



Economic Wood Flow Modelling to Identify Opportunity Wood in Ontario

Base Model Update

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Project Objectives

- ▶ To develop a comprehensive spatial forest supply chain model for the managed forest of Ontario aka **FindWood**
- ▶ To examine the interaction of industrial demand, spatial wood supply, tenure, transportation networks, harvest logistics and economics to assess and identify opportunity wood
- ▶ To support regionally specific inquiries related to new entrants, changes in product demand, wood supply, markets or policy changes and their potential impact on the forest supply chain
- ▶ To work towards products and tools that will support and promote economic development and efficient wood supply utilization.



Overview of the Provincial Fibre Supply Chain Modelling

- A systems or supply chain approach to understanding wood flow. The forest, transportation network, existing mills, existing tenure and business relationships make up the ecosystem in which new entrants must participate.



Forest Supply Chain Modelling



- HARVEST BLOCK MODEL**
Describes spatial distribution of harvest blocks and their product volume composition

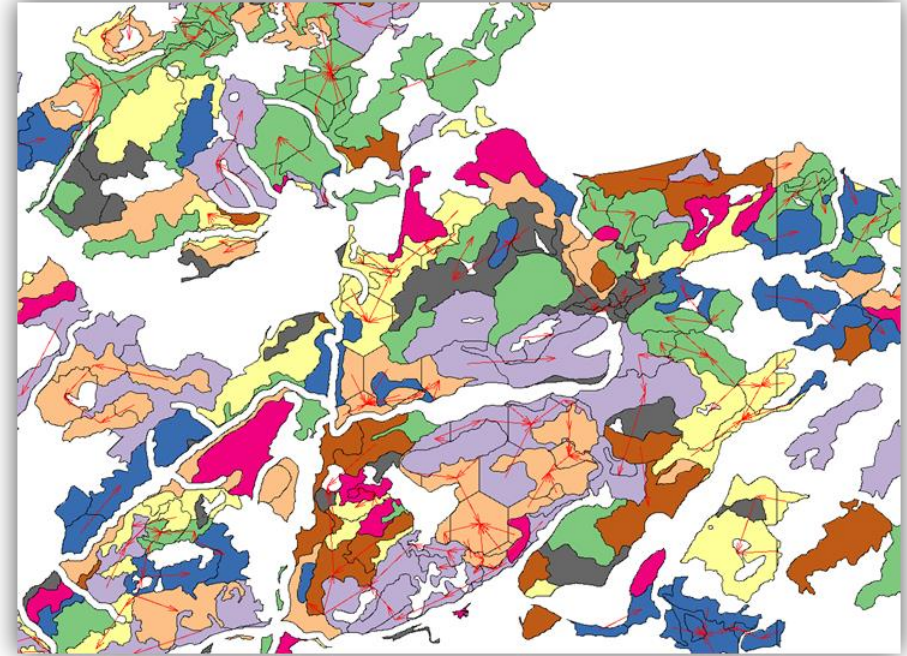
- ROAD NETWORK MODEL**
Haul cost based on average truck payload, charge back rate, and average speed by road type

- MILL MODEL**
Haul destinations with demand by product volume and tenure type

Block Model

Block Model Development Methodology

- ① 10 years of planned harvest areas for each FMU (N=39)
 - ▶ Intersect with planning inventory for stand attributes
 - ▶ Planned harvest that is currently depleted updated with older inventories
 - ▶ Stand-level yields are calculated for each polygon – merchantable and biomass (undersized/defect)
 - ▶ Large polygons are split into smaller polygons and intelligent block aggregation is used to generate blocks with similar characteristics
 - ▶ Raw stand yields are adjusted for partial harvest silviculture
 - ▶ FMP volume adjustment factors are applied for each FMU and species group to align estimates with current FMPs



Block Model - Yields

Block Model Yield Estimates

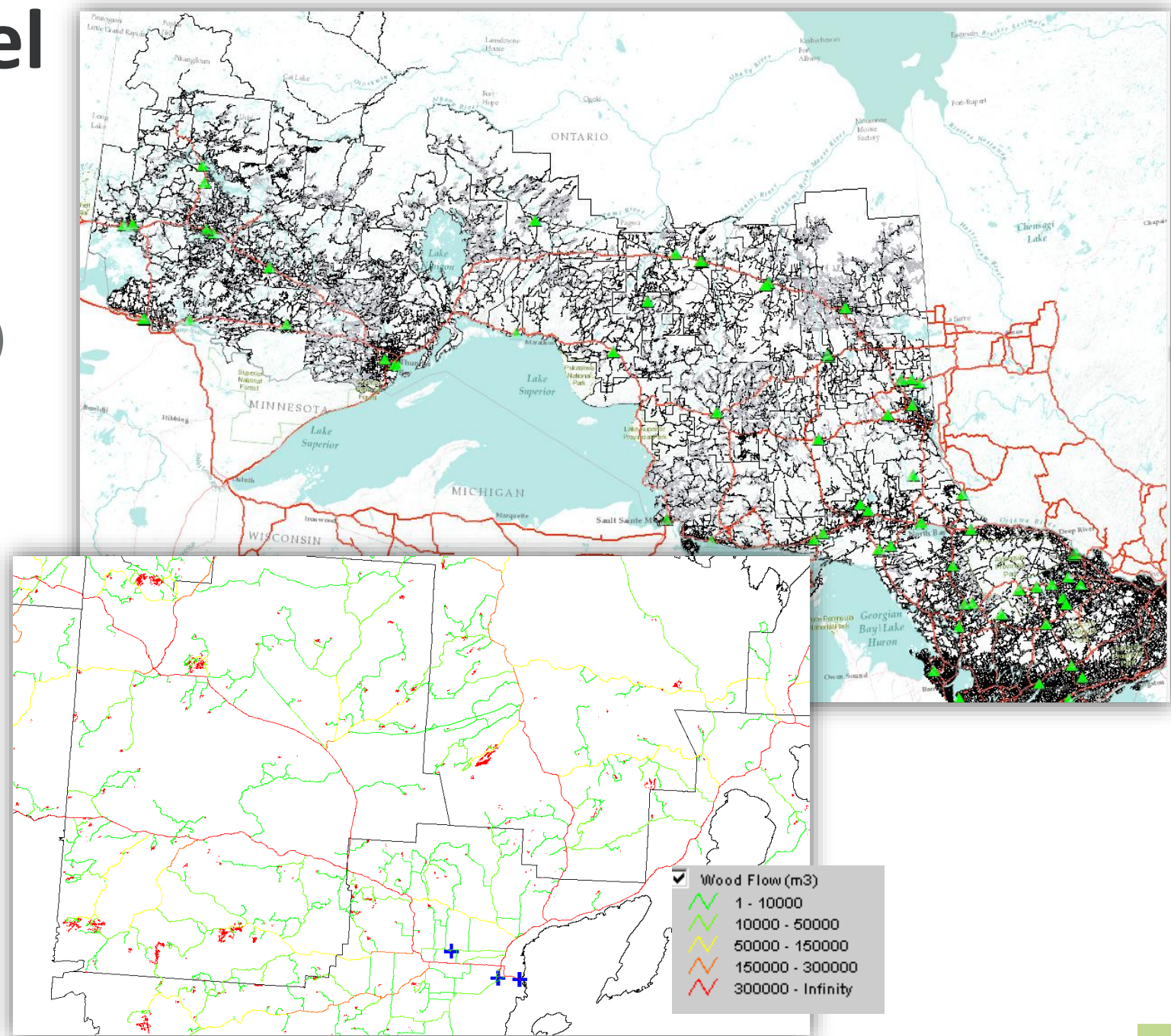
- ① A standard stand-level methodology applied to every stand across Province
 - ▶ MIST based stand-level yield calculation using inventory attributes
 - ▶ Adjustments applied for silviculture systems

- ② Aggregated stand yields not always in good alignment with FMP tables for many different reasons:
 - ▶ Difference between plan harvest spatial file vs. FMP table (i.e. old plans, contingencies etc.)
 - ▶ Yield estimation approach (i.e. yield curves vs. stand-level)
 - ▶ Adjustments for silviculture systems
 - ▶ Various net-downs and adjustment factors applied to FMP tables

- ③ FIM does not provide standard information that links planned harvest volume tabular data to planned harvest spatial layer. Problematic for conducting spatial analysis of planned wood supply.

Road Network Model

- ▶ All major road networks by Road Type
- ▶ Each road segment has a haul, maintenance and build cost (\$/m³) based on:
 - average truck payload/wood density
 - average truck charge back rate
 - average speed by road type
- ▶ Roads linked to blocks and model accumulates cost based on allocation of product to mill



Mill Model

Mill Demand by Species Group

➤ 60 Mills included in model that have an annual wood supply demand greater than 5,000m3/yr

➤ NDMNRF – Available Wood Reports utilized as basis for mill demand

- ▶ Represents current understanding of wood flow and mill requirements
- ▶ Reviewed regularly in consultation with SFL holders
- ▶ Contains tenure mechanism info

➤ Could consider alternative demand scenarios based on historic use etc.

NMV Mill Demand Summary Based on AWR								
Facility..	Facility Name	SPF	PO	PWR	SPG TOL	BW	OC	Grand Total
Grand Total		13,590,407	3,488,853	645,402	602,222	564,435	46,421	18,937,740
2403	AV Terrace Bay Inc.(Terrace Bay) - Pulp	1,484,520	266,440					1,750,960
2590	Resolute FP Canada Inc.(Thunder Bay) - Sawmill	1,366,521						1,366,521
1103	Domtar Inc.(Dryden) - Pulp	1,303,073					29,721	1,332,794
2504	Resolute FP Canada Inc. (Thunder Bay) - Pulp	695,835	420,000					1,115,835
3609	Georgia Pacific North Woods L.P.(Englehart) - Composite		919,000			184,000		1,103,000
3101	GreenFirst Forest Products (QC) Inc. (Chapleau) - Sawmill	792,000						792,000
1422	Weyerhaeuser Company Limited(Kenora) - Composite		611,290			101,250		712,540
4229	Domtar Inc.(Espanola) - Pulp	269,400	153,400	50,200	117,300	106,200		696,500
3202	GreenFirst Forest Products (QC) Inc. (Cochrane) - Sawmill	676,894						676,894
2114	Resolute FP Canada Inc.(Atikokan) - Sawmill	624,000						624,000
3803	EACOM Timber Corporation(Timmins) - Sawmill	615,108						615,108
1510	EACOM Timber Corporation(Ear Falls) - Sawmill	588,400						588,400
3635	EACOM Timber Corporation(Elk Lake) - Sawmill	573,975						573,975
1240	Norbord Inc.(Barwick) - Composite		498,923			66,043		564,966
4704	White River Forest Products Limited Partnership(White River) - Sawmill	501,103	50,000					551,103
3408	Lecours Lumber Co. Limited(Calstock) - Sawmill	498,360						498,360
4238	EACOM Timber Corporation(Nairn Centre) - Sawmill	488,500						488,500
3303	EACOM Timber Corporation(Ostrom) - Sawmill	461,073						461,073
3401	Hornepayne Lumber LP(Hornepayne) - Sawmill	460,000						460,000
3406	GreenFirst Forest Products (QC) Inc. (Hearst) - Sawmill	445,000						445,000
3521	GreenFirst Forest Products (QC) Inc. (Kapuskasung) - Sawmill	440,000						440,000
2312	Nakina Lumber Inc.(Nakina) - Sawmill	422,120						422,120
1301	Resolute FP Canada Inc.(Ignace) - Sawmill	378,879						378,879
3404	Levesque Plywood Limited(Hearst) - Veneer		252,000					252,000
1401	Prendville Industries Ltd. (Kenora Forest Products)(Kenora) - Sawmill	242,700						242,700
3201	Rockshield Engineered Wood Products ULC(Cochrane) - Veneer		175,600					175,600
9209	Rayonier A.M. Canada G.P.(Temiscaming) - Pulp				108,172	61,000		169,172
5802	Murray Brothers Lumber Co. Ltd (Madawaska) - Sawmill	6,300	40,400	47,600	28,500		6,100	128,900
4309	Goulard Lumber Limited(Sturgeon Falls) - Sawmill			118,500				118,500
5632	Ben Hokum & Son Ltd.(Killaloe) - Sawmill	7,100	26,900	81,800				115,800
5801	McRae Mills Ltd.(Whitney) - Sawmill	8,800	7,100	11,700	77,500		10,600	115,700
5617	Lavern Heideman & Sons Ltd.(Eganville) - Sawmill	10,700	15,400	54,200	27,200			107,500
4412	Boniferro Mill Works Inc.(Sault Ste. Marie) - Sawmill				100,400			100,400
4116	Midway Lumber Mills Limited(Thessalon) - Sawmill	28,150		50,000	8,000			86,150
5313	Huntsville Forest Products Inc.(Huntsville) - Sawmill				68,950			68,950
3652	Rosko Forestry Operations Ltd.(Kirkland Lake) - Sawmill	62,667						62,667
6409	Cascades Canada ULC(Trenton) - Pulp		33,000		28,500			61,500
3805	Little John Enterprises Ltd.(Timmins) - Sawmill	56,712						56,712
3618	Cheminis Lumber Inc.(Larder Lake) - Sawmill	51,667						51,667
5643	Dament & Charles Lumber Manufacturing Ltd.(Pembroke) - Sawmill			36,100				36,100
2596	Precision Wood Design Inc.(Murillo) - Sawmill					33,000		33,000
5337	Muskoka Timber Mills Ltd.(Bracebridge) - Sawmill			13,300	15,500			28,800
5642	Carson Lake Lumber Ltd.(Pembroke) - Sawmill			28,700				28,700
1423	1358807 Ontario Limited o/a Makoose Wood Innovations(Perrault Falls (..	18,550	10,000					28,550
5654	Herb Shaw & Sons Ltd.(Pembroke) - Sawmill			26,202				26,202
4524	Lahaie Lumber Ltd.(Alban) - Sawmill			25,300				25,300
1221	Manitou Forest Products Ltd.(Emo) - Sawmill			25,000				25,000
1232	531322 Ontario Limited (Nickel Lake Lumber)(Fort Frances (Nickel Lake)) -			25,000				25,000
4509	Gervais Forest Products Ltd.(Falconsbridge) - Sawmill			23,500				23,500
4520	H. & R. Chartrand Lumber Ltd.(Noelville) - Sawmill			20,800				20,800
5206	Freymond Lumber Ltd.(Bancroft) - Sawmill			7,500	12,700			20,200
4305	Columbia Forest Products Ltd.(Rutherglen) - Veneer					12,942		12,942
5530	1409822 Ontario Inc. o/a Almaguin Forest Products(South River) - Sawmill				9,500			9,500
5637	Gulick Forest Products Ltd.(Palmer Rapids) - Sawmill		9,400					9,400
1129	Oxdrift Tractor Sales Ltd.(Oxdrift) - Sawmill	7,000						7,000
3632	Stella-Jones Inc.(Kirkland Lake) - Sawmill	5,300						5,300

Baseline Scenarios

- **Demand:** Even-flow of AWR based mill demand for products, ignore tenure
- **Haul:** Minimize transport cost to each mill
- **Operations:** Harvest block aggregation and minimize active road network
- **Utilization:** Minimize merchantable wood left in blocks



FindWood as an Economic Development Tool

Fibre Supply Chain Model:

- Quantifying the amount and cost of opportunity wood while considering:
 - Existing mill requirements and tenures
 - 10-Year Wood Supply Distribution
 - Harvest logistics and Infrastructure

1. Identify Opportunity Wood

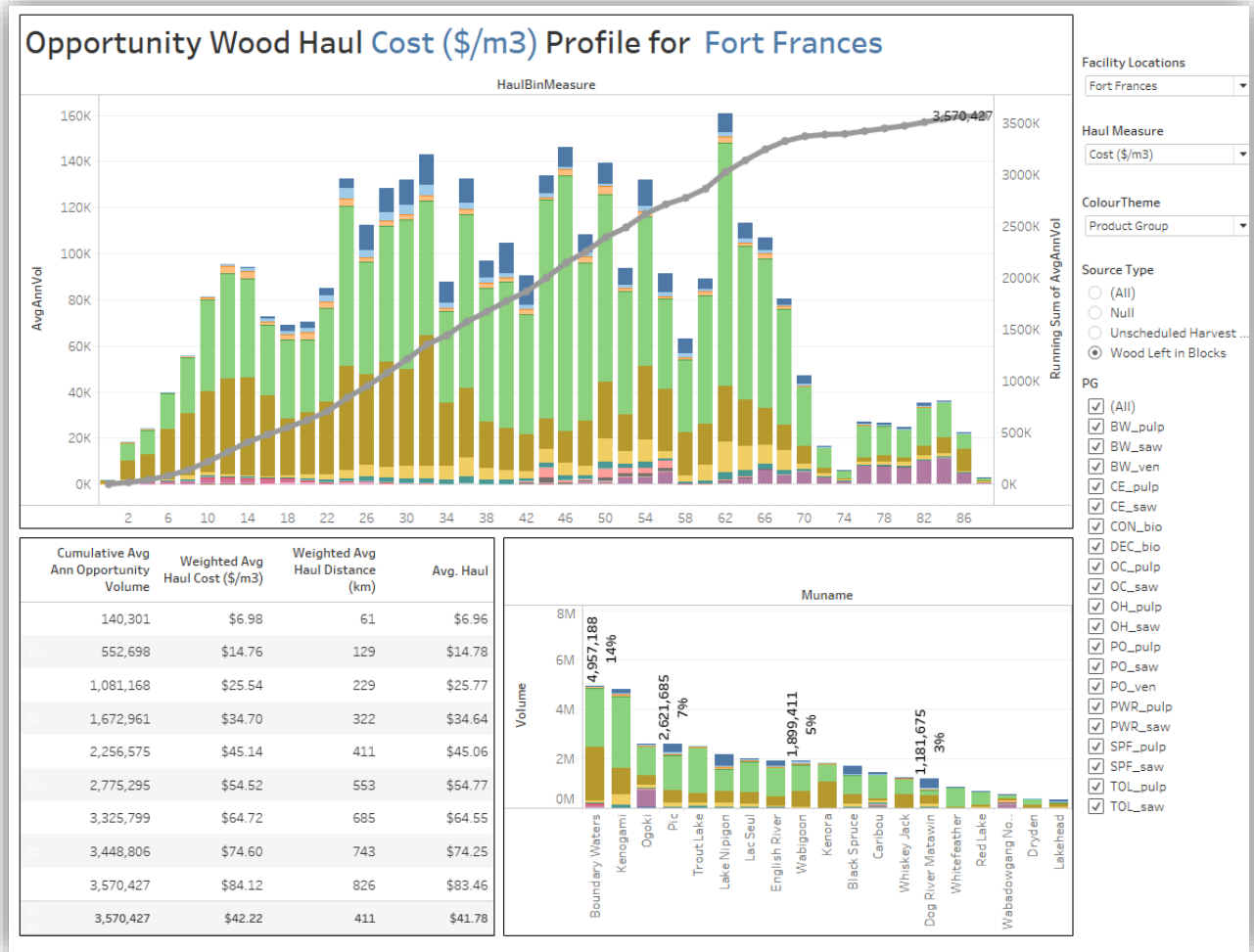
- Wood Left in Blocks
- Unscheduled Harvest Blocks

2. Describe Cost Profile of Opportunity Wood

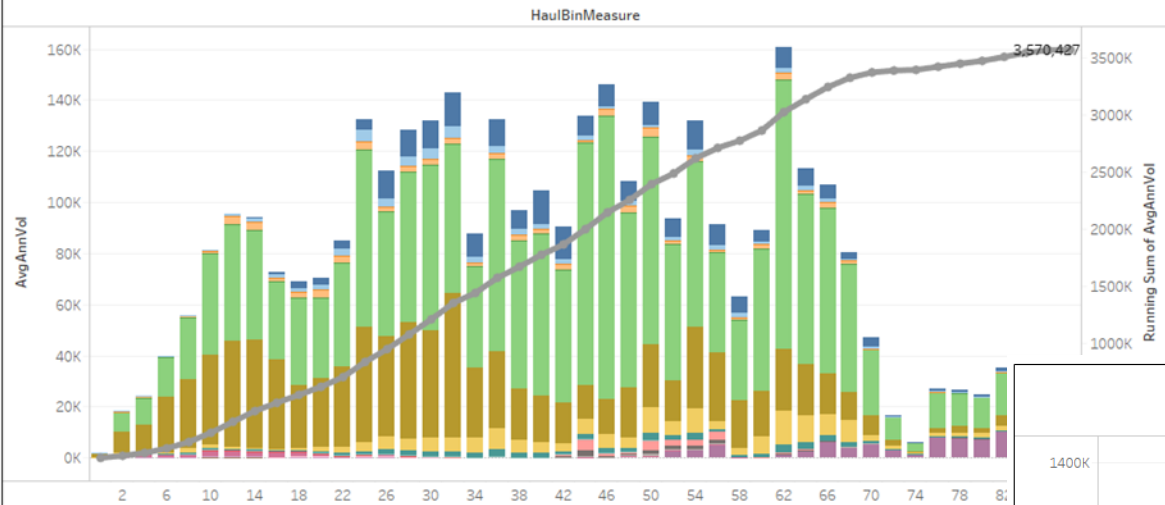
- Determine Size and location of opportunities

3. Scenario Model Prospective Mills

- Examine integration into supply chain, including positive or negative effect on existing mills



Opportunity Wood Haul Cost (\$/m3) Profile for Fort Frances



Facility Locations
Fort Frances

Haul Measure
Cost (\$/m3)

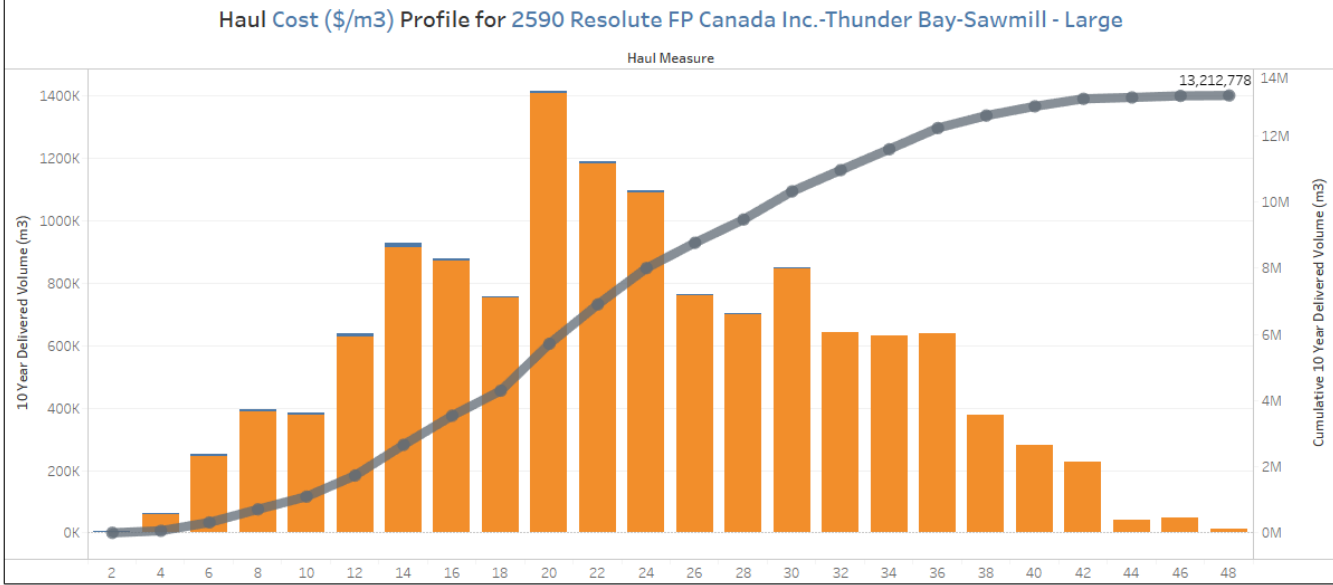
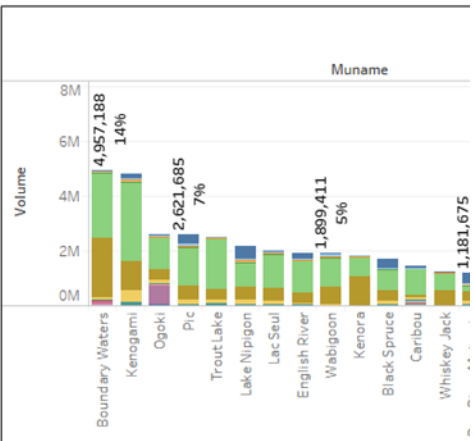
ColourTheme
Product Group

Source Type
 (All)
 Null
 Unscheduled Harvest ...
 Wood Left in Blocks

PG

Quick Tour

Cumulative Avg Ann Opportunity Volume	Weighted Avg Haul Cost (\$/m3)	Weighted Avg Haul Distance (km)	Avg. Haul
140,301	\$6.98	61	\$6.96
552,698	\$14.76	129	\$14.78
1,081,168	\$25.54	229	\$25.77
1,672,961	\$34.70	322	\$34.64
2,256,575	\$45.14	411	\$45.06
2,775,295	\$54.52	553	\$54.77
3,325,799	\$64.72	685	\$64.55
3,448,806	\$74.60	743	\$74.25
3,570,427	\$84.12	826	\$83.46
3,570,427	\$42.22	411	\$41.78

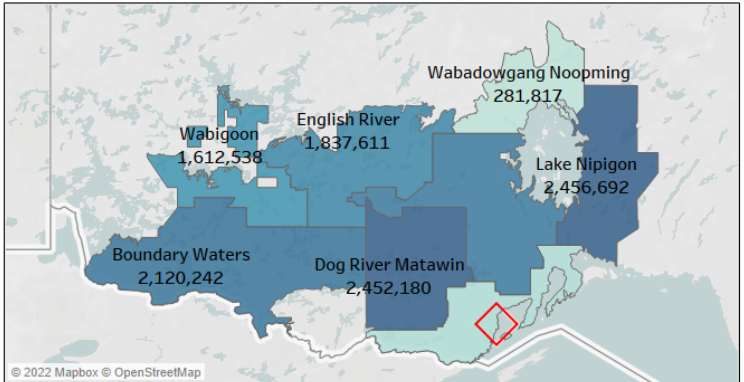


Facility Code Parameter
2590 Resolute FP Canada I...

Haul Measure
Cost (\$/m3)

ColourTheme
Product Group

Theme
 CON_bio
 SPF_saw



Delivered Volume	13,212,778
Weighted Avg Haul Cost	\$24.30
Weighted Avg Haul Distance	241

Muname	% of Total Volume	Delivered Volume
Lake Nipigon	19%	2,456,692
Dog River Matawin	19%	2,452,180
Boundary Waters	16%	2,120,242
Black Spruce	15%	2,030,679
English River	14%	1,837,611
Wabigoon	12%	1,612,538
Lakehead	3%	421,019
Wabadowgang Noopming	2%	281,817
Grand Total	100%	13,212,778

Project Stages, Timelines and Opportunities to Participate

➤ **Stage 2: Develop Baseline Scenario** (Early March)

- ▶ *Review baseline results and help refine modelling assumptions*

➤ **Stage 3: Develop Regional Scenarios** (March/April)

- ▶ *Collaborate in development of regionally specific scenarios or test specific economic development activities*

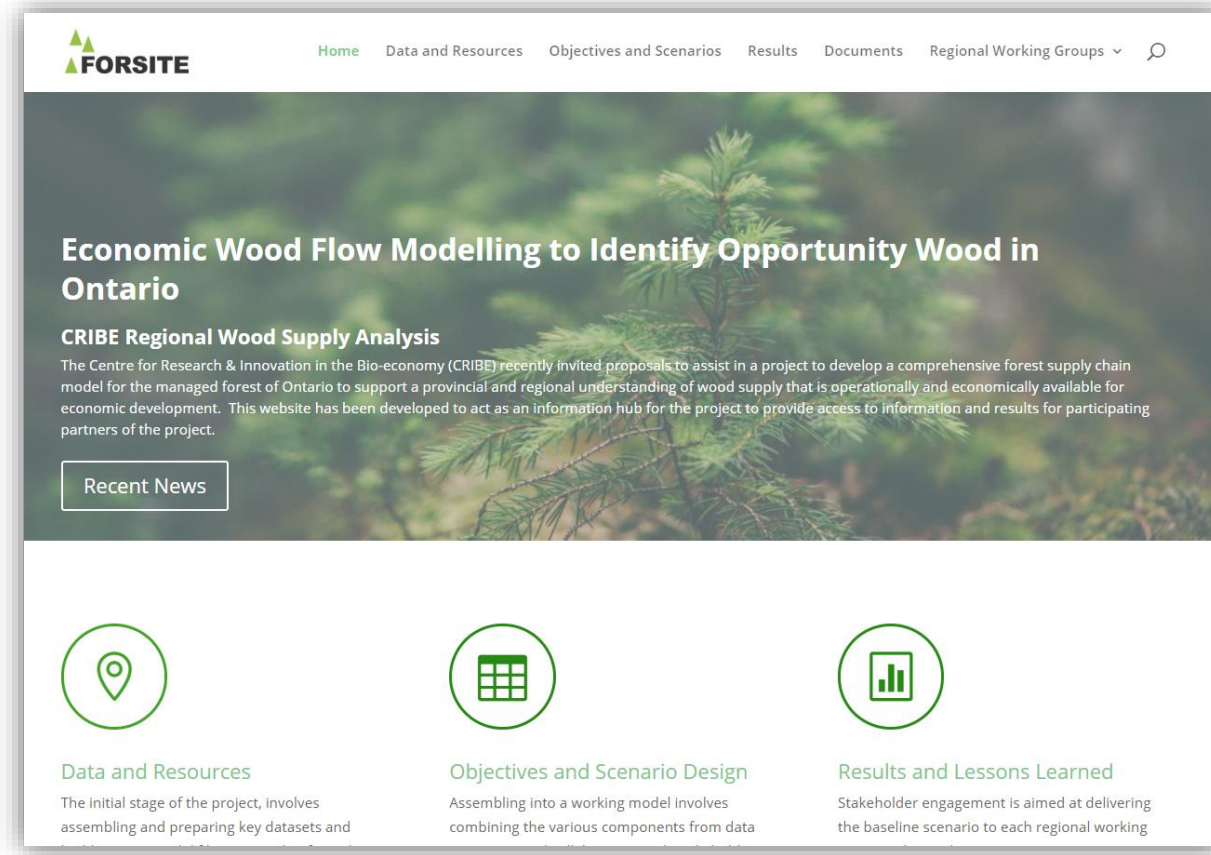
How to Participate?

➤ Forsite Interactive website

- ▶ Blog posts
- ▶ document repository
- ▶ portal to detailed model results

➤ Regional working group members will get email invitation to website

- ▶ If you are not on a working group request membership via Mike Barten (mike.barten@cribe.ca)



Thank You!



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