Cruising "Big, Valuable" Timber

(ok great, what is "big and valuable")

Timber Measurements Society
April 11, 2013

Paul Wagner
Washington Project Manager
Atterbury Consultants, Inc.

Old growth Douglas-fir near Darrington, Washington, 1943. No. 1 peeler in the butt log. The tree scaled 25,000 bd. Ft.

Much of our Pacific Northwest timber is big and valuable

To some folks any tree over 20 inches diameter is big.

In a timber cruising career you will likely still cruise some old-growth. It may be for appraisal purposes rather than harvest.

We have every day "Big, Valuable" timber around us:

- In Washington, DNR managed Trust Land timber sales often have big and valuable trees due to a longer rotation age.
- Some private and muninciple timber land owners use a longer rotation to maximize growth and yield.

- *The PNW is some of the world's best timber land for growth. Our common species are world known. We should be growing our valuable timber big.*

The Basics:

Cruise, cruising

The Dictionary of Forestry
Published by Society of American Foresters

1. A forest survey to ***locate*** and ***estimate*** the ***quantity*** of timber on a given area, according to species, size, ***quality***, possible ***products***, or other characteristics.
2. The estimates obtained from such a cruise.

Basic Questions for a Cruise:

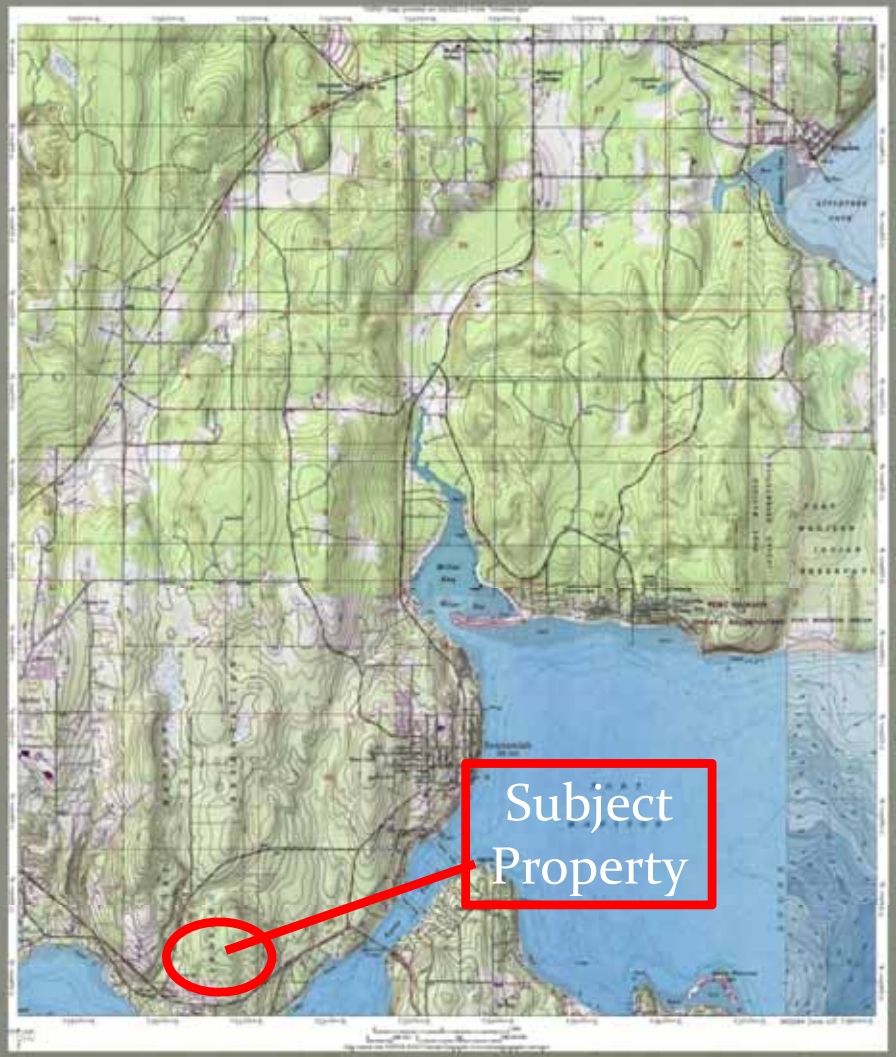
- Where is the timber property?
- How many acres are there?
- Access and topography?
- What is the forest stand structure?
- *How much time is available?*
- *What is the budget?*
- *What is desired cruise accuracy?*
- *Daily production and time to write report?*

From these questions a cruise or sampling plan is developed.

Where is the timber property?

- Map in GIS using NAIP 2011 imagery for the base.
- Add PLS (Public Land Survey) layer showing township, range and sections.
- Add county parcel layer.
- Add roads & streams.
- Define subject property, define unique, homogenous timber types if suitable for project.
- Calculate acreage.

General Location Map



What is the Appropriate Sampling Method?

- Variable plot (BAF)
- Fixed Area plot
- Strip Cruise
- 100% Cruise (measure ALL trees)

Sampling System Key

- **Small area up to 10 acres**

  Area known

Small trees up to 8” DBH	Fixed Area
Few large trees	100%
Many large trees	Strip or Fixed

  Area un-known

Few trees	100%
Many trees	Strip

- **Large area over 10 acres**

  Area known

Small trees up to 8” DBH	Fixed Area
Trees over 8”	BAF
Merch trees with over-story	BAF, strip, 100%
Un-even-aged stands	Nested plots

  Area un-known

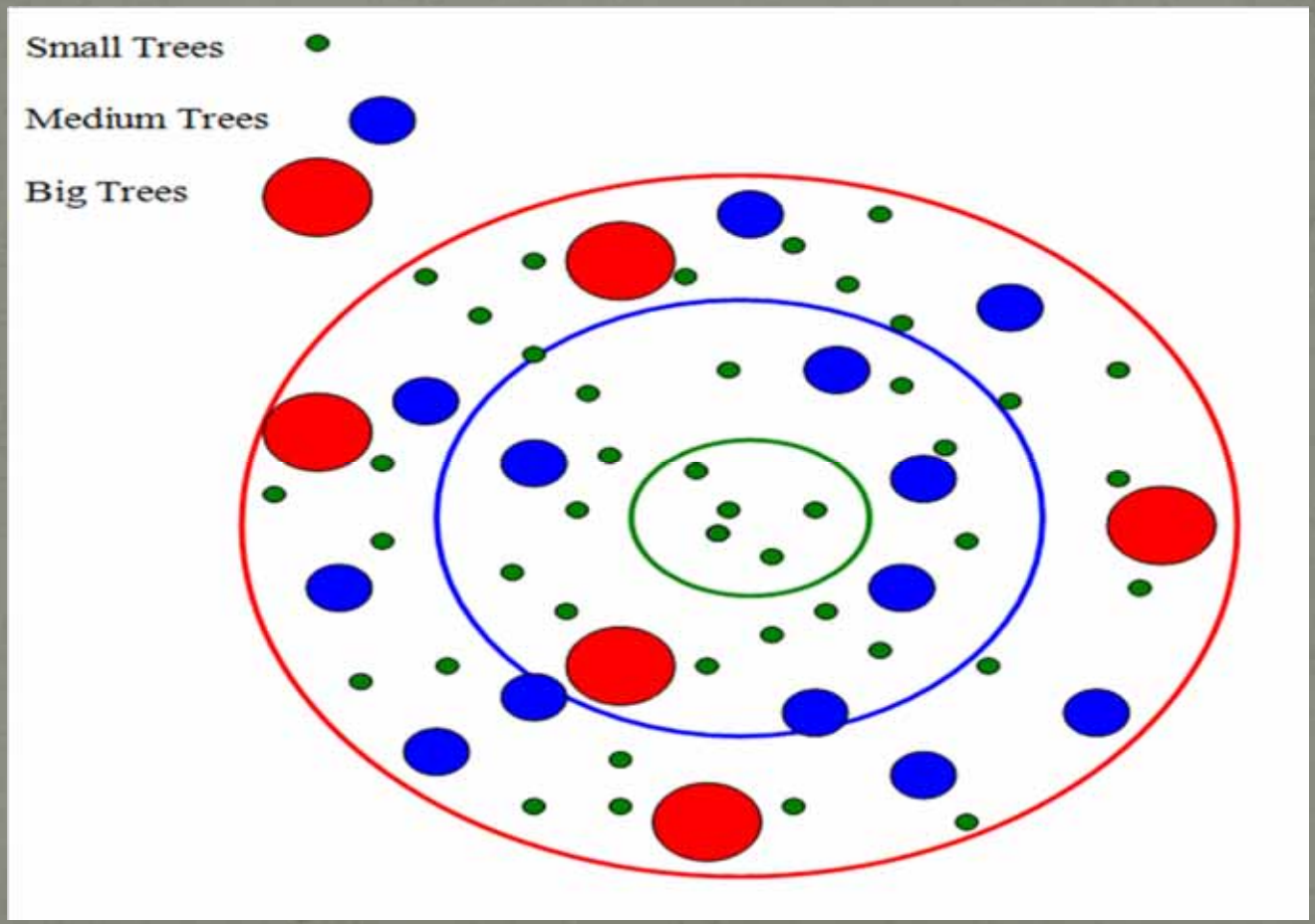
Small range of DBH	Strip
Un-even-age	Nested strips

Nested Plots

- Combination of sampling that will best pick up variation in the timber
  - Different BAF for a species or age/size class
  - Fixed radius plot with variable plot.
  - If strip cruising, different strip widths can be used for specific species or age class.
  - Combine 100% cruise with another system. (if there are scattered or small clumps of high value timber in the type).

Multi-Age Stands
Nested Plots

This concept can be used for strip cruising, fixed area plots, and prism cruising. It can also be used for combinations of sampling systems, such as fixed area plots for small trees and BAF for larger trees.



Northwest Stands - (your typical "Big & Valuable")

Northwest stands are variable. They average about five species in each stand. A fifty year old site II or III Douglas-fir or hemlock stand can have trees from 7 to 34 inches DBH and a height range from 50 to 130 feet total height. The coefficient of Variation (CV%) averages around 40 to 60%.

Sample intensity:

Measured in number of plots, percent of area cruised, or volume sampled.

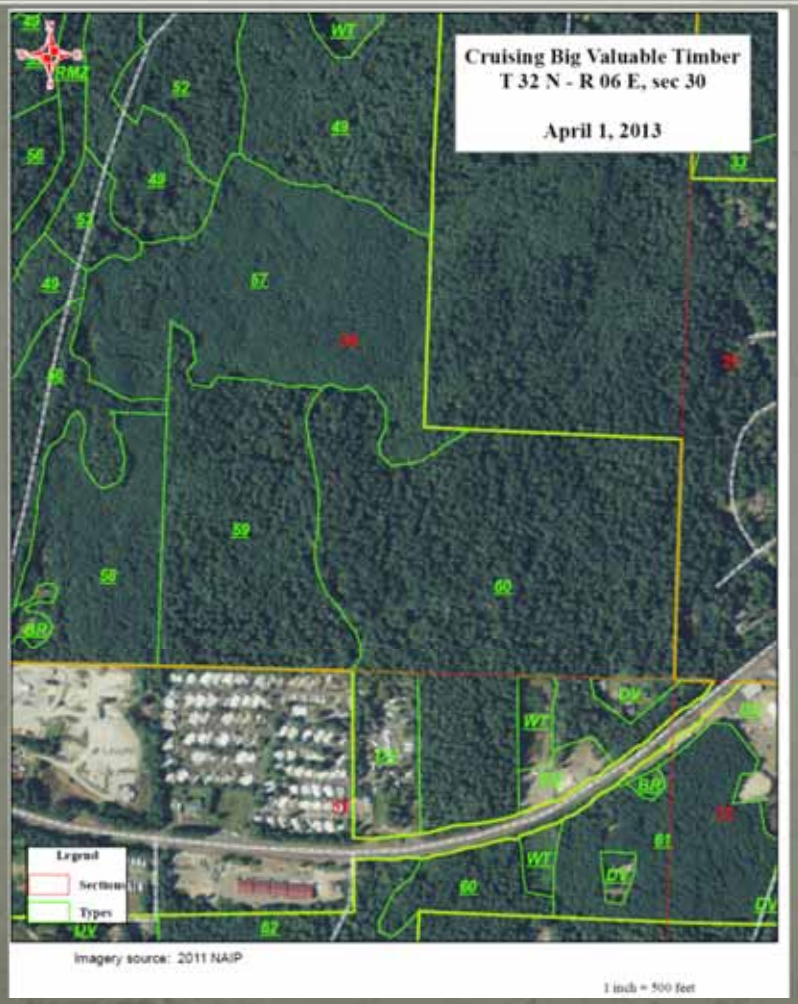
- Factors to Consider:

- Natural Variability
  - High variability means more plots and trees measured
- Number of samples required for designated sampling error
  - A goal of a low sampling error means more plots are required.
- Probability
  - 1 Standard Deviation 66 times out of 100
  - 2 Standard Deviations 95 times out of 100
  - 3 Standard Deviations 99 times out of 100

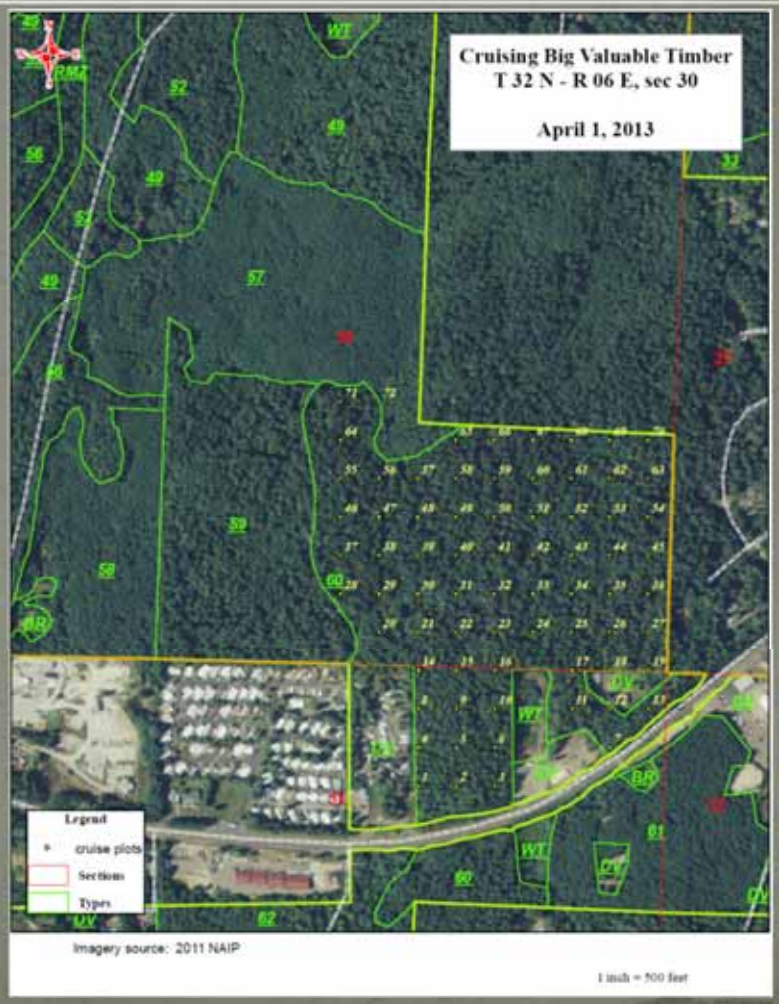
Bottom Line: How much **risk** are you or the company willing to take if the cruise is too high or low.

Cruise Preparation

Timber Type Map



Cruise Plot Map



Maps for the Field

- Create Arcpad files for use in handheld PC.
  - Use pre-numbered plots.
  - May want roads and imagery to cover large area for driving to property.
  - Use GPS to track driving to location and to locate plots.
- Printed map for field reference in waterproof cover.

“Big" can mean HEIGHT

- Poles, especially long ones, are a high value product.
- If there are tall & straight Douglas-fir or red cedar trees of suitable diameter and without any spike knots, you should look at cruising poles.

Straight & Tall Douglas-fir and western red cedar may make high value poles

- IF logging system and road system are suitable for yarding and transporting long poles.
- IF there is a suitable amount of sapwood for preservative treatment.

Compare DF Pole $/MBF with Sawlogs

DF Poles

THE OESER COMPANY
730 Marine Drive Bellingham, WA 98225
Phone: (360) 734-1480 Fax: (360) 671-4703

DF-12D

DOUGLAS FIR PRODUCERS

SIZE	DOB Bd. FT	FIB $ Each	FIB $ / MBF
1-30	60	$47	$783
4-30	60	$39	$650
5-30	55	$32	$640
6-30	55	$29	$480
5-35	85	$58	$726
4-35	85	$47	$588
5-35	80	$38	$633
6-35	80	$31	$517
2-40	120	$83	$692
3-40	120	$72	$600
4-40	90	$62	$689
5-40	75	$48	$686
2-45	155	$109	$687
3-45	135	$95	$762
4-45	120	$79	$625
5-45	90	$62	$689
2-50	180	$116	$688
3-50	140	$97	$643
4-50	140	$77	$550
1-60	290	$231	$797
2-60	225	$176	$650
3-60	180	$134	$705
1-65	320	$283	$884
2-65	240	$208	$866
3-65	210	$149	$710
H4-70	360	$462	$825
H3-70	480	$429	$894
H2-70	400	$309	$965
H1-70	400	$349	$825
1-70	350	$347	$991
2-70	270	$251	$856
3-70	230	$171	$743
H4-75	800	$594	$990
H3-75	520	$554	$1,065
H2-75	520	$515	$990
H1-75	520	$479	$915
1-75	440	$436	$991
2-75	290	$244	$855
3-75	250	$187	$749

SIZE	DOB Bd. FT	FIB $ Each	FIB $ / MBF
H4-80	700	$638	$911
H3-80	600	$594	$990
H2-80	600	$516	$860
H1-80	540	$539	$997
1-80	440	$475	$1,080
2-80	360	$329	$856
3-80	290	$218	$741
H4-85	900	$806	$874
H3-85	660	$693	$985
H2-85	660	$624	$945
H1-85	660	$594	$900
1-85	570	$568	$963
2-85	490	$418	$853
H4-90	900	$799	$816
H3-90	800	$730	$990
H2-90	800	$704	$959
H1-90	660	$607	$966
1-90	590	$584	$990
2-90	490	$431	$880
H4-95	1000	$829	$825
H3-95	870	$781	$898
H2-95	870	$748	$860
H1-95	780	$710	$947
1-95	640	$634	$975
2-95	540	$478	$885
H4-100	1230	$991	$805
H3-100	900	$847	$941
H2-100	900	$818	$909
H1-100	780	$716	$945
1-100	660	$653	$989
H4-105	1180	$967	$825
H3-105	1000	$913	$913
H2-105	1000	$858	$858
H1-105	840	$781	$908
1-105	740	$726	$981
H4-110	1320	$1,023	$839
H3-110	1200	$977	$977
H2-110	1200	$924	$880
H1-110	910	$863	$948
1-110	780	$773	$990
H3-115	1300	$1,247	$1,042
H2-115	1300	$988	$988
H1-115	1300	$826	$826
1-115	940	$863	$1,203
H3-120	1300	$1,145	$877
H2-120	1300	$1,080	$831
H1-120	1140	$1,014	$889
1-120	970	$940	$940

TERMS:
1 - Poles will be manufactured to their highest value regardless of delivered length.
2 - Peeling to remain current, based on delivery.
3 - Prior weeks receipts will be paid each Friday.
4 - Culls & Undersize to be paid on log scale, FOB OESER, less $75/MBF to cover shipping & handling.
5 - Sizes larger than shown will be paid at closest size shown unless purchased on special order.
* 6 - Sizes with no price shown will be paid at the shorter (cutback) size they will make.

IF YOU HAVE ANY QUESTIONS CALL:
Mike Fiscrud - Forester 360.966.7613 / Cell: 360.708.4421 or Mark Edick - Manager 360-757-2252 / Cell: 360.708.5148

DF-12D

DF Sawlogs

Formark
Timber buying, Selling and Appraisals

Forest Marketing Enterprises, Inc.
3223 Pine Street, Everett, WA 98201
Phone 425-258-3167 • Fax: 425-258-1280
Eric Warren: 425-359-8370 mobile
Dennis Buss: 360-770-0221 mobile

PLEASE NOTE OUR TOP AND BUTT SIZE CHANGES IN THE 108 AND 113 SORTS

Delivery into MS Smith Island Log Yard
Dumping hours: 7:00am. - 4:00pm.
For assistance please contact
(425) 258-3167 Teresa at ext 4 or Kim at ext 1.
Effective date: April 1, 2013
Insect Free Green Production Only

DOUGLAS FIR

Sort	$/mbf	Description
105	$740	12"+, 30-40', J Sort
106	$720	12"+, 30-40', CJ Sort
160	$680	12"+, 30-40', Lo-C
		ALL ABOVE 36' PREFERRED
108L	$650	8"+, 39' and 40' ONLY
108M	$625	8"+, 33-38'
108S	$600	8"+, 26-32'
		108 SORTS: BUTTS ARE OVER 36"
114	$250	8"+, 26'+, Rough / Cobby / Lo-Grade #3
128	$150	8"+, 16-25', Short Saw logs

DOUGLAS FIR

Sort	$/mbf	Description
109	$700	9-11", 30-40', J Sort
107	$670	9-11", 30-40', K Sort
113L	$650	8"+, 39' and 40' ONLY
113M	$625	8"+, 33-38'
113S	$600	8"+, 26-32'
		113 SORTS: BUTTS ARE UNDER 36"
110	$100	5-7", 16-40', Chip 'n Saw
112	$5	REJECTS / METAL / CULLS

HEMLOCK / WHITE FIR

Sort	$/mbf	Description
205	$680	12"+, 30-40', J Sort, 36'PREFERRED
207	$650	12"+, 30-40', C Sort, 36'PREFERRED
208L	$630	12"+, #2, 39' and 40' ONLY
208M	$600	12"+, #2, 33-38'
208S	$550	12"+, #2, 26-32'
214	$200	8"+, 26'+, Rough / Cobby / Lo-Grade #3
228	$120	8"+, 16-25', Short Saw logs

HEMLOCK / WHITE FIR

Sort	$/mbf	Description
209	$650	10-11", 30-40',J Sort, 36'PREFERRED
217	$635	10-11", 30-40',K Sort, 36'PREFERRED
213L	$630	8-11", 39' and 40' ONLY
213M	$600	8-11", 33-38'
213S	$550	8-11", 26-32'
210	$100	5-7", 16-40', Chip 'n Saw
212	$5	REJECTS / METAL / CULLS

CEDAR

Sort	$/mbf	Description
413	$1000	5"+ top, 32-40', Sawlogs
412	$700	5"+ top,16-30', Short
410	$250	SHORT / WORMY/ OUT OF SPEC
410S	$5	Metal

PINE

Sort	$/mbf	Description
313	$640	8"+, 26-40', Saw logs 26', 33', 39' PREFERRED
310	$75	5-7", 16-40', Chip 'n Saw

SPRUCE

Sort	$/mbf	Description
608	$650	8-19", Saw logs
613	$570	20"+ 26', 33', 39' PREFERRED

MAPLE/BIRCH

Sort	$/mbf	Description
835	$800	Maple 24"+, 16-40', Clean, White heart
833	$250	Maple 10"+, 16-40'
831	$5	Maple REJECT

ALDER

Sort	$/mbf	Description
715	$475	10"+, 20-40', 20,28,32 preferred
713	$350	10"+, 16-19'
711	$5	REJECTS / METAL / CULLS

Rollout scale by Pacific Rim Log Scaling & Grading Bureau. Prices based on net Scribner MBF scale. All lengths must have 10" trim added. All knots must be trimmed even to the bark. Excessively knotty logs will be rejected.
Please call for timber appraisals. We also buy standing timber. Prices are subject to change without notice.
EMAIL [redacted] to receive price list by email. For directions and other info, visit www.formark.net

~$1,000/MBF for best 80 ft pole vs $700/MBF Japan Sort log

“Big” = diameter

Factors for log value:

- Is a log too large for your client or local mills?
- If timber is large diameter, does it have fine ring count?
- Are the logs relatively free of knots?
- What species is the timber? How old is it?

- *You may have different cutting specifications for “over size” logs depending on quality & species.*

Ring count and spacing is important for value

5 rings/inch, even spacing

8+ rings/inch, higher value

The finer ring counts are important for export value and structural cuttings

Big does not always mean more value

High Value Old Growth Sitka Spruce

Sitka Spruce - Not so much value

Value Depends on Species

- In the Pacific Northwest, Alaska yellow cedar and Port Orford-cedar are the most valuable (old growth and usually scarce).
- Western red cedar is our most valuable common species.
- Douglas-fir logs and red alder logs have at times switched places for highest value per MBF.

- *In competitive bidding, minor, high value species such as red cedar have made the difference in winning a bid.*
- *Attention must be paid to sampling these minor species in cruising. A nested plot can accomplish this.*

SORTS define quality and value of logs

- *Sorts* depend on the local log market and the client for which a cruise is done.
- For *any* cruise, a cruiser needs to know what outputs are needed. This means sorts and preferred log lengths.
- A cruiser should be looking at log combinations that produce the most *value*.

Value Also Depends on Location

- What will it cost to get logs to a buyer?
  - Logging system – ground based, cable or helicopter?
  - Hauling distance to buyer.
  - Existing road system condition & new construction.
- If logs are going to different buyers, what price and cost combination has the most margin? This is important if doing an appraisal.
  - Hauling cost may be more than a higher price somewhere.

If logging with helicopter, high cost may mean more wood left

A cruiser needs to consider merchantability standards.

- Defect in this log made the value less than the cost of flying it out by helicopter.
- There may be more long butting to remove defect when helicopter yarding.

Cutting Practices for Local Market

Long butted red cedar log – SE Alaska

Our local market

- Local cedar mills will usually take this defect in a log and get what they can from it.
- Cruiser must know the preference and either take a cull segment or appropriate scaling deductions in long log.

Tall tree heights and age usually mean breakage from falling and defect

- A cruiser should allow for breakage on a per tree basis; depending on topography and tree height.
  - This is done by calling cull or zero segments in the upper portion of a tree.

Defect in a tree such as spike knots, rot, forks, large branches will affect breakage.

Old growth trees don't flex and will break more.

Applying a breakage percent to the whole cruise affects ALL logs and is not realistic.

Breaks are often lineal splits

Big timber is usually older

- Older means more time for weather to beat at and cause defects such as broken tops, forked tops, spike knots, frost cracks and shake.
- Many tree damaging fungi grow slowly – older trees have more defect from rots if infected.

- A cruiser needs to be familiar with recognizing different rots and how they affect the wood.

Common Rots
White Speck

White speck heart rot

White speck in wood

Brown Cubical Butt Rot

"cow pie" conk on ground, often near old DF stump

Small amount of rot in center of log

“Wormy” red cedar

This is an example of defect that drastically affects log value. “Wormy” cedar is worth $800-900 less per M.

On Site Evidence of Rot Extent

On Site Evidence of Rot Extent

Fomes or Armillaria rot

Combination of rots & old damage

On Site Evidence of Rot & Defect Extent

Stumps on adjacent cuts

Log decks on adjacent cutting

Large logs will check in the center

Usually about 30" and larger logs will get a heart check

A cruiser needs to recognize this and take inch diameter deductions in large logs

Measuring the Darn Stuff

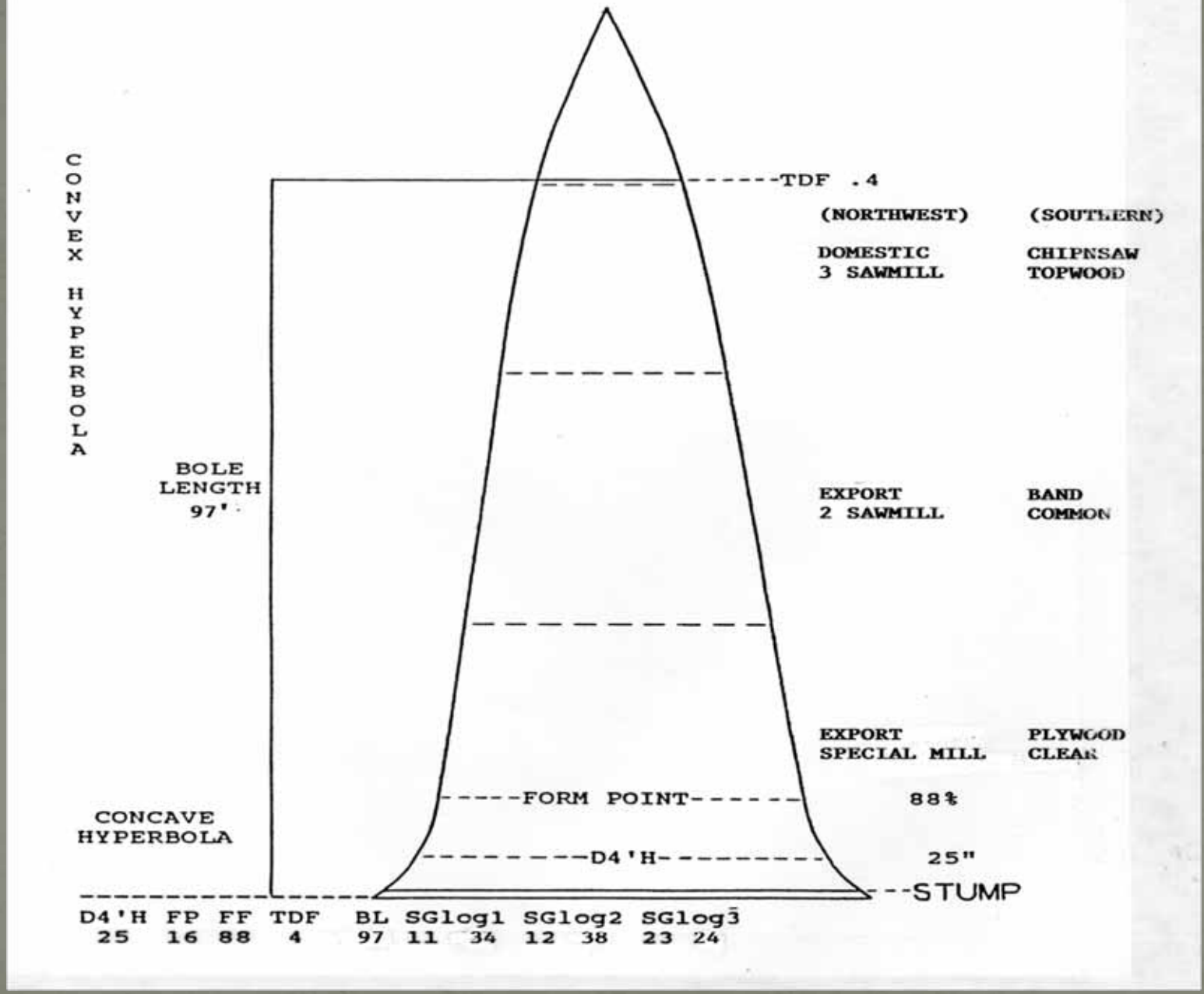
- Hokey smokey that's' tall

- <u>Use a laser for heights</u>
  - Bole height is the most important determinant of tree volume. Especially in variable plot cruising.
  - Lasers are fast, accurate and more versatile than tape and relaskop or other methods.
  - They will pay for themselves by making you more productive and accurate.

Being X% off on your bole heights translates almost directly to cruise volume being off by X%

Figure 4

Sorts, Grades, Volumes and Values

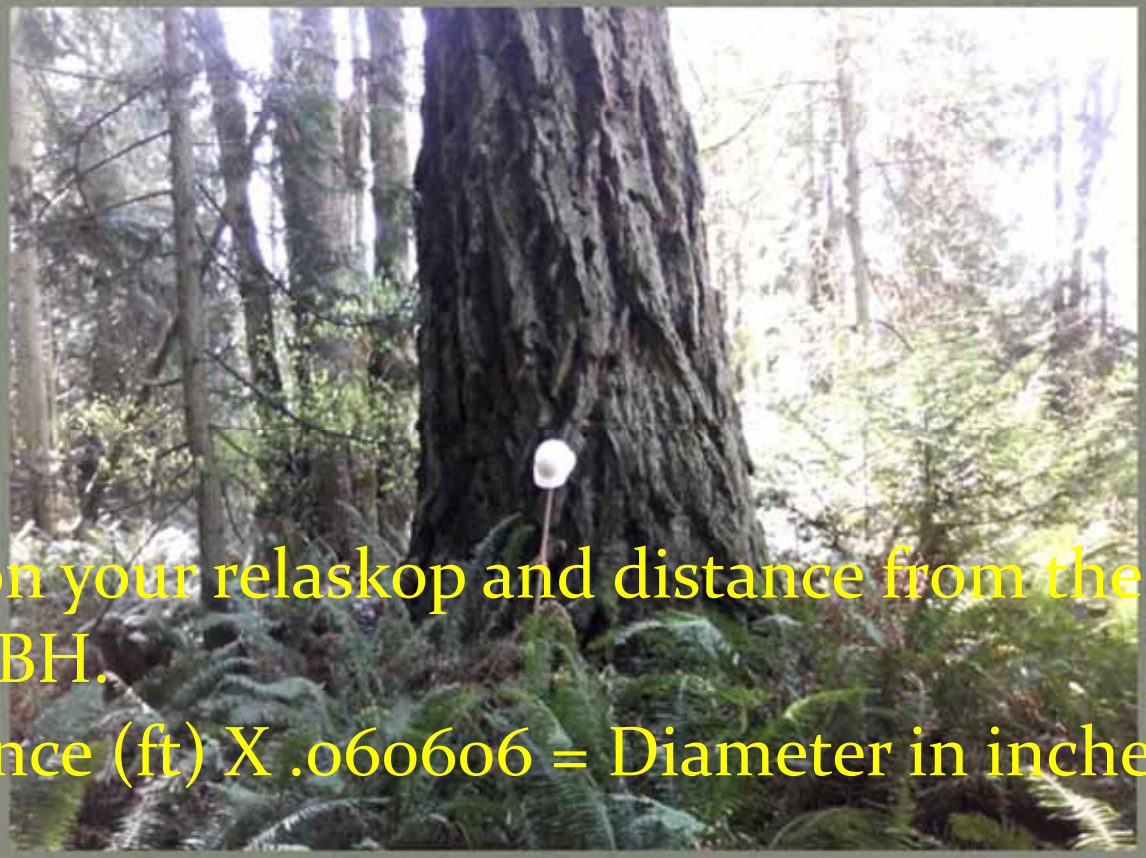


Big Valuable Alder

How do you measure height in a forked tree?

- Your cruise program should be able to handle a variable top fraction for bole height.
- Total heights and fixed top fractions do not work very well; for what should be obvious reasons

Hokey smokey that's big, how do I get my diameter tape around it?

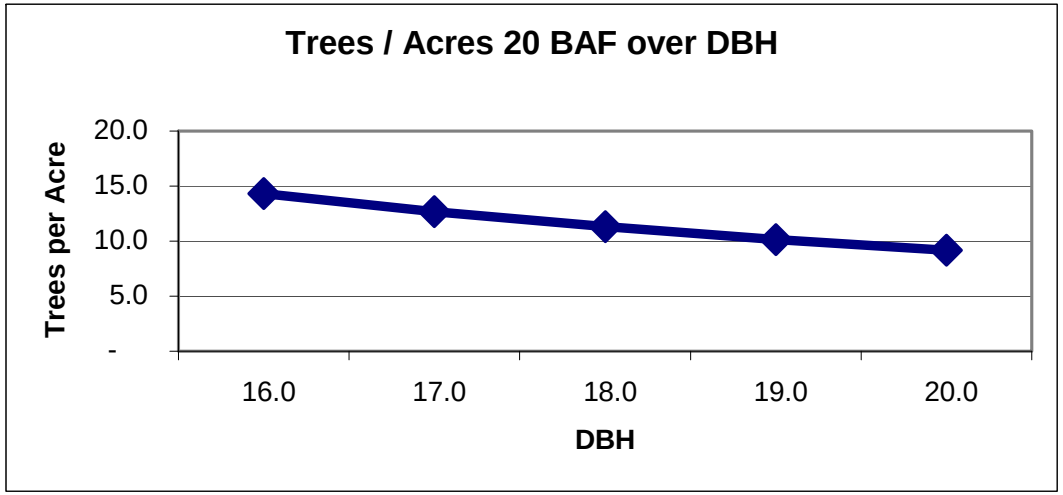


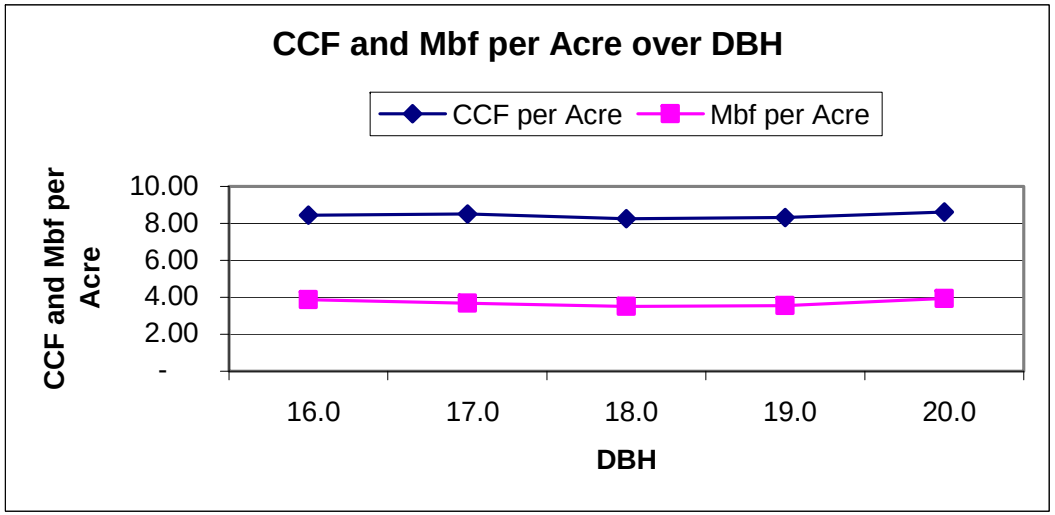
- Use the bars on your relaskop and distance from the tree to calculate DBH.
- #Bars X Distance (ft) X .060606 = Diameter in inches

Sensitivity of DBH to Volume per Acre with a BAF cruise

01N 24W 01 BAF Balance 0007 Plot 1

Tree No.	BAF	DBH	FP	FF	TDF	Bole Ht	Total Ht	Per Acre BA	Per Acre Trees	Tree Net CuFt	Tree Net BdFt	per acre CCF	per acre MBF
1	**20**	**16.0**	16	89	4	**95**	**116**	20.00	14.3	59	270	8.45	3.867
2	**20**	**17.0**	16	89	4	**95**	**116**	20.00	12.7	67	290	8.50	3.680
3	**20**	**18.0**	16	89	4	**95**	**116**	20.00	11.3	73	310	8.26	3.508
4	**20**	**19.0**	16	89	4	**95**	**116**	20.00	10.2	82	350	8.33	3.555
5	**20**	**20.0**	16	89	4	**95**	**116**	20.00	9.2	94	430	8.62	3.942



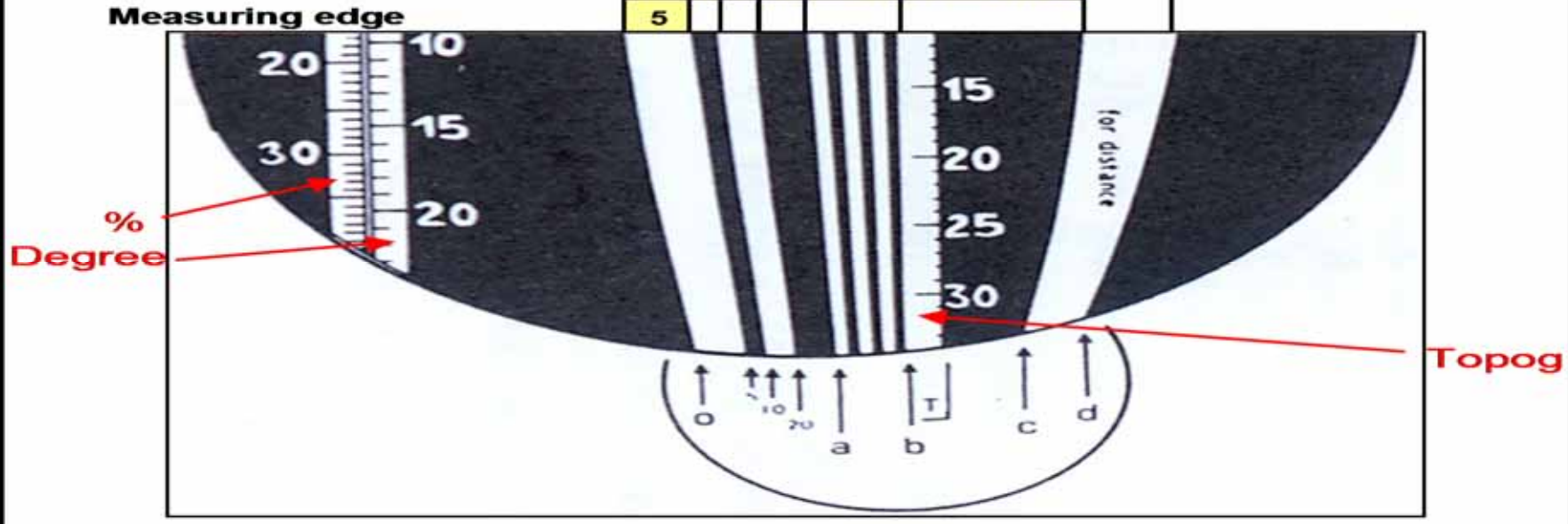


American Scale Relaskop

BAF numbers, (bands)

360 (36)				
250 (30)				
	160 (24)			
90 (18)		90 (18)		
40 (12)		40 (12)		
	25		10	
20		90 (18)		
10 (6)	10(6)	10 (6)	40 (12)	
5				

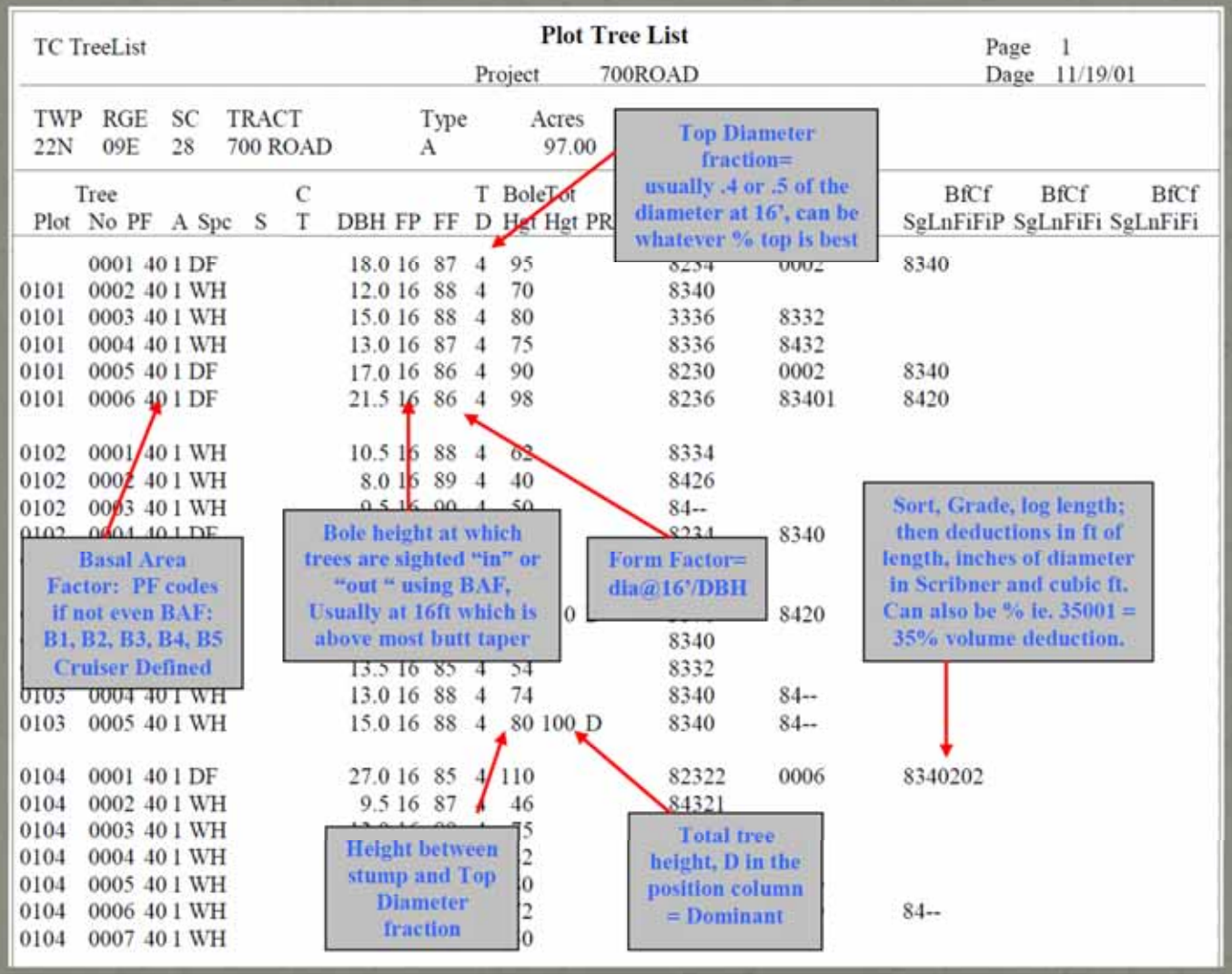
BAF 160 (24 bands)



1 / 16.5 = 0.06060606
Diameter = .06060606 * Distance feet * number bands
BAF = 0.277777778 * (bands)^2
Limiting distance = Sq Rt (75.321 / BAF) * Diameter inches
Form = bands at form point / bands at DBH. Form class = form * bark factor

Depress the brake to let the wheel compensate for slope.
Pump brake to settle oscillation down quickly.

Cruise Details: what goes where



TC TreeList

Plot Tree List

Project 700ROAD

Page 1
Dage 11/19/01

TWP	RGE	SC	TRACT	Type	Acres
22N	09E	28	700 ROAD	A	97.00

Plot	Tree No	PF	A	Spc	S	C T	DBH	FP	FF	T D	BoleTot Hgt	Hgt PR		BfCf SgLnFiFiP	BfCf SgLnFiFi	BfCf SgLnFiFi
	0001	40	1	DF			18.0	16	87	4	95		8234	0002		8340
0101	0002	40	1	WH			12.0	16	88	4	70		8340			
0101	0003	40	1	WH			15.0	16	88	4	80		3336	8332		
0101	0004	40	1	WH			13.0	16	87	4	75		8336	8432		
0101	0005	40	1	DF			17.0	16	86	4	90		8230	0002		8340
0101	0006	40	1	DF			21.5	16	86	4	98		8236	83401		8420
0102	0001	40	1	WH			10.5	16	88	4	62		8334			
0102	0002	40	1	WH			8.0	16	89	4	40		8426			
0102	0003	40	1	WH			9.5	16	90	4	50		84--			
0102	0004	40	1	DF									8234			8340
												0				8420
													8340			
							15.5	16	85	4	54		8332			
0103	0004	40	1	WH			13.0	16	88	4	74		8340	84--		
0103	0005	40	1	WH			15.0	16	88	4	80	100 D	8340	84--		
0104	0001	40	1	DF			27.0	16	85	4	110		82322	0006		8340202
0104	0002	40	1	WH			9.5	16	87	4	46		84321			
0104	0003	40	1	WH							75					
0104	0004	40	1	WH							2					
0104	0005	40	1	WH							0					
0104	0006	40	1	WH							2					84--
0104	0007	40	1	WH							0					

Top Diameter fraction= usually .4 or .5 of the diameter at 16', can be whatever % top is best

Basal Area Factor: PF codes if not even BAF: B1, B2, B3, B4, B5 Cruiser Defined

Bole height at which trees are sighted "in" or "out " using BAF, Usually at 16ft which is above most butt taper

Form Factor= dia@16'/DBH

Sort, Grade, log length; then deductions in ft of length, inches of diameter in Scribner and cubic ft. Can also be % ie. 35001 = 35% volume deduction.

Height between stump and Top Diameter fraction

Total tree height, D in the position column = Dominant

So, I've measured trees, now what?

- The final part of a cruise is the client report.
  - It should be to the point, highlighting important facts like volume and percent species.
  - Map of area and cruise plot locations.
  - How the cruise was done.
  - Comments on quality, especially factors not apparent in cruise outputs. (1955 freeze impacts, breakage)
  - Photos are helpful.
  - Operational logging information.
  - Information specific to clients needs/wants.
    - (Like how many of the logs may be too big for their mill.)

Thank You,

- Questions?

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