University of Idaho
College of Natural Resources

A NETWORK ANALYSIS TO IDENTIFY HOTSPOTS IN WHICH FOREST PRODUCT MERCHANTABILITY IS LIMITED ACROSS THE UNITED STATES

RAJU POKHAREL AND GREG LATTA

POLICY ANALYST GROUP
UNIVERSITY OF IDAHO

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BACKGROUND

- Forestland in the U.S.
  - 766 million acres (2012), or 33 % of total land.
  - 56% private (42% family, 14% corporate), 44% public ownerships
    - West -30% private 70% public forests
    - East 81% private 19% public
- Primary forest product manufacturing facilities (mills
  - 3340+ facilities
  - Supply of forest commodity depends on distance of forest from the facility, and the cost associated with its procurement.
  - Demand of forest commodity depends on type of mills, its proximity to the forest, and their processing capacity
- Supply chain logistics
  - Roads are primary haul preference

Figure 1. Volume Differences of the Same Weight Material by Different Product Types

Source: Oswalt, S.N., Smith, W.B., 2014. US forest resource facts and historical trends. US Dept. of Agriculture, Forest Service, Washington, DC, DC.

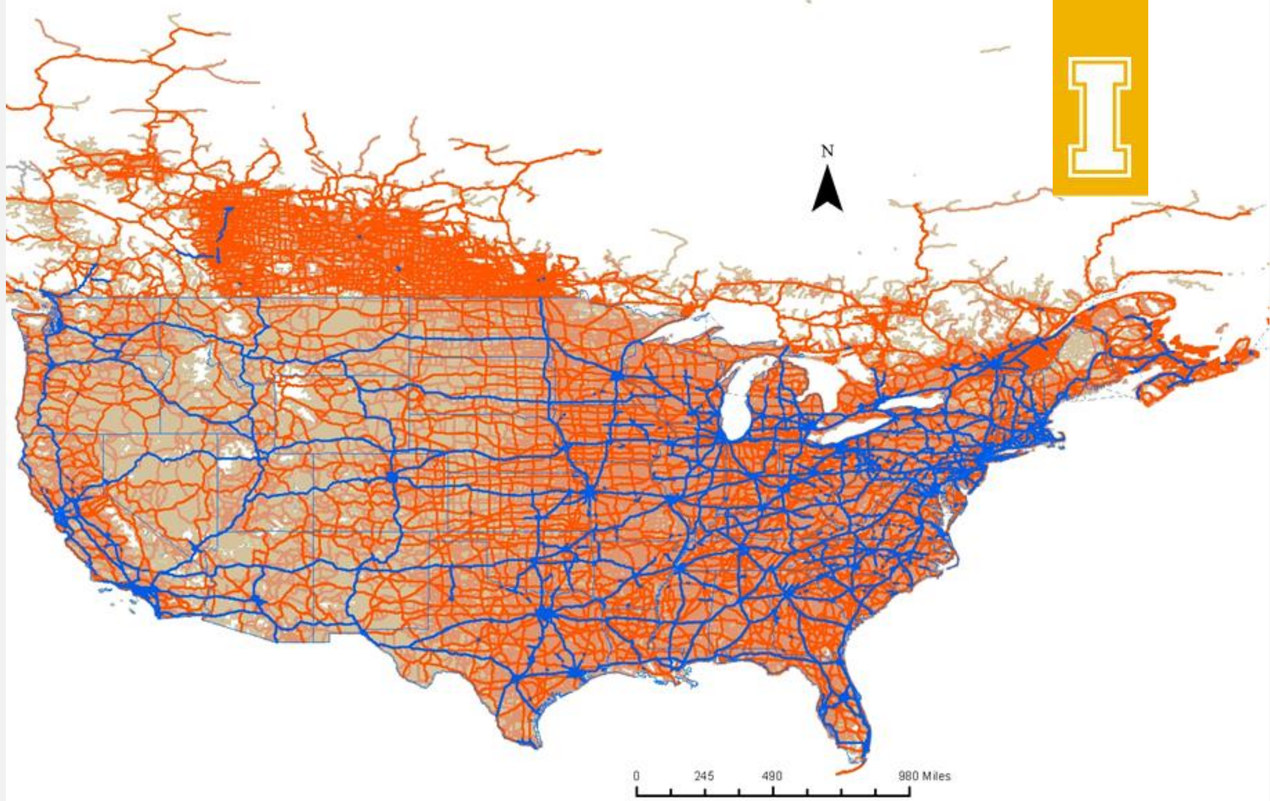
OBJECTIVE

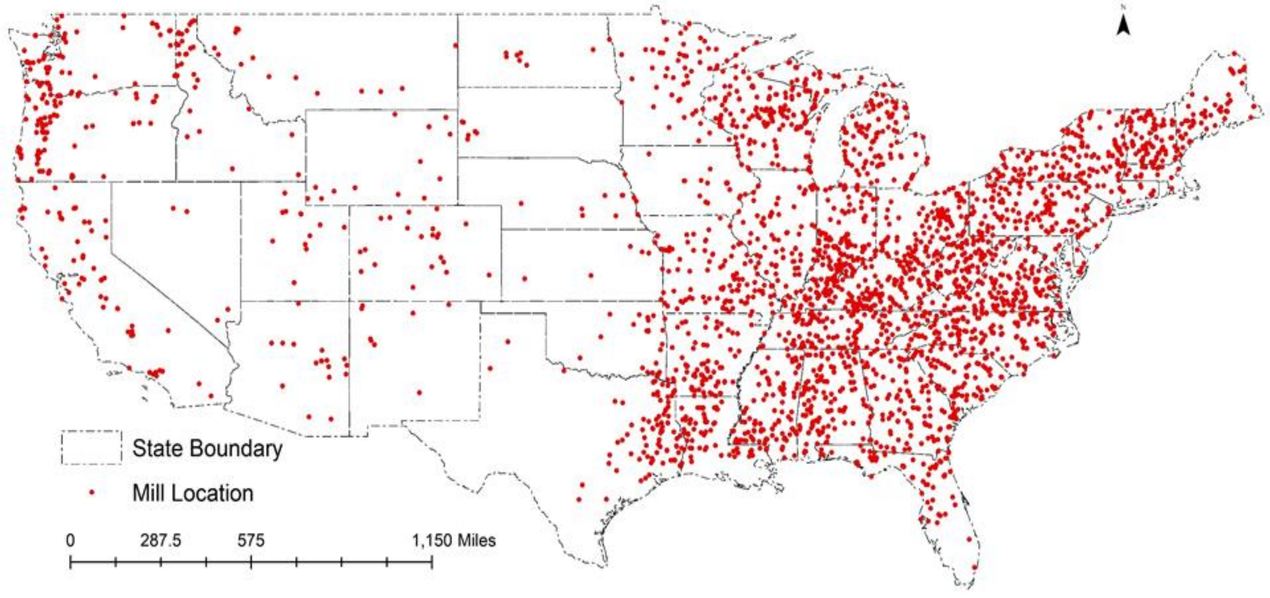
- To define the service area around forest product manufacturing facilities.

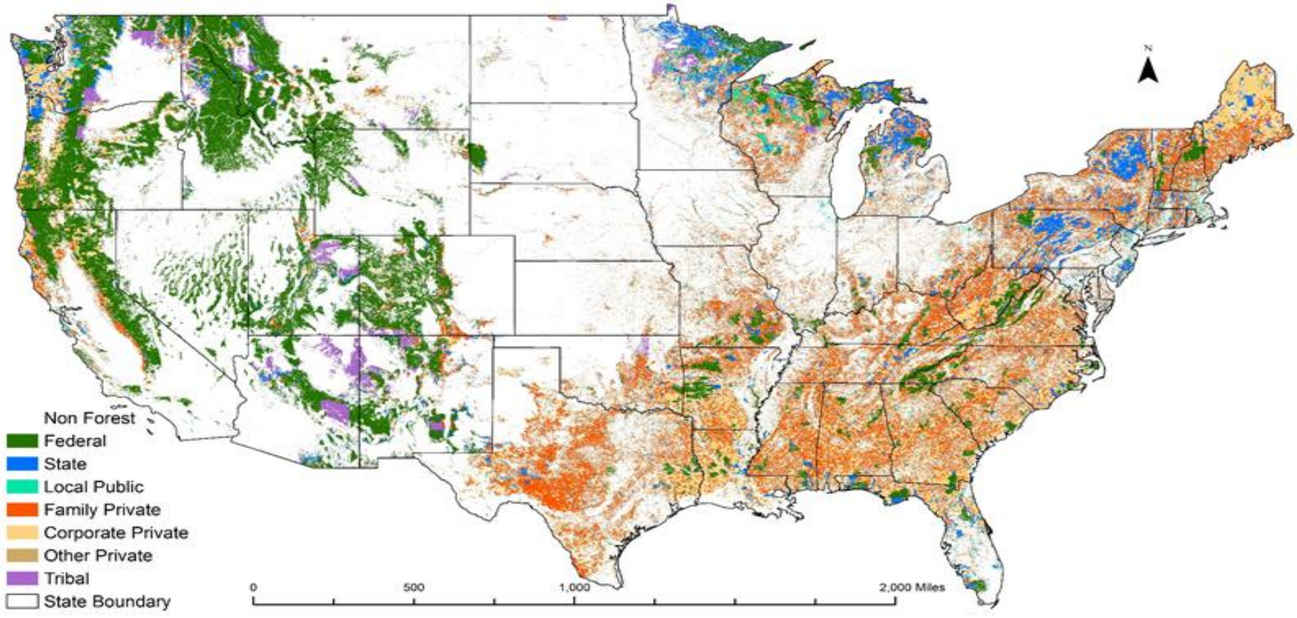
- To identify hotspots where merchantability of forest commodity is limited.

METHODS DATA

- Primary Forest product manufacturing facilities
- Forest Ownerships
- Road networks
  (Interstates, Highways, Local roads, minor roads, forest roads, and other roads)



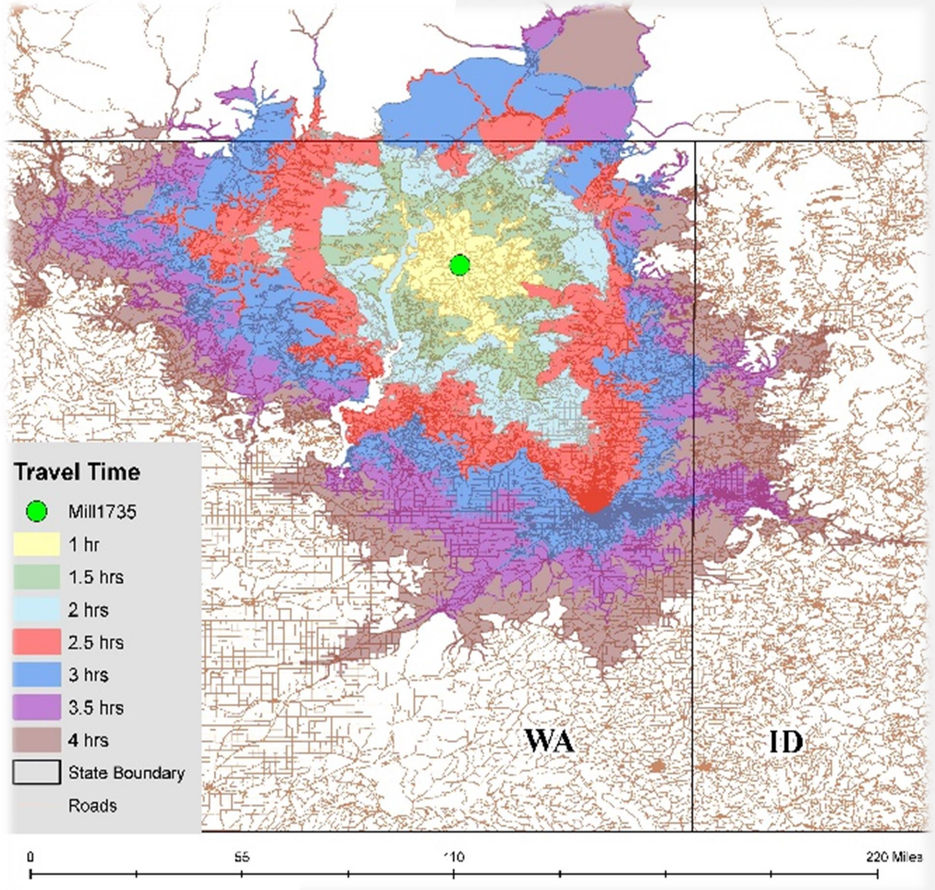




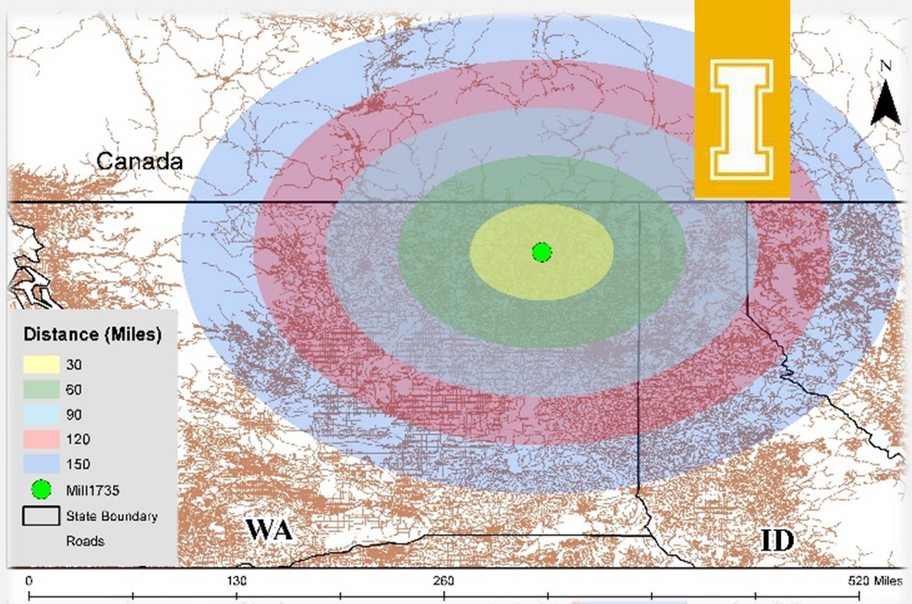
METHODS

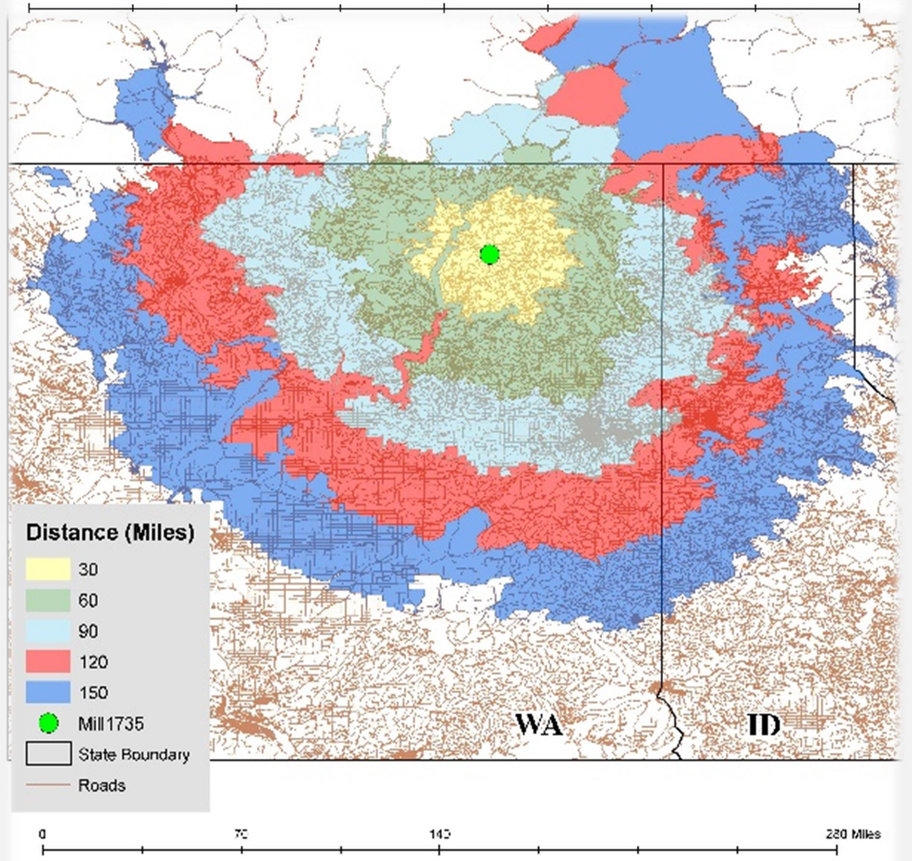
SERVICE AREA

- ArcGIS Network Analysis
- Routes optimization between two points travelling in the existing roads.
- Area around the mills that can be reached traveling on the existing roads



- Aerial distances overpredicts the service area around the mill
- Service area using distance is more accurate than aerial distances
- Service area using time is the most accurate since it takes speed limits and road conditions into account.





FOREST COMMODITIES

Demands of commodity based on final products

HW Lumber and plywood = HW logs
SW Lumber and plywood = SW logs
Pulp, paper and , boards = Chips
Bioenergy and pellets = Bioenergy

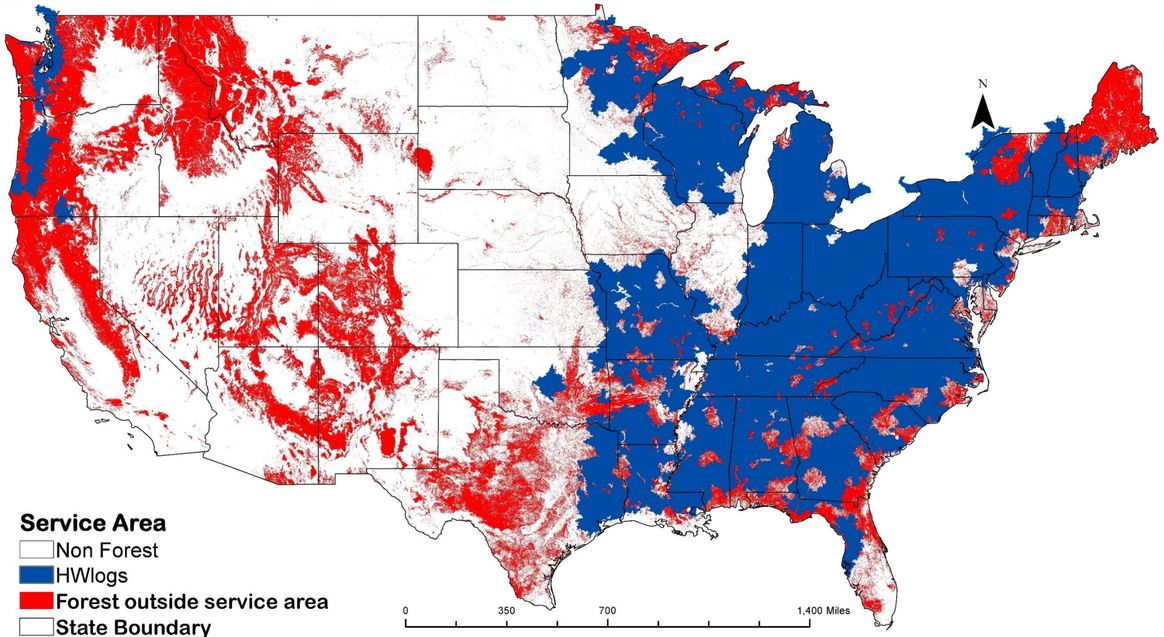
www. trucknews.com

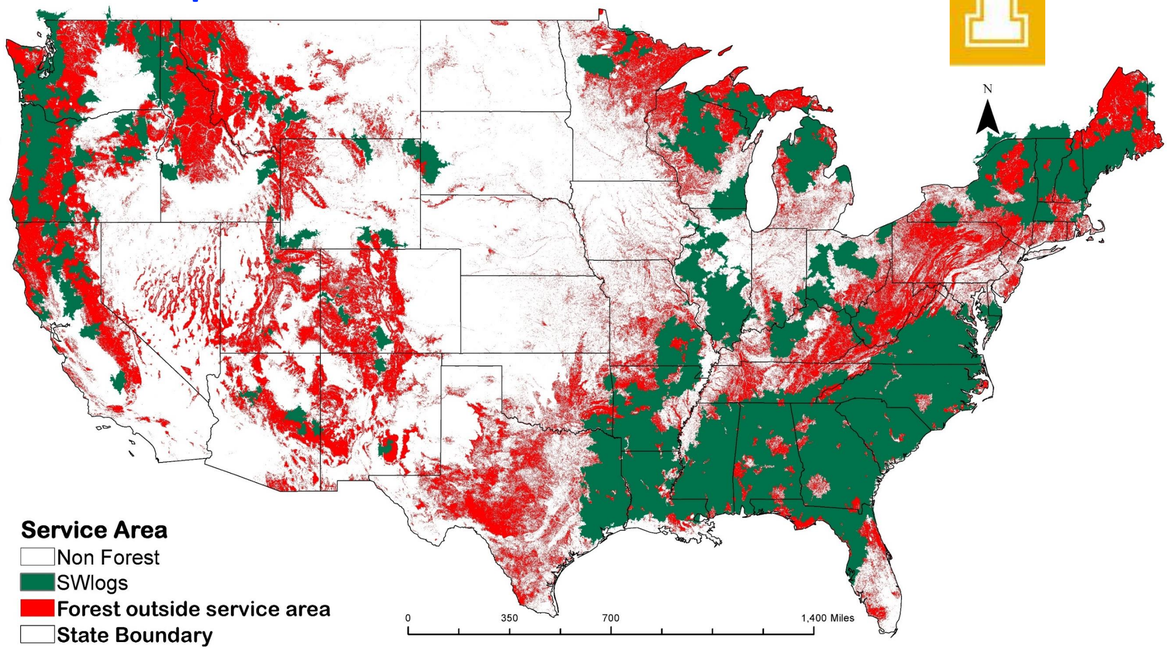
Photos: www.cbi-inc.com

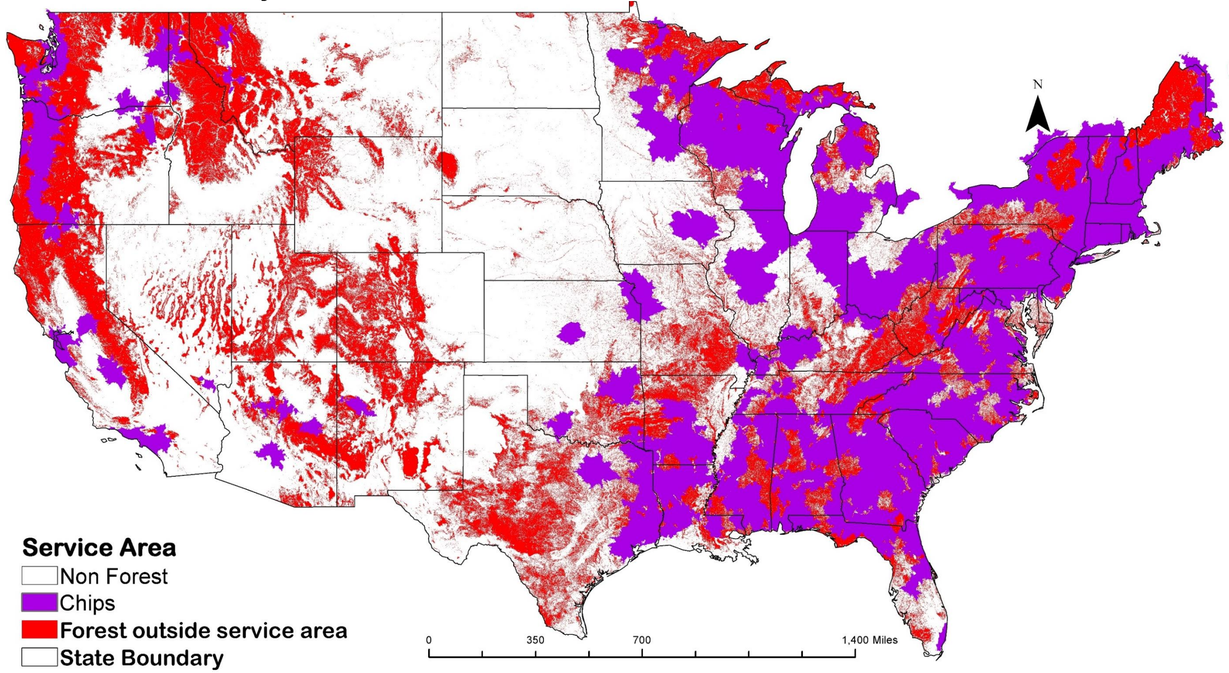
biomassmagazine.com

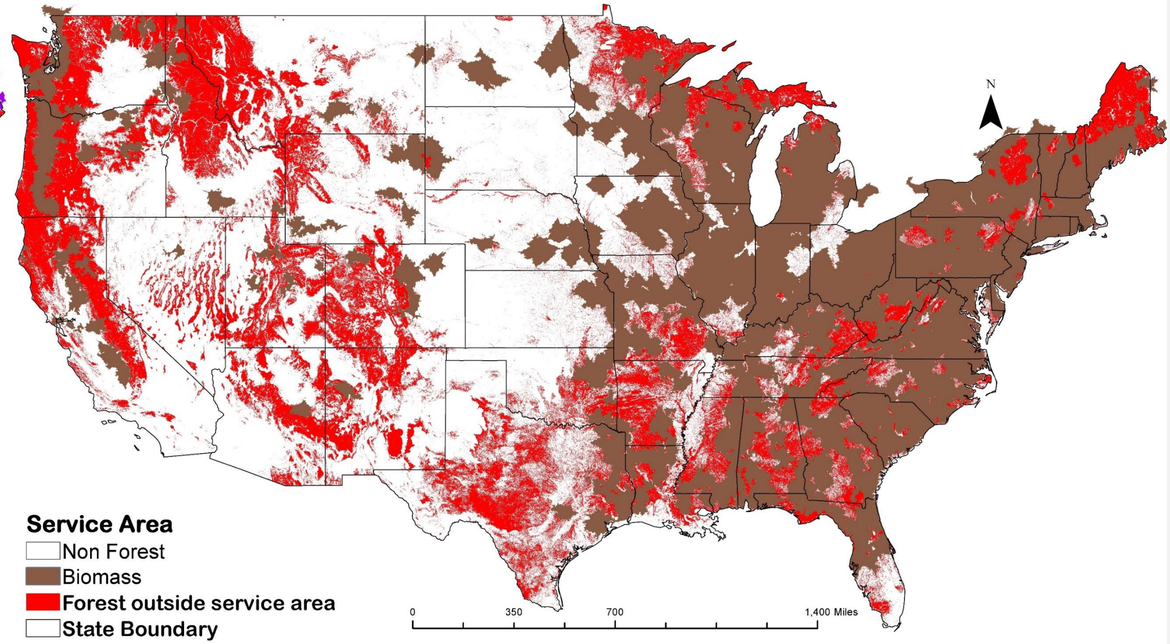
Photos:
www.lippel.com.br

RESULTS SERVICE AREA 2 hours round trip

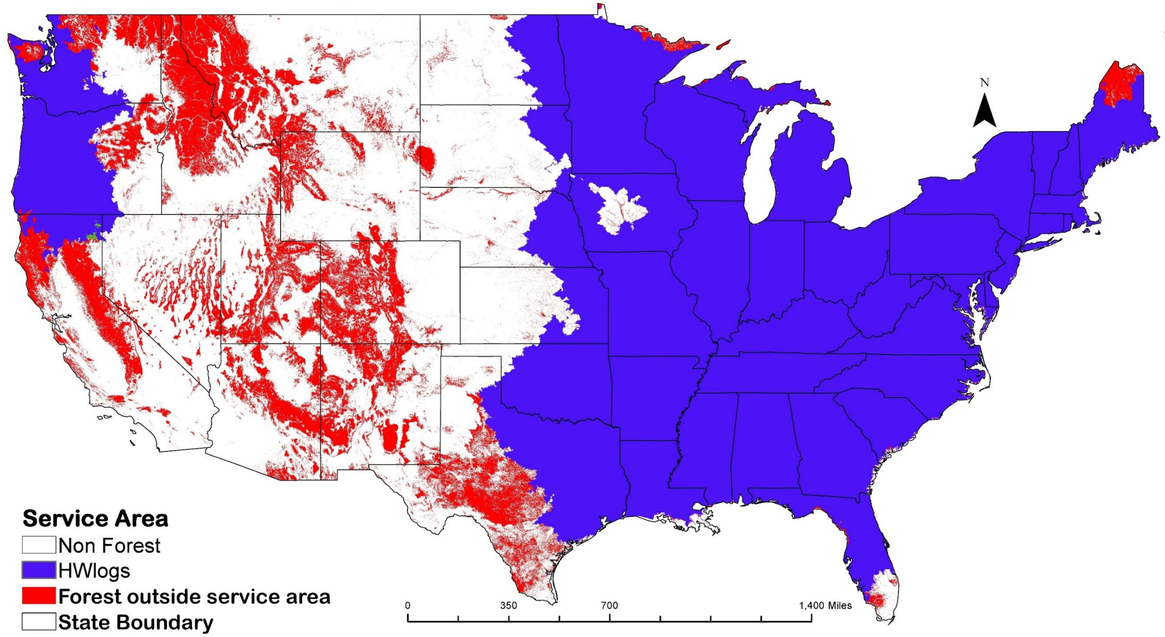


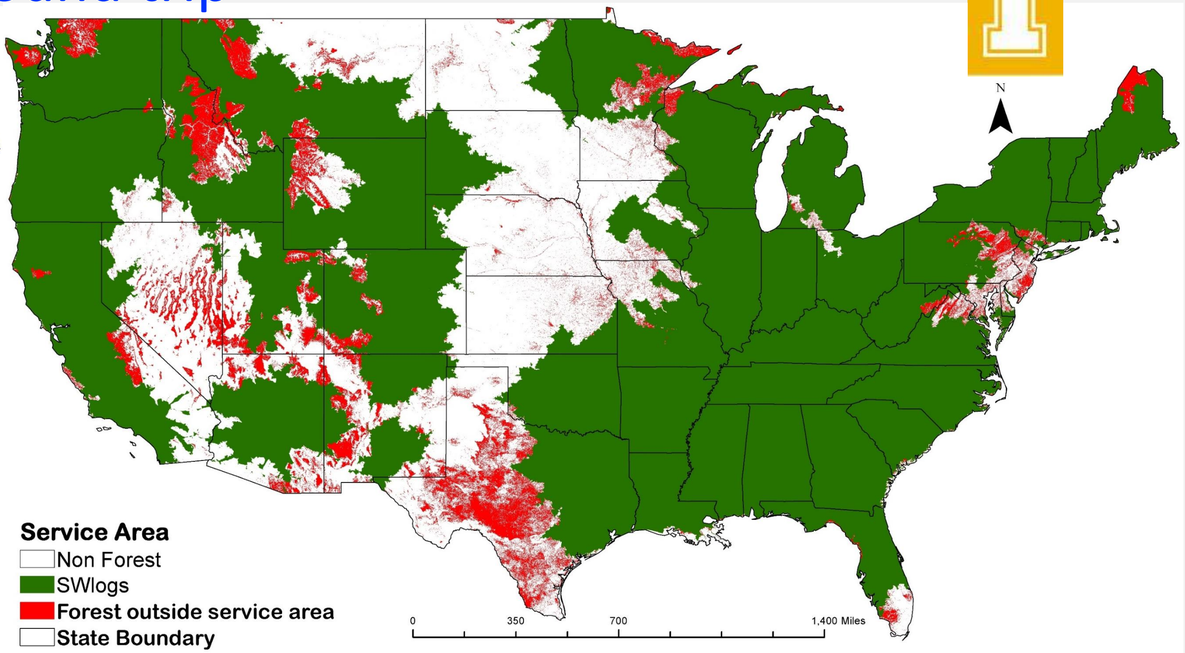


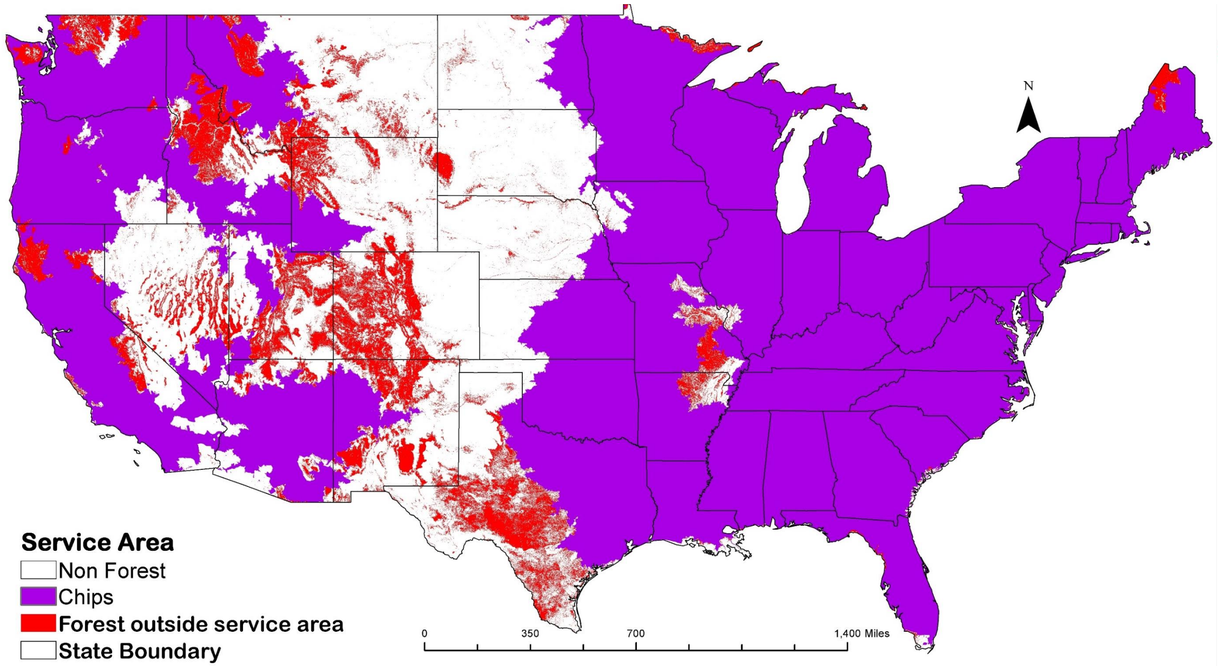


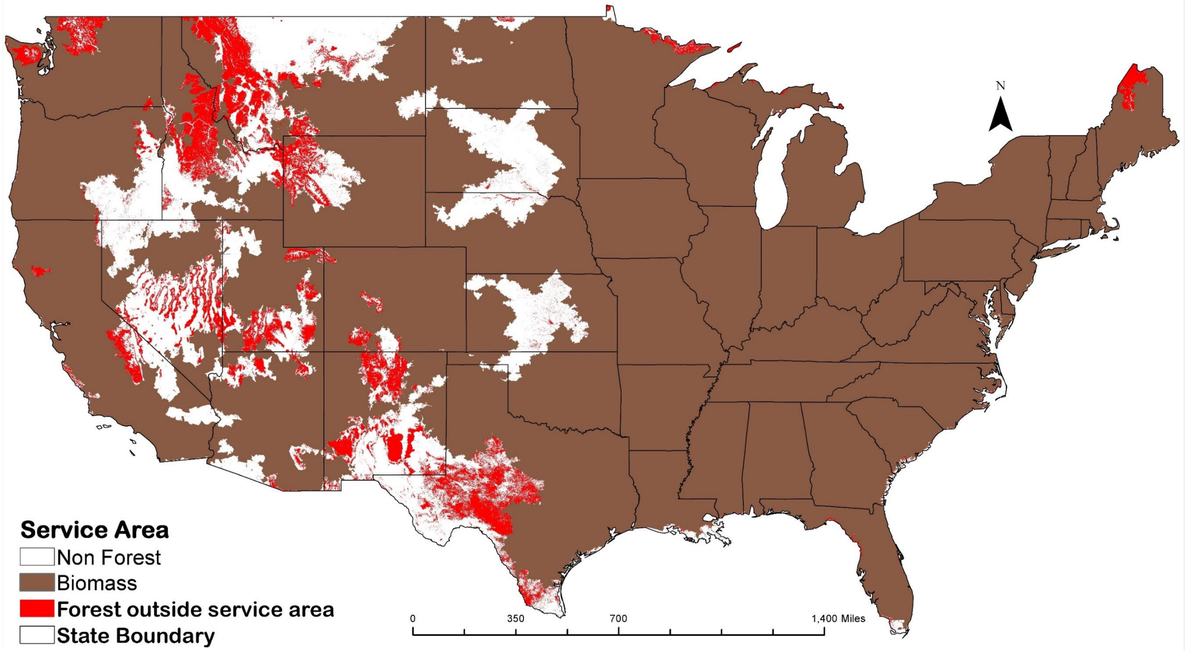


RESULTS SERVICE AREA 6 hours round trip









MERCHANTABILITY INDEX

Merchantability Index for forest commodity

Commodity	Index Value
Softwood Logs –	3
Hardwood Logs –	3
Chips –	2
Bioenergy feedstocks –	1


Photo: Elstafor

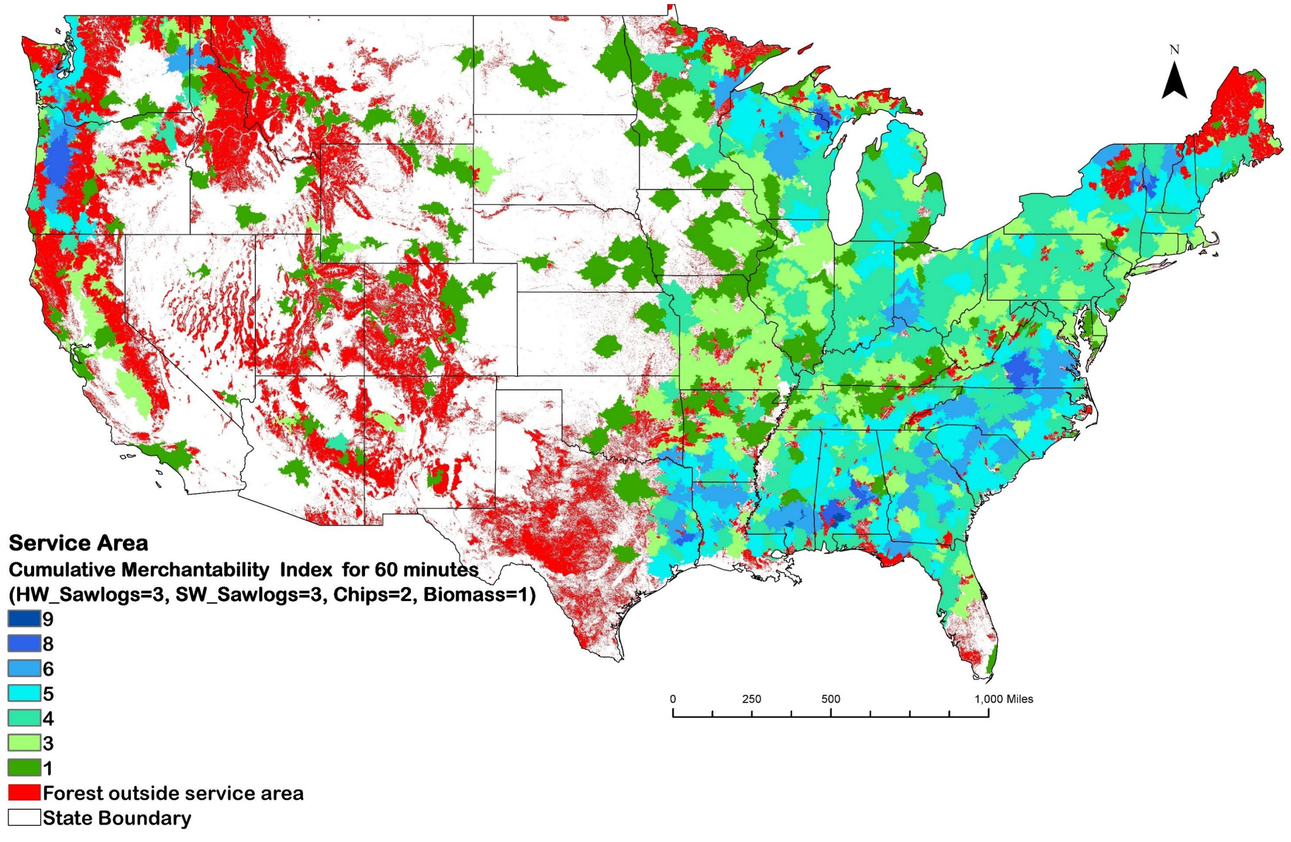
Photo: The Clun Log Company

MERCHANTABILITY INDEX

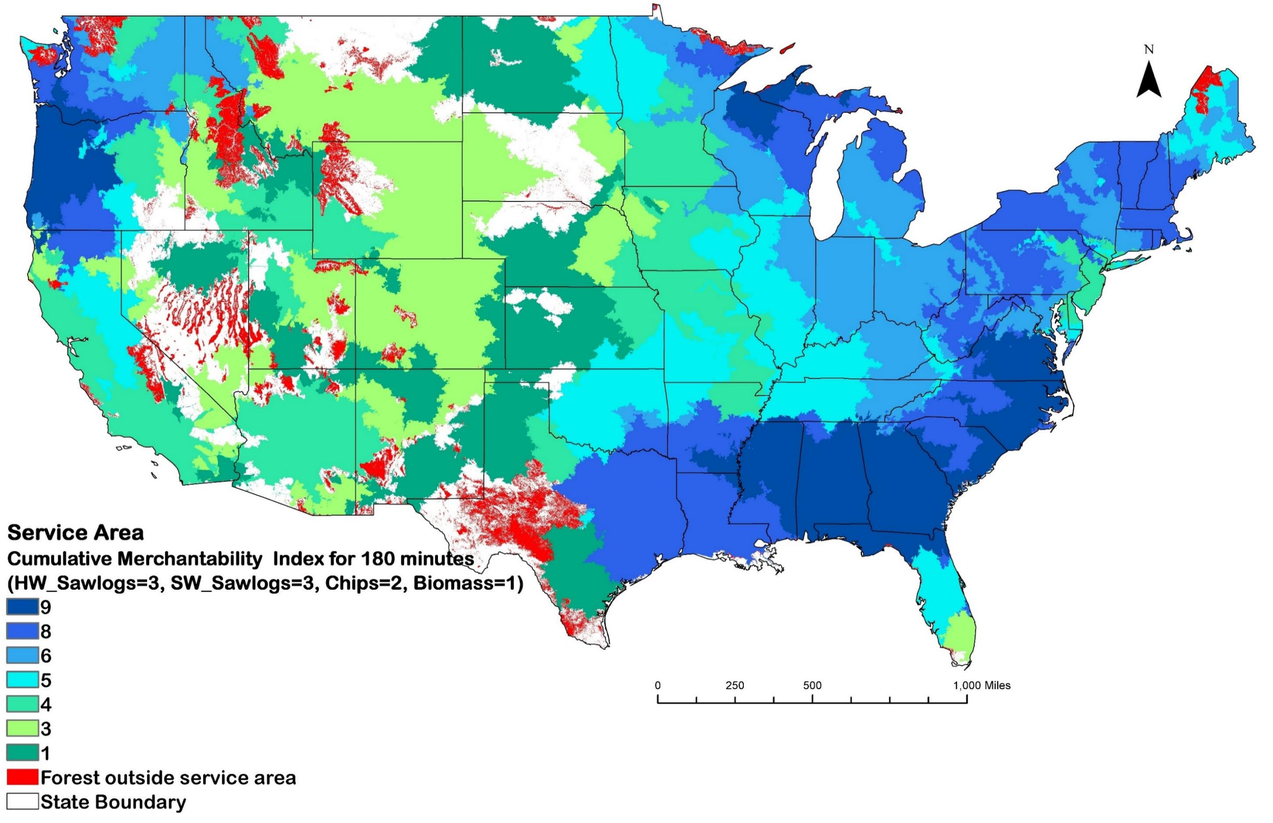
Cumulative Merchantability Index (CMI)	Merchantability of forest commodities			
	Hardwood logs	Softwood logs	Chips	Biomass
0	-	-	-	-
1	-	-	-	Yes
3	Yes	-	-	-
3	-	Yes	-	-
3	-	-	Yes	Yes
4	Yes	-	-	Yes
4	-	Yes	-	Yes
5	Yes	-	Yes	-
5	-	Yes	Yes	-
6	Yes	Yes	-	-
6	Yes	-	Yes	Yes
6	-	Yes	Yes	Yes
8	Yes	Yes	Yes	-
9	Yes	Yes	Yes	Yes

RESULTS MERCHANTABILITY INDEX

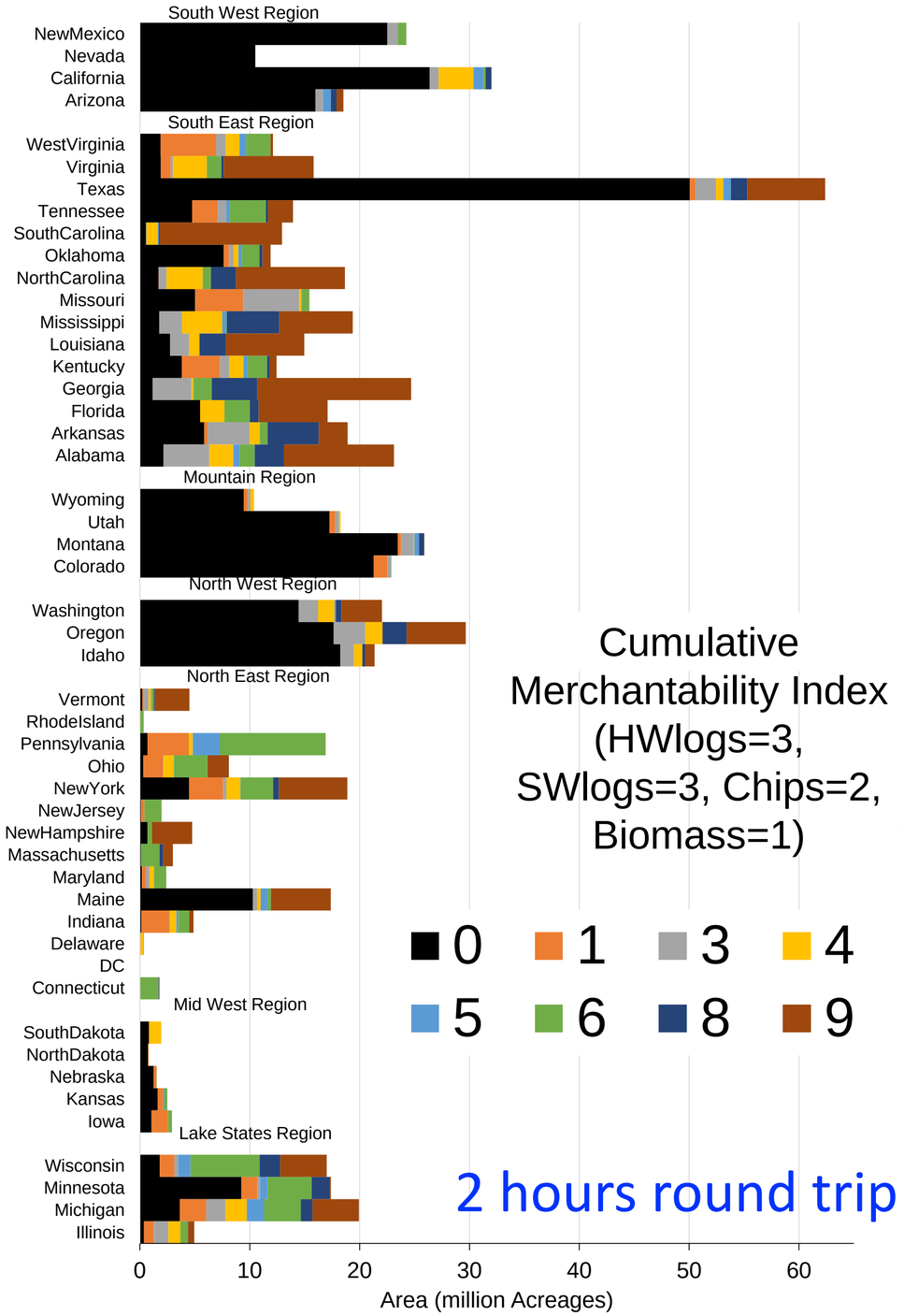
2 hours round trip



6 hours round trip



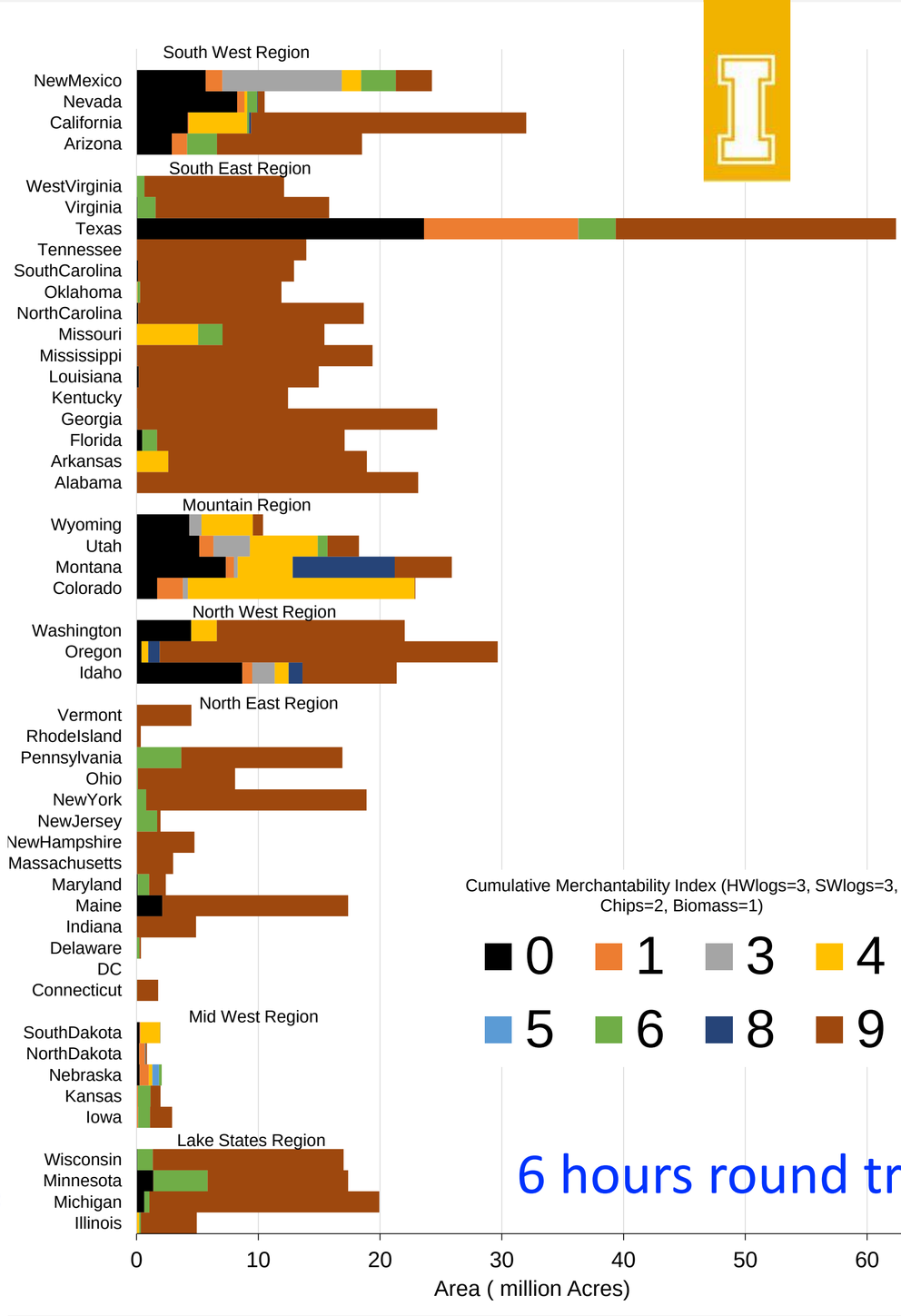
RESULTS



Cumulative Merchantability Index (HWlogs=3, SWlogs=3, Chips=2, Biomass=1)

0 1 3 4 5 6 8 9

2 hours round trip



Cumulative Merchantability Index (HWlogs=3, SWlogs=3, Chips=2, Biomass=1)

0 1 3 4 5 6 8 9

6 hours round tr

CONCLUSIONS

- At 2 hours round trips, common in transporting bioenergy feedstocks, plenty of forest areas had limited merchantability.
- Even at 6 hours round trips, mostly used for log transport, a significant area of forest had limited merchantability.
- Coastal Pacific northwest, northeast, and southern United States had better merchantability compared Midwest and southwest.
- Merchantability can improve with better-conditioned roads, and the addition of new facilities, and increasing haul time (if economically feasible)

ACKNOWLEDGEMENTS

- Bruce Godfrey
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Questions

Source: AlisonMayerPhotography.com