Producer Interest In Supplying Corn Stover Biomass:

South East Minnesota Findings

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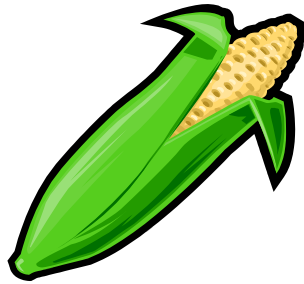
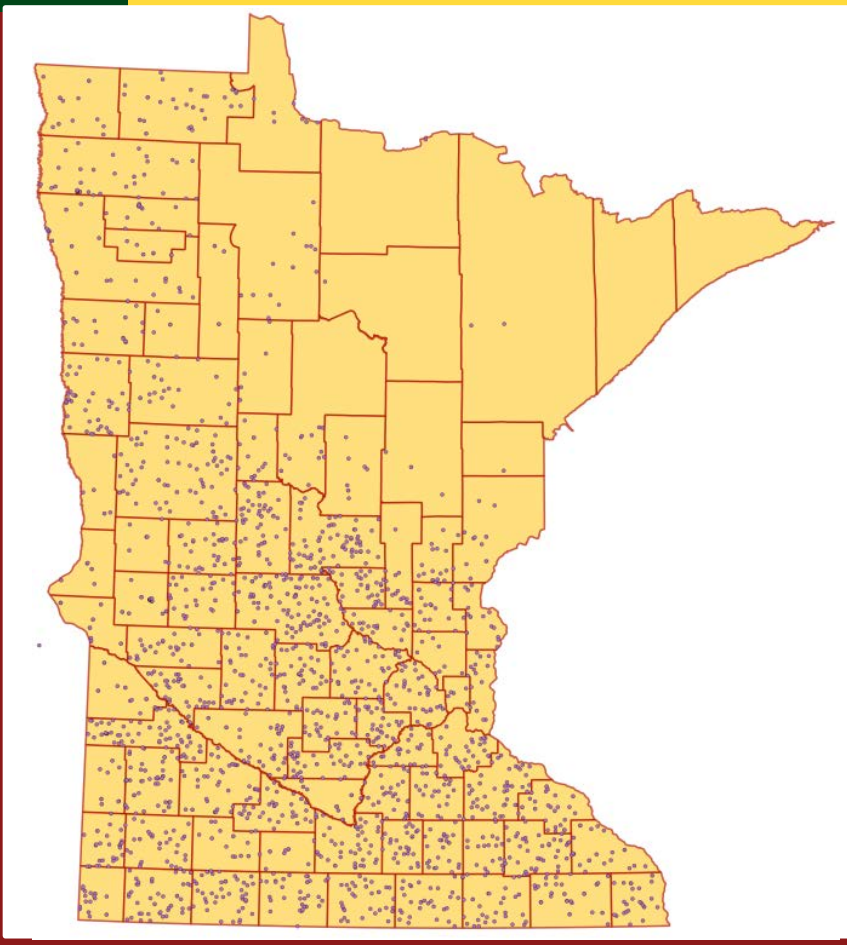
UNIVERSITY OF MINNESOTA

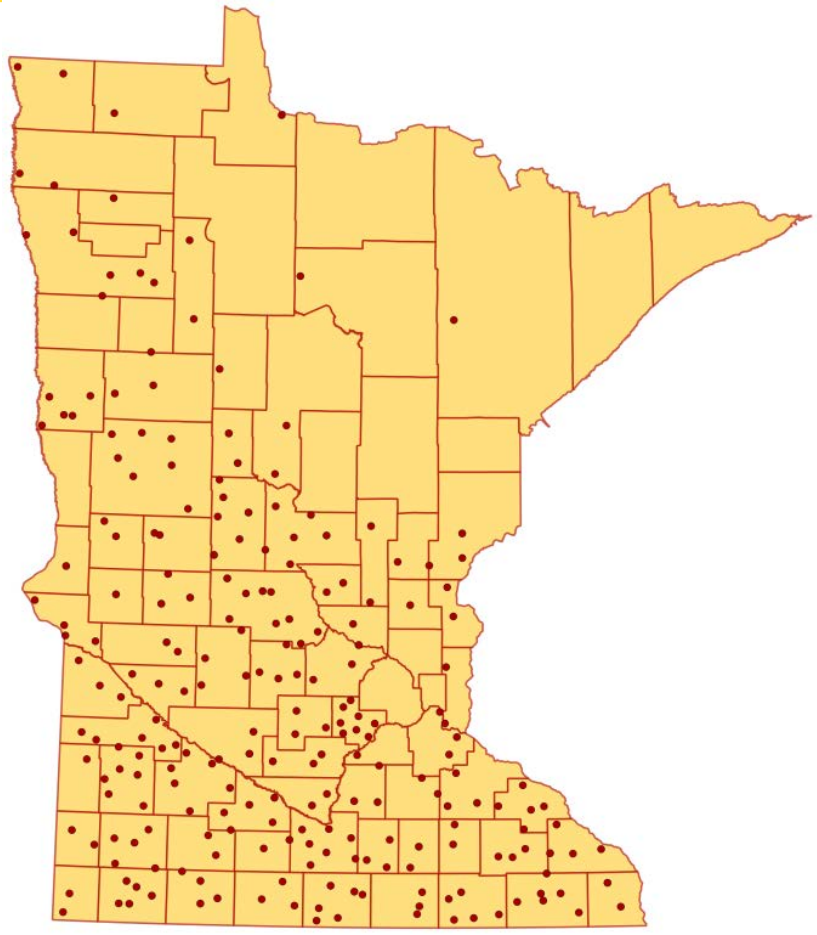


Agricultural Biomass

- Wide variety of uses
  - Cellulosic ethanol, heat, bioplastics
- USDA predicted high biomass availability
- Less farmer interest than predicted
- My work looked into farmer interest
  - How much interest (primarily in corn stover)
  - Factors influencing interest
  - What that meant for biomass availability

Part I: Producer Survey

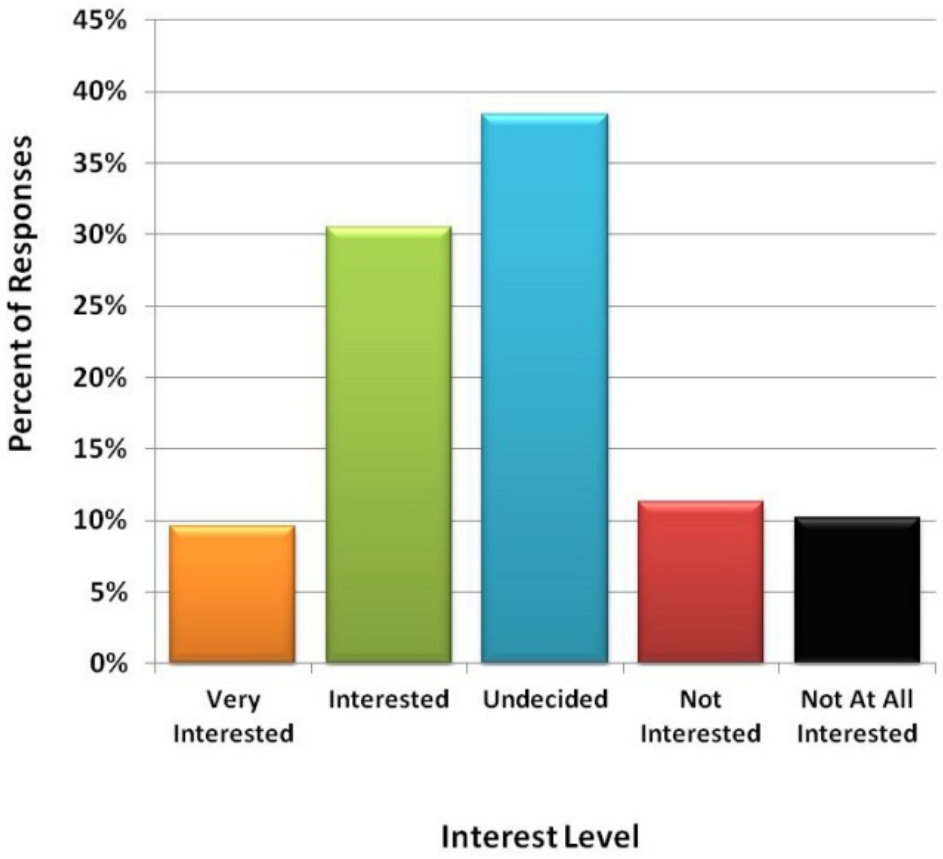




14.5 % response rate

Producer Participation Interest

Primary Question:
…. would you be interested in selling biomass ……?



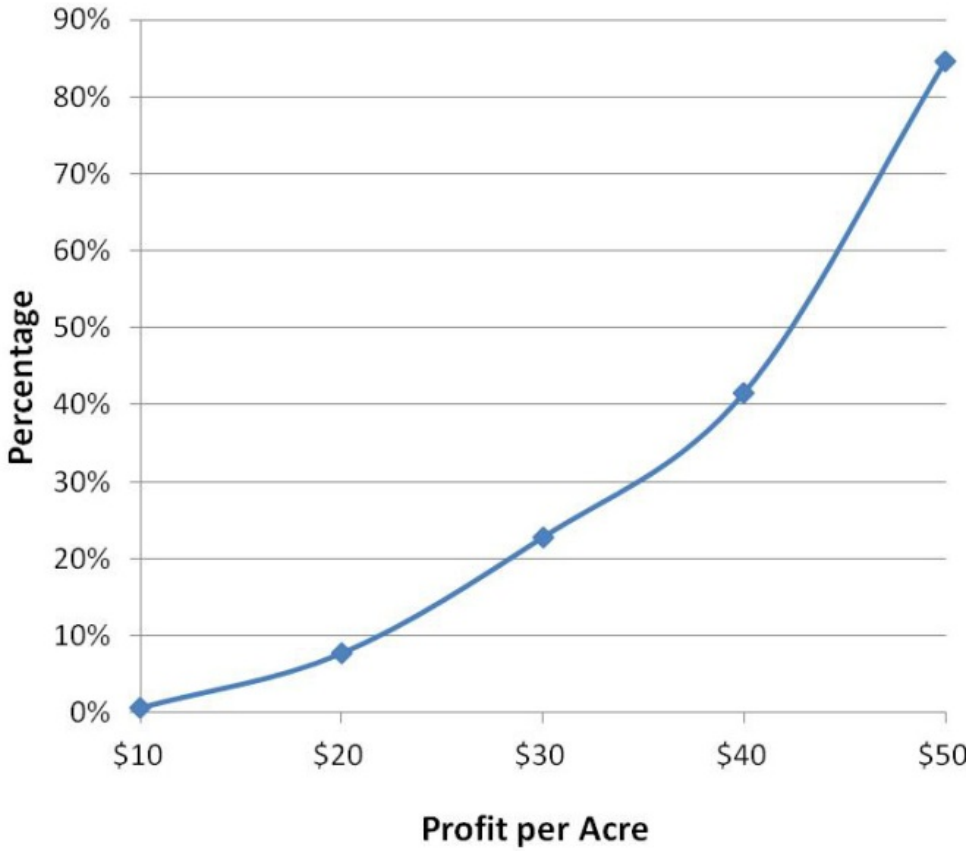
Influence of the Different Factors

	Factor	gamma	Sign.
Associated With **Increased** Interest	Added Income	0.34	Yes
	Added Jobs	0.28	Yes
	Ability To Sell On Contract	0.22	Yes
	Improved Planting	0.17	Yes
	Weather/timing	0.01	No
	Land Rental Agreements	-0.03	No
	Extra Labor	-0.09	No
	Extra Time	-0.13	No
	Equipment Maintenance	-0.13	No
Associated with **Decreased** Interest	Nutrient replacement	-0.20	Yes
	Maintaining Soil Quality	-0.38	Yes

Economic Considerations

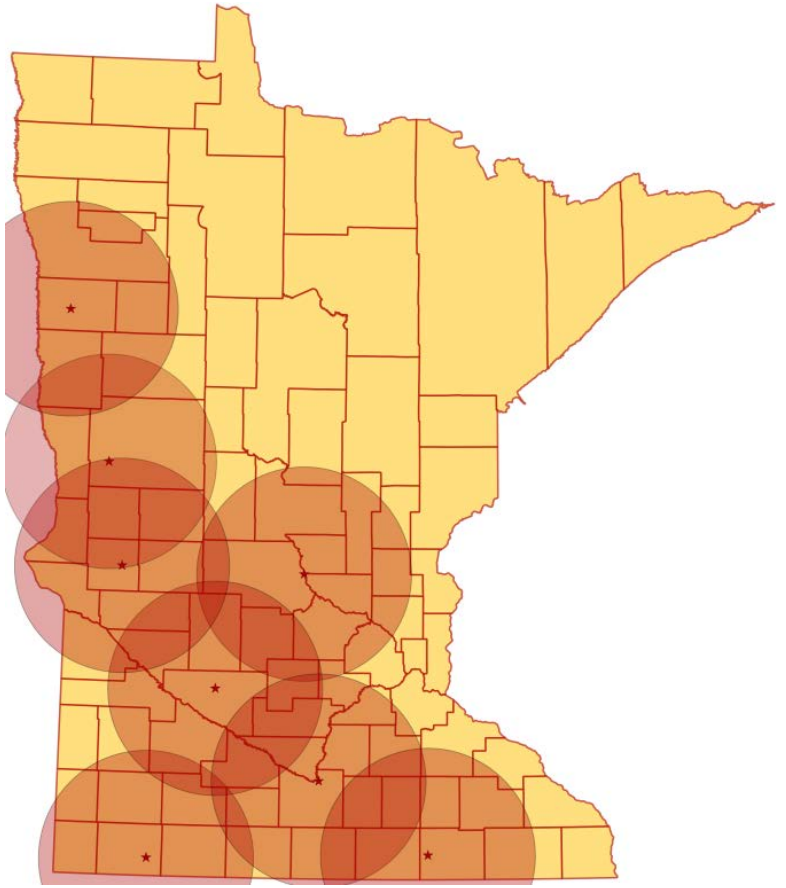
Question:

After paying all costs, at what profit level would you consider selling biomass from your croplands (assuming current grain prices)?



Part 2: Biomass Mapping

- Selected county seats
  - Had rail access
  - Along state highway
  - Typically had industry
  - Typically high population
- Factors Considered
  - Producer Interest
  - Biomass Yields
  - Conservation

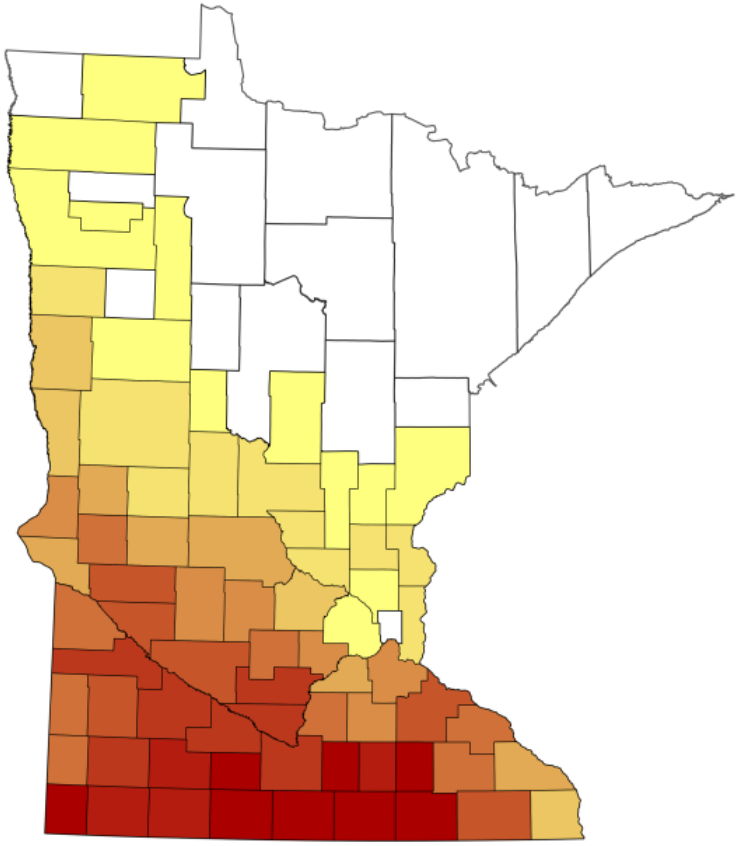


Where should I build my biomass plant?

Statewide Biomass Production Map

County Corn Stover Production Density.

Density of biomass production in each county calculated by taking total county production and dividing by the size in acres of the entire county. Counties with no or extremely limited corn production colored in white.

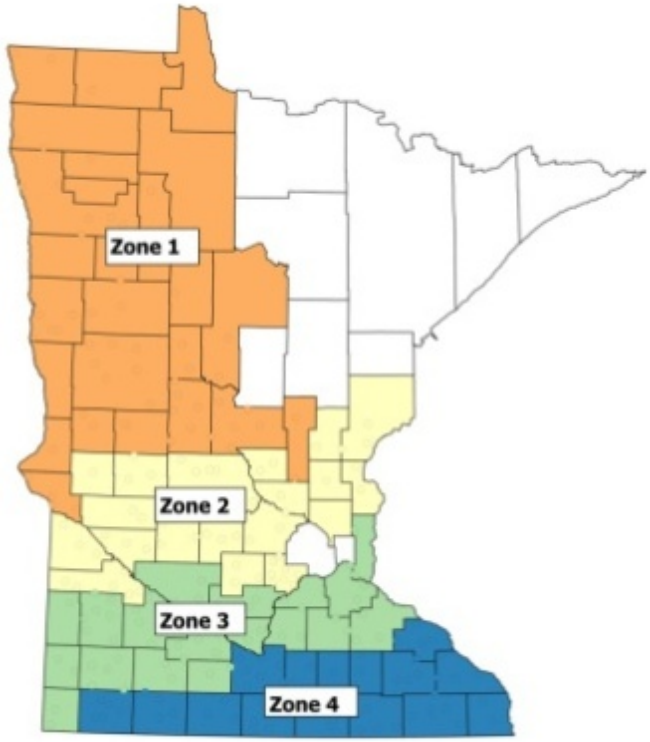


Legend

Countywide Tons Per Acre

- 0.0106 - 0.2505
- 0.2505 - 0.4903
- 0.4903 - 0.7301
- 0.7301 - 0.9700
- 0.9700 - 1.2098
- 1.2098 - 1.4496
- 1.4496 - 1.6895
- 1.6895 - 1.9293
- 1.9293 - 2.1692
- 2.1692 - 2.4090

Regional Variation in Interest



Interest Varied by region

- Northern areas were higher
- Southern regions lower

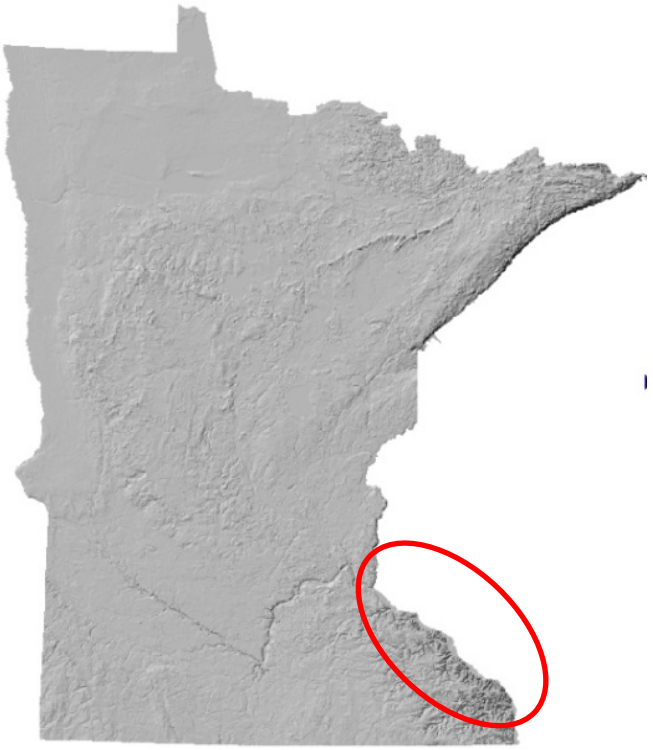
Likely due to economics

- Grain profits lower in Zone 1
- Based on lower yield

Important Conservation Concerns

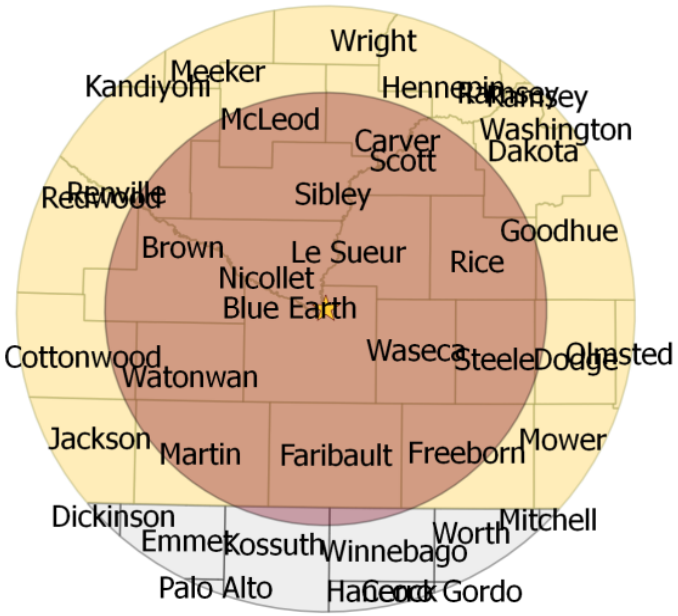
- Erosion
- Soil Carbon
- Soil Nutrients

There is not yet a firm consensus on the best method to account for soil conservation in biomass availability models. Soils, slopes, and yield variations make predictions very complex.



Area is SE Minnesota where erosion is an important concern

Mankato Region (70 Mile Radius)

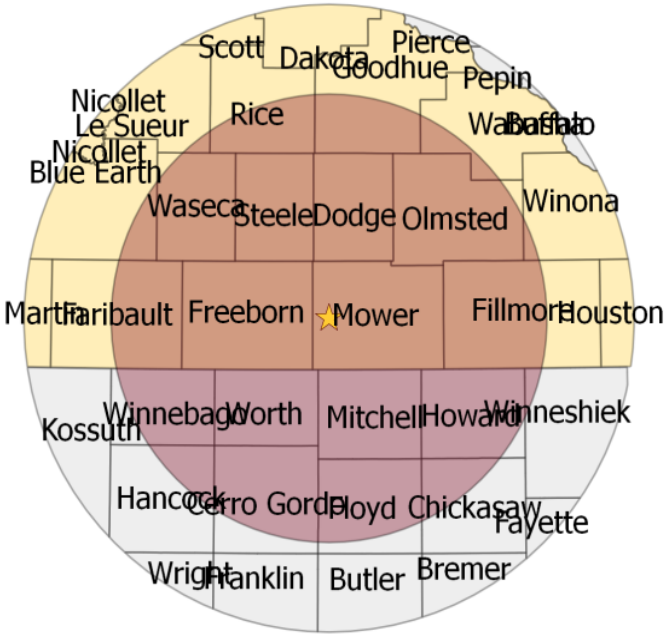


Not All Counties Shown

Minnesota County	Area in Radius	Harvested Corn Acres	Corn Yield bu/acre	Total Stover Produced
Blue Earth	489,753	194,600	172.1	937,738
Brown	395,605	157,300	164.2	723,202
Carver	240,517	55,900	154.8	242,293
Cottonwood	358,391	151,205	165.7	701,532
Dakota	360,930	81,812	175.6	402,255
Dodge	281,161	121,400	183.2	622,733
Faribault	461,735	217,000	175.1	1,063,908
Freeborn	461,958	201,500	180.2	1,016,688
Goodhue	320,121	99,598	178.5	497,793
Sibley	384,225	153,500	159.1	683,812
Steele	276,423	115,000	170.5	549,010
Waseca	276,915	121,000	177.5	601,370
Washington	17,465	1,355	178.4	6,767
Watonwan	281,331	135,600	178.5	677,729
Wright	209,022	33,341	145.6	135,927
	8,683,245	3,155,038		14,751,041

Where should I build my biomass plant?

Austin Region (50 Mile Radius data)



Not All Counties Shown

Minnesota County	Area in Radius	Harvested Corn Acres	Corn Yield bu/acre	Total Stover Produced
Goodhue	184,258	57,328	178.5	286,524
Wabasha	54,435	13,585	181.3	68,962
Freeborn	461,958	201,500	180.2	1,016,688
Mower	455,011	205,000	178.1	1,022,294
Le Sueur	10,416	3,175	159.2	14,151
Rice	156,186	41,985	159.8	187,857
Waseca	265,743	116,118	177.5	577,108
	3,218,843	**1,244,449**		**6,193,375**
Border States				
Cerro Gordo	288,966	144,485	169	683,701
Hancock	77,509	42,405	179	212,531
Mitchell	300,282	155,000	180	781,200
Winnebago	209,720	105,141	176	518,134
Winneshiek	15,049	5,028	186	26,188
	1,790,116	**858,147**		**4,274,700**
Grand Total	**5,008,959**	**2,102,596**		**10,468,075**

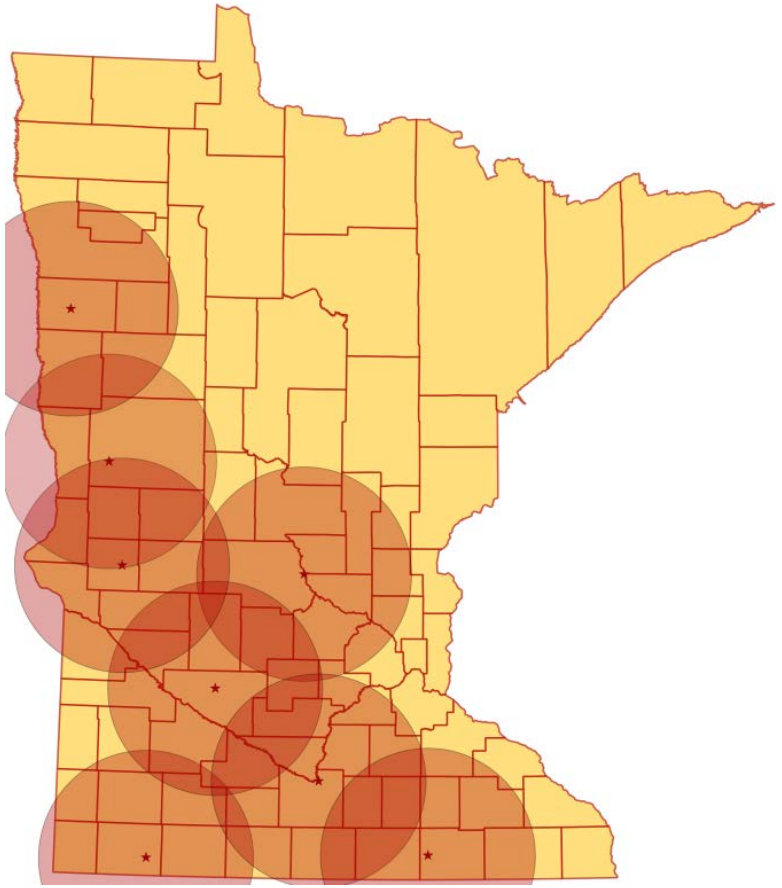
Available Biomass After Conservation

Low participation

Region	Purchasable Biomass (Tons)	
	50 miles	70 Miles
Mankato	1,754,101	3,631,057
Austin	1,915,134	3,354,402

High participation

Region	Purchasable Biomass (Tons)	
	50 miles	70 Miles
Mankato	2,631,151	5,091,374
Austin	3,064,006	5,433,641



Regional Conclusions

- There is a good deal of biomass
  - Conservation is very important
- Profitability is key for farmer interest
- Multiple facilities would need to consider possible competition in selecting a location

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