

PUTTING THE PUZZLE TOGETHER: FRASS

William E. Schlosser, Ph.D.

Schlosser@Resource-Analysis.com

<http://Forest-Econometrics.com/> 

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Western Forest Economist Meeting
May 18-20, 2014
Missoula, Montana

Agenda

In a short amount of time, we will take a long walk together

**SaaS
Overview**

**Cloud Computing, Sequential Quadratic Programming,
RPA Forecast Tool, SQL databases, High Security**

**Puzzle
Pieces**

Biometrics, Physical Site Characteristics, GIS, Delivered Log
Markets, Forest Management Costs

Structure

Expand your perception of what the puzzle will look like when
assembled

**Price/Cost
Forecasting**

Real Price & Cost Projections with the RPA Forecast Tool

Timing

Financially Optimal Timber Harvest Timing

One timber stand at a time

One Rotation at a time

Reports

Report data organization, conveyance & use

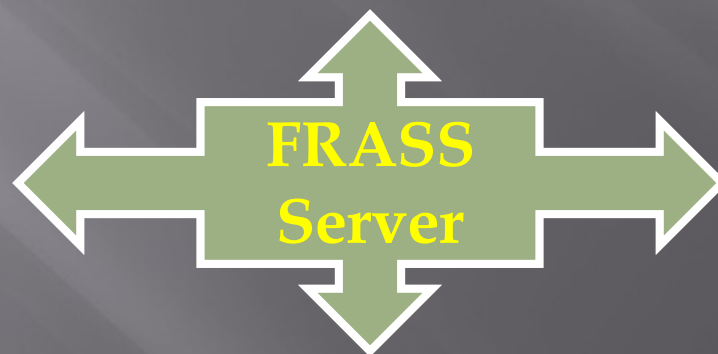
Audience

Who are FRASS users?

Software-as-a-Service (SaaS)

Cloud, distributed computing, many names...

- Internet connection from Client to Host
 - Thin client - or better
 - No update hassles for client
 - No processing demands on client-side
 - No storage on client-side
 - In-Network Portfolio sharing
 - High security for all confidential data




 FOREST RESOURCE ANALYSIS SYSTEM SOFTWARE

Home Locator Interactive Map Parcels Owners Market Models My Reports Users Admin Logout


 Forest
Econometrics
Geospatial
Resource Analysis

<http://forest-econometrics.com>

The Forest Resource Analysis System Software (FRASS) has been developed to create a reliable and efficient lands management system for scheduling economically optimal forest management activities while also valuing discrete timber land properties. FRASS has been designed to integrate factors of timber species, size, growth, density, and response to management with data on soils productivity, riparian protection for riverine species, bird species, and zoning regulations. These physical site conditions are combined with monthly updated market economic data to provide users with predictions of value and management activities consistent with optimal economic decision making tools. At the same time, it provides users a reliable system of predicting the probable sales price of parcels based on timber production as the Highest and Best Use.

This program is focused on parcels, composed of timber stands, roads, rivers, and other physical components of the land and resources. The holders of these lands may be commercial timber companies, federal or state agencies, forestry consultants, Trust owners, or Indian Tribes or Nations. The process of determining the site's intrinsic value in response to site factors and the economic profile of the region, and the country, is part of this process of value estimation. This program provides Users with tools used in making economic decisions about land management to achieve the highest value.

Forest Resource Analysis System Software

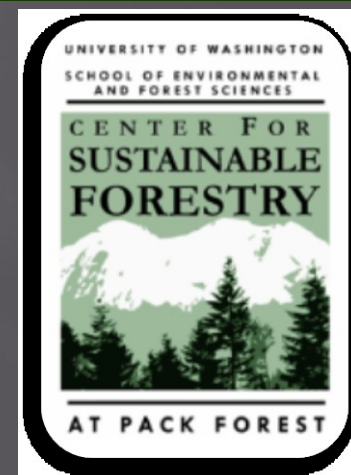
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Forest Resource Analysis System Software

FRASS

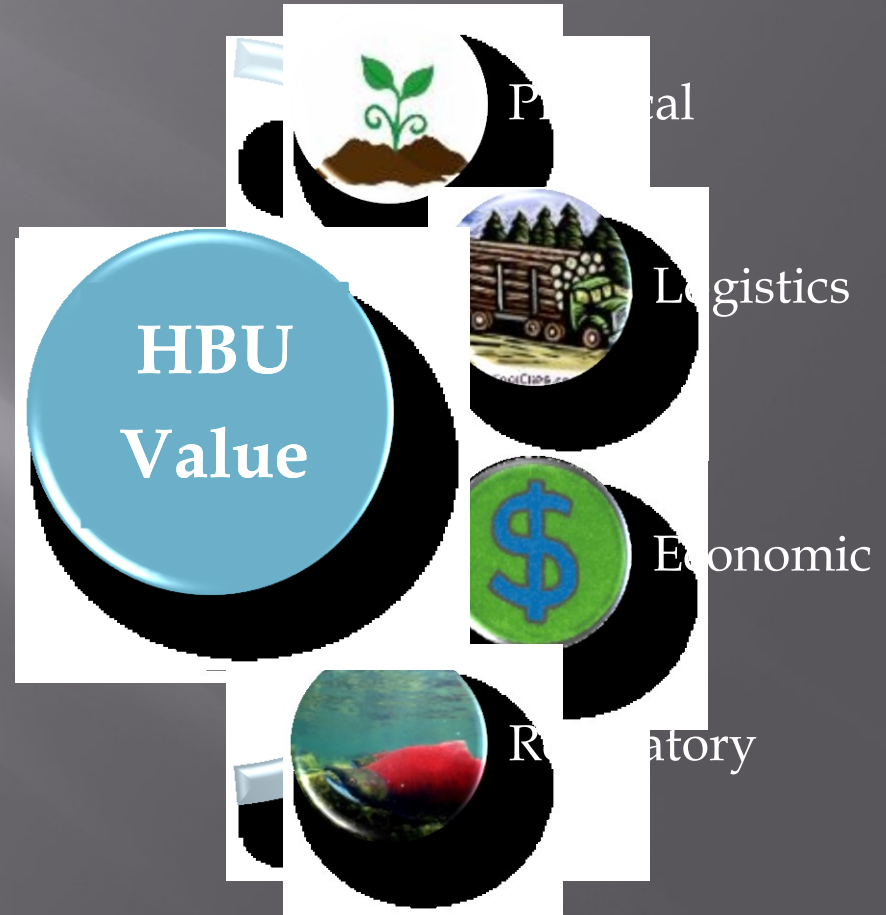
<http://FRASS.Forest-Econometrics.com/>

Demonstration Site: University of Washington's Pack Forest, near Eatonville, Washington
 UW is not a participant in the FRASS program's development or promotion.



The FRASS Purpose?

- Temporal considerations,
- Parcel attributes,
- Management options,
- Administrative opportunities,
- Growth & Yield,
- Market Timing
- Financially optimal
Highest & Best Use



$$\left[\text{Highest \& Best Use Value} \right] = \left\{ \text{Publically Traded Asset Value} \right\} = \left\{ \text{Appraised Property Value} \right\} = \left\{ \text{Financially Optimal Harvest Timing} \right\}$$

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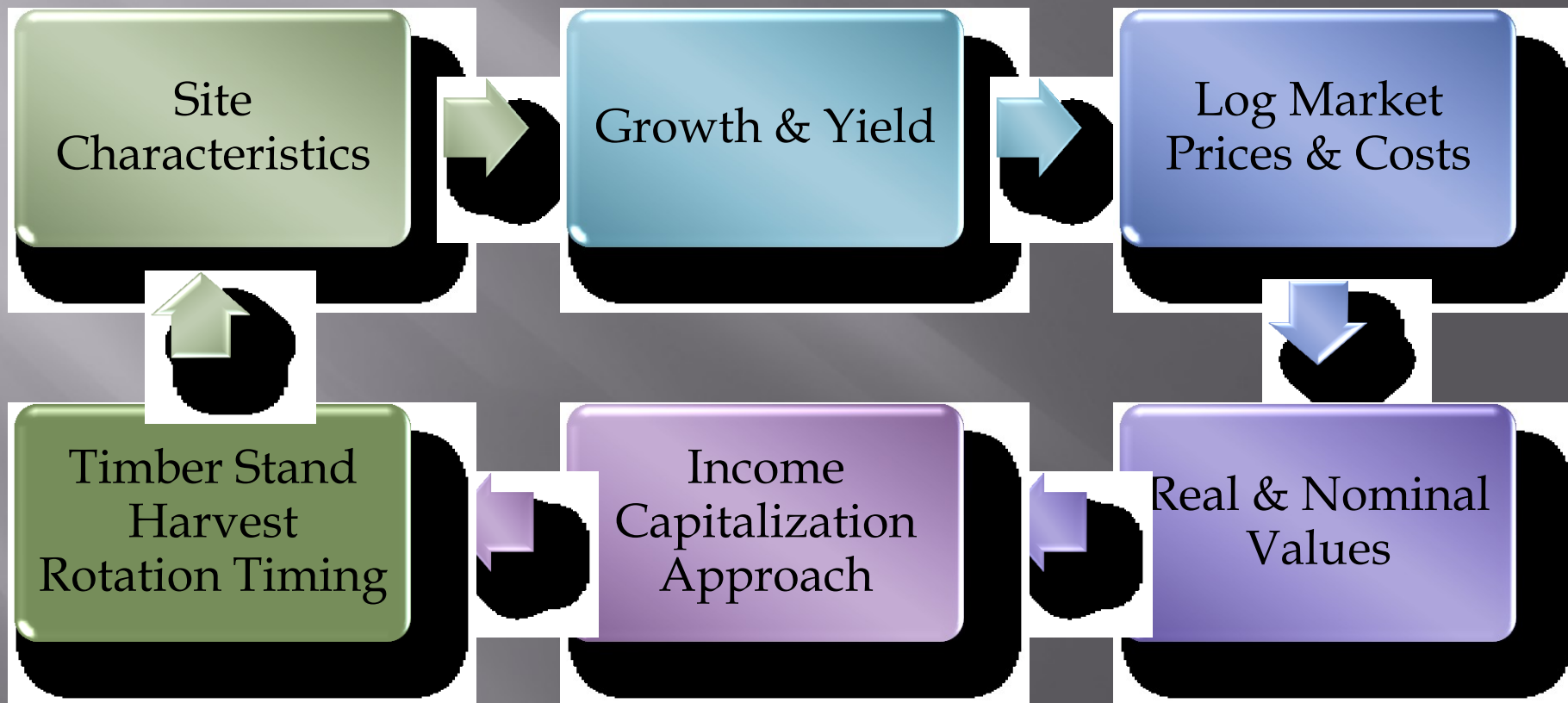
Report data organization, conveyance & use

Audience

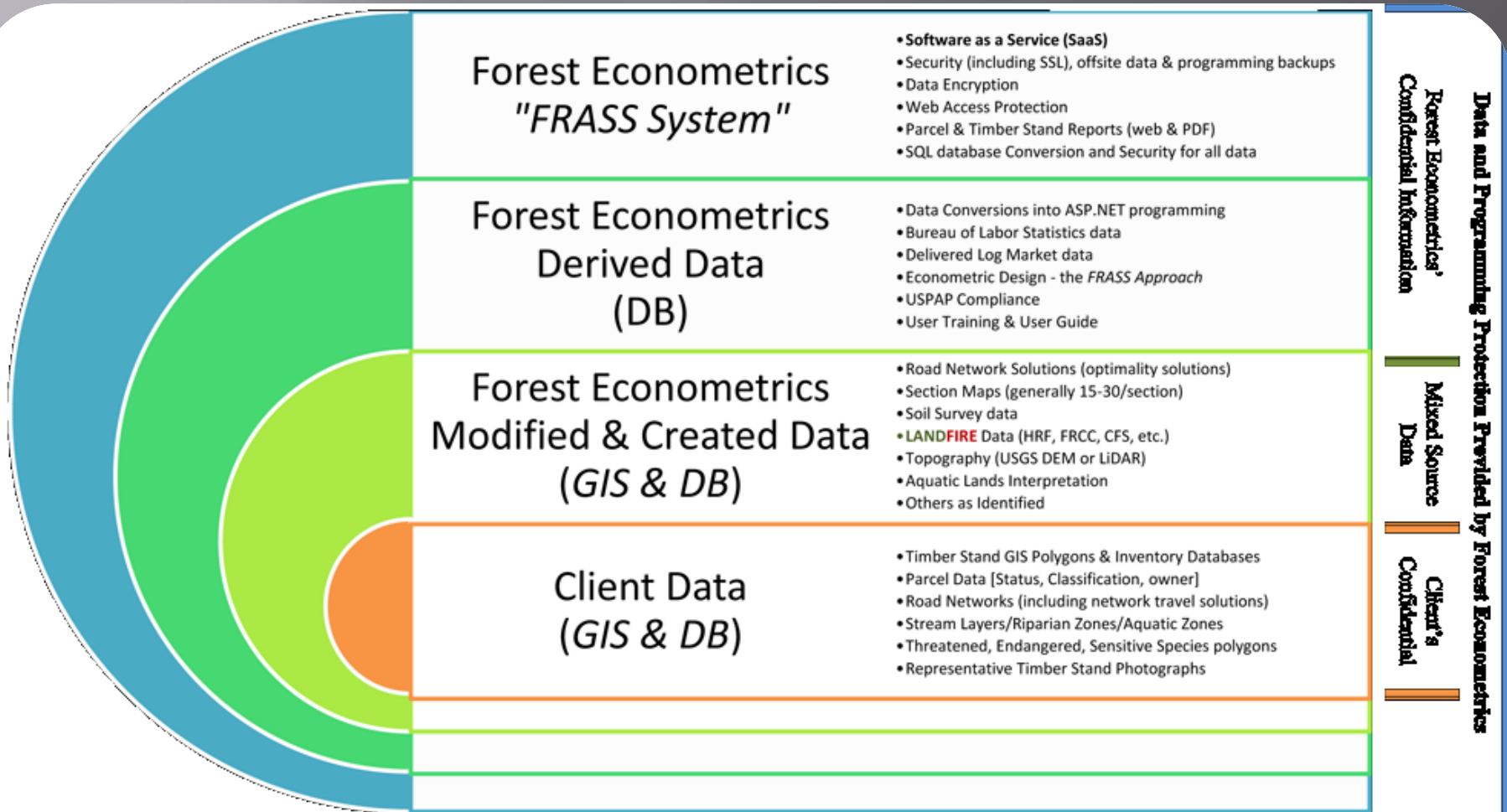
Who are FRASS users?

Data Design / Puzzle Pieces

Some assembly required



Data Design



Data Availability

“Everyone has it... right?”



- Forest Growth & Yield data
- Comprehensive GIS data
- Nominal Delivered Log Market Data

Although forest management data is compiled and used constantly for forest management, relatively few organizations have it all assembled, ready for use – **on-demand**.

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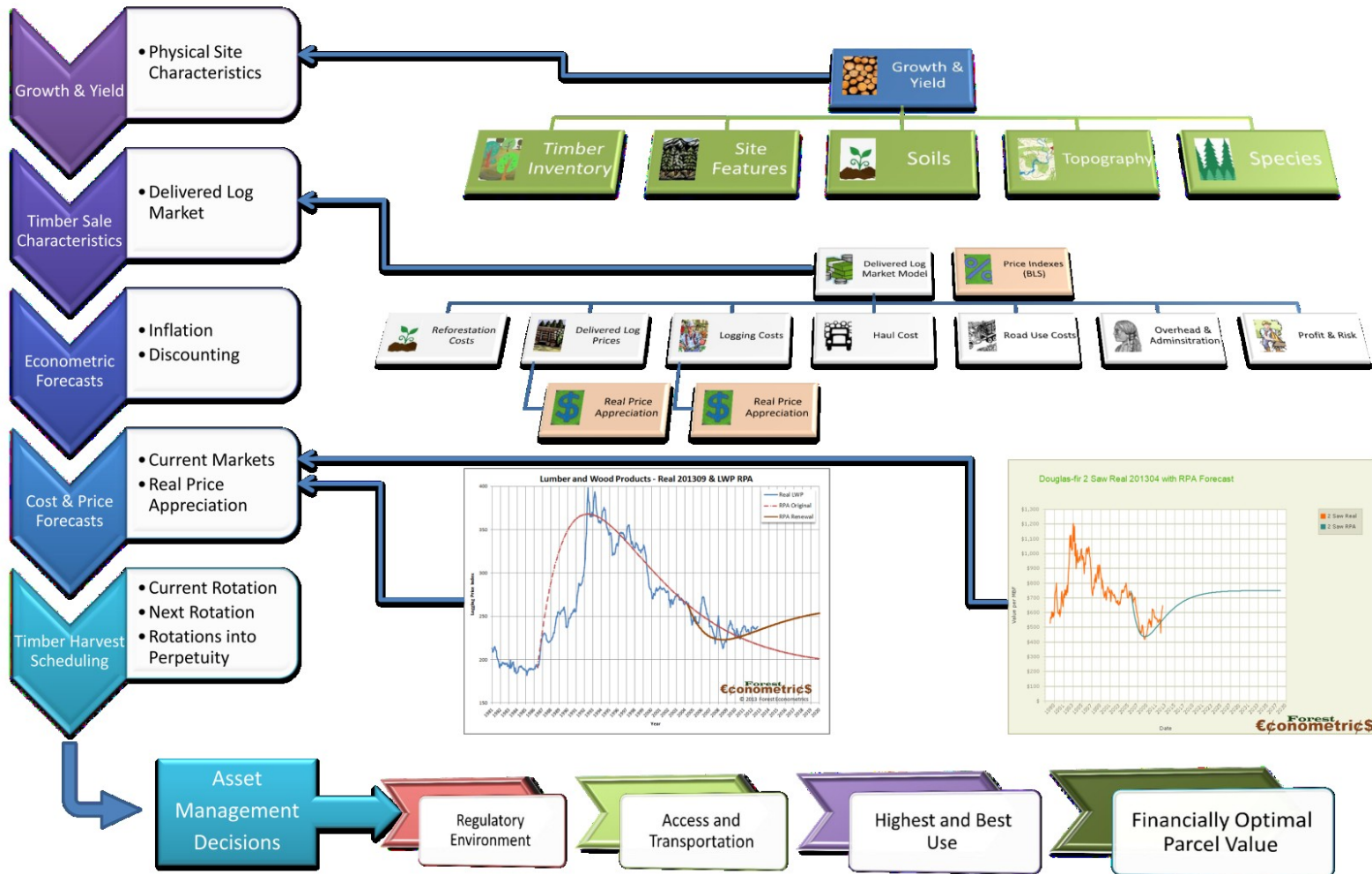
Audience

Who are FRASS users?

Structure & Assembly

Financially Optimal Harvest Timing **MATCHES** Highest & Best Use Value

Harvest Scheduling & Property Valuation Process for Forestlands in FRASS: Highest and Best Use for Timber Production



Initial Parcel Summary

Snapshot of Today: *our starting point*

The screenshot shows the 'Owners' page of the Forest Resource Analysis System Software. The page includes a navigation menu with options like Home, Locator, Interactive Map, Parcels, Owners, Market Models, My Reports, Users, Admin, and Logout. Below the menu is a table of owners with columns for Name, Address, City, State, and Zip. A yellow circle highlights the 'Logout' link in the navigation menu.

Name	Address	City	State	Zip
> Roger Chapman	Forest Mensuration Drive	Pullman	WA	99163
> Herman Nelson	1 Bear Creek-Dewatto Rd	Belfair	WA	98528
> Chadwick Oliver	Yale School of Forestry & Environmental Studies 195 Prospect Street	New Haven	CT	06511
> Charles Lathrop	9010 453rd St. East	Eatonville	WA	98328
> Daniel Lawson	5 Venuk Way	Pullman	WA	99163
> Dietrich Brandis	1 Father of Tropical Forestry Lane	Bonn, West Germany	GR	99999
> Dimitri Lawson	2 Venuk Way	Pullman	WA	99163
> Georg Ludwig Hartig	1786 Darmstadt School of Forestry	Gladenbach, Hesse, Germany	GR	99999
> George W. Vanderbilt	36 Montford Ave. Biltmore Stick	Asheville	NC	28801
> Frederick Waverhaeuser	P.O. Box 9777	Federal Way	WA	98063

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Volume, Price & Cost

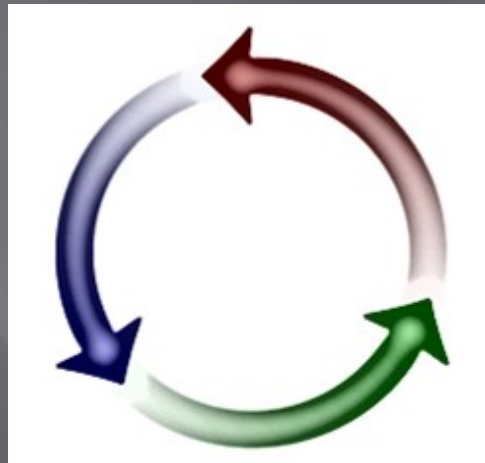
Prices & Costs must be integrated with Growth & Yield



Biometric
Forecasting

Delivered Log
Price
Predictions

Logging Cost
Expectations



Order of Operations

Optimality combines Each Rotation on Each Timber Stand

Growth & Yield

Grow CURRENT rotation for 200 years in 5 year increments

Grow NEXT rotation for 200 years in 5 year increments

Delivered Log Market Price Forecasts

Real Price Appreciation Forecasts into the "future" in 5 year increments

Forest Management Cost Forecasts

Logging

Log Trucking

Overhead &
Administration

Professional
Labor

- Databases referenced to specific event years.
- Each Rotation on each timber stand.
- Growth & Yield data matched to the local market area.
- **FRASS is NOT**
 - GIS Program
 - G&Y Program
 - An Appraiser

Delivered Log Market Portfolio

FOREST RESOURCE ANALYSIS SYSTEM SOFTWARE

Delivered Log Market Portfolio

Start New Delivered Log Market Portfolio

Model Name	Created/Updated	Creator	Editor	Share It	Delete It
NW Pacific Rim	11/04/2013	William Schlosser	William Schlosser	Share	Delete
WWa 201311	11/04/2013	William Schlosser	William Schlosser	Share	Delete
NW Pacific Rim 70s	11/14/2013	William Schlosser	William Schlosser	Share	Delete
NW Pacific Rim Flater	02/05/2014	Georg Räumliche	William Schlosser	Share	Delete
Test Bed 201401	01/02/2014	William Schlosser	William Schlosser	Share	Delete
Puget 201401	01/25/2014	William Schlosser	William Schlosser	Share	Delete
Will & Bill	01/22/2014	William Schlosser	William Schlosser	Share	Delete
ITLP	01/30/2014	William Schlosser	William Schlosser	Share	Delete
Puget 201402	02/21/2014	William Schlosser	William Schlosser	Share	Delete
Intrafor 20140225	02/25/2014	William Schlosser	William Schlosser	Share	Delete
Puget 201404	04/16/2014	William Schlosser	William Schlosser	Share	Delete
Puget 201404B	04/18/2014	William Schlosser	William Schlosser	Share	Delete

RPA Portfolio

Start New RPA Market Portfolio



Real Price Appreciation Portfolio

← → C frass.forest-econometrics.com/MarketModel/MarketModel.aspx

Puget 201404	04/16/2014	William Schlosser	William Schlosser	Share	Delete
Puget 201404B	04/18/2014	William Schlosser	William Schlosser	Share	Delete
Market 20140421	04/21/2014	William Schlosser	William Schlosser	Share	Delete

RPA Portfolio

[Start New RPA Market Portfolio](#)

Model Name	Created/Updated	Creator	Editor	Share It	Delete It
Cascadia 201311	03/20/2014	William Schlosser	William Schlosser	Share	Delete
Cascadia 20131104	11/05/2013	William Schlosser	William Schlosser	Share	Delete
Recovery 201311	11/04/2013	William Schlosser	William Schlosser	Share	Delete
Cascadia 20131106	11/16/2013	Georg Räumliche	William Schlosser	Share	Delete
Cascadia 20131116	12/13/2013	Georg Räumliche	William Schlosser	Share	Delete
Cascadia 20140215	02/15/2014	William Schlosser	William Schlosser	Share	Delete
Cascadia 20131223	12/23/2013	William Schlosser	William Schlosser	Share	Delete
Cascadia 20131224	01/02/2014	William Schlosser	William Schlosser	Share	Delete
Cascadia 201401	01/15/2014	William Schlosser	William Schlosser	Share	Delete
Cascadia 20140119	01/20/2014	William Schlosser	William Schlosser	Share	Delete
Cascadia 20140120	01/20/2014	William Schlosser	William Schlosser	Share	Delete
Cascadia 20140122	02/08/2014	William Schlosser	William Schlosser	Share	Delete
Cascadia 20140208	02/10/2014	William Schlosser	William Schlosser	Share	Delete
Cascadia 20140318	03/18/2014	William Schlosser	William Schlosser	Share	Delete
Cascadia 20140320	03/21/2014	William Schlosser	William Schlosser	Share	Delete
Cascadia 20140325	04/15/2014	William Schlosser	William Schlosser	Share	Delete
Cascadia 20140414	04/18/2014	William Schlosser	William Schlosser	Share	Delete

Forest Resource Analysis System Software

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PLAY!

VIDEO

Share Your Portfolios



Forest
Econometrics



frass.forest-econometrics.com/MarketModel/MarketModel.aspx

FOREST RESOURCE ANALYSIS SYSTEM SOFTWARE

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Delivered Log Market Portfolio

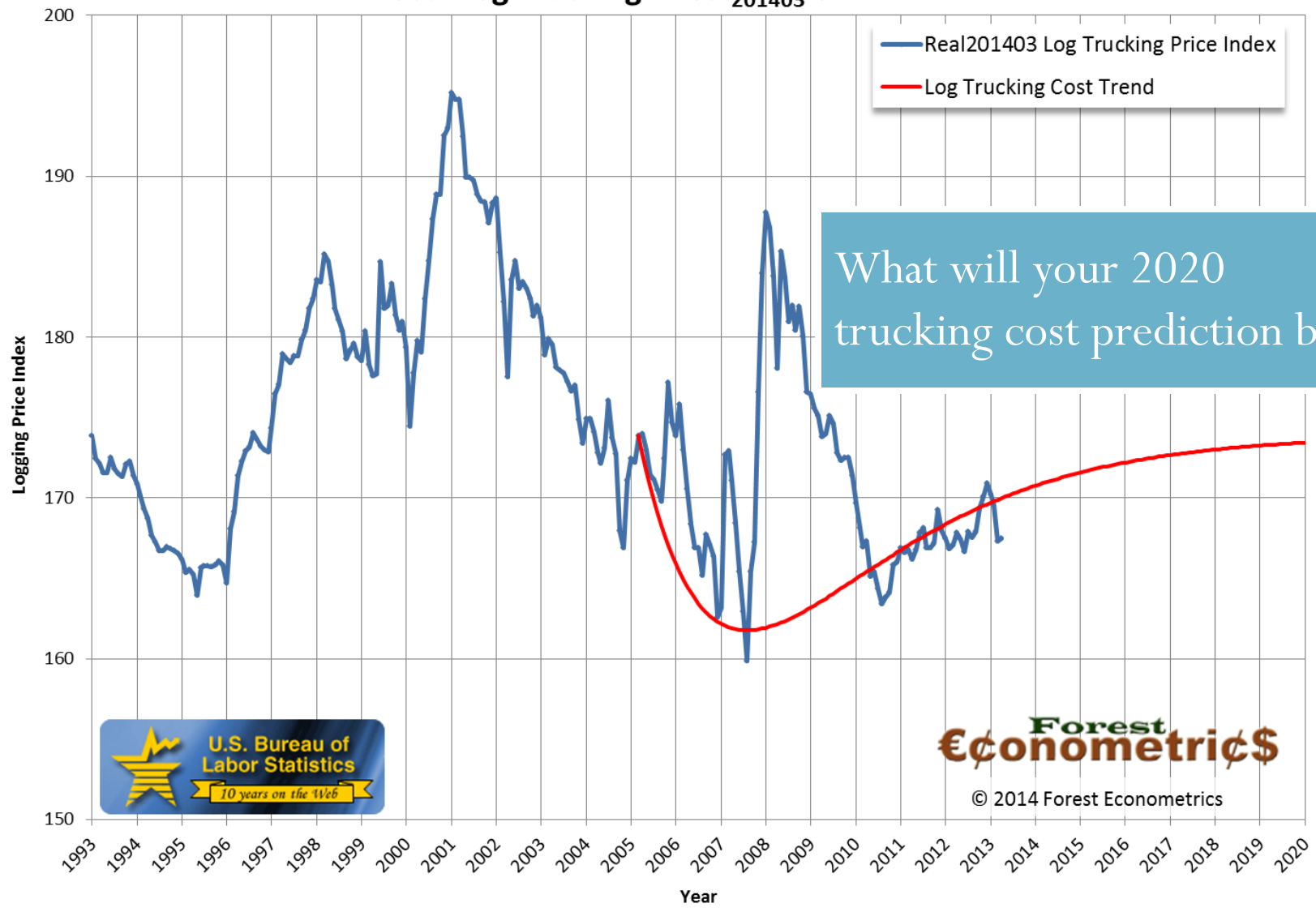
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Market 20140421	04/21/2014	William Schlosser	William Schlosser	Share	Delete

Portfolio Sharing is internal to the FRASS Program, only share notification is sent over e-mail.

VIDEO

Local Log Trucking - Real₂₀₁₄₀₃ & TPI RPA



What will your 2020 trucking cost prediction be?



Delivered Log Price Examples

Puget Sound Delivered Log Market Examples

Western Red Alder 2 Saw Real 201403 with RPA Forecast



Chart by D&D Larix, LLC,
 Delivered Log Market Data:
 RISI Log Lines
<http://www.risiinfo.com/>
 Producer Price Index Data:



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Who are FRASS users?

Timing is Everything

Look beyond the single rotation optimum

Looking Forward

Future Nominal Prices

View Market Value F 201402 Casc
 View Stand Report | 198381
 Export to PDF Generate Full Parcel F

Market Model Name	RPA Portfolio Name	Rate of Inflation	Landowner Discount Rate	Reforestation Cost	Access Fee (Timber)	Maintenance Fee	New Logging Road Construction				
Puget 201402	Cascadia 20140414	2.75%	2.81%	\$375/Acre	\$0.50/MBF/Mile	\$1.33/MBF/Mile	\$19,500/Mile				

Sort	Market Value	RPA	Longevity Term	Profit & Risk	Overhead & Administration	Logging Cost	Hauling Cost	Projected Delivered Log Value				
								2014	2015	2020	2030	2040
Eastern Red Alder												
Saw	\$716	0.0716	10.91	0.00	\$35	\$135	\$45	\$716	\$758	\$810	\$945	\$1,147
Saw	\$680	0.0587	10.91	0.00	\$35	\$135	\$45	\$680	\$693	\$748	\$888	\$1,091
4 Saw	\$558	0.0625	10.91	0.00	\$35	\$135	\$45	\$558	\$589	\$634	\$748	\$916
Pulp	\$356	-0.1126	4.50	0.00	\$5	\$25	\$45	\$256	\$258	\$315	\$429	\$566
Black Cottonwood												
2 Saw	\$525	-0.0946	1.75	0.00	\$35	\$135	\$45	\$525	\$476	\$573	\$757	\$992
3 Saw	\$500	-0.0512	2.91	0.00	\$35	\$135	\$45	\$500	\$434	\$529	\$716	\$941
4 Saw/CNS	\$378	-0.0665	2.16	0.00	\$35	\$135	\$45	\$378	\$395	\$478	\$636	\$834
ulp	\$269	-0.1310	4.75	0.00	\$5	\$25	\$45	\$269	\$217	\$272	\$377	\$499
Douglas-fir												
port 12"+	\$747	-0.1489	2.50	0.00	\$35	\$135	\$45	\$747	\$789	\$960	\$1,279	\$1,678
port 8-12"	\$710	-0.1796	2.50	0.00	\$35	\$135	\$45	\$710	\$738	\$910	\$1,215	\$1,595
SM and Better	\$752	-0.1568	3.00	0.00	\$35	\$135	\$45	\$752	\$688	\$879	\$1,199	\$1,577
2 Saw	\$681	-0.1619	3.00	0.00	\$35	\$135	\$45	\$681	\$666	\$854	\$1,167	\$1,534
3 Saw	\$673	-0.1613	3.00	0.00	\$35	\$135	\$45	\$673	\$633	\$812	\$1,109	\$1,459
4 Saw	\$613	-0.1595	3.00	0.00	\$35	\$135	\$45	\$613	\$590	\$755	\$1,031	\$1,356
Chip-n-Saw	\$461	-0.2149	2.66	0.00	\$35	\$135	\$45	\$461	\$390	\$498	\$673	\$884
ulp	\$269	-0.2527	3.08	0.00	\$5	\$25	\$45	\$269	\$309	\$363	\$481	\$631
Eastern Redcedar												
amprun	\$1,155	-0.1110	3.08	0.00	\$35	\$135	\$45	\$1,155	\$1,102	\$1,422	\$1,964	\$2,585
Eastern Hemlock												
port 12"+	\$723	-0.1720	3.08	0.00	\$35	\$135	\$45	\$723	\$701	\$827	\$1,095	\$1,437
port 8-12"	\$745	-0.1792	3.08	0.00	\$35	\$135	\$45	\$745	\$686	\$810	\$1,074	\$1,409
SM and Better	\$600	-0.1195	4.83	0.00	\$35	\$135	\$45	\$600	\$535	\$674	\$943	\$1,252
2 Saw	\$601	-0.1336	4.83	0.00	\$35	\$135	\$45	\$601	\$573	\$732	\$1,033	\$1,373
3 Saw	\$607	-0.1221	4.83	0.00	\$35	\$135	\$45	\$607	\$524	\$662	\$928	\$1,232
4 Saw	\$536	-0.1211	4.83	0.00	\$35	\$135	\$45	\$536	\$482	\$608	\$852	\$1,131
Pulp	\$297	-0.1808	4.58	0.00	\$5	\$25	\$45	\$297	\$301	\$385	\$541	\$717

Log Market Forecasts

Western Red Pine Saw Values with PPI and Inflation Over 40 Years

Future Nominal Prices

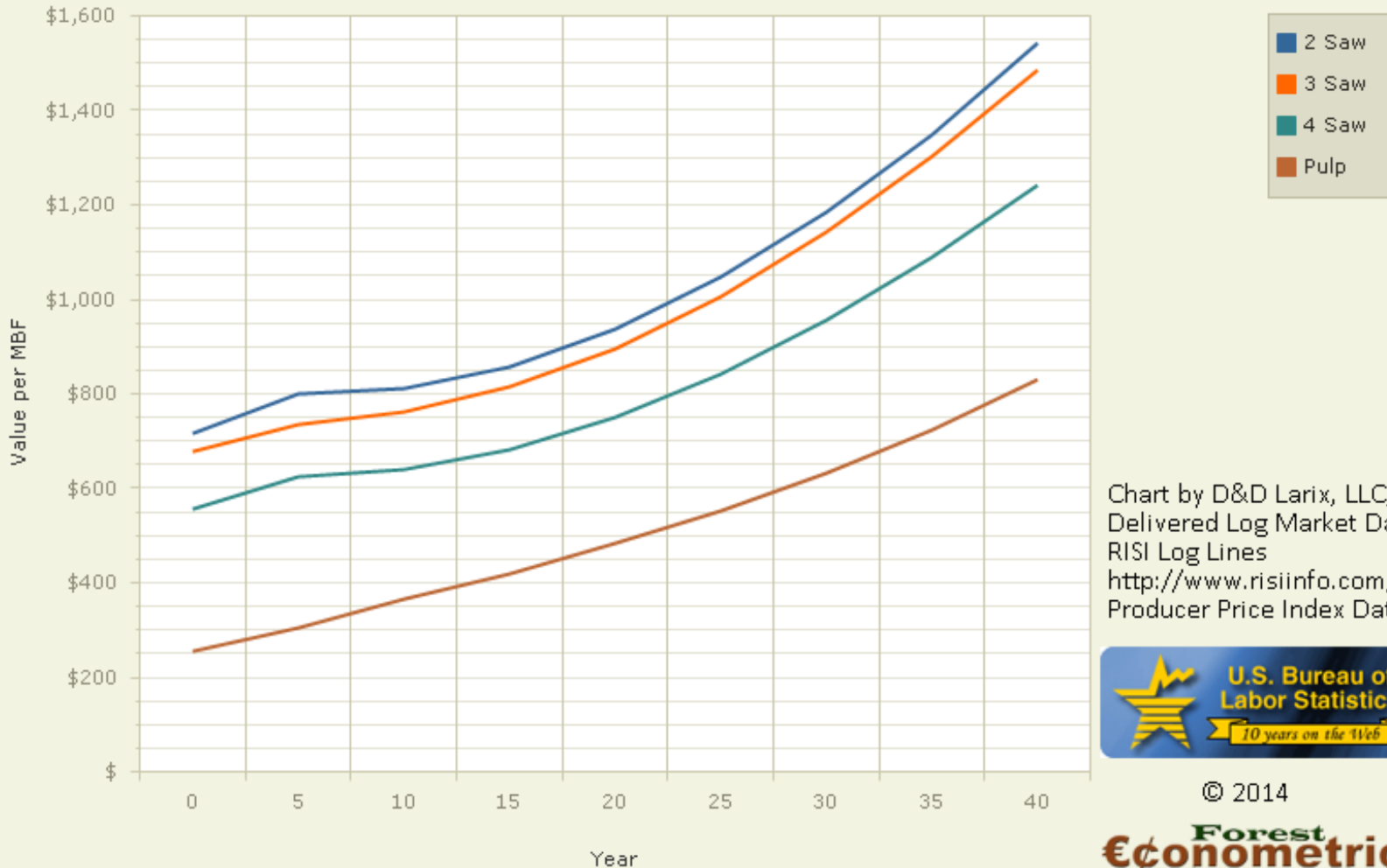


Chart by D&D Larix, LLC,
Delivered Log Market Data:
RISI Log Lines
<http://www.risiinfo.com/>
Producer Price Index Data:



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Forest Econometrics
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Log Market Forecasts

Douglas Fir-Sitka Spruce with PBA and Loblolly Pine 40 Year

Future Nominal Prices

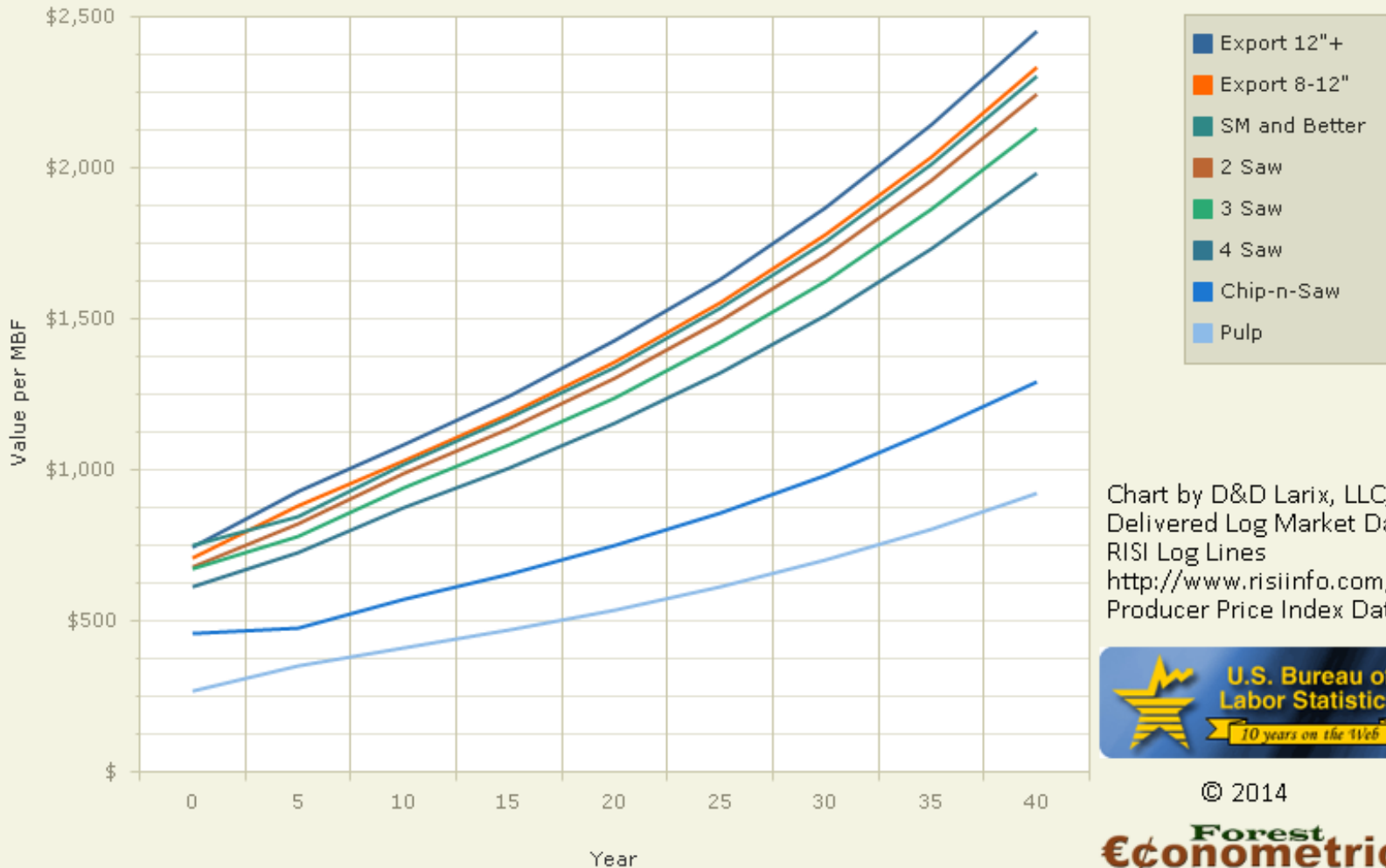


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201402
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198381



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Linear Programming

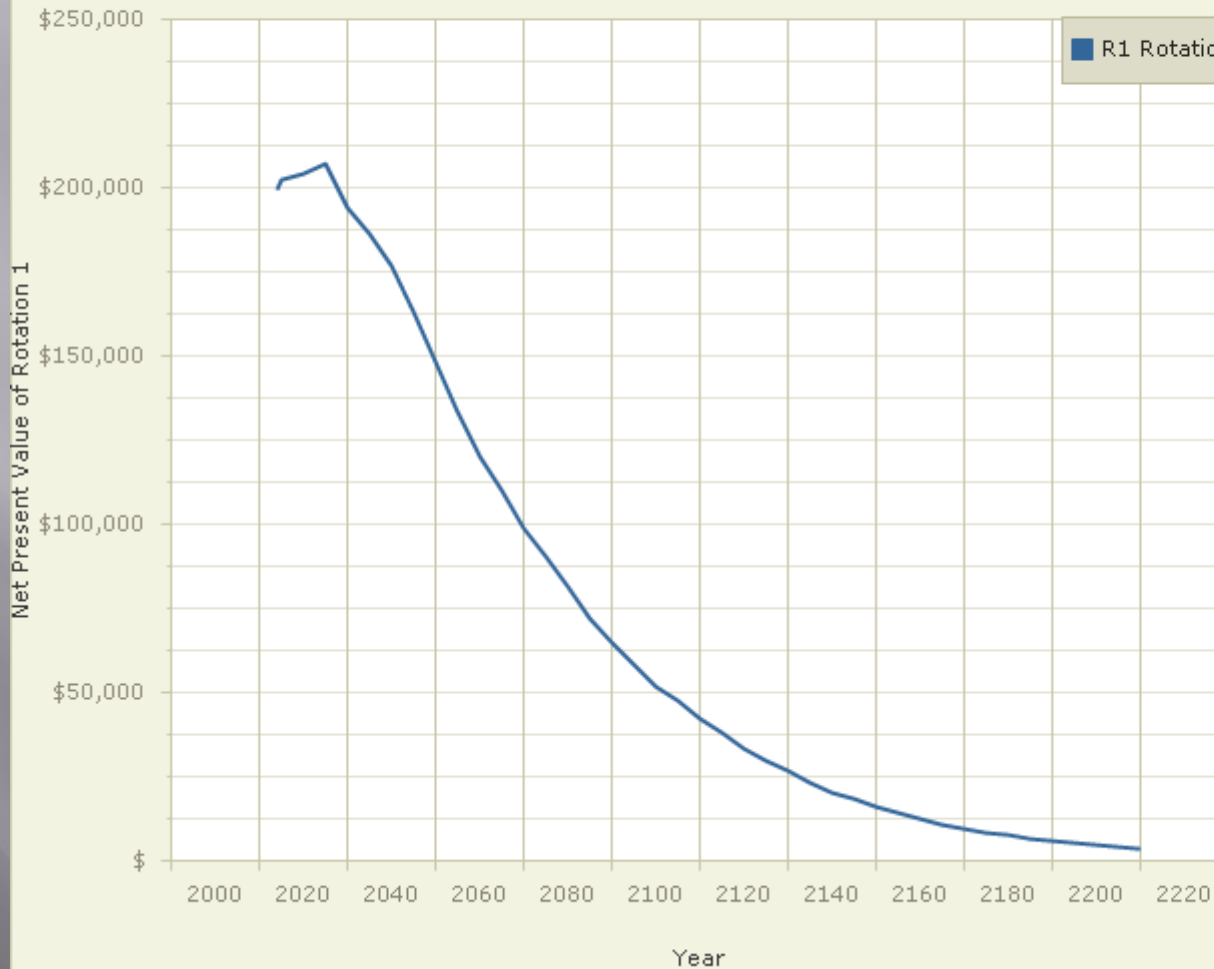
Parcel: 16N04E0416261028
 Stand: 19359150
 Market Model: Puget 201402
 RPA Portfolio: Cascadia 20140414

Rotation 1	Rotation 2	Perpetuity	Optimal Combination					
Sort	Species Code	Sort Code	2014	2015	2020	2025	2030	2035
Western Red Alder								
2 Saw	RA	H1	\$74.55	\$81.03	\$85.01	\$492.13	\$483.10	\$548.91
2 Saw	RA	H2	\$741.05	\$844.34	\$1,467.18	\$1,202.51	\$1,636.54	\$2,338.08
3 Saw	RA	H3	\$678.02	\$720.20	\$352.98	\$914.34	\$810.60	\$1,066.10
4 Saw	RA	H4	\$2,949.55	\$3,258.02	\$3,966.94	\$4,511.99	\$5,092.39	\$5,743.15
Pulp	RA	P4	\$62.73	\$51.88	\$74.21	\$101.14	\$134.67	\$44.33
Black Cottonwood								
2 Saw	CW	B1	\$79.90	\$62.38	\$66.80	\$75.40	\$86.37	\$102.62
2 Saw	CW	B2	\$52.98	\$44.43	\$50.69	\$53.62	\$66.11	\$78.16
3 Saw	CW	BP	--	--	--	--	--	--
Pulp	CW	P4	\$8.75	\$6.17	\$7.08	\$8.15	\$9.87	\$11.82
Douglas-fir								
Export 12"+	DF	E2	\$85.20	\$83.49	\$184.25	\$214.93	\$278.51	\$318.96
Export 8-12"	DF	E3	\$49.41	\$55.42	\$86.09	\$325.33	\$395.13	\$563.82
3 Saw	DF	D3	\$173.76	\$222.56	\$276.17	\$338.38	\$501.69	\$580.85
4 Saw	DF	D4	\$70.02	\$78.46	\$132.09	\$97.62	\$115.38	\$166.60
Pulp	DF	P4	\$16.46	\$24.58	\$33.26	\$45.19	\$59.59	\$75.19
Western Redcedar								
Camprun	RC	C1	\$205.05	\$210.03	\$274.75	\$539.14	\$648.24	\$881.30
Camprun	RC	C2	\$75.58	\$120.08	\$182.02	\$77.58	\$142.81	\$400.30
Camprun	RC	C4	\$70.54	\$36.22	\$101.64	\$249.18	\$287.57	\$178.16
Camprun	RC	C3	--	--	--	--	--	--
Western Hemlock								
Export 12"+	WH	E2	\$370.52	\$353.79	\$548.35	\$657.61	\$885.61	\$1,052.74
Export 8-12"	WH	E3	\$167.90	\$147.13	\$34.75	\$177.38	\$218.52	\$306.41
SM and Better	WH	D1	--	--	--	--	--	\$70.58
2 Saw	MH	D2	\$175.98	\$159.46	\$216.90	\$272.10	\$354.91	\$421.22
2 Saw	WH	D2	\$191.25	\$330.69	\$509.64	\$709.02	\$902.82	\$1,795.51
2 Saw	WP	D2	--	--	--	--	--	--
3 Saw	MH	D3	\$46.66	\$43.42	\$203.95	\$316.58	\$392.74	\$536.82
3 Saw	WP	D3	\$10.51	\$8.66	\$72.07	\$138.60	\$207.26	\$271.87
3 Saw	WH	D3	\$684.02	\$614.49	\$994.53	\$1,553.33	\$2,111.69	\$2,305.06
3 Saw	LP	D3	--	--	--	--	\$56.90	\$64.12
4 Saw	WH	D4	\$202.72	\$194.92	\$301.63	\$312.14	\$489.20	\$660.67
Chip-n-Saw	MH	CS	\$57.34	\$62.34	\$25.65	\$164.38	\$224.10	\$275.19
Chip-n-Saw	WP	CS	--	--	--	--	\$29.02	\$47.53
Pulp	WP	P4	\$0.63	\$0.67	\$5.51	\$10.48	\$18.62	\$25.35
Pulp	WH	P4	\$90.68	\$110.65	\$165.01	\$234.38	\$317.69	\$416.29
Pulp	MH	P4	\$19.31	\$19.84	\$31.31	\$57.25	\$73.78	\$93.58
Pulp	LP	P4	--	--	--	--	\$4.27	\$4.80
Value-Cost			\$7,640	\$8,182	\$10,790	\$14,316	\$17,616	\$22,180
Additional Costs			\$596.76	\$630.97	\$763.51	\$939.29	\$1,126.49	\$1,356.53
Periodic NET Revenue			\$7,043.53	\$7,550.63	\$10,026.83	\$13,377.11	\$16,489.25	\$20,823.86
Acre Adjustment FV			\$199,500.96	\$213,864.25	\$284,000.10	\$378,893.28	\$467,041.64	\$589,815.24
NPV			\$199,500.96	\$202,451.50	\$204,369.16	\$207,265.88	\$194,214.02	\$186,446.83
NPV Max	\$207,266							
Optimal Rotation Year	2025							



Linear Programming

R1 For StandID: 19359150 From 2014 - 2210



R1 Rotation of \$207,266 at year 2025

Chart by D&D Larix, LLC,
Delivered Log Market Data:
RISI Log Lines
<http://www.risiinfo.com/>
Producer Price Index Data:



© 2014

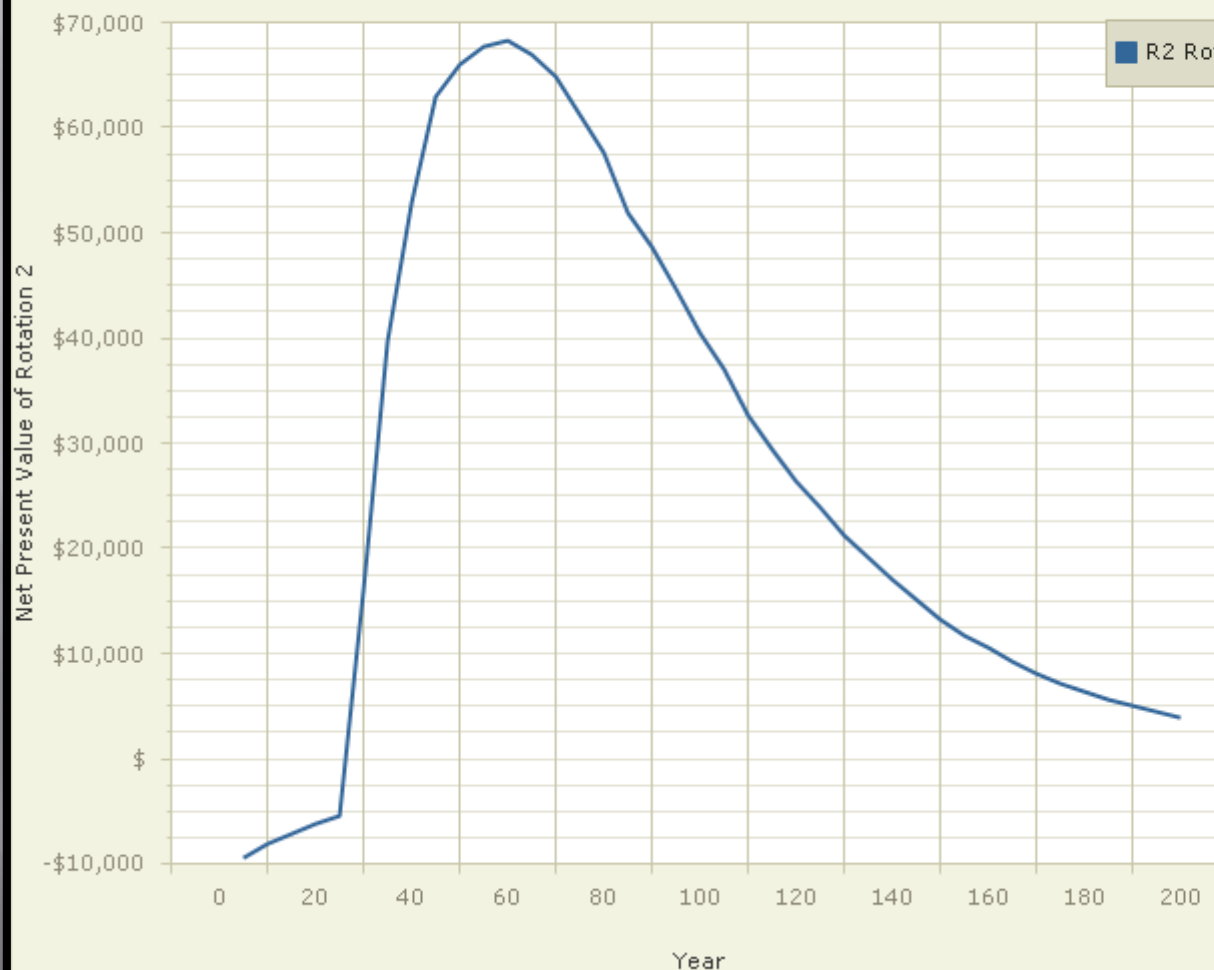
NPV Max \$207,266
Optimal Rotation Year 2025

Linear Programming

Parcel: 16N04E0416261028
 Stand: 19359150
 Market Model: Puget 201402
 RPA Portfolio: Cascadia 20140414

Rotation 1	Rotation 2	Perpetuity	Optimal Combination					
@0			45	50	55	60	65	70
Sort	Species Code	Sort Code						
Western Red Alder								
Black Cottonwood								
Douglas-fir								
Export 12"+	DF	E2	--	\$827.99	\$2,084.22	\$3,467.80	\$4,526.32	\$7,363.03
Export 8-12"	DF	E3	\$1,556.45	\$1,890.72	\$3,287.22	\$6,597.75	\$7,679.62	\$10,067.84
3 Saw	DF	D3	\$7,828.70	\$9,789.78	\$11,043.77	\$13,637.39	\$17,980.39	\$20,749.44
4 Saw	DF	D4	\$2,307.14	\$3,246.00	\$3,748.74	\$3,662.64	\$3,333.30	\$3,511.78
Pulp	DF	P4	\$732.13	\$976.82	\$1,217.79	\$1,598.77	\$1,943.27	\$2,373.88
Western Redcedar								
Camprun	RC	C1	--	\$923.37	\$2,447.63	\$2,790.93	\$4,088.16	\$6,128.64
Camprun	RC	C2	\$2,049.92	\$1,713.67	\$1,188.11	\$1,342.24	\$1,510.49	\$1,599.23
Camprun	RC	C4	\$358.27	\$913.34	\$1,269.07	\$1,637.42	\$2,073.38	\$1,653.33
Western Hemlock								
Export 12"+	WH	E2	--	\$3,284.77	\$4,369.15	\$11,516.89	\$15,483.87	\$20,182.20
Export 8-12"	WH	E3	\$5,438.58	\$5,864.34	\$10,388.04	\$8,414.06	\$11,226.39	\$19,893.86
3 Saw	WH	D3	\$5,419.42	\$5,951.68	\$7,168.72	\$10,179.41	\$13,705.38	\$12,533.40
4 Saw	WH	D4	\$1,743.79	\$2,160.55	\$2,076.85	\$1,681.04	\$1,769.75	\$2,415.72
Pulp	WH	P4	\$1,406.85	\$1,832.83	\$2,403.73	\$3,112.92	\$4,095.39	\$5,089.52
Value-Cost			\$28,841	\$39,376	\$52,693	\$69,639	\$89,416	\$113,562
Additional Costs			\$2,551.48	\$3,144.66	\$3,842.34	\$4,733.68	\$5,794.69	\$6,958.30
Acre Adjustment FV			\$744,631.67	\$1,026,213.15	\$1,383,647.10	\$1,838,386.01	\$2,368,482.41	\$3,019,440.31
NPV			\$63,120.14	\$66,126.89	\$67,776.62	\$68,455.02	\$67,042.91	\$64,971.54
NPV Max	\$68,455							
Optimal Rotation Length	60							

R2 For StandID: 19359150 Over 200 with 0 years Offset



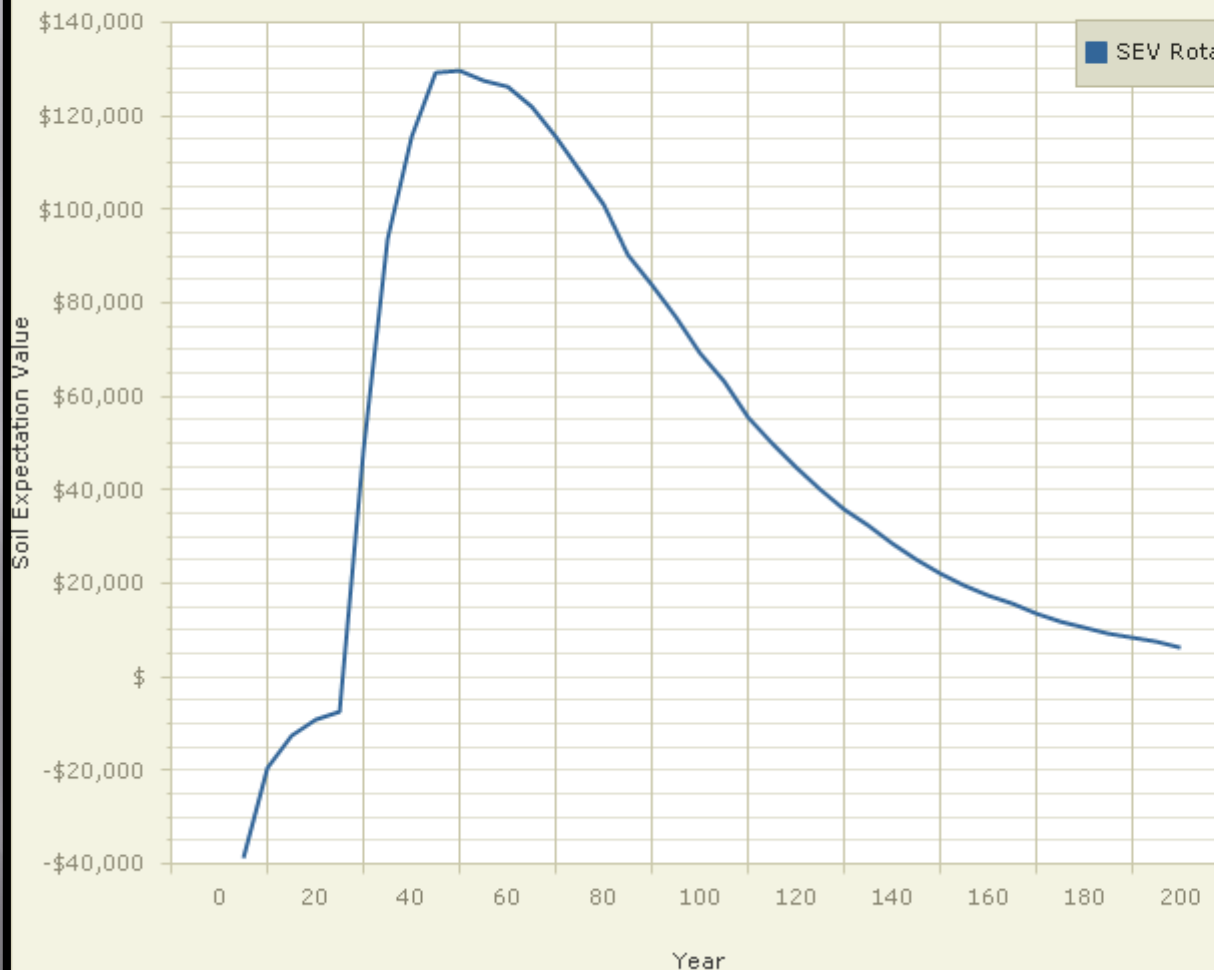
R2 Rotation of \$68,455 at year 60

Chart by D&D Larix, LLC,
 Delivered Log Market Data:
 RISI Log Lines
<http://www.risiinfo.com/>
 Producer Price Index Data:



© 2014

SEV For StandID: 19359150 Over 200 Years



SEV Rotation of \$129,880 at year 50

Chart by D&D Larix, LLC,
 Delivered Log Market Data:
 RISI Log Lines
<http://www.risiinfo.com/>
 Producer Price Index Data:



© 2014

Sequential Quadratic Programming

Parcel: 16N04E0416261028
 Stand: 19359150
 Market Model: Puget 201402
 RPA Portfolio: Cascadia 20140414

	Rotation 1	Rotation 2	Perpetuity	Optimal Combination
Total	R1	R2 Year	R2	SEV (50)
This harvests R1 in 2025				
\$250,435.30	\$207,265.88	30 (2055)	\$10,677.67	\$32,491.75
\$261,726.89	\$207,265.88	35 (2060)	\$26,173.39	\$28,287.61
\$266,865.96	\$207,265.88	40 (2065)	\$34,972.63	\$24,627.45
\$270,353.81	\$207,265.88	45 (2070)	\$41,647.04	\$21,440.88
\$269,567.23	\$207,265.88	50 (2075)	\$43,634.72	\$18,666.63
\$268,241.71	\$207,265.88	55 (2080)	\$44,724.49	\$16,251.34
\$266,586.88	\$207,265.88	60 (2085)	\$45,172.43	\$14,148.56
\$263,824.44	\$207,265.88	65 (2090)	\$44,240.69	\$12,317.87

“Cut Rotation 1” in 2025 was the one rotation optimum.
 Rotation 2: 60 Years was the one rotation optimum
 When discounted, R2 “improved” to 45 years.

Sequential Quadratic Programming

Parcel: 16N04E0416283008

Stand: 19838190

Market Model: Puget 201402

RPA Portfolio: Cascadia 20140414

Rotation 1	Rotation 2	Perpetuity	Optimal Combination
------------	------------	------------	---------------------

Total	R1	R2 Year	R2	SEV (50)
This harvests R1 in 2025				
\$250,435.30	\$207,265.88	30 (2055)	\$10,677.67	\$32,491.75
\$261,726.89	\$207,265.88	35 (2060)	\$26,173.39	\$28,287.61
\$266,865.96	\$207,265.88	40 (2065)	\$34,972.63	\$24,627.45
\$270,353.81	\$207,265.88	45 (2070)	\$41,647.04	\$21,440.88
\$269,567.23	\$207,265.88	50 (2075)	\$43,634.72	\$18,666.63
\$268,241.71	\$207,265.88	55 (2080)	\$44,724.49	\$16,251.34
\$266,586.88	\$207,265.88	60 (2085)	\$45,172.43	\$14,148.56
\$263,824.44	\$207,265.88	65 (2090)	\$44,240.69	\$12,317.87
\$260,863.80	\$207,265.88	70 (2095)	\$42,873.87	\$10,724.05
\$257,120.00	\$207,265.88	75 (2100)	\$40,517.66	\$9,336.45
\$253,466.91	\$207,265.88	80 (2105)	\$38,072.63	\$8,128.40
\$248,715.43	\$207,265.88	85 (2110)	\$34,372.89	\$7,076.66
\$245,609.30	\$207,265.88	90 (2115)	\$32,182.41	\$6,161.00
\$242,169.73	\$207,265.88	95 (2120)	\$29,540.02	\$5,363.83
\$238,672.11	\$207,265.88	100 (2125)	\$26,736.43	\$4,669.80
\$235,800.49	\$207,265.88	105 (2130)	\$24,469.04	\$4,065.57
\$232,445.73	\$207,265.88	110 (2135)	\$21,640.33	\$3,539.52
\$229,830.38	\$207,265.88	115 (2140)	\$19,482.96	\$3,081.54


Sequential Quadratic Programming

Parcel: 16N04E0416261028

Stand: 19359150

Market Model: Puget 201402

RPA Portfolio: Cascadia 20140414

Rotation 1	Rotation 2	Perpetuity	Optimal Combination	
Total	R1	R2 Year	R2	SEV (50)
This harvests R1 in 2014				
\$265,006.74		30 (2044)	\$16,267.43	\$49,238.34
\$282,090.10		35 (2049)	\$39,721.79	\$42,867.35
\$289,843.91		40 (2054)	\$53,022.24	\$37,320.70
 \$295,112.85		45 (2059)	\$63,120.14	\$32,491.75
\$293,915.46		50 (2064)	\$66,126.89	\$28,287.61
\$291,905.03		55 (2069)	\$67,776.62	\$24,627.45
\$289,396.87		60 (2074)	\$68,455.02	\$21,440.88
\$285,210.49		65 (2079)	\$67,042.91	\$18,666.63
\$280,723.84		70 (2084)	\$64,971.54	\$16,251.34
\$275,050.43		75 (2089)	\$61,400.91	\$14,148.56

Rotation 1: Originally harvested in 2025 with NPV \$207,266

Rotation 2: Originally was 60 years with NPV \$45,172

Continuously Extended Optimum: in 2014/45/50

Sequential Quadratic Programming

Forest Resource Analysis

frass.forest-econometrics.com/Parcels/ReportStand.aspx?ParcelID=29&RPAPortfolioID=37&MarketModelPortfolioID=23&StandID=19359150

FOREST RESOURCE ANALYSIS SYSTEM SOFTWARE

How valuable is the declaration of the Continuously Extended Optimum?

@2014/45/50 : \$295,113

- **Individual Optimums were:**
 - @ 2025,60,50 : \$266,587**
 - **➔ 10% Discounted Value Increase on one timber stand**
- **Now consider the value of Opportunity Cost comparisons from alternative solutions...**

\$233,695.45	\$199,500.96	115 (2129)	\$29,524.69	\$4,669.80
--------------	--------------	------------	-------------	------------

VIDEO

Agenda

In a short amount of time, we will take a long walk together

SaaS Overview

Cloud Computing, Sequential Quadratic Programming, RPA Forecast Tool, SQL databases, High Security

Puzzle Pieces

Biometrics, Physical Site Characteristics, GIS, Delivered Log Markets, Forest Management Costs

Structure

Expand your perception of what the puzzle will look like when assembled

Price/Cost Forecasting

Real Price & Cost Projections with the RPA Forecast Tool

Timing

Financially Optimal Timber Harvest Timing

One timber stand at a time

One Rotation at a time

Reports

Report data organization, conveyance & use

Audience

Who are FRASS users?

Looking Forward



[View Market Value Report](#)

Puget 201402

Casc

[View Stand Report](#)

19838190

[Export to PDF](#)

[Generate Full Parcel Report](#)

Future Nominal Prices

Market Model Name	RPA Portfolio Name	Rate of Inflation	Landowner Discount Rate	Reforestation Cost	Access Fee (Timber)	Maintenance Fee	New Logging Road Construction
Puget 201402	Cascadia 20140414	2.75%	2.81%	\$375/Acre	\$0.50/MBF/Mile	\$1.33/MBF/Mile	\$19,500/Mile

Sort	Market Value	RPA	Longevity Term	Profit & Risk	Overhead & Administration	Logging Cost	Hauling Cost	Projected Delivered Log Value				
								2014	2015	2020	2030	2040
<u>Western Red Alder</u>												
2 Saw	\$716	0.0716	10.91	0.00	\$35	\$135	\$45	\$716	\$758	\$810	\$945	\$1,147
3 Saw	\$680	0.0587	10.91	0.00	\$35	\$135	\$45	\$680	\$693	\$748	\$888	\$1,091
4 Saw	\$558	0.0625	10.91	0.00	\$35	\$135	\$45	\$558	\$589	\$634	\$748	\$916
Pulp	\$256	-0.1126	4.50	0.00	\$5	\$25	\$45	\$256	\$258	\$315	\$429	\$566
<u>Black Cottonwood</u>												
2 Saw	\$525	-0.0946	1.75	0.00	\$35	\$135	\$45	\$525	\$476	\$573	\$757	\$992
3 Saw	\$500	-0.0512	2.91	0.00	\$35	\$135	\$45	\$500	\$434	\$529	\$716	\$941
4 Saw/CNS	\$378	-0.0665	2.16	0.00	\$35	\$135	\$45	\$378	\$395	\$478	\$636	\$834
Pulp	\$269	-0.1310	4.75	0.00	\$5	\$25	\$45	\$269	\$217	\$272	\$377	\$499
<u>Douglas-fir</u>												
Export 12"+	\$747	-0.1489	2.50	0.00	\$35	\$135	\$45	\$747	\$789	\$960	\$1,279	\$1,678
Export 8-12"	\$710	-0.1796	2.50	0.00	\$35	\$135	\$45	\$710	\$738	\$910	\$1,215	\$1,595
SM and Better	\$752	-0.1568	3.00	0.00	\$35	\$135	\$45	\$752	\$688	\$879	\$1,199	\$1,577
2 Saw	\$681	-0.1619	3.00	0.00	\$35	\$135	\$45	\$681	\$666	\$854	\$1,167	\$1,534
3 Saw	\$673	-0.1613	3.00	0.00	\$35	\$135	\$45	\$673	\$633	\$812	\$1,109	\$1,459
4 Saw	\$613	-0.1595	3.00	0.00	\$35	\$135	\$45	\$613	\$590	\$755	\$1,031	\$1,356
Chip-n-Saw	\$461	-0.2149	2.66	0.00	\$35	\$135	\$45	\$461	\$390	\$498	\$673	\$884
Pulp	\$269	-0.2527	3.08	0.00	\$5	\$25	\$45	\$269	\$309	\$363	\$481	\$631
<u>Western Redcedar</u>												
Camprun	\$1,155	-0.1110	3.08	0.00	\$35	\$135	\$45	\$1,155	\$1,102	\$1,422	\$1,964	\$2,585
<u>Western Hemlock</u>												
Export 12"+	\$723	-0.1720	3.08	0.00	\$35	\$135	\$45	\$723	\$701	\$827	\$1,095	\$1,437
Export 8-12"	\$745	-0.1792	3.08	0.00	\$35	\$135	\$45	\$745	\$686	\$810	\$1,074	\$1,409
SM and Better	\$600	-0.1195	4.83	0.00	\$35	\$135	\$45	\$600	\$535	\$674	\$943	\$1,252
2 Saw	\$601	-0.1336	4.83	0.00	\$35	\$135	\$45	\$601	\$573	\$732	\$1,033	\$1,373
3 Saw	\$607	-0.1221	4.83	0.00	\$35	\$135	\$45	\$607	\$524	\$662	\$928	\$1,232
4 Saw	\$536	-0.1211	4.83	0.00	\$35	\$135	\$45	\$536	\$482	\$608	\$852	\$1,131
Pulp	\$297	-0.1808	4.58	0.00	\$5	\$25	\$45	\$297	\$301	\$385	\$541	\$717


Your e-Parcel Report

Forest Resource Analysis System Software




Home | Locator | Interactive Map | Parcels | Owners | Market Models | My Reports | Users | Admin | Logout

Export to PDF | NW Pacific Rim | Cascadia 201311 | Apply Market Model with RPA Portfolio

Forest Resource Analysis System Software Reporting System:
Delivered Log Market Model - NW Pacific Rim: Cascadia 201311

Generated By	William Schlosser	Date Generated	4/23/2014
Parcel Number:	16N04E0416351088	Acres	19.9
	This parcel may be marginal in size needed to represent a commercial timber production parcel. Caution should be applied in reference to timber production costs for this parcel.		
Township:	16N		
Range	04E		
Section	35		
County	Pierce County	Legal Description	W½ SE¼ NW¼, Sec. 35, T16N R04E WM

Threatened, Endangered & Sensitive Species Habitat

Marbled Murrelet, (<i>Brachyramphus marmoratus</i>)		Caution: Timber harvest timing may be restricted to times when the species is not nesting.
Northern Spotted Owl, (<i>Strix occidentalis caurina</i>)		No restrictions apply
American Bald Eagle, (<i>Haliaeetus leucocephalus</i>)		No restrictions apply

Existing Roads on Parcel

Road Type	Feet	Miles
Surface Roads:		

VIDEO

Looking Forward

View Market Value Report

Puget 201402

Casc

View Stand Report 19838190

Export to PDF

Generate Full Parcel Report



Future Nominal Prices

Market Model Name	RPA Portfolio Name	Rate of Inflation	Landowner Discount Rate	Reforestation Cost	Access Fee (Timber)	Maintenance Fee	New Logging Road Construction
Puget 201402	Cascadia 20140414	2.75%	2.81%	\$375/Acre	\$0.50/MBF/Mile	\$1.33/MBF/Mile	\$19,500/Mile

Sort	Market Value	RPA	Longevity Term	Profit & Risk	Overhead & Administration	Logging Cost	Hauling Cost	Projected Delivered Log Value				
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<u>Western Red Alder</u>												
2 Saw	\$716	0.0716	10.91	0.00	\$35	\$135	\$45	\$716	\$758	\$810	\$945	\$1,147
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4 Saw	\$558	0.0625	10.91	0.00	\$35	\$135	\$45	\$558	\$589	\$634	\$748	\$916
Pulp	\$256	-0.1126	4.50	0.00	\$5	\$25	\$45	\$256	\$258	\$315	\$429	\$566
<u>Black Cottonwood</u>												
2 Saw	\$525	-0.0946	1.75	0.00	\$35	\$135	\$45	\$525	\$476	\$573	\$757	\$992
3 Saw	\$500	-0.0512	2.91	0.00	\$35	\$135	\$45	\$500	\$434	\$529	\$716	\$941
4 Saw/CNS	\$378	-0.0665	2.16	0.00	\$35	\$135	\$45	\$378	\$395	\$478	\$636	\$834
Pulp	\$269	-0.1310	4.75	0.00	\$5	\$25	\$45	\$269	\$217	\$272	\$377	\$499
<u>Douglas-fir</u>												
Export 12"+	\$747	-0.1489	2.50	0.00	\$35	\$135	\$45	\$747	\$789	\$960	\$1,279	\$1,678
Export 8-12"	\$710	-0.1796	2.50	0.00	\$35	\$135	\$45	\$710	\$738	\$910	\$1,215	\$1,595
SM and Better	\$752	-0.1568	3.00	0.00	\$35	\$135	\$45	\$752	\$688	\$879	\$1,199	\$1,577
2 Saw	\$681	-0.1619	3.00	0.00	\$35	\$135	\$45	\$681	\$666	\$854	\$1,167	\$1,534
3 Saw	\$673	-0.1613	3.00	0.00	\$35	\$135	\$45	\$673	\$633	\$812	\$1,109	\$1,459
4 Saw	\$613	-0.1595	3.00	0.00	\$35	\$135	\$45	\$613	\$590	\$755	\$1,031	\$1,356
Chip-n-Saw	\$461	-0.2149	2.66	0.00	\$35	\$135	\$45	\$461	\$390	\$498	\$673	\$884
Pulp	\$269	-0.2527	3.08	0.00	\$5	\$25	\$45	\$269	\$309	\$363	\$481	\$631
<u>Western Redcedar</u>												
Camprun	\$1,155	-0.1110	3.08	0.00	\$35	\$135	\$45	\$1,155	\$1,102	\$1,422	\$1,964	\$2,585
<u>Western Hemlock</u>												
Export 12"+	\$723	-0.1720	3.08	0.00	\$35	\$135	\$45	\$723	\$701	\$827	\$1,095	\$1,437
Export 8-12"	\$745	-0.1792	3.08	0.00	\$35	\$135	\$45	\$745	\$686	\$810	\$1,074	\$1,409
SM and Better	\$600	-0.1195	4.83	0.00	\$35	\$135	\$45	\$600	\$535	\$674	\$943	\$1,252
2 Saw	\$601	-0.1336	4.83	0.00	\$35	\$135	\$45	\$601	\$573	\$732	\$1,033	\$1,373
3 Saw	\$607	-0.1221	4.83	0.00	\$35	\$135	\$45	\$607	\$524	\$662	\$928	\$1,232
4 Saw	\$536	-0.1211	4.83	0.00	\$35	\$135	\$45	\$536	\$482	\$608	\$852	\$1,131
Pulp	\$297	-0.1808	4.58	0.00	\$5	\$25	\$45	\$297	\$301	\$385	\$541	\$717

Your PDF-Parcel Report



FOREST RESOURCE ANALYSIS SYSTEM SOFTWARE

- Home
- Locator
- Interactive Map
- Parcels
- Owners
- Market Models
- My Reports
- Users
- Admin
- Logout

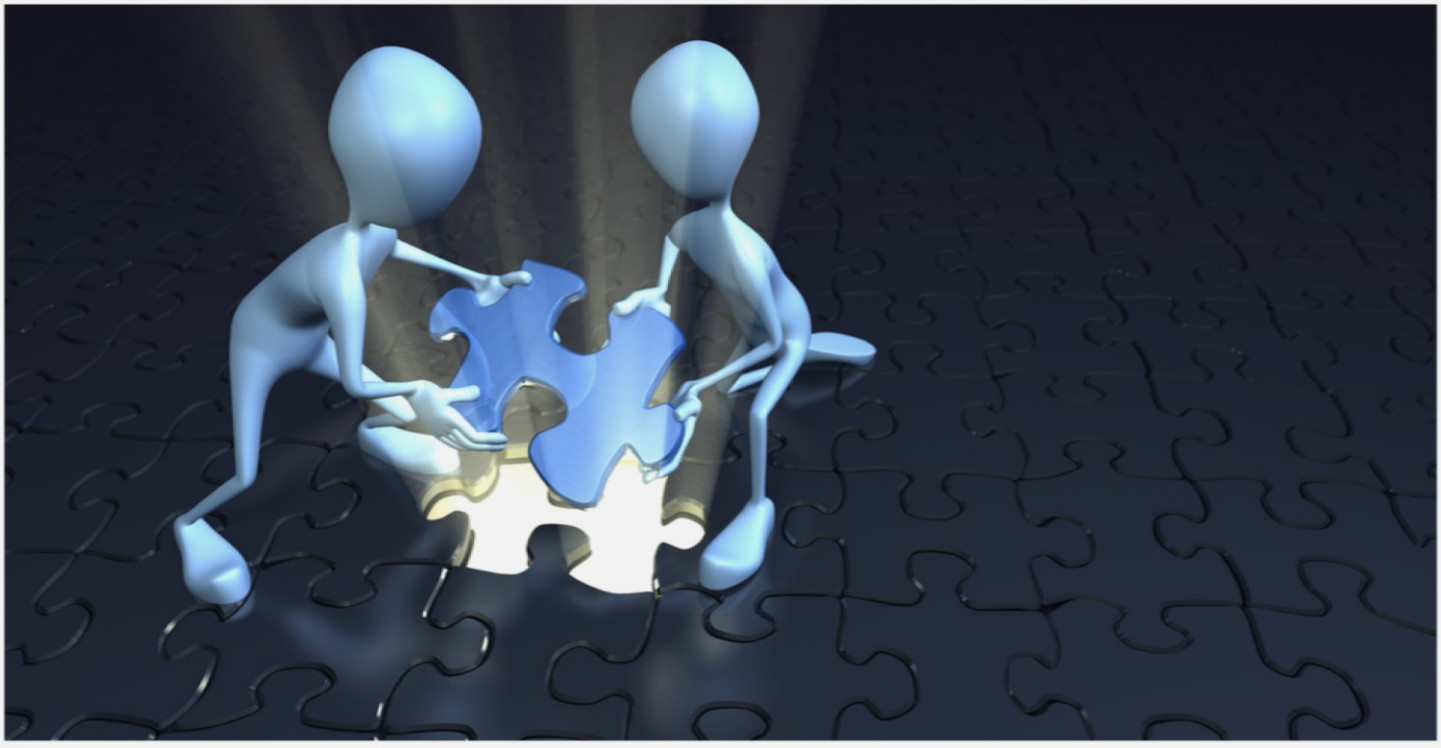
[FRASS User Guide](#)

[FRASS Package Summary](#)



Adobe Acrobat
Document

	Parcel Number	Report Type	Report Date	Ready For Download	
<u>Full Parcel Report: 16N04E0416261026: Puget 201404B: Cascadia 20140414</u>	16N04E0416261026	Full Parcel	4/18/2014	True	Delete
<u>Full Parcel Report: 16N04E0416261026: Puget 201404: Cascadia 20140414</u>	16N04E0416261026	Full Parcel	4/18/2014	True	Delete
<u>Full Parcel Report: 16N04E0416283008: Puget 201402: Cascadia 20140414</u>	16N04E0416283008	Full Parcel	4/21/2014	True	Delete



Share your experience

Mary takes step one,

Joe builds on it,

Jane brings in new insights

Kelly approves the forecasts and the values are used for harvest timing & shareholder reports.

Agenda

In a short amount of time, we will take a long walk together

SaaS Overview

Cloud Computing, Sequential Quadratic Programming, RPA Forecast Tool, SQL databases, High Security

Puzzle Pieces

Biometrics, Physical Site Characteristics, GIS, Delivered Log Markets, Forest Management Costs

Structure

Expand your perception of what the puzzle will look like when assembled

Price/Cost Forecasting

Real Price & Cost Projections with the RPA Forecast Tool

Timing

Financially Optimal Timber Harvest Timing

One timber stand at a time

One Rotation at a time

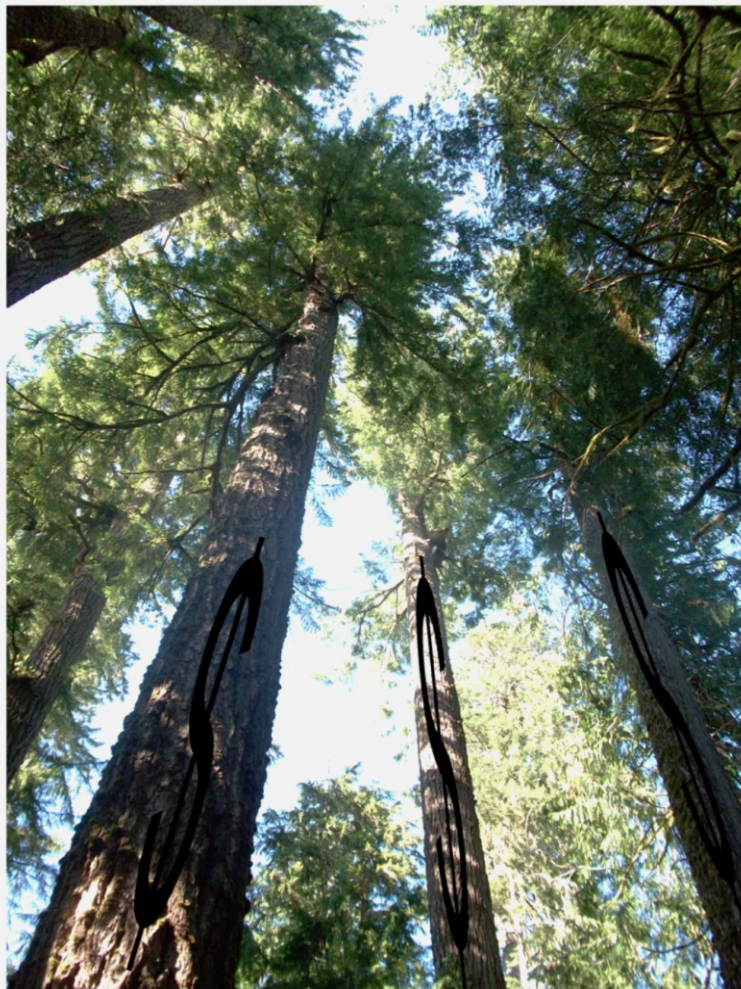
Reports

Report data organization, conveyance & use

Audience

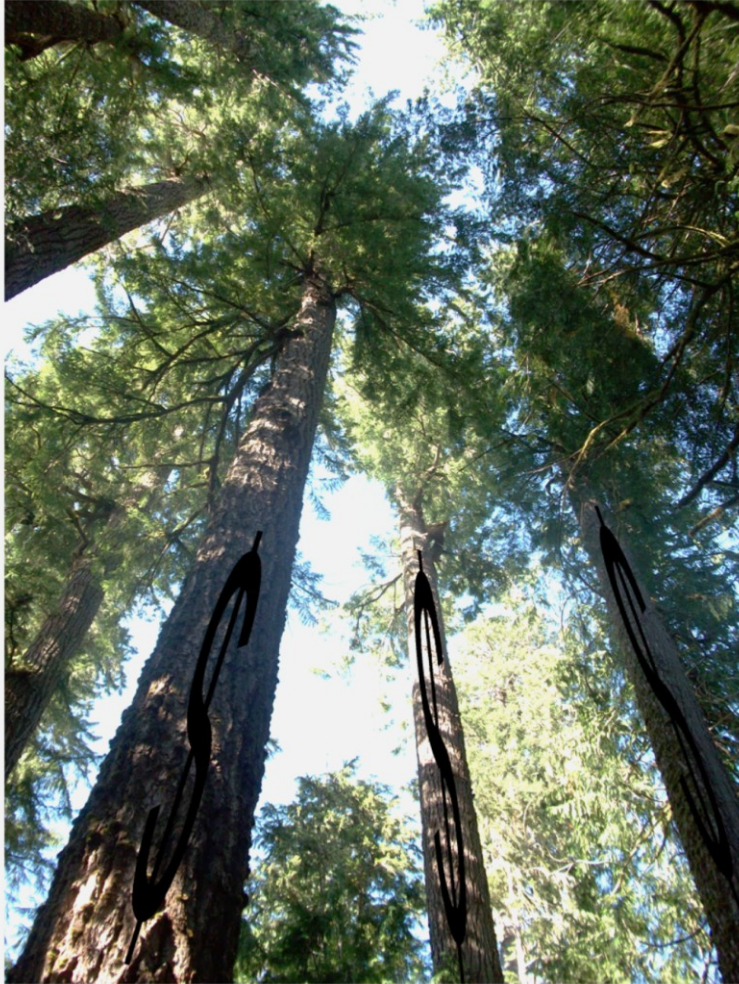
Who are FRASS users?

Who are FRASS Users?



- Timber Investment Management Organizations
- Forest Industry
- Tribal Forestry
- Consulting Foresters
- Public Agency Land Managers (Federal, State, County, City, University)
- Forestland Appraisers
- Asset Valuation Analysts
- Non-Industrial Private Forestland Owners

For What Purpose?



- Financially optimal timber stand harvest date selection
- New road construction location and timing (network solutions)
- Asset valuation → **on demand**
- Land appraisal value using Income Capitalization Approach techniques
- Comprehensive data access by authorized users
- **FRASS IS A FORESTLAND RESOURCE MANAGEMENT APPARATUS**

FRASS Subscription – 2 types

1. Full FRASS Market System:

- Everything you saw in the presentation,
- Plus more

2. FRASS RPA Market Projections

- Log Market Data Analysis
- Real Price Appreciation Forecast Tool projections
- Price forecasts and trends in a Subscription to the quarterly *Forest Econometrics Bulletin*

Option #1 includes all of Option #2

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Forest Econometrics Bulletin

Volume 2014 Issue 1, Washington State: Puget Sound and Olympic Peninsula

First Quarter 2014
March 2014

Log Inventories Grow in Anticipation of Consumer Demand

Delivered log prices have continued upward progression to higher price levels. The Real price climb for many sorts has been to nearly double prices since the trough of June 2009. Mild winter weather provided log buyers with ample opportunity to fill inventories in preparation for the

opment projects. There is pent-up demand building for wood products across North America, but the flow of "new wood" into the end-product markets will first exhaust current log inventories (which are high in the northwest), then rely on new timber harvest materials. It is the reliance on the

should be supporting about 160 million workers, but the Bureau of Labor Statistics reports (March 2014) that approximately 135 million workers are gainfully employed in the US. This employment level is 1 million off from last summer, despite conflicting government statistics.



<http://Forest-Econometrics.com/> 

<http://FRASS.Forest-Econometrics.com/>

<FTP://Data.Resource-Analysis.com/>
User: FRASS

THE PUZZLE IS ASSEMBLED: FRASS

William E. Schlosser, Ph.D.

Schlosser@Resource-Analysis.com

D&D Larix, LLC

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Western Forest Economist Meeting
May 18-20, 2014
Missoula, Montana

Credits

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Written & Produced by
William E. Schlosser, Ph.D.
&
Birgit R. Schlosser

YouTube Video Music: Pure Amadeus

By Wolfgang Amadeus Mozart
Performed by Paulina Niemi-Loseva

Sonata C-minor, K. 457
Allegro
Adagio
Molto Allegro

Sonata C-major, K. 545
Rondo



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