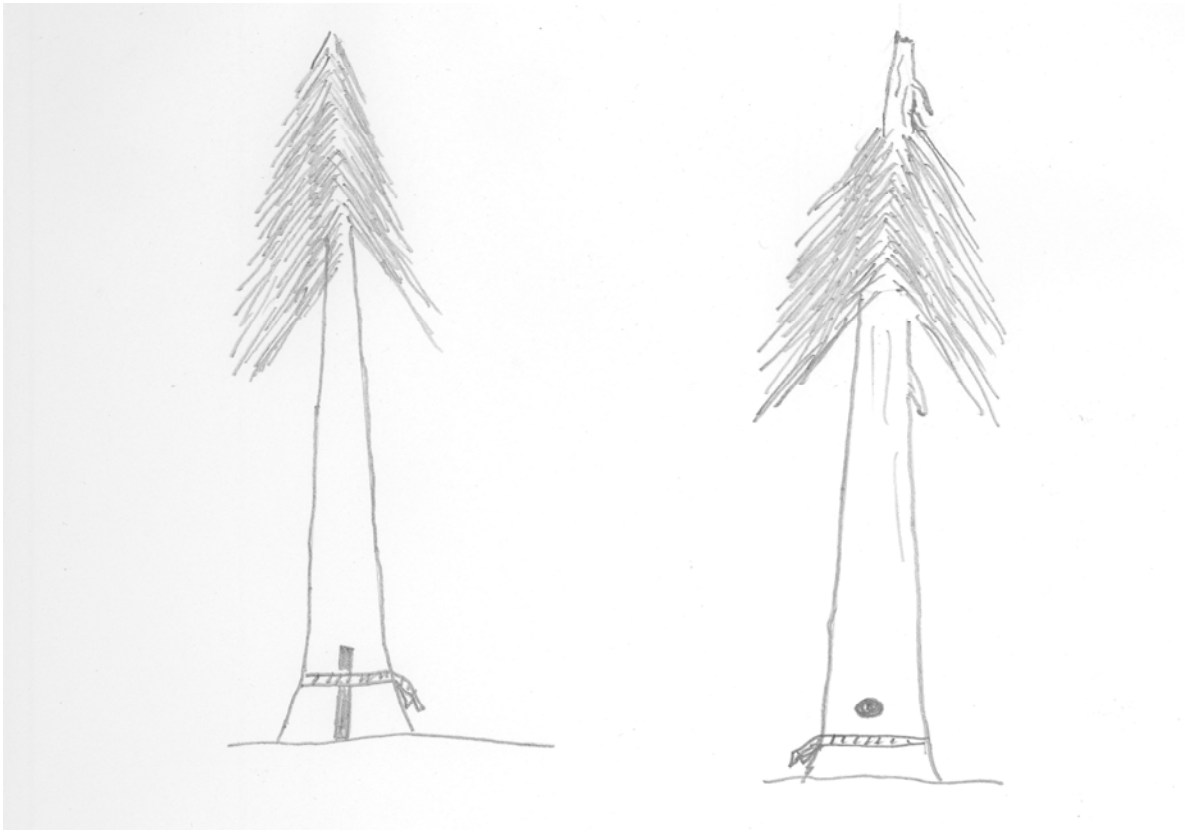
Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT									GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES								Comm Code	
							LENGTH			TOP			E	BUTT		E				LEN			TOP			BUTT		D	
In accumulation sub populations or dispersed sup populations																												
										0				0														
N	O		S	C	A	L	E			0				0		N	O		T	A	L	L	Y					
										0				0														

Standing tree inside block boundary marked – No Tally

Leave Tree in Thinning Operation

Leave Tree in Variable Retention

Standing tree inside block boundary marked – No Tally



When found in accumulation or dispersed sub populations:

The marked trees illustrated in the photos (left) and the drawing (above) have been reserved as part of a thinning operation or biodiversity (variable retention) and would therefore not be scaled, measured and/or tallied for Waste Surveys.

Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT									GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES								Comm Code	
							LENGTH			TOP		E	BUTT		E			LEN			TOP		BUTT		D		
In accumulation sub populations or dispersed sup populations																												
										0				0														
N	O		S	C	A	L	E			0				0		N	O		T	A	L	L	Y					
										0				0														

Windfall originating from outside block boundary – No Tally

Boundary marked with yellow flagging

Boundary marked with yellow flagging

Windfall originating from outside block boundary – No Tally

When found in accumulation or dispersed sub populations:

Windfalls (or any piece) originating from outside the block or pieces that were included in an earlier survey are not scaled and/or tallied for Waste Surveys.

Proper entry of piece(s) on FS 161 (Plot tally card)																												
Piece No.			Species		KIND	CLASS	GROSS DIMENSIONS FOR PIECES INSIDE PLOT									GRADE	BRDR	DEDUCTIONS FOR ROT/HOLES								Comm Code	
							LENGTH			TOP			E	BUTT	E			LEN		TOP		BUTT		D		
In accumulation sub populations or dispersed sup populations																												
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PART 6

Broadleaf Species Identification

Broadleaf Species - Arbutus

Sapwood is white & heartwood is pink

Bark is paper thin & flakey

Broadleaf Species – Arbutus – An evergreen broadleaf

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Arbutus - Species code AR	
Logs	Tend to be non-cylindrical and very crooked, with flattened surfaces, frequently showing irregular shaped depressions.
Bark	Thin, smooth, reddish brown in colour and readily peels off in papery flakes and strips.
Wood	Heavy, hard and fine grained. It is pale yellowish brown to reddish brown in colour, with little distinction between sapwood and heartwood.
Leaves	Alternate on twigs, 7.5 to 12 cm long and have a thick leathery texture. Colour is dark, glossy green above and lighter colour on the under surface. Leaves are hairless, with numerous veins, often branching
Common Defects	Crooks and checks badly when dried.
Common Uses	None at present.

Broadleaf Species - Cottonwood

Sapwood & heartwood is white

Bark deeply furrowed & dark grey

Broadleaf Species - Cottonwood

Cottonwood - Species code CO	
LOGS	Have irregular branching, are usually quite round and can be as large as 160cm (80 rads) in diameter.
Bark	On young trees is smooth and yellowish grey, turning dark greyish brown and becoming furrowed with flat topped ridges separated by V shaped crevices.
Wood	Light, soft, low in strength and rather fuzzy in texture with a slightly offensive odour. The sapwood is whitish in colour and blends gradually into the greyish white to light brown heartwood.
Leaves	Broad, egg shaped and taper from below the middle to a drawn out tip. They are 7.5 to 12 cm long with fine toothed edges. Colour is dark green above and silver green below, often stained with brownish resin blotches.
Common Defects	Butt rot, crook and adventitious knots
Common Uses	Veneer, pulp (mainly for tissue) and specialty lumber.

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Broadleaf Species - Bigleaf Maple

Sapwood white & heartwood beige

Bark grey &often covered with moss

Broadleaf Species - Bigleaf Maple

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Maple - Species code MA	
LOGS	Have irregular branching and frequently display burls or swellings, especially on the butt. Diameters range up to and may exceed 60 cm (30 rads)
Bark	Light brown to milk chocolate brown and has a pattern similar to Cottonwood with scaly ridges separated by V shaped crevices.
Wood	Moderately hard and whitish yellow to light brown in colour. Cut ends will stain to many different shades
Leaves	The coastal species of Maple is called Bigleaf Maple and the leaves may be up to 30 cm across. They are five-lobed, shiny and dark green above and paler on the underside. The leaf stalk exudes a milky sap when broken. There is a second species of Maple found (rarely) on the coast called Douglas Maple. The leaves are similar in shape but are much smaller.
Common Defects	Rotten Knots, burls and crooks.
Common Uses	Limited to the manufacture of furniture.

Broadleaf Species - Red Alder

Bark smooth & patchy grey/silver

Lower stem often with epicormic shoots

Broadleaf Species - Red Alder

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Alder - Species code AL	
LOGS	Not very large, short and often crooked. Branching is irregular
Bark	Smooth, light grey to almost white with small warty appearing outgrowths on the bark of young trees. On very old trees bark may break into irregular flat plates. The inner bark is bright reddish brown in colour.
Wood	Fine grained, even textured and pale brown when first cut. Cut faces will soon oxidize to a characteristic reddish brown. There is no visible contrast between sapwood and heartwood.
Leaves	Leaves are oval shaped, tapered from the middle to both ends. They are thick, not sticky and dull dark green above, greyish and hairy on the veins underneath.
Common Defects	Heart rot, rotten knots, crooks and adventitious knots.
Common Uses	For the manufacture of furniture stock and palette stock.

Broadleaf Species – Bitter Cherry

Sap wood white & heartwood pinkish

Bark papery & peels horizontally like Birch

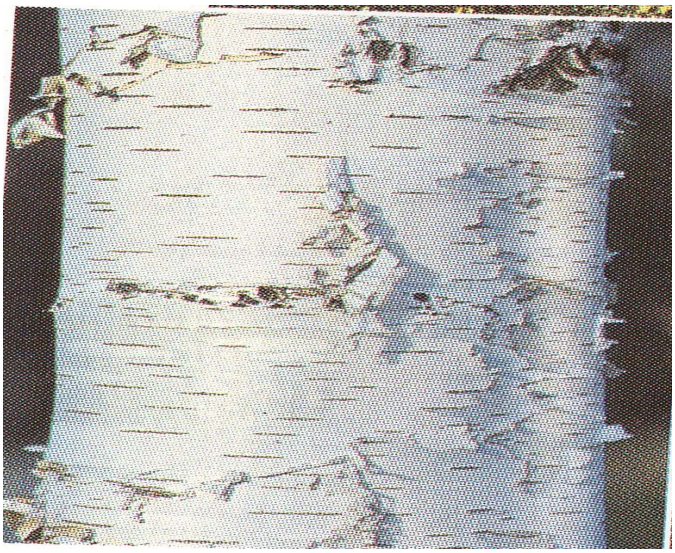
Broadleaf Species – Bitter Cherry

Bitter Cherry - Species code CH	
LOGS	Often quite straight for a coastal broadleaf and up to 40 cm (20 rads) in diameter
Bark	Reddish brown or grey with horizontal rows of raised pores. Bark peels horizontally in thin strips and can easily be confused with Birch.
Wood	Sapwood is white and heartwood is light brown to pink. Wood is fine grained, hard and brittle.
Leaves	Alternate, oblong to oval, 3 - 8 cm long, finely toothed and round at the tip.
Common Defects	Rotten knots and crooks.
Common Uses	Fuel and sometimes for smoking fish.

Broadleaf Species – Birch

Sap wood white

Bark papery & peels horizontally



Broadleaf Species – Birch

Birch - Species code BI	
LOGS	Small, rarely exceeding 60 cm (30 rads) in diameter and tend to be crooked.
Bark	Very distinctive. Thin and smooth, reddish brown on young trees, it becomes creamy white and peels off in large sheets from more mature trees. Peeling exposes a reddish-orange inner bark that oxidizes in time to black.
Wood	Hard, heavy and relatively strong. Pale brown in colour with almost white sapwood. Easily mistaken for coastal Bitter Cherry.
Leaves	Alternate, oval to round and sharply pointed at the tip. Roughly 10 cm long, sometimes very shallowly lobed, dull green above, paler and hairy below. Margins doubly toothed.
Common Defects	But rot, white heart rot and crooks.
Common Uses	For the manufacture of finishing veneer, furniture, flooring and panelling.

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