Recovery of Construction and Standard Lumber in Second Growth Logs with Large Knot Collars

Pacific Rim Log Scaling Bureau

2013

Background

- The Scaling Practice Committee of the Northwest Log Rules Advisory Group conducts a minimum of two scaling rollouts each year to maintain continuity in applying the Official Rules across the region. Representatives form all areas are encouraged to participate. Each member Bureau supplies a representative to establish the “school solution” for the group of logs and the results are discussed log by log . During this process a noted difference of interpretation of a specific surface characteristic, large and numerous knot collars, was identified. After many lengthy discussions, supporting the different positions, Pacific Rim Log Scaling Bureau felt we needed a more detailed study to insure we applied the rules accurately. By preforming this analysis internally we could control the process and eliminate any influence by buyers and sellers of logs
- To facilitate this analysis, Pacific Rim Log Scaling gathered a group of 24 logs. The five member Bureaus of the Northwest Log Rules Advisory Group were invited to participate in the selection of the logs for milling. Yamhill, Columbia River, Southern Oregon, and Pacific Rim Log Scaling participated in the study. The logs were scaled and a solution was established by a team consisting of one representative from each organization. Five logs were selected for milling. These five logs had the widest spread of defect percentage amongst the Bureau representatives that established the “school solution”. Two of the selected logs were of the targeted log type, second growth logs that did not have oversized knots but did have extremely large knot collars. Two additional logs had defect relating to knots and knot collars and the final log was selected due to differences in the deduction relating to gradual sweep.

Log Selection

- Green Diamond Resource Corporation provided Pacific Rim Log Scaling Bureau with a group of 24 logs and the use of their facility and people for the project. Pacific Rim invited the five member Bureaus of the Northwest Log Rules Advisory Group to participate in the selection. Yamhill, Columbia River, Southern Oregon, and Pacific Rim Log Scaling participated in the study. There was little to no variance of scale on 19 of the logs. 5 logs were selected for milling.

Tracking the Scaling Cylinder

The logs were bucked to maximize recovery and the scaling cylinder was marked on each segment to allow tracking of lumber cut from the scaling cylinder. Each log was assigned a different paint color to maintain the accountability of the lumber produced by the specific log.

Milling

The sawyer was instructed to emulate Scribner's diagramed cutting solution for each segment. The diagrams are of perfect circles having the given diameter of the log. Volume is determined by the quantity of boards positioned in the circle, or scaling cylinder, that best utilizes the area. Boards are1 inch thick with varying face widths measured in 2 inch multiples. The narrowest face is 4 inches. The logs were bucked into segments that would maximize recovery, 8, 10 and 12 feet. The boards from the specific log were tracked by log and log segment through the milling process and transport to the grading site.

Grading

Ron Peterson, retired Western Wood Lumber Inspector, was hired to grade the lumber according to the Alternate Board Grades, 30.50, as published by WWPA in the Western Lumber Grading Rules. All of the scaling participants were present for the grading. Ron answered questions and explained the requirements for the grades used, Select Merchantable, Construction, Standard, and Utility. The minimum required recovery for a Douglas Fir, Western Hemlock, or Sitka Spruce No.2 sawmill is Construction and better lumber to an amount not less than 65% of the net scale and for a No.3 sawmill it is Standard and better lumber not less than 33.33% of the gross scale. NWLRAG Rules deduct for Utility.

Milling Results
by Log

Log 1, targeted log type

This log had over 90 knots with extremely large knot collars around every knot on the log. There were no oversized knots on the log. 3 participants took diameter deductions for the knot collars. 5 participants graded the log a number 2 sawmill and 5 participants graded the log a number 3 sawmill.

After scaling the log the knots were bucked flush to the log surface. The knot collars were up to 7". The picture below shows a 2.5" knot with a 6.5" collar.

Lumber from Log #1

The 4 stacks of lumber in the first photo are stacked by grade, select merchantable, construction, standard, and utility. This log contained 87% select merchantable. The required recovery for a special mill grade is “select merchantable and better lumber in an amount of not less than 65% of the net scale. The log did not have the exterior characteristics to allow it to be graded Special Mill, although it did meet the recovery requirements.

Log 1 Summary

Description

Specie:	Hemlock
Length:	32’
Top Diameter:	13”
Butt Diameter:	24”
Ring Count:	7”

Consensus

Consensus Deduction:	3’
Consensus Defect:	5.26%
Consensus Grade:	#2 Sawmill

Deductions were made for break

Defect and Grade Range

5 participants graded #2 Sawmill

5 participants graded #3 Sawmill

Highest Defect:	26.32%
Lowest Defect:	5.26%

Milling Results

Construction and Better:	97%
Defect:	5%
Grade:	#2 Sawmill

Comment: No loss resulted from knot collars

Log 2, targeted log type

Log 2 was a Douglas Fir with 2.5” diameter knots in full whorls the entire length of the log. 2 participants took a diameter deduction for the knot collars. 8 participants graded the log a #3 sawmill and 2 participants graded it a #2 sawmill. Deductions ranged from no deduction up to a 2” deduction for the knot collars. The 2” deduction resulted in the percentage deduction being 31.58%

The log was poorly trimmed. Upon cutting the knots flush to the log surface, it was determined the knots measured up to 2.5” in diameter. The collars around the knots measured up to 5”.

Lumber from Log #2

Log 2 produced 94% construction and better lumber, 90% of the net scale was select merchantable grade. The picture shows the lumber stacked by grade, select merchantable, construction, and standard. There were no utility grade boards produced from this log.

Log 2 Summary

Description

Specie:	Douglas Fir
Length:	38’
Top Diameter:	16”
Butt Diameter:	24”
Ring Count:	4

Consensus

Consensus Deduction:	1’
Consensus Defect:	2.63%
Consensus Grade:	#3 Sawmill

Deductions were made for break

Defect and Grade Range

2 participants graded #2 Sawmill

8 participants graded #3 Sawmill

Highest Defect:	31.58%
Lowest Defect:	0%

Milling Results

Construction and Better:	94%
Defect:	0%
Grade:	#2 Sawmill

Comment: No loss resulted from knot collars

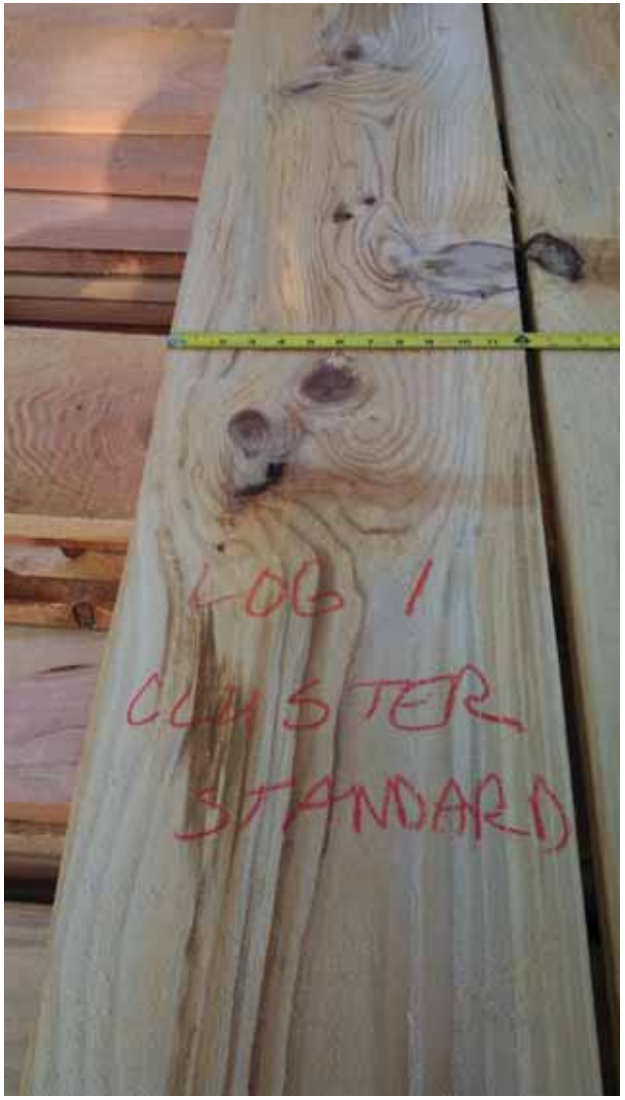
Log 3

This log had many oversized knots grouped in clusters. Some of the collars around the knots were in excess of 12" and the knots were in excess of 3" inside the scaling cylinder. The standard rough cut for a 19" log is 2". The participants agreed the knots and knot clusters were so distributed as to permit the required recovery for a #2 sawmill. The large knots pictured are in the first 8' segment of the log.

After the log was scaled the knots were bucked flush for further examination. The example below shows a knot cluster located within 8' of the top end of the log. This cluster did not result in the lose of standard lumber that the participants expected.

Standard grade lumber produced from log #3

Shows allowable spike knots and knot clusters in this lumber grade.



Log 3 Summary

Description

Specie:	**Hemlock**
Length:	**28’**
Top Diameter:	**19”**
Butt Diameter:	**23”**
Ring Count:	**8”**

Consensus

Consensus Deduction:	**8’**
Consensus Defect:	**28.57%**
Consensus Grade:	**#2 Sawmill**

Deductions were made for large knots and knot clusters.

Defect and Grade Range

All participants graded this log #2 sawmill.

Highest Defect:	**40.48%**
Lowest Defect:	**16.67%**

Milling Results

Construction and Better:	**72%**
Defect:	**9%**
Grade:	**#2 Sawmill**

Comment: The Standard Deduction of 2” results to a defect percentage of 24.

Log 4

The log had over 80 knots on the surface with full whorls 12 to 18 inches apart the full length of the log. The larger knots exceeded 2 inches but were less than 3 inches. Some felt the knots were loose and encased. 6 participants graded the log a number 2 sawmill and 4 of the participants graded it a number 3 sawmill. The deductions on the log were for sweep.

Upon cutting the knots it was shown they were not loose and encased but recently dead. This type of knot was referred to, by the lumber grader, as encased but firmly affixed. Incased knots that are firmly affixed are allowable in construction and standard boards to the knot size that is allowed for sound tight knots. Loose and encased knots are allowable to half the diameter of sound tight knots.

Construction and Utility grade boards produced form log #4

Log 4 Summary

Description

Specie:	Sitka Spruce
Length:	32’
Top Diameter:	12”
Butt Diameter:	20”
Ring Count:	4 to 5

Consensus

Consensus Deduction:	5’,
Consensus Defect:	18.75%
Consensus Grade:	#2 Sawmill

Deductions were made for sweep

Defect and Grade Range

6 participants graded #2 Sawmill

4 participants graded #3 Sawmill

Highest Defect:	25%
Lowest Defect:	6.25%

Milling Results

Construction and Better:	85%
Defect:	11%
Grade:	#2 Sawmill

Comment: Redirecting the scaling cylinder does not always result in a volume lose but the deduction is required per the rule book.

Log 5

Log 5 was not a rough log but was added due to wide range in deductions relating to the sweep of the log. Cuts of 2', 3', 4', 6', and 10' were recorded by the participants. 6 participants took 4' or less and 4 participants took 6' or greater. The discussion centered around the potential lumber lose in the butt segment of the log. All participants graded log 5 a #2 sawmill.

Lumber from log #5

This log was selected for the variations in sweep deductions. It is acceptable to reposition the scaling cylinder to maximize recovery. There was no loss in the butt segment of the log. Encased but firmly affixed knots in the butt segment resulted in less select merchantable than the other Douglas Fir examples. A deduction of 2' for redirecting the scaling cylinder at two points in the log was sufficient.

Log 5 Summary

Description

Specie:	**Douglas Fir**
Length:	**26’**
Top Diameter:	**23”**
Butt Diameter:	
Ring Count:	**3 to 6**

Consensus

Consensus Deduction:	**6’**
Consensus Defect:	**17.61%**
Consensus Grade:	**#2 Sawmill**

Deductions were made for sweep

Defect and Grade Range

All participants graded	**#2 Sawmill**
Highest Defect:	**37.7%%**
Lowest Defect:	**8.2%**

Milling Results

Construction and Better:	**82%**
Defect:	**5%**
Grade:	**#2 Sawmill**

Conclusions

- The grain distortion created by knot collars and the collars themselves do not result in a loss of Select Merchantable, Construction, or Standard board grades. This study supports Pacific Rim Log Scaling Bureau's position that knot collars are not a deductible defect. This study was preformed by Pacific Rim Log Scaling and not the Scaling Practice Committee of the Northwest Log Rules Advisory Group.