Analysis of location, feedstock availability, and economic contributions of locating a mass timber manufacturing plant in Wisconsin

Council on Forestry meeting, March 2024
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Forest products industry economics

- Considerable contribution to local, county, state, and regional economy.
- WI FPI, one of the leading manufacturing sector in the states
  - Represented by 12% of total manufacturing jobs
- Nationwide rank
  - Pelki and Sherman 2019
    - Jobs: 5th
    - Employee compensation: 2nd
    - Value-added: 2nd
  - Jolley et al. 2020
    - Pulp and paper sector : ranked no. 1 in terms of jobs and value-added

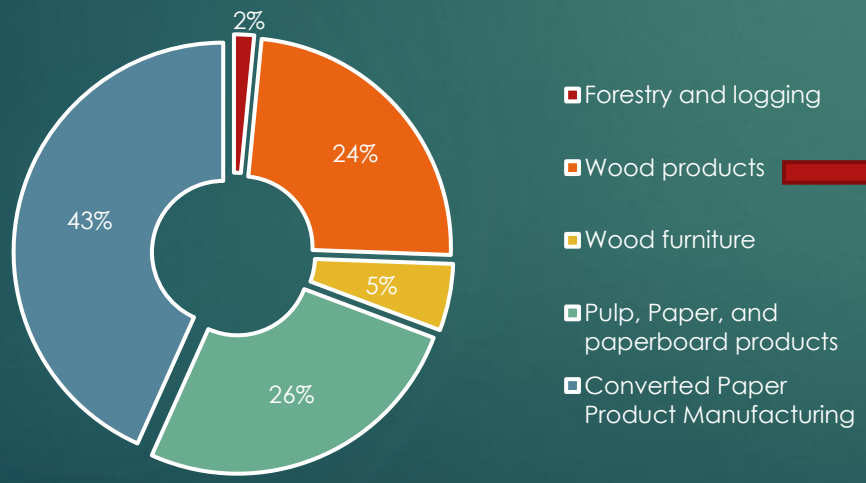
WI FPI economic contribution…

Economic contribution of the forest products sector on Wisconsin economy (2022) in million dollars				
Effects	Employment	Labor Income $MM	Gross Output $MM	Value-added $MM
Direct	57,079	4,464	26,913	8,023
Indirect	35,439	2,658	8,878	4,386
Induced	33,419	1,908	5,993	3,490
Total	125,937	9,030	41,783	15,899
Multiplier	2.21	2.02	1.98	1.98

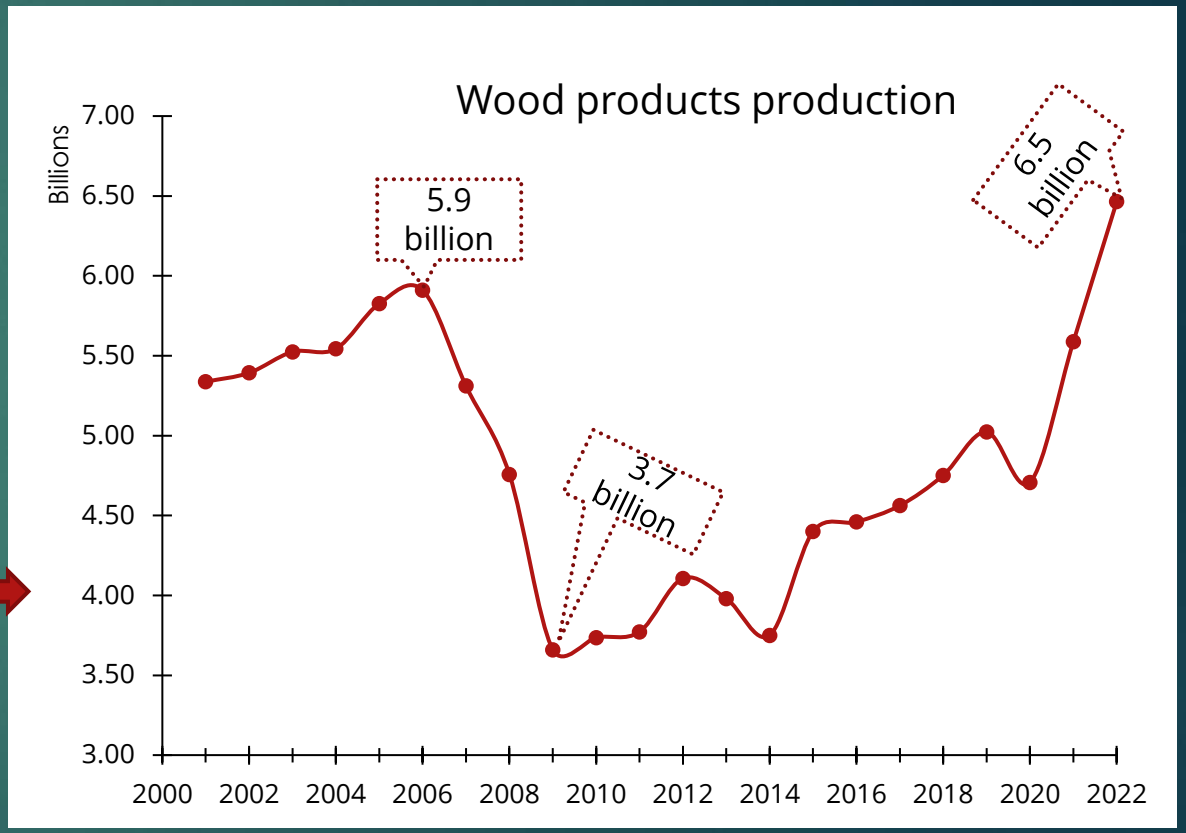
- Employed 57,000 workers (1.5% of state's total jobs) and paid $4.5 billion in labor income
- FPI's average annual income was $78,000 compared to $65,000 for the state average
- Total contribution – 125,000 jobs, $42 billion output
- Multiplier: Employment – 2.21 (Every 100 jobs in the forest products industry sector supported an additional 121 jobs in other sectors of the economy)

Wood products industry

Mass timber



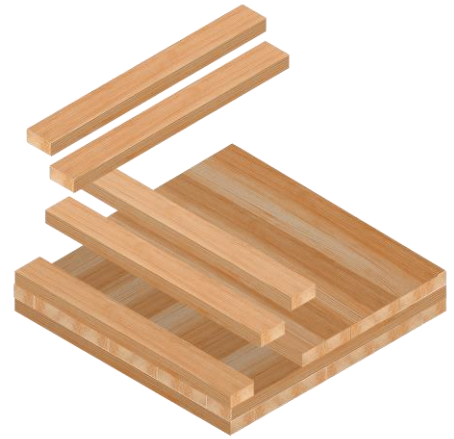
Forest products production share, 2022



What is mass timber?

- Engineered wood building materials – created by layering and bonding wood

- Examples:
  - Cross laminated timber (CLT)
  - Glue-laminated timber (GLULAM)
  - Nail-laminated timber
  - Laminated strand lumber
  - Laminated veneer lumber



Cross-laminated Timber (CLT)
Source: Think Wood

Glue Laminated Timber (GLULAM)
Source: Think Wood

Status

- Emerging climate-smart commodity
  - 38 mass timber manufacturing facilities (24 can produce CLT) (*Source : FORISK data base 2023)*
  - Production capacity – over 62 million cubic feet
  - Over 2,000 completed or planned mass timber construction projects as of Dec 2023 *(Source: www.woodworks.org)*

State	Stage	
AK	In Design	7
AL	Construction Started / Built	12
	In Design	11
AR	Construction Started / Built	24
	In Design	6
AZ	Construction Started / Built	3
	In Design	4
CA	Construction Started / Built	122
	In Design	172
CO	Construction Started / Built	32
	In Design	39
CT	Construction Started / Built	13
	In Design	7
DC	Construction Started / Built	10
	In Design	14
DE	Construction Started / Built	1
	In Design	1
FL	Construction Started / Built	33
	In Design	55
GA	Construction Started / Built	22
	In Design	42
HI	Construction Started / Built	2
	In Design	2
IA	Construction Started / Built	7
	In Design	2
ID	Construction Started / Built	11
	In Design	10
IL	Construction Started / Built	18
	In Design	28
IN	Construction Started / Built	6
	In Design	5
KS	Construction Started / Built	3
	In Design	3
KY	Construction Started / Built	7
	In Design	8
LA	Construction Started / Built	3
	In Design	11
MA	Construction Started / Built	35
	In Design	76
MD	Construction Started / Built	9
	In Design	18
ME	Construction Started / Built	13
	In Design	15
MI	Construction Started / Built	11
	In Design	30
MN	Construction Started / Built	14
	In Design	17
MO	Construction Started / Built	10
	In Design	19
MS	Construction Started / Built	2
	In Design	11
MT	Construction Started / Built	19
	In Design	17
NC	Construction Started / Built	46
	In Design	36
ND	Construction Started / Built	2
	In Design	1
NE	Construction Started / Built	6
	In Design	7
NH	Construction Started / Built	4
	In Design	8
NJ	Construction Started / Built	8
	In Design	10
NM	Construction Started / Built	3
	In Design	3
NV	Construction Started / Built	1
	In Design	5
NY	Construction Started / Built	30
	In Design	37
OH	Construction Started / Built	12
	In Design	19
OK	Construction Started / Built	5
	In Design	3
OR	Construction Started / Built	107
	In Design	40
PA	Construction Started / Built	9
	In Design	12
RI	Construction Started / Built	6
	In Design	2
SC	Construction Started / Built	24
	In Design	10
SD	Construction Started / Built	2
	In Design	1
TN	Construction Started / Built	13
	In Design	31
TX	Construction Started / Built	62
	In Design	90
UT	Construction Started / Built	15
	In Design	15
VA	Construction Started / Built	13
	In Design	30
VI	In Design	1
VT	Construction Started / Built	3
	In Design	11
WA	Construction Started / Built	106
	In Design	62
WI	Construction Started / Built	28
	In Design	18
WV	Construction Started / Built	2
	In Design	1
WY	Construction Started / Built	3

(Source: www.woodworks.org)

Benefits of mass timber

- Carbon storage
- Emission displacement
- Forest management
- Improved construction
- Workforce growth
- Waste management

Brock commons tallwood house, UBC

Challenges/opportunity for Mass timber

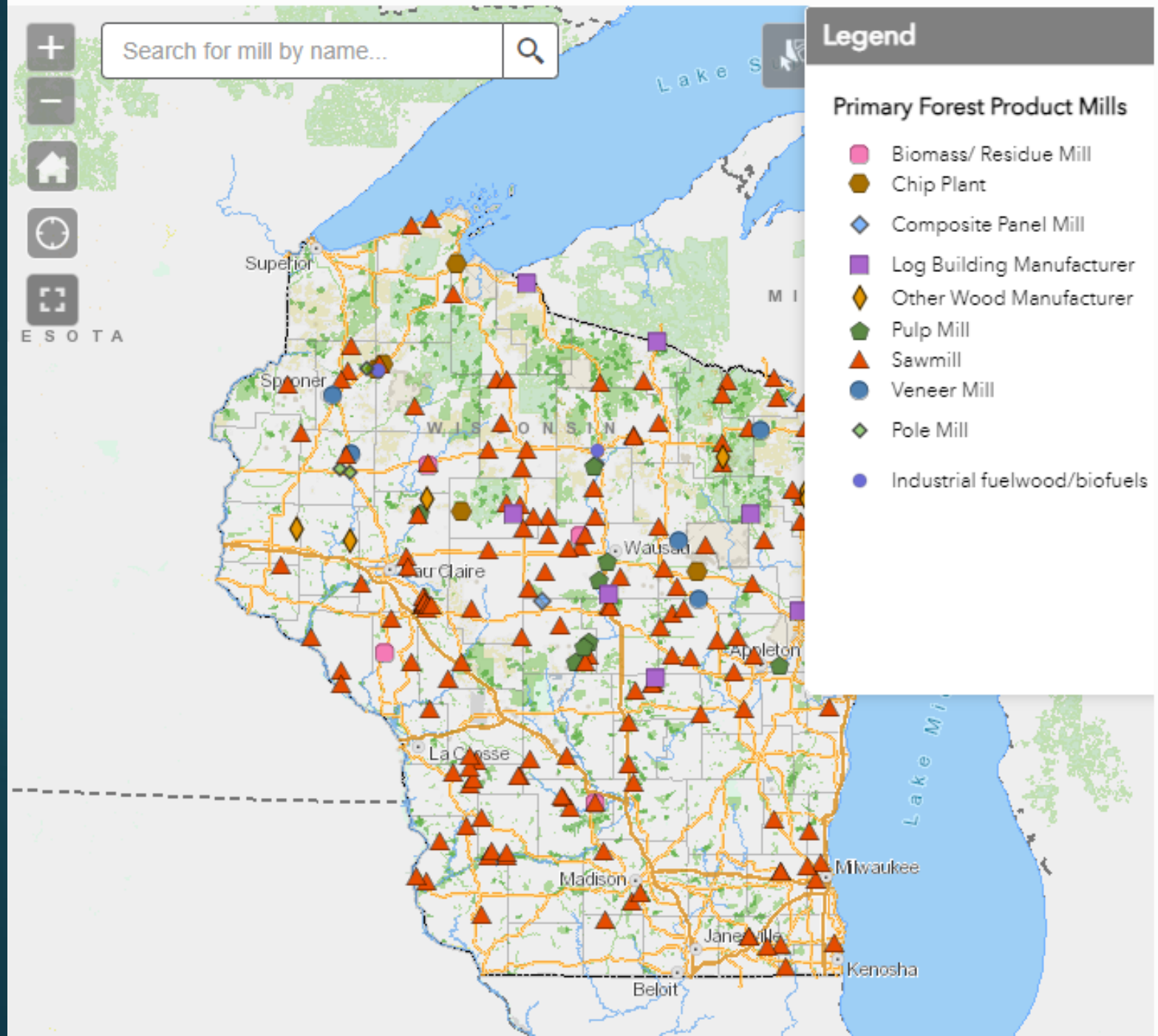
- Mass timber in WI is often expensive than steel or concrete due to lack of nearby processing facilities
- The annual growth of timber has outpaced the harvest volume for decades
- Opportunities for forest rich region like Great Lakes
- New market development for softwoods increasingly important!

Project objectives

Objective #1: Identify hotspots of softwood availability

Objective #2: Identify potential location for a new mass timber facility

Objective #3: Estimate the economic impact/contribution of the new mass timber facility.



Funding

2023 Forest Stewardship IIJA/BIL

Contract

Michigan state University

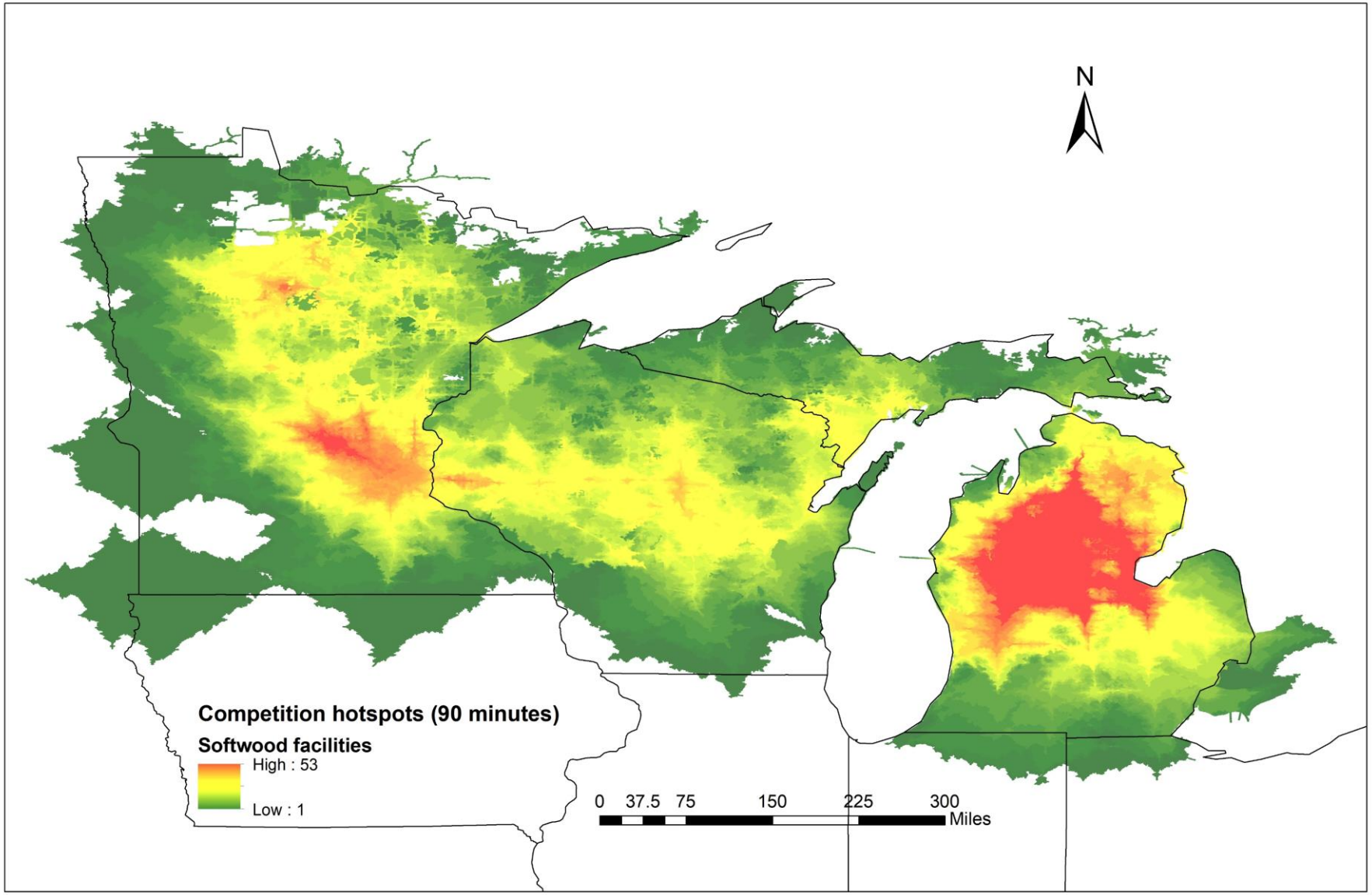
Objective #1: Identify hotspots of softwood availability

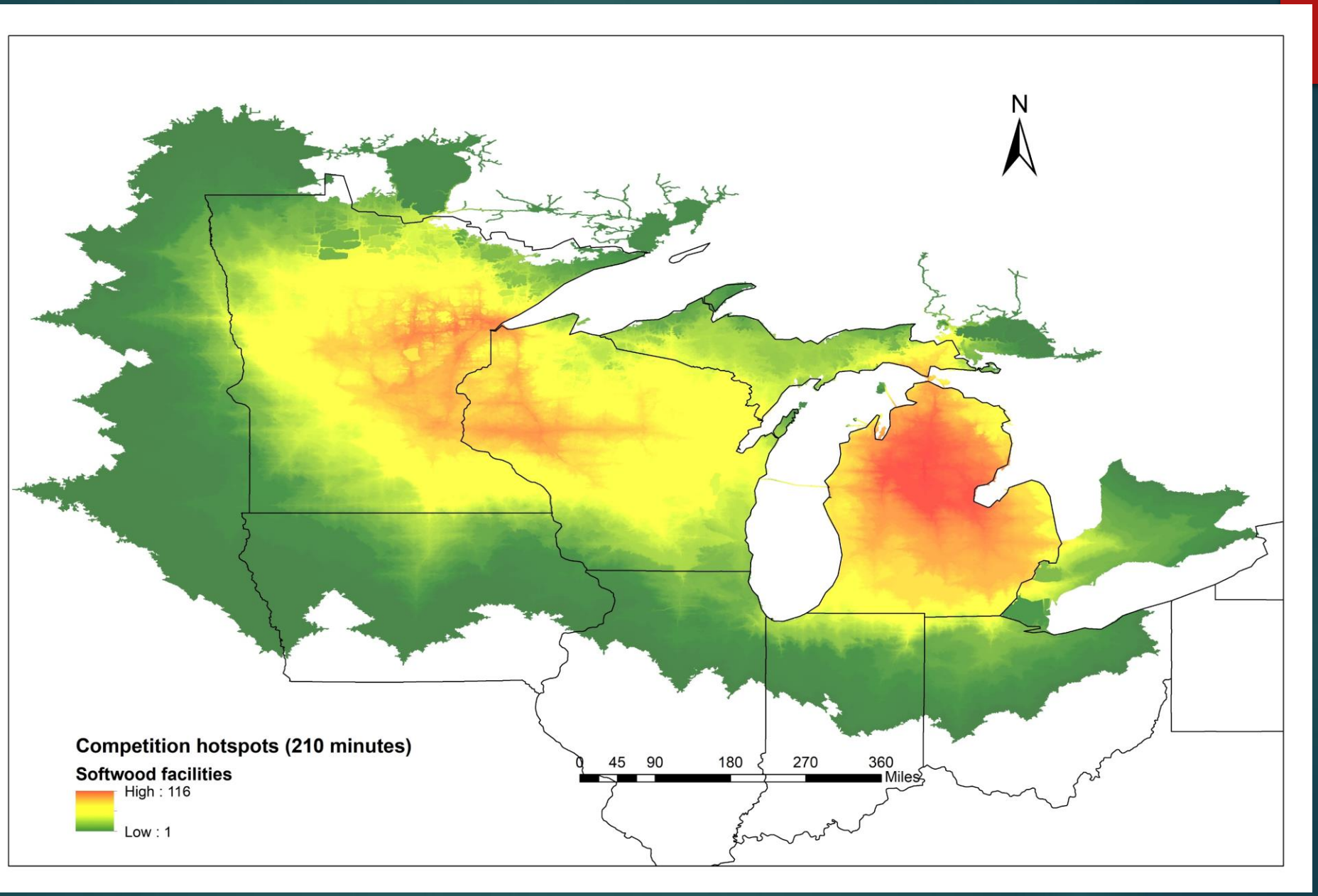
- Transportation logistics model approach
  - To establish forest products market extent and competition,
  - Minimizing the cost of procurement of wood products

- Data sources:
  - Delivered softwood price, stumpage price
  - FIA data
  - Road network data

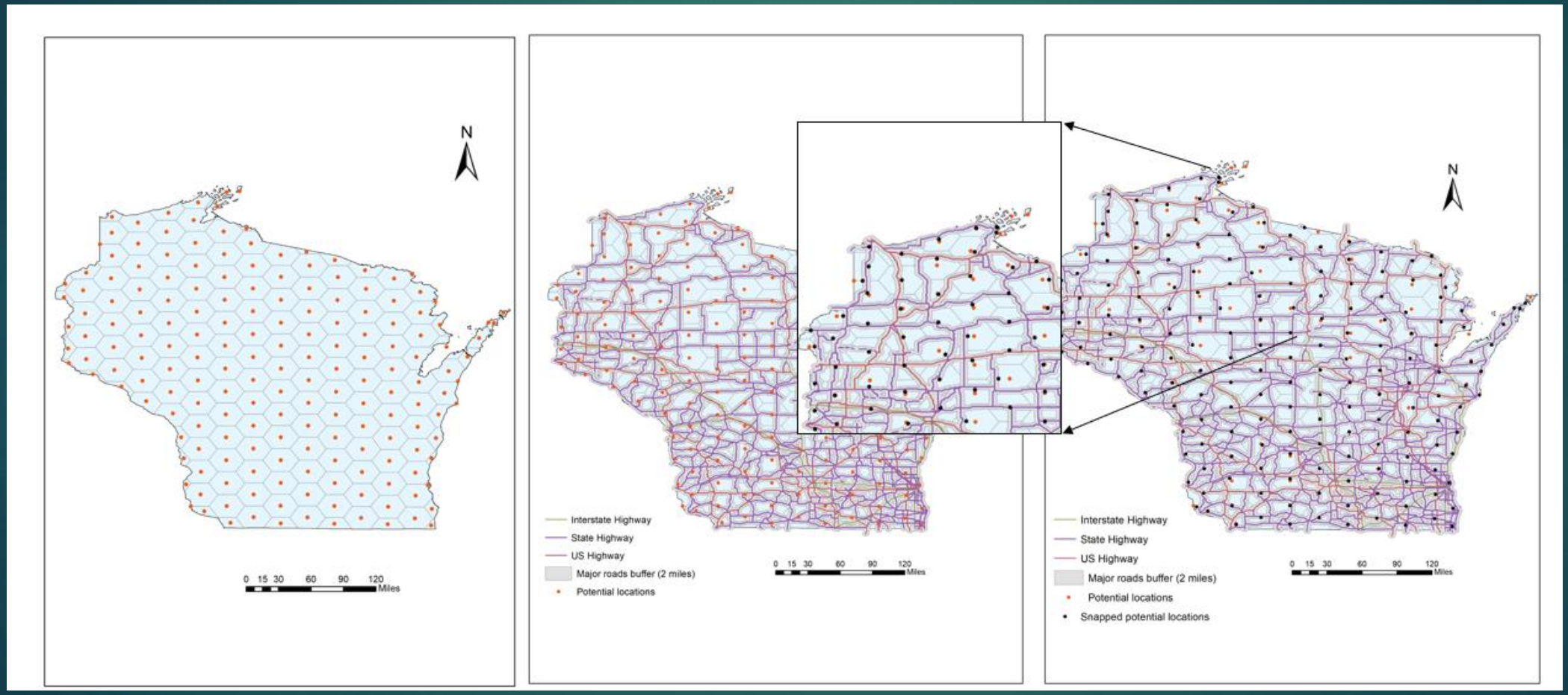
Objective #1: Identify hotspots of softwood availability

- Created by overlapping and processing the procurement zones and routes.
- Visualizing tool or systems to show complex systems that involve social (ownership), ecological (forest type, ecoregion), and economic (costs) information and more.
- Can serve as a powerful tool in decision-making for land managers, industry, policymakers, and stakeholders


N
Competition hotspots (90 minutes)
Softwood facilities
High : 53
Low : 1
0 37.5 75 150 225 300
Miles


N
Competition hotspots (210 minutes)
Softwood facilities
High : 116
Low : 1
0 45 90 180 270 360
Miles

Objective #2: Identify potential location for a new mass timber facility



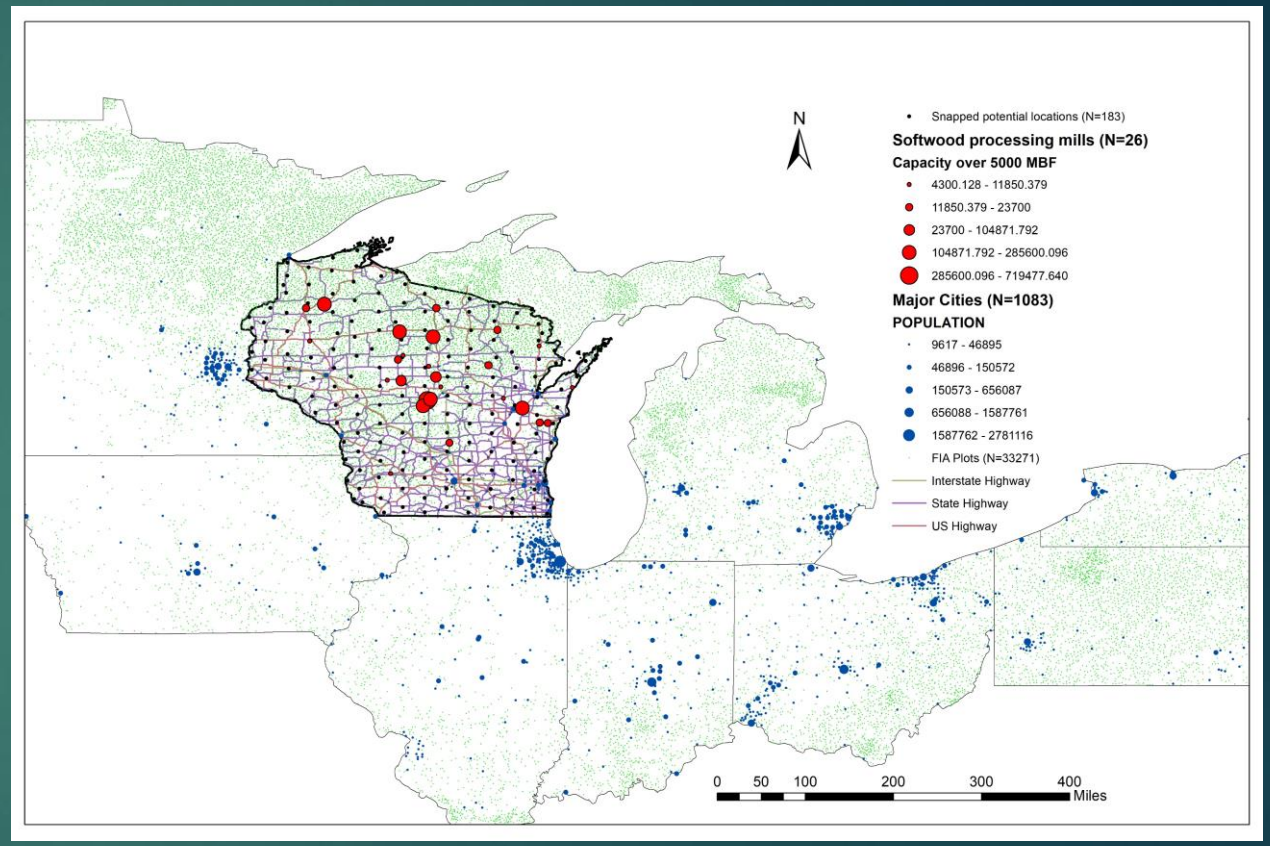
Objective #2: Identify potential location for a new mass timber facility

- Optimal location identification for mass timber production
  - Equal Weight to supply of softwood lumber and demand for mass timber

$$Score_{Location} =$$

$$\mathbf{0.5}\left(\frac{\sum city^1 \sum Lumber\_mill^1}{\sum City^1}\right) * \sum_{city} \frac{\left(\frac{Population_{city}}{Population}\right)}{Drive\_Time_{facility,city}}$$

$$+\mathbf{0.5}\left(\frac{\sum city^1 \sum Lumber\_mill^1}{\sum Lumber\_mill^1}\right) \sum_{Lumber\_mill} \frac{\left(\frac{Capacity_{Lumber\_mill}}{Capacity}\right)}{Drive\_Time_{Lumber_{mill},facility}}$$



Objective #3: Estimate the economic impact/contribution of the new mass timber facility.

- IMPLAN data/software
- IMPLAN – Impact Analysis for Planning

Total Effects /Impacts

Initial effect to local industry from an activity or policy being analyzed

Effects resulting from business-to-business purchases in the supply chain within the region

Effects in the region resulting from employees spending their wages.

Objective #3: Estimate the economic impact/contribution

- Employment:
  - Number of full and part-time employee, including self-employed and seasonal jobs
  - NO FTE
- Labor income:
  - Sum of employee compensation and proprietor income
- Output:
  - Total value of production by the industry in the given year
  - It equates to the total of sales and net inventory change
- Value-added:
  - Industry output minus cost of intermediate inputs
  - Equivalent to GSP or GDP

Anticipated output

1. Procurement zones and competition hotspots for softwood processing facilities will be identified and presented as maps.
2. Potential location will be identified for the new mass timber facility, and feedstock (softwood sawtimber) availability will be estimated using FIA data for the new mass timber facility.
3. Economic impact of a new mass timber facility will be assessed using IMPLAN data and software.

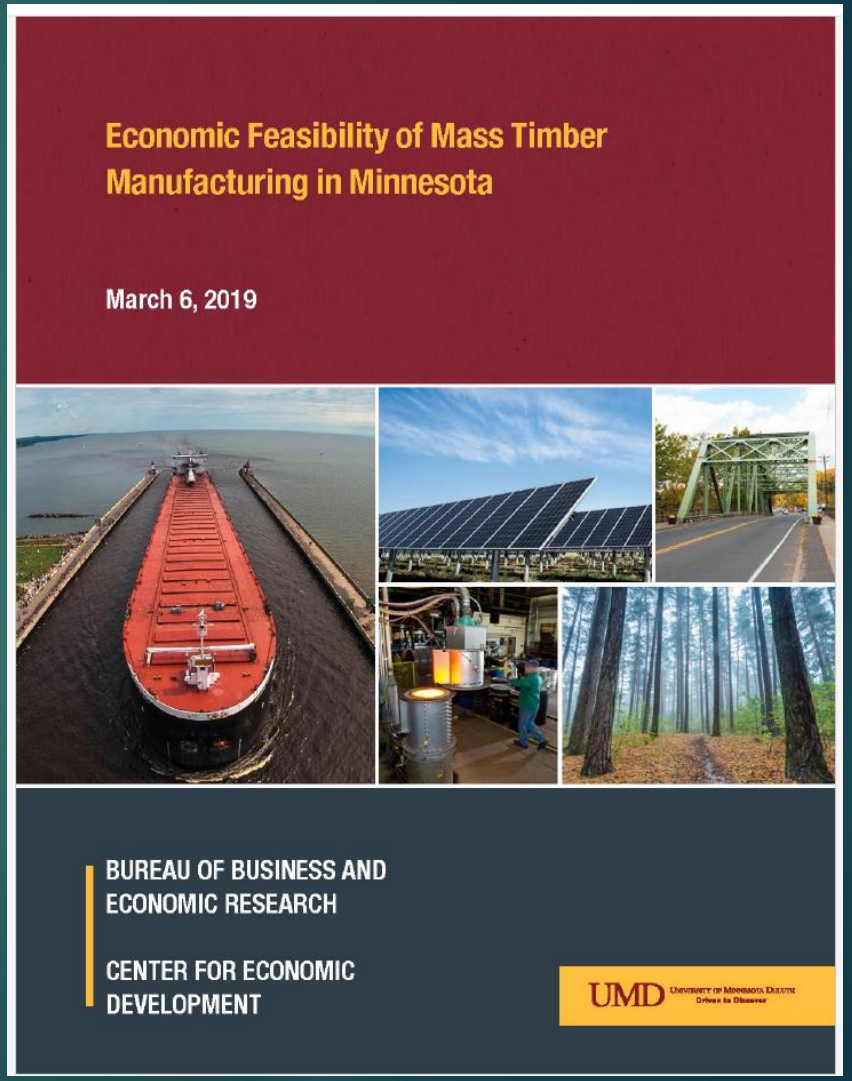
Deliverables

1. Hotspot maps: The procurement zone and hotspots maps in jpeg or pdf format.
2. Online webinar: WIDNR and forestry stakeholders.
3. Presentations: WI/national SAF or any other relevant conference or meeting
4. Final Report (Max 20 pages): Market extent and competition of current softwood milling facilities, a potential location for a new mass timber facility, procurement zones, feedstock estimates (from the existing mill and FIA data), and economic contribution to the state.
6. Newsletter: WIDNR newsletter (e.g., ForesTREEporter), FPS newsletter, MSU Department of Forestry newsletter etc.

Similar studies in neighboring states

Minnesota

- A survey was developed for regional sawmills (N= 8)
  - Familiarity with CLT and other mass timber products? (Y=6, N=2)
  - Visually or machine stress graded?
  - Quality of red pine, spruce fir, jack pine, and balsam fir lumber produced ?
  - Asked to provide an estimate of length for the lumber species and grades they reported?
  - Amount of lumber produced sold to retail and wholesale? etc.



Similar studies…..

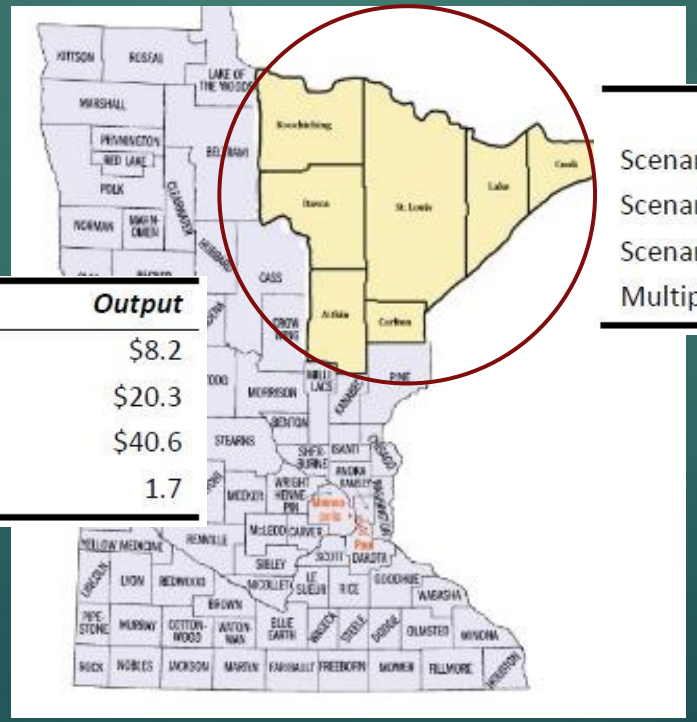
Minnesota

- **Economic feasibility of mass timber manufacturing in Minnesota (Report published in 2019)**
- Economic impact analysis
  - Two Study area (Seven county arrowhead region or elsewhere in the sate)

Total economic impact of CLT, in millions, State of MN

	Employment	*Labor Income*	*Value Added*	*Output*
Scenario I	38	$2.5	$3.3	$8.2
Scenario II	95	$6.2	$8.2	$20.3
Scenario III	190	$12.4	$16.4	$40.6
Multiplier	1.9	1.9	2.3	1.7

Scenario I – Small CLT manufacturing firm (20 emp)
Scenario II – Mid-size (50 emp)
Scenario III – Large firm (100 emp)



Total economic impact of CLT, in millions, Arrowhead region

	Employment	*Labor Income*	*Value Added*	*Output*
Scenario I	33	$1.9	$2.4	$6.8
Scenario II	82	$4.7	$6.0	$16.8
Scenario III	163	$9.5	$12.0	$33.6
Multiplier	1.6	1.4	1.7	1.4

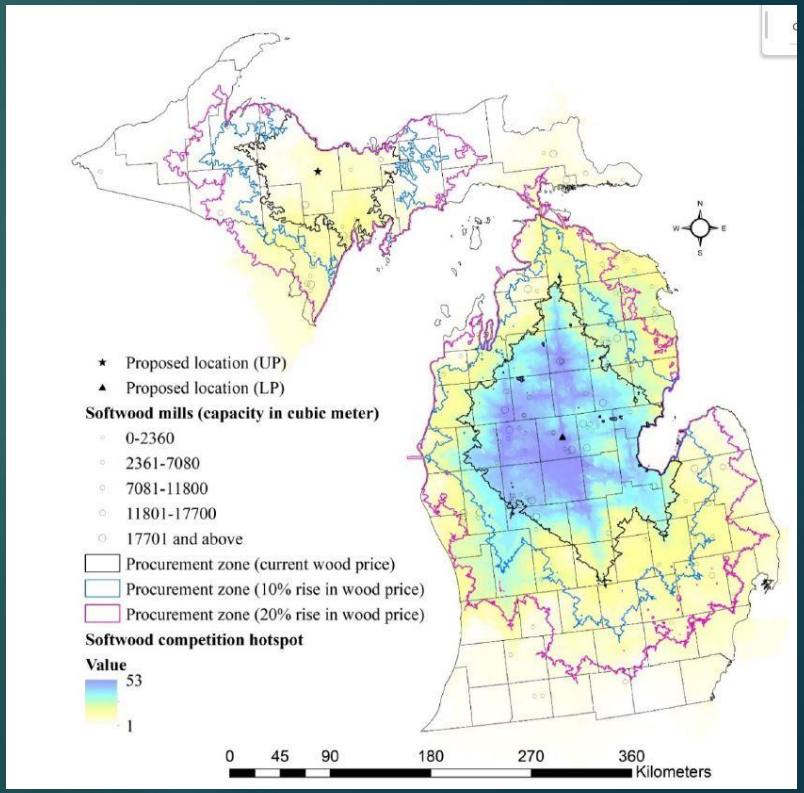
Similar studies in neighboring states

Michigan

- Master thesis (MSU):

  Location analysis and economic contribution of a mass timber facility

- Identified two locations for mass timber – Marquette county in UP and Clare county in LP
  - Based on number of nearby softwood sawmills
  - Proposed site – Clare county in LP (as it can source lumber from 48 nearby sawmills)



Similar studies in neighboring states

Michigan

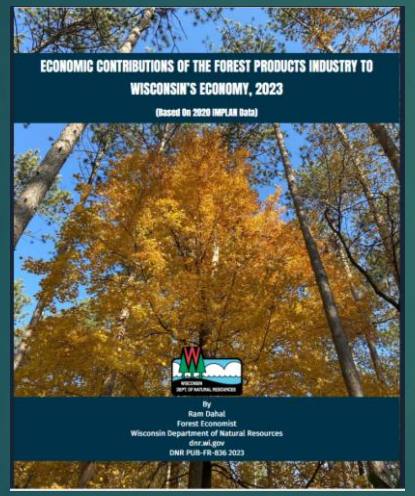
- Master thesis: location analysis and economic contribution of a mass timber facility
- Economic impact analysis
  - Two Study area (LP and UP)

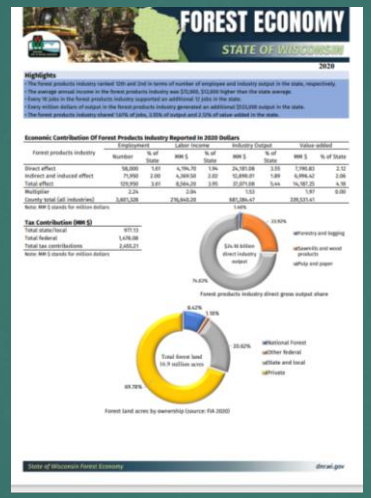
Economic impact of mass timber facility, in millions, LP and UP

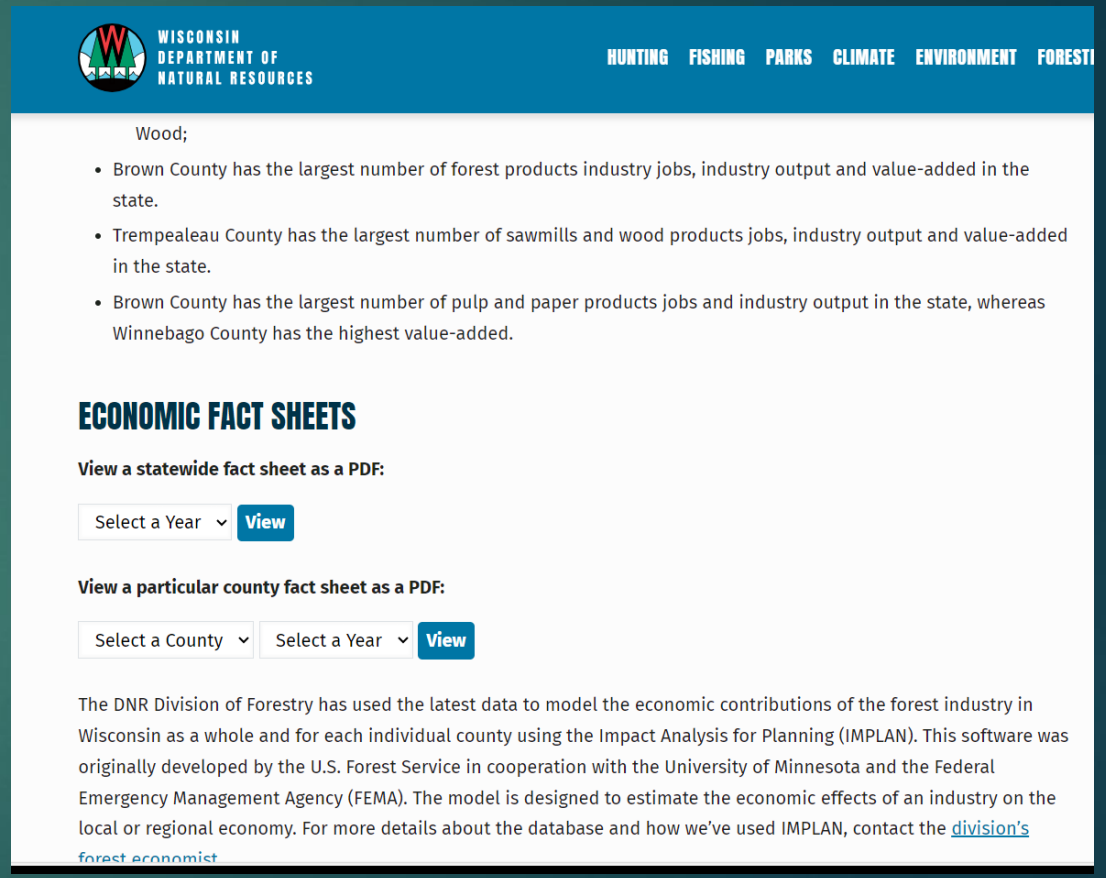
Activity	Direct		Indirect		Induced		Total Impacts	
	UP	LP	UP	LP	UP	LP	UP total	LP total
Employment	35	35	29	39	29	27	93	101
Labor Income	1.39	1.63	1.44	2.63	0.46	1.26	3.29	5.52
Total Value Added	1.49	1.73	1.75	3.26	0.84	2.19	4.08	7.18
Total Output	5.78	5.78	5.15	7.50	1.59	3.77	12.52	17.05

Resources available

- Forest products industry economic contribution
  - Two-page factsheets
  - Detail State report







Available at DNR website (https://dnr.wisconsin.gov/topic/forestbusinesses/factsheets)

CONNECT WITH US

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