

Call Grading

3

3.1 Introduction

This section outlines the steps needed to assess the quality of measured trees.

3.2 Definitions

Call grading is the procedure used to assign one of the modified coastal log grades to standing and fallen timber based on the hierarchical log sorts. Grading is a hierarchical process based on the scaling conventions using top diameter inside bark, knot size (location and distribution) as well as the percentage of recoverable or sound wood available for cutting.

3.2.1 Procedures

- The cruiser will be able to grade the log into the appropriate log sort. The sorts are lumber, peeler, sawlog, gang, shingle, utility and pulp.
- Logs are assigned to sorts, the maximum standard log length is selected and then graded based on size, quality, sound wood recoverability and merchantability.
- Grades are assigned using the hierarchy of grades within a sort. Start with the longest standard log length for the highest grade in the sort. If the standard log length for any of the sort grades cannot be accommodated, then use the next lower sort.
- A log cannot be “one sort or another”. It is not a choice of market preference, current harvesting practices, accessibility, or other factors. A log is the highest grade it qualifies for within the hierarchy.
- ALL trees (live or dead, standing or fallen) will be call graded and net factored.
- All saw log grades must be at least 5 metres long and Y-grade must be at least 3 metres long.
- Record whether the tree is alive (L) or dead (D).
- Record whether the tree is mature (M) or second growth (S).
- Grade consideration is applied by the cruiser to determine the percentage of soundwood available for manufacturing. It includes deductions for rot, missing wood and surface characteristics as well as wood unavailable due to defect shape or characteristics. The grade consideration due to butt rot is shown in Table 18 below. For example, a sawlog (H-grade) fir log that is 8 m long and has a 45 cm top and severe butt rot (3/4 ratio):
 - i. Net factor = $(8.0 \text{ m} - 1.2\text{m})/8.0 \text{ m} = 85\%$
 - ii. Grade consideration = 3.6 m (Table 18) = $(8.0 \text{ m} - 3.6 \text{ m})/8.0 \text{ m} = 55\%$
 - iii. Therefore it is an I-grade since it does not meet the minimum lumber percentage criteria for an H-grade.

Measure all log lengths from the high-side ground level.

Determine the longest standard length and highest sort that the butt log can be based on the grading rules and standard log lengths.

If the length can be maintained for longer than 13 m, then try and assign standard log length combinations to optimize the sort.

Record the grades and the length.

The last grade on the tree will have a "99" recorded to the top regardless, of the utilization limits. Try not to create short logs at the top of the tree.

On short, small diameter logs record J 99 if an 8 m log with a 15 cm top can be achieved or if not then record U 99.

Cut Stems - If the tree has missing portions then the missing portion is graded as "N" and net factor "00".

Table of Standard Lengths

SORT TYPE	GRADE	STANDARD LENGTHS (m)	NOTES
Lumber	B, D, F, G	13, 11, 8	Min length 5 m
Peeler	C	13, 11, 8	Min length 5 m
Sawlog	H, I	13, 11, 8	Min length 5 m
Gang	J	13, 11, 8	Min length 5 m
Shingle	K, L, M	13, 11, 8	Min length 4 m, 1 m multiple up to 13 m / attempt to use standard lengths.
Utility	U, X	13, 11, 8	Min length 5 m
Pulp	Y	13, 11, 8	Min length 3 m, 1 m multiple up to 13 m / attempt to use standard lengths.

Log lengths of 4 and 6 m are allowed for all sorts for helicopter logging only.

NON SORT	GRADE	STANDARD LENGTHS (m)	NOTES
Breakage	Z Shatter and non-recoverable	1 m multiples	Z grade is not intended to meet the statutory definition of firmwood reject. Use length of "99" for lengths that will be extended to the merchantable top.
Nothing	N	1 m multiples	Use NF = 00

3.2.2 Grading Conventions and Guidelines

Conventions

- All dead trees or pieces, standing or fallen must have at least one U-grade or better butt log that is at least 8 metres long.
- The primary objective is to have logs in the appropriate end use sort. Grades within the sort are a secondary objective.
- The grades and the grading rules are simplifications of the statutory grading rules and are not intended to match statutory grading rules and logic.
- The standard lengths are 13, 11 and 8 metres.

- Specified helicopter operations have additional options of 6 metres and 4 metres.
- Shingle lengths are a minimum of 4 metres increasing in 1 metre increments up to 13 metres.
- Pulp (Y-grade) lengths are in increments of 1 metre. Attempt to use standard lengths.
- Grade "Z" is used for non-recoverable and shatter, and grade "N" is used for nothing there (missing wood).
- The last log in a tree is described "99" to indicate the top of the tree.
- Ring shake is recognized for all species except Cedar and Cypress.
 - Large trees that have been sheltered throughout most of their growth but have a major broken top (40 cm) as a result of wind damage, or
 - Large trees without broken tops which have clearly been exposed to wind over an extended period of time (i.e., vets in immature stands).
- Butt logs with ring shake will not grade peeler or lumber.
- Windfall trees (with roots attached) and up to 100 cm DBH will have a 1 metre "Z" grade in the butt log.
- Windfall trees (with roots attached) and over 100 cm DBH will have a 2 metre "Z" grade in the butt log.
- Standard procedure-based deductions will be used to determine the extent of the defect and the calculation of the net factor (% sound wood).
- Pencil bucking for non-standard log lengths is used for tree shape (forks, pistol butt) as well as extreme decay or missing wood.
- If it is necessary to calculate log volumes the convention will be to use DBH for the butt log diameter and the estimated midpoint diameter for logs above the butt log.

3.2.3 Guidelines

3.2.3.1 Heart Rot:

- Conk, blind conk, and rotten branches have specific lengths and grades applied.

Conk	Y	2 m above, 4 m below, 50% sound
Blind Conk	Y	4 m above, 6 m below, 50% sound
Rotten Branch	Z	1 m above, 1 m below, 50% sound

- Severe cylindrical cat face should be pencil bucked at the top of the cat face, with that length and net factor used to determine the grade.

3.2.3.2 Butt Rot

- Butt rot is generally included with the log for its standard length with the exception of the cedar shingle sort.
- Refer to the Butt Rot Guide for the Length Deduction table. Note that the net factor may determine the grade, based on the % lumber recovery or other grade requirements. The table also provides a guide for “grade considerations”.
- Butt rots are considered to be conical unless there is visible evidence that it is cylindrical.
- Schweinitzii - The section affected by schweinitzii and other butt rots can not be a peeler sort.

Table 18 Butt Rot Guide for Length Deductions

Ratio	Length Deduction	Grade Consideration*
¼ diameter	0.2 m	0.6 m
½ diameter	0.4 m	1.8 m
¾ diameter	1.2 m	3.6 m
⁴ / ₄ diameter	2.4 m	4.2 m
Sounding	0.8 m	2.4 m
P. schweinitzii	0.6 m	2.0 m
*Grade consideration describes how much of a log will not produce 2 by 4's at least 8 feet long.		

3.2.3.3 Frost Cracks

- Multiple frost cracks and their position around the tree may affect lumber recovery and must be considered in the determination of the sort and grade.
- Peeler sorts will not permit frost cracks.

The angle, position, or net factor will determine the appropriate grade based on % lumber recovery and/or % merchantable.

3.2.3.4 Occasional Larger Knots

All grades except peeler can have occasional larger knots (OLK's) to the extent of one per 3 meters of log length [two per 3 meters for X grade logs over 50 centimetres top diameter]. The oversize knots must be confined to the portion of the log where the allowable knots are permitted.

3.2.3.5 Weather Checks and/or Insect Damage

- A check is a separation of the wood, at right angles to the annual rings. There is no sound wood deduction for weather checks or insect damage unless there is rot associated with them.
- Logs with <10 cm sound core are Y-grade
- Logs with <10 cm sound collar are Y-grade.

Formula for Grade Consideration Calculation of Sound % Lumber

where r = radius of the portion that can be sawn into lumber, and
 R = radius of tree

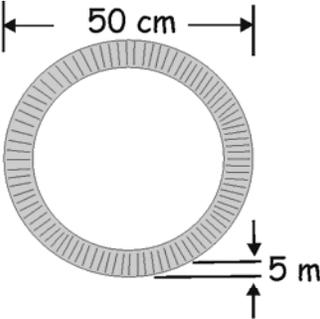
EXAMPLE	
<p>DBH = 50 cm; Radius of tree (R) = 25 cm; Sun check = 5 cm Radius of sawable lumber portion (r) = 20 cm Whole tree is weather checked</p>	
$\begin{aligned} \text{\% Recovered} &= \frac{\pi r^2}{\pi R^2} \times 100\% \\ &= \left(\frac{20}{25}\right)^2 \times 100\% \text{ or } \left(\frac{40}{50}\right)^2 \times 100\% \\ &\text{(These give the same mathematical result.)} \\ &= 64\% \text{ lumber recovery} \end{aligned}$	
<p>Note – If the weather check was sap rot, the net factor would be 64%.</p>	
 <p style="text-align: right; margin-right: 50px;">Fir-H quality with 45 cm top</p>	
$\begin{aligned} \text{\% Recovery} &= \frac{r^2}{R^2} \times 100\% \\ &= \left(\frac{40}{50}\right)^2 \times 100\% \\ &= 64\% \end{aligned}$	

Figure 3.1 Example of Grade Calculation for Weather Checked Logs.

3.2.3.6 Twist

- There is no sound wood deduction for twist.
- Grade considerations are applied.
- The amount of twist is estimated for 30 cm at the displacement point of the log. The percentage of twist is calculated by dividing by the estimated top diameter of the log. Twist must be less than both of these restriction as per the table below. For example, a D grade must deviate by no more than 6 cm over the 30 cm distance, and the displacement divided by the top diameter in cm must not exceed 4%.
- Twist comprises two factors: percentage of top diameter; and maximum displacement over 30 cm at the mid-point of the log. Table 19 shows the maximum values for specific grades. If the parameters are not met, the next lower grade applies.

Do not use the procedure for measuring twist that is used in *Chapter 6 of the Cruising Manual*.

Table 19 Maximum Twist Displacement by Grade

Grades		% of top diameter	Maximum displacement (over 30 cm) estimated @ midpoint
Lumber/Shingle	D, F, G, K	4%	6 cm
Peeler	B, C	7%	8 cm
Sawlog/Shingle	H, L, M	7%	8 cm
Sawlog	I	10%	9 cm
Sawlog	J	10%	4 cm
Utility	U, X	13%	13 cm

Note: Spiral grain that runs from one side of the log to the other within 2 metres is automatically Y grade.

If twist only appears on a portion of a tree and will affect the sort, then apply a shorter standard length.

EXAMPLE
<p>Calculations Estimated top DIB: 60 cm for log section Severe twist 8 cm (along 30 cm section) $\% \text{ twist} = (8 \text{ cm twist}) / (60 \text{ cm top}) * 100\% = 13\%$</p> <p>This log is graded as U, since this is the first grade met in the hierarchy (other defects may lower the grade further).</p>

*Figure 3.2 Examples of Grade Calculation for Twist.***3.2.3.7 Cedar Shingle Criteria**

Cedar will not be graded as a shingle if it can make a sawlog grade. If a log, due to heart rot, butt rot, or is not suitable for sawlog due to fluting, breakage, excessive butt rot, etc. but meets slab thickness requirement for that grade, the log becomes shingle grade. Lengths in 1 m increments are acceptable starting at 4 metres.

Initial Grade	Changes To
D grade	K grade
F grade	L grade
H/I grade	M grade

3.2.3.8 Lumber Grades

Log grade merchantability criteria will typically be written as “90% surface clear”. In application this indicates 10% of the log may have knots or knot indicators on any surface from the top of the log with the remaining 90% of the log being clear of knots. There is not a limit to the size of the knots or indicators. The lumber grades do not allow any conk or visible conk stain. Butt rot is allowed as long as the minimum lumber and merchantable requirements are met. If knot indicators are not visible, assume that knot indicators will extend 2 branch whorls below the last visible stubs or branches.

3.2.3.9 Tree Form

Sweep, major forks, pistol butt and any odd shapes which will normally be left behind during logging may be pencil bucked out and graded appropriately.

3.2.3.10 Last Log

- Mature block - last log generally an "X" to the top, sometimes "Y".
CGNF to a 15 cm top.
- Second growth block or maturity unknown - last log generally a "U" grade.
CGNF to a 10 cm top.

3.2.3.11 Dead/Dry Tops

Dead and dry tree tops are often severely weather checked. If there is evidence of sap rot and the depth will reduce the core diameter to less than 10 cm, then record the log as Y-grade (pulp).

3.2.3.12 Ring Shake

Ring shake or water shake is the separation of the annual rings. If any of the following conditions are met (except cedar and cypress), then the butt log grade will not be considered suitable for the lumber or peeler sorts and a standard log length of 8 metres will be assigned:

- Large trees that have been sheltered throughout most of their growth but have a major broken top (40 cm) as a result of wind damage, or
- Large trees without broken tops which have clearly been exposed to wind over an extended period of time (i.e., vets in an immature stand).

3.2.3.13 Missing Wood and Separated Pieces

- a. For all chunks and tree pieces > 8 metres length the DBH is measured 1.3 m up from the big end.
- b. If it is obvious that the tree piece originated from a nearby stump, then CGNF all of the portions as one tree.
- c. Project the total height of trees with broken tops and record the projected height in the tree height column of the cruise tally card. Record the grade and net factor of the missing portion as “N 99 00”.

3.3 Revenue Call Grading Criteria



CGNF CRUISING

FIR & PINE (No Pine Peelers)

DIMENSIONS	CUT (min)	KNOTS (max diameter)
D LBR ▶5.0m ▶76cm	75 %	90% surface clear
F LBR ▶5.0m ▶60cm	75 %	60-75cm, 75% surface clear ▶76cm, knots allowed 75% 1 side or 50% 2 sides
B PLR ▶5.0m ▶60cm	80 % Veneer	60-75cm, 1 clear butt block ▶76cm, knot ind butt block
C PLR ▶5.0m ▶38cm	80 % Veneer	4cm max
H S/L ▶5.0m ▶38cm or ▶50cm	75 % 50 %	▶38cm to 4cm reas well spaced, or 5cm on top 1/2 * , ▶50cm, 5cm on top 2/3 * , or 8cm on top 1/2 * * 2cm on bottom portions
I S/L ▶5.0m ▶38cm or ▶50cm O/W H Quality	75 % 50 % 50 %	▶38cm, to 8cm ▶50cm, to 9cm ▶76cm, to 10cm
J S/L ▶5.0m 15 - 36cm	75 %	15-28cm, to 4cm 28-38cm, to 6cm
U UTL ▶5.0m 10-14cm or ▶5.0m 15-36cm or ▶5.0m ▶38cm	75 % 66.7 % 50 %	10-14cm to 4cm; 15-26cm to 6cm 27-36cm to 8cm; 38-48cm to 10cm 50-74cm to 12cm; ▶76cm to 14cm
X UTL ▶5.0m ▶10cm	33.3 %	same as U, except ▶50cm allow 2 OLK / 3m
Y CHPR ▶3.0m, poorer than X UTL, better than Z. NON RECOVERABLE		
Z for appraisal - Z is NON RECOVERABLE (NRec)		

HEMLOCK & BALSAM

D LBR ▶5.0m ▶66cm	75 %	66-74cm 90% surface clear ▶76cm 80% surface clear
F LBR ▶5.0m ▶50cm	75 %	50-64cm 75% surface clear ▶66cm knots allowed 75% 1 side or 50% 2 sides
H S/L ▶5.0m ▶38cm O/W D or F Quality	75 % 50 %	see Fir H knot specs
I S/L ▶5.0m ▶38cm O/W H Quality	75 % 50 %	see Fir I knot specs
J S/L, U UTL, X UTL, Y CHPR, Z NRec see Fir specs		

CYPRESS

D LBR ▶5.0m ▶60cm	75 %	66-74cm 75% surface clear ▶76cm 67% surface clear
F LBR ▶5.0m ▶50cm O/W D Quality	75 %	50-58cm 75% surface clear ▶60cm - knots allowed 75% on 1 side or 50% 2 sides
H S/L ▶5.0m ▶38cm	50 %	see Fir H knot specs
I S/L ▶5.0m ▶38cm	50 %	see Fir I knot specs
J S/L ▶5.0m 15-36cm	75 %	see Fir J knot specs
U UTL, X UTL, Y CHPR, Z NRec see Fir specs		

SPRUCE

F LBR ▶5.0m ▶76cm	75 %	90% surface clear
G LBR ▶5.0m ▶60cm	75 %	60-74cm, 75% surface clear ▶76cm, knots allowed 75% 1 side or 50% 2 sides or 75% shopgrade ▶100cm, 50% shopgrade
H S/L ▶5.0m ▶38cm	75 %	see Fir H knot specs
I S/L ▶5.0m ▶38cm or ▶50cm	75 % 50 %	see Fir I knot specs ▶100cm to 13cm max
J S/L ▶5.0m 16-36cm	75 %	see Fir J knot specs
U & X UTL, same as Fir except logs ▶100cm allow knots to 18cm		
Y CHPR, Z NRec see Fir specs		

SPIRAL GRAIN - % of top diameter				OCC LGR KNTS
4%	7%	10%	13%	1 per 3m length;
D, E, F, G, K	B, C, H, L, M	I, J Ungrd Spec	U, X	
6cm max	8cm max	1 = 9cm, J = 4cm	13cm max	X-UTL ▶50cm up to 2 per 3m

HARDWOODS : DECIDUOUS SPECIES

C (cottonwood only) ▶5.0m ▶25cm Max twist 7% (8cm)	80 % Veneer	Knots < 4cm well spaced NO Conk, NO Butt Rot NO Sweep, No Crook
I S/L ▶5.0m ▶25cm	50%	25-36cm to 4cm; 38-48cm to 8cm; ▶50cm to 9cm
U UTL ▶5.0m 10-14cm or 15-24cm or ▶25cm	75 % 66.7 % 50 %	10-14cm to 4cm; 15-26cm to 6cm 28-36cm to 8cm; 38-48cm to 10cm ▶50cm to 12cm;
Y CHPR poorer than S/L, better than NRec, Dead Potential = Y or lower		
Z NRec, see Fir specs		

CEDAR (NO POWDER WORM in D, F, K, L, M, H - n/a CGNF)

DIMENSIONS	CUT	KNOTS (diameter)
D LBR ▶5.0m ▶60cm or ▶120cm	75 % 66.7 %	60-74cm 75% surface clear ▶76cm 67% surface clear
F LBR ▶5.0m ▶50cm	75 %	50-54cm surface clear; 60-74cm 67% surface clear ▶76cm knots allowed 75% 1 side or 50% 2 sides
K SHG ▶4.0m ▶50cm Slab ▶38cm thick	50 SS	50-58cm surface clear ▶60cm same as Cedar D
L SHG ▶4.0m ▶38cm Slab ▶26cm thick	50 SS	50% surf. Cir. Or spacing, round logs >60cm allow spacing
M SHG ▶4.0m ▶38cm Slab ▶18cm thick	50 SS	25% surf clear, or spacing, round logs >50cm allow spacing
H S/L ▶5.0m ▶38cm	75 %	see Fir H knot specs
I S/L ▶5.0m ▶38cm or ▶10.0m ▶50cm O/W H Quality	75 % 50 % 50 %	see Fir I knot specs see Fir H knots
J S/L, U & X UTL, Y CHPR, Z- NRec see Fir specs		

SLABS

Cedar	D,F,K	H,I	L	M	U	X
Thickness	38cm	38	26	16	16	10
Mean dia.	50cm	38	38	26	16	10

Cedar : Use knot specs based on slab width. Thickness is rgt. angle to grain
Other species, I S/L & better, 38cm thick & mean diameter ▶ grade rule

GENERAL FACTORS & RULES

LOG LENGTHS: Standard lengths 8m, 11m, 13m Min lgths 5m, Shingle 4m, Y 3m Heli Blocks, 4m & 8m allowed	LUMBER - no conk or blind onk DEAD - must > 8m Gr U No Top = Gr N 99 00%
CROOK & PISTOL GRIP in PEELERS <8.0 m - no loss allowed 8.0 m to <11.0 m-up to 1.2m Grade Con. ▶11.0 m - up to 2.0m Grade Con.	BUTT ROT in PEELERS <8.0 m - none allowed 8.0 to <11.0 m - to 1/3 butt meas ▶11.0 m - to 1/2 butt meas
SWEEP in PEELERS <8.0 m - up to 0.8m Grade Con 8.0 m to <11.0 m-up to 1.2m Grade Con. ▶11.0 m - up to 2.0m Grade Con	CONK +2m /-4m NF 50% Gr Y B/CONK +4m/-8m NF 50% Gr Y Fork w/decay 1m NF 50% Gr Z Crk w/decay 1m NF 50% Gr Z Rot Brch +/- 1m NF 50% Gr Z Shatter/Breakage - Gr Z Root Rot Deduct 0.6m
Mental Bucking Allowance <8.0 m - NO Bucks Allowed 8.0 m to <13.0 m-1 Buck only ▶13.0 m - 2 bucks only	

BUTT ROT GUIDE

B/Rot Diam Ratio	N/F Deduction	Grade Consideration Length Not Recoverable
1/4	0.2m	0.6m
1/2	0.4m+	1.8m
3/4	1.2m+	3.6m
4/4	2.4m	4.2m
Sounding	0.8m	2.4m
P. schweinitzii	0.6m	2.0m

▶ means equal to or greater than (= or >)

O/W = otherwise

NB: Common lower grades are listed under FIR & PINE

