Frac Sand and Transportation

Transportation Impacts from Non-Metallic Mining in Wisconsin

Frac Sand and Transportation

The Economics of Sand

Supply

Frac Sand and Transportation

The Economics of Sand

Supply

Demand

Frac Sand and Transportation

The Economics of Sand

Supply

Logistics

Demand

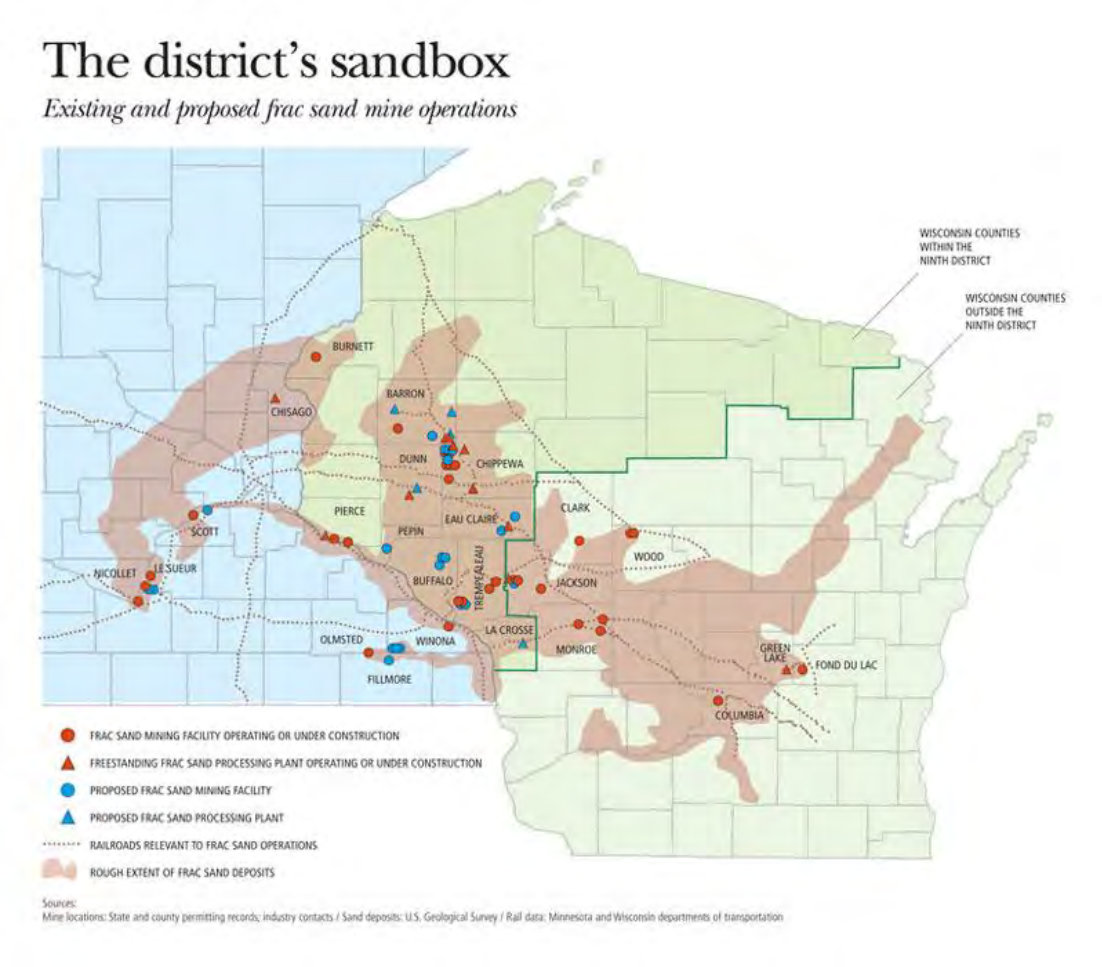
FRACTURE SAND – SUPPLY

Wisconsin is home to the "Gold Standard" of frac sand - "Northern White" - which has the ideal size, shape, strength, and purity for hydraulic fracture drilling.

FRACTURE SAND – SUPPLY

- Radius of 60 miles around Eau Claire is 'ground zero' for fracture sand mining worldwide.

- More than 100 mine and related facilities in operation or permit process of which 95% didn't exist 12-24 months ago.

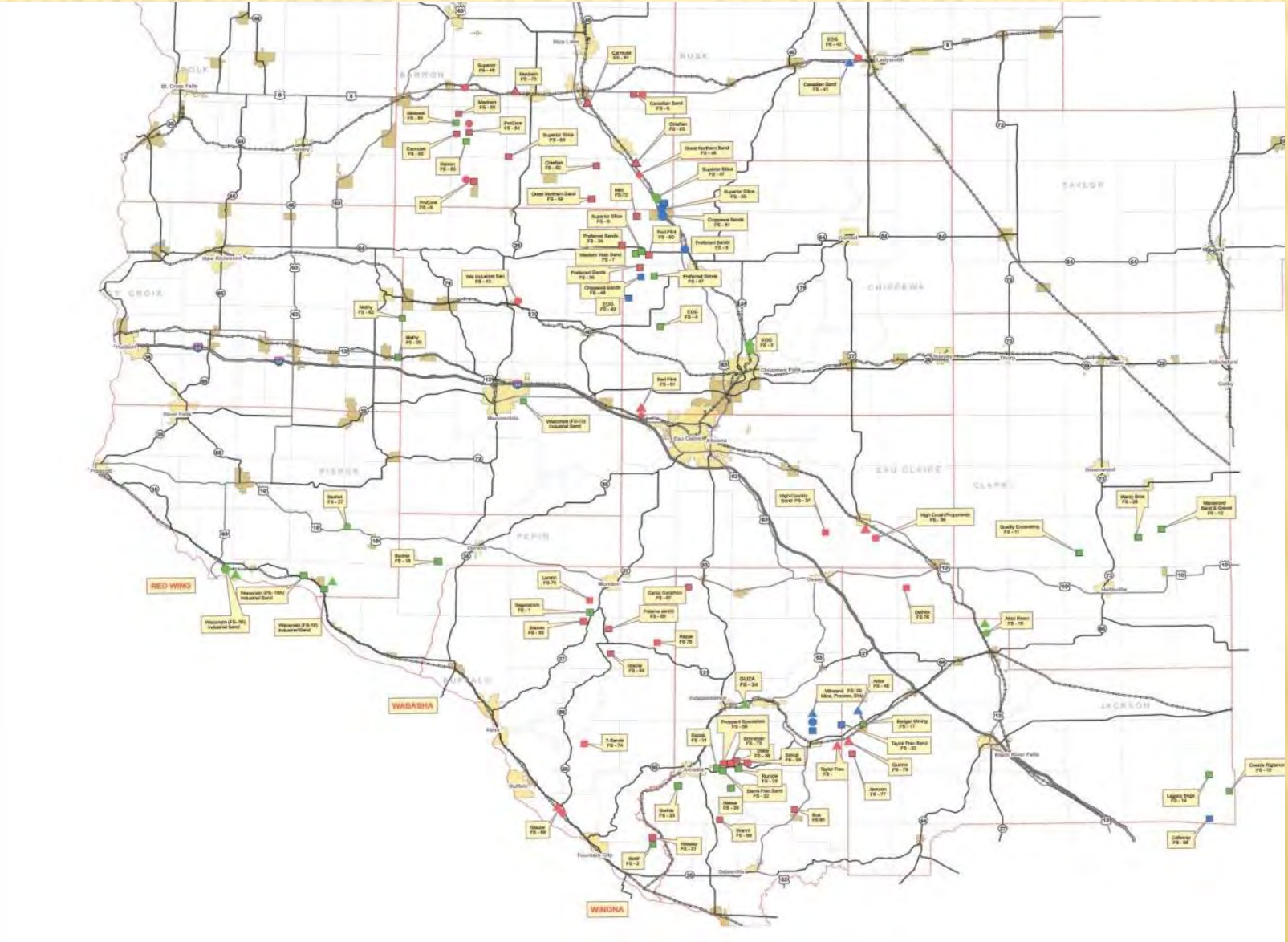


FRACTURE SAND – SUPPLY

US Production
2009 – 6.5 million tons
2010 – 13 million tons
2011 – 28 million tons

Analysts expect supply to increase by 15%/year for next three years

FRACTURE SAND – SUPPLY



FRACTURE SAND – SUPPLY

Superior Silica Mine, STH 64, Chippewa County

FRACTURE SAND – SUPPLY

EOG Mine, CTH B, Chippewa County

FRACTURE SAND – SUPPLY/LOGISTICS

Chieftain Sands Loadout Facility, USH 53, Barron County

FRACTURE SAND – SUPPLY/LOGISTICS

Chieftain Sands/Great Northern Sands Loadout Facilities, USH 53, Barron County

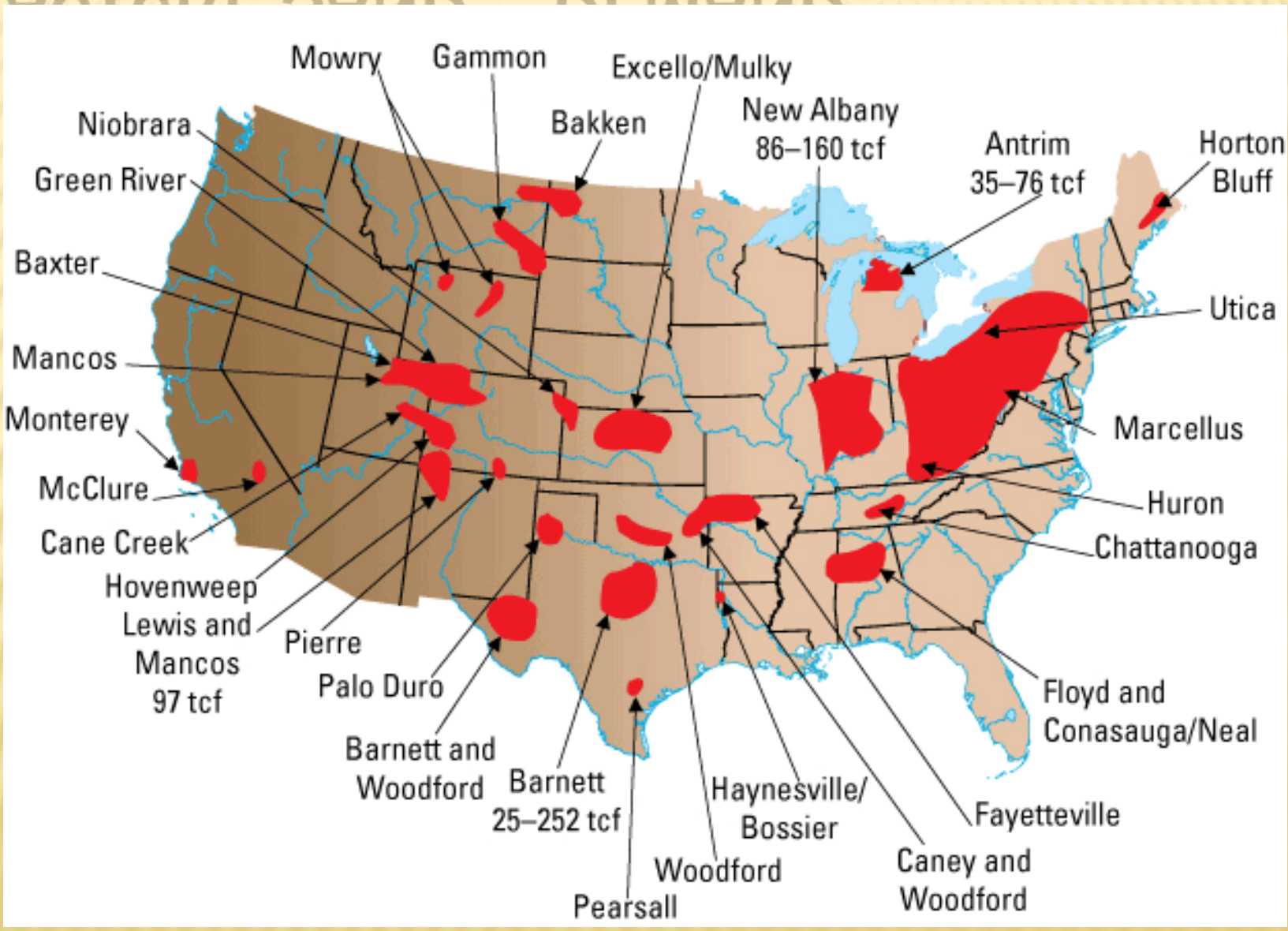
FRACTURE SAND – SUPPLY

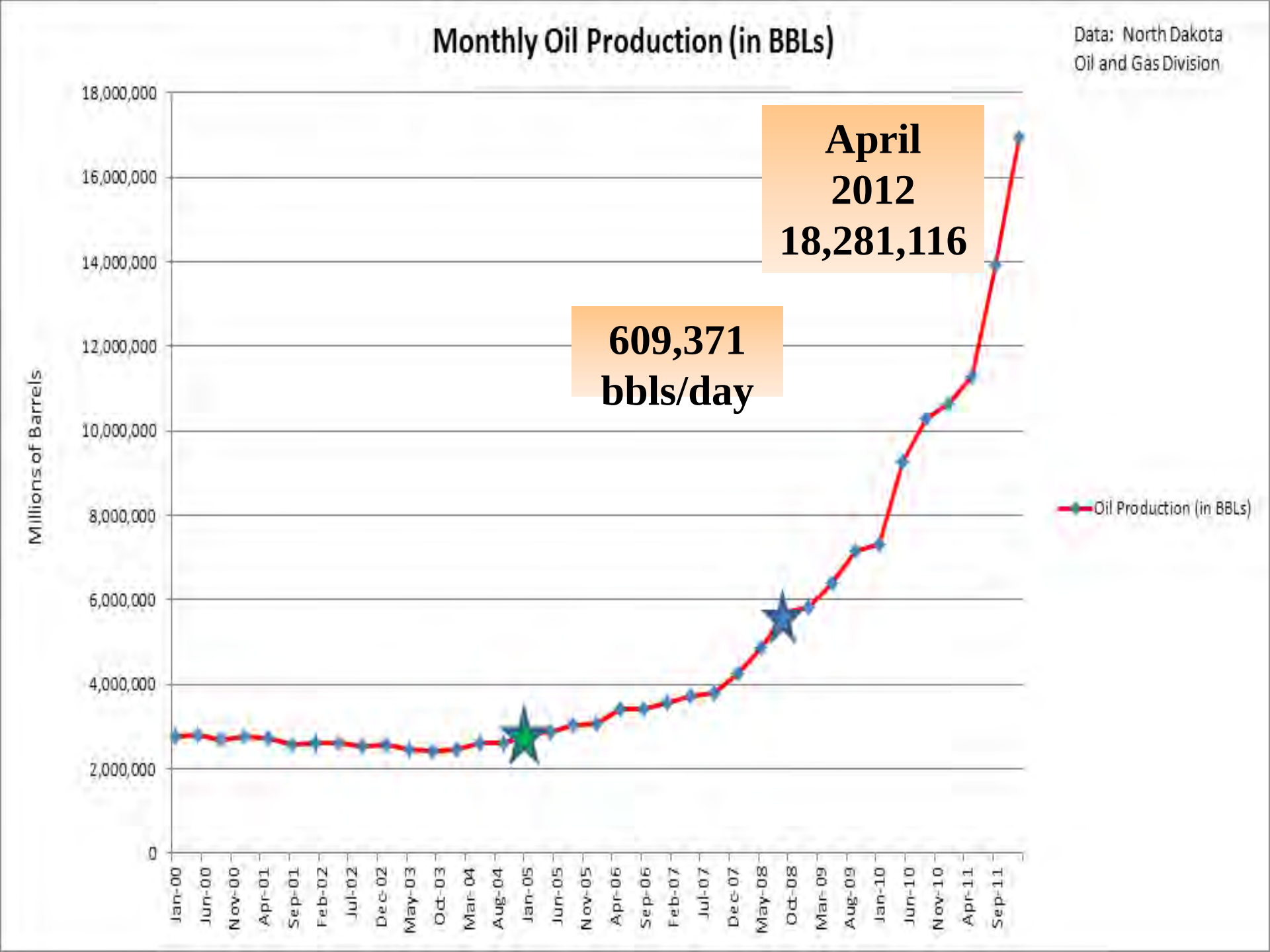
Per Day Truck Loads	Per Day Truck Tons	Per Year Truck Tons	Per Day Sand Tons	By Year Sand Tons	Per Day Trains Cars	Per Year Train Cars	Per Year Unit Trains
50	2,000	500,000	1,250	312,500	13	3,125	31
75	3,000	750,000	1,875	468,750	19	4,688	47
100	4,000	1,000,000	2,500	625,000	25	6,250	63
150	6,000	1,500,000	3,750	937,500	38	9,375	94
200	8,000	2,000,000	5,000	1,250,000	50	12,500	125
250	10,000	2,500,000	6,250	1,562,500	63	15,625	156
300	12,000	3,000,000	7,500	1,875,000	75	18,750	188
350	14,000	3,500,000	8,750	2,187,500	88	21,875	219
400	16,000	4,000,000	10,000	2,500,000	100	25,000	250
450	18,000	4,500,000	11,250	2,812,500	113	28,125	281
500	20,000	5,000,000	12,500	3,125,000	125	31,250	313

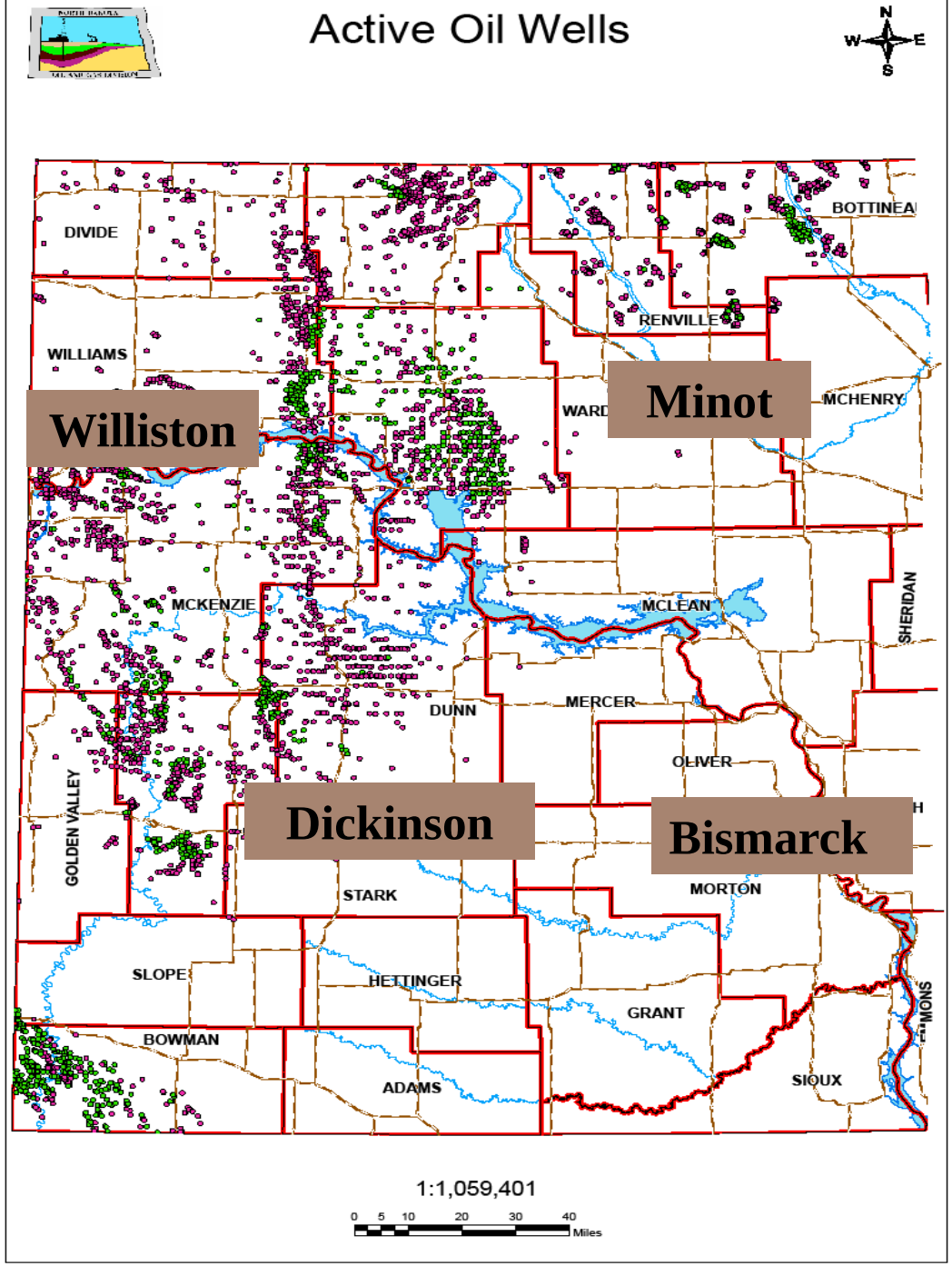
FRACTURE SAND – SUPPLY

# of Mines	Per Day Truck Loads	Per Day Truck Tons	Per Year Truck Tons	Per Day Sand Tons	By Year Sand Tons	Per Day Trains Cars	Per Year Train Cars	Per Year Unit Trains
15	2,250	90,000	22,500,000	56,250	14,062,500	563	140,625	1406
20	3,000	120,000	30,000,000	75,000	18,750,000	750	187,500	1875
30	4,500	180,000	45,000,000	112,500	28,125,000	1,125	281,250	2813
40	6,000	240,000	60,000,000	150,000	37,500,000	1,500	375,000	3750
50	7,500	300,000	75,000,000	187,500	46,875,000	1,875	468,750	4688
60	9,000	360,000	90,000,000	225,000	56,250,000	2,250	562,500	5625
70	10,500	420,000	105,000,000	262,500	65,625,000	2,625	656,250	6563
80	12,000	480,000	120,000,000	300,000	75,000,000	3,000	750,000	7500
90	13,500	540,000	135,000,000	337,500	84,375,000	3,375	843,750	8438

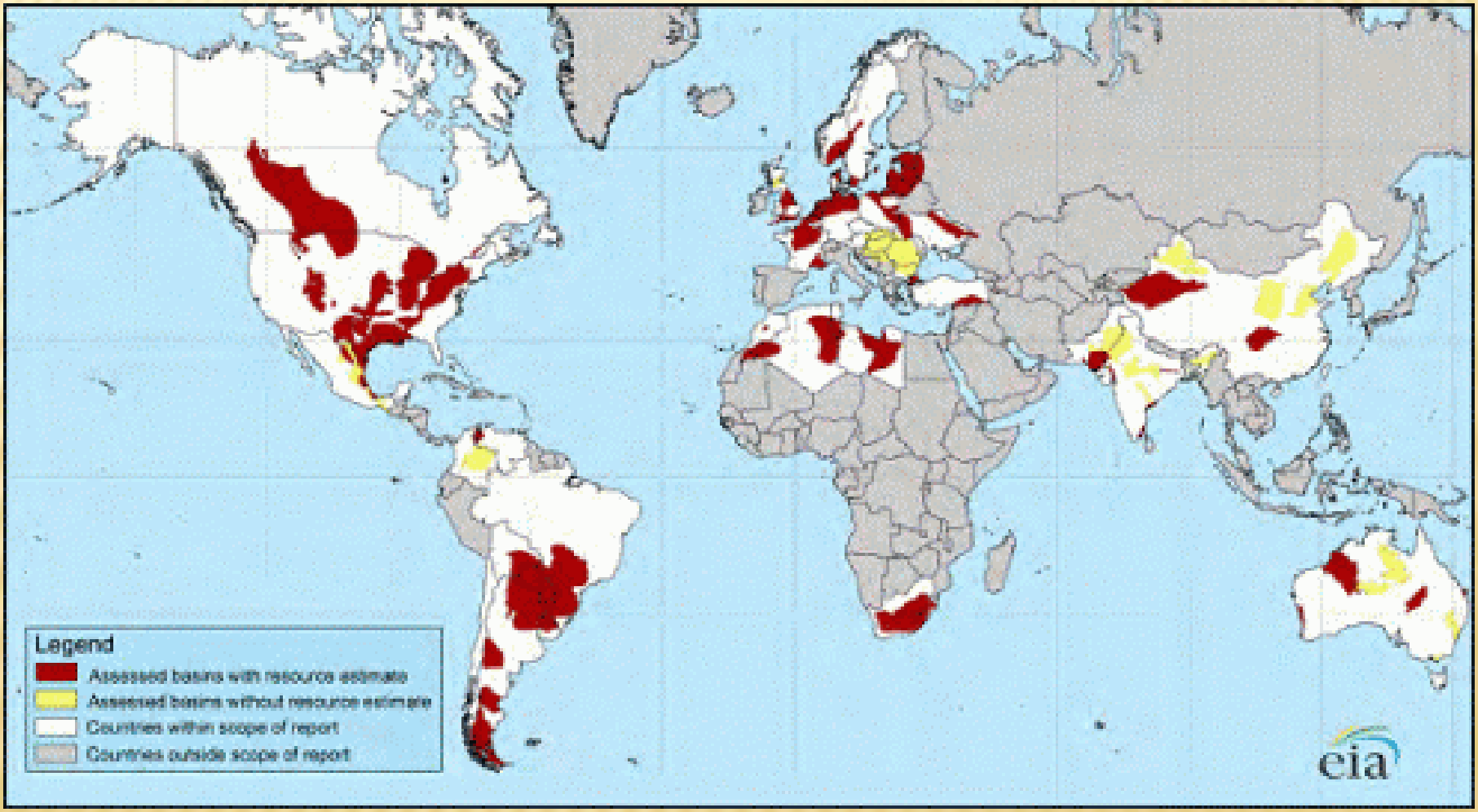
FRACTURE SAND – DEMAND




Monthly Oil Production (in BBLs)
Data: North Dakota Oil and Gas Division
April 2012 18,281,116
609,371 bbls/day
Millions of Barrels
18,000,000
16,000,000
14,000,000
12,000,000
10,000,000
8,000,000
6,000,000
4,000,000
2,000,000
0
Jan-00
Jun-00
Nov-00
Apr-01
Sep-01
Feb-02
Jul-02
Dec-02
May-03
Oct-03
Mar-04
Aug-04
Jan-05
Jun-05
Nov-05
Apr-06
Sep-06
Feb-07
Jul-07
Dec-07
May-08
Oct-08
Mar-09
Aug-09
Jan-10
Jun-10
Nov-10
Apr-11
Sep-11
Oil Production (in BBLs)


Active Oil Wells
N
W
E
S
DIVIDE
BOTTINEAU
RENVILLE
WILLIAMS
Williston
Minot
WARD
MCHENRY
MCKENZIE
MCLEAN
SHERIDAN
MERCER
DUNN
OLIVER
GOLDEN VALLEY
Dickinson
Bismarck
STARK
MORTON
SLOPE
HETTINGER
GRANT
BOWMAN
ADAMS
SIOUX
1:1,059,401
0 5 10 20 30 40
Miles

FRACTURE SAND – DEMAND



Russian potential shale estimated to be 80x larger than ND

FRACTURE SAND – LOGISTICS

"Triad" Impact on Wisconsin Transportation

- Extraction (Supply)
- Processing (Supply/logistics)
- Ship Out (Logistics)

FRACTURE SAND – LOGISTICS

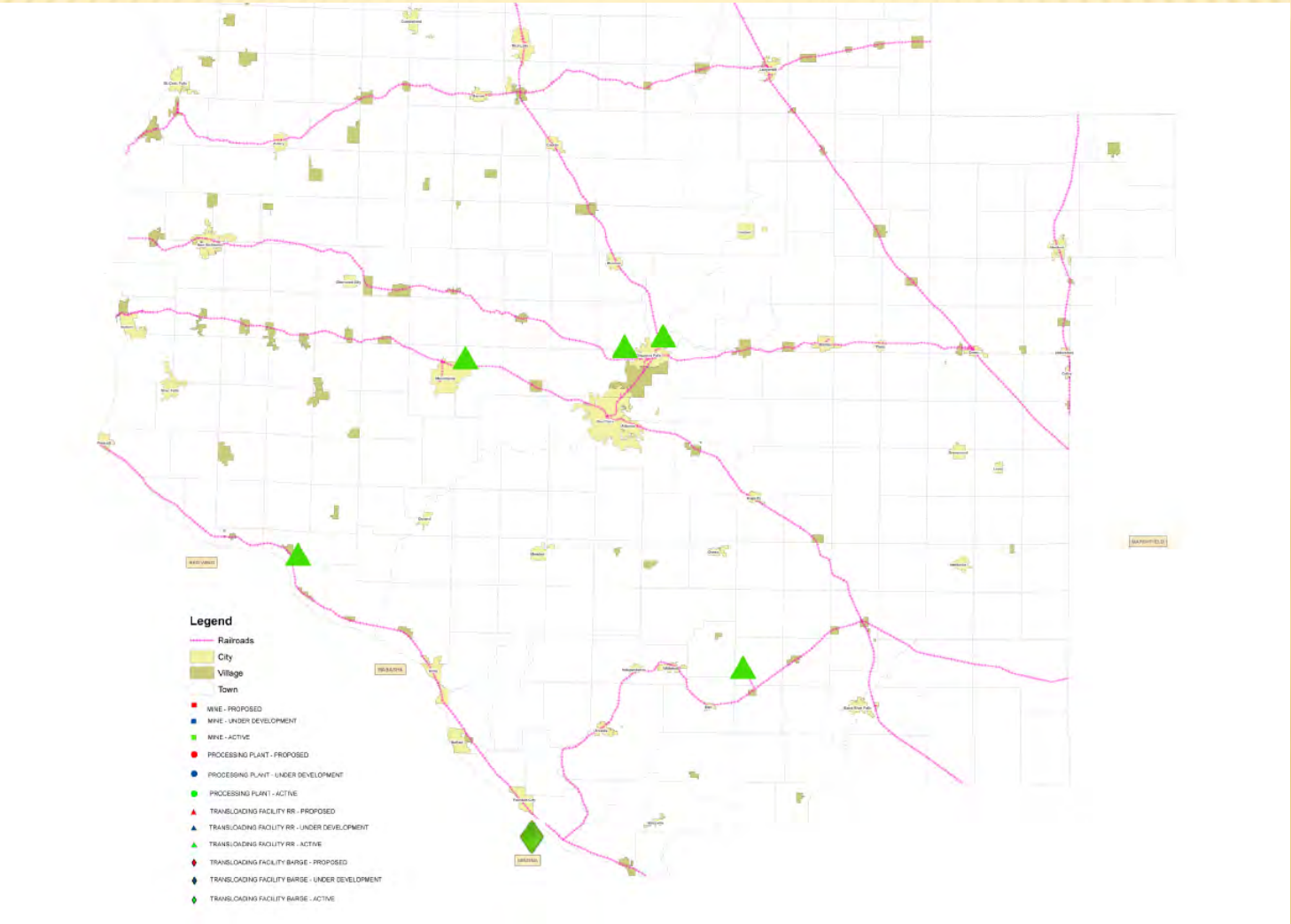
- Limitless Supply
- Increasing Demand
- Limited Logistics

Ship Out Locations are the **Critical Link**

- Rail
- Barge

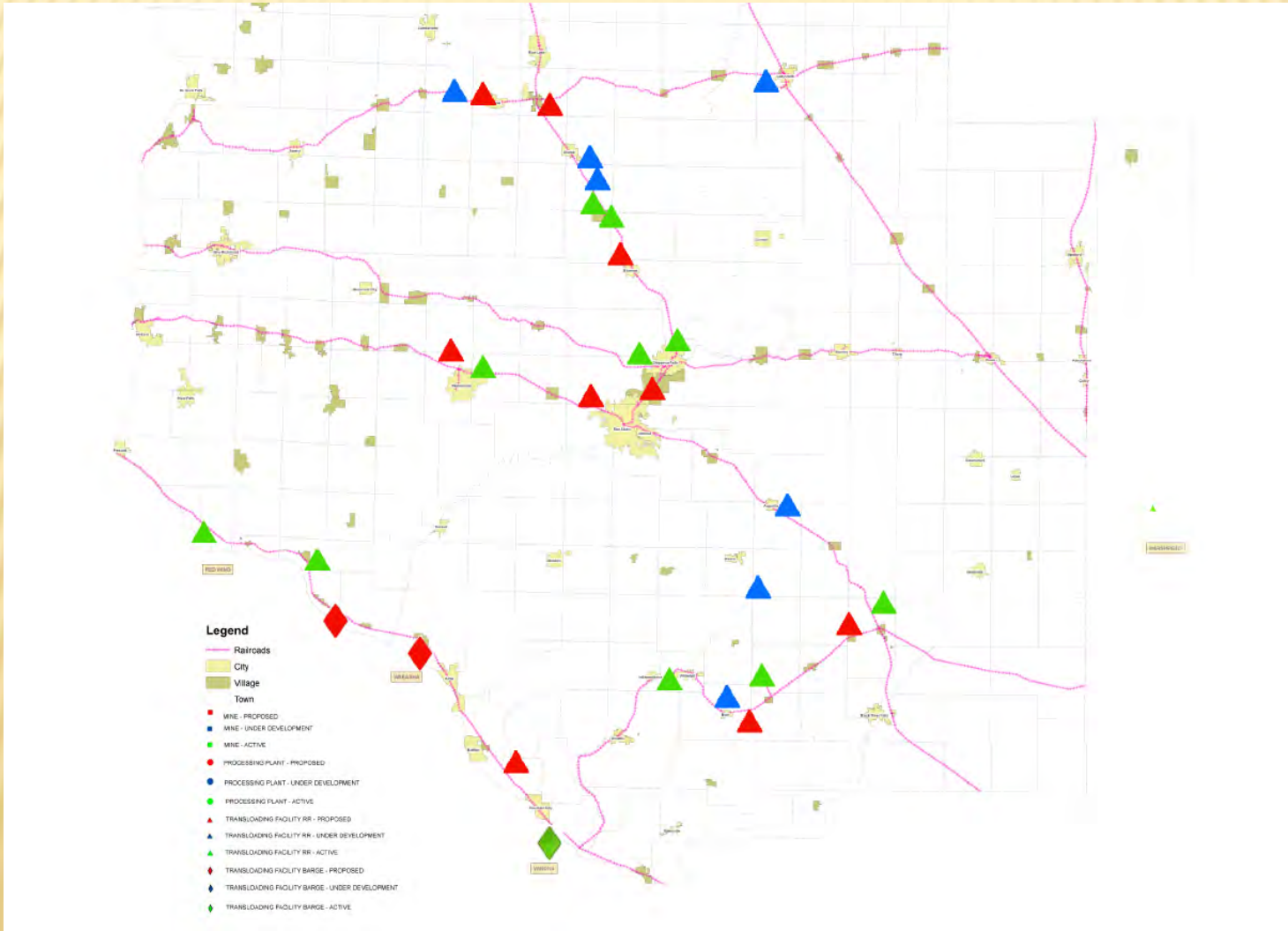
FRACTURE SAND – LOGISTICS

TRANSLOAD FACILITIES BEFORE FRAC SAND



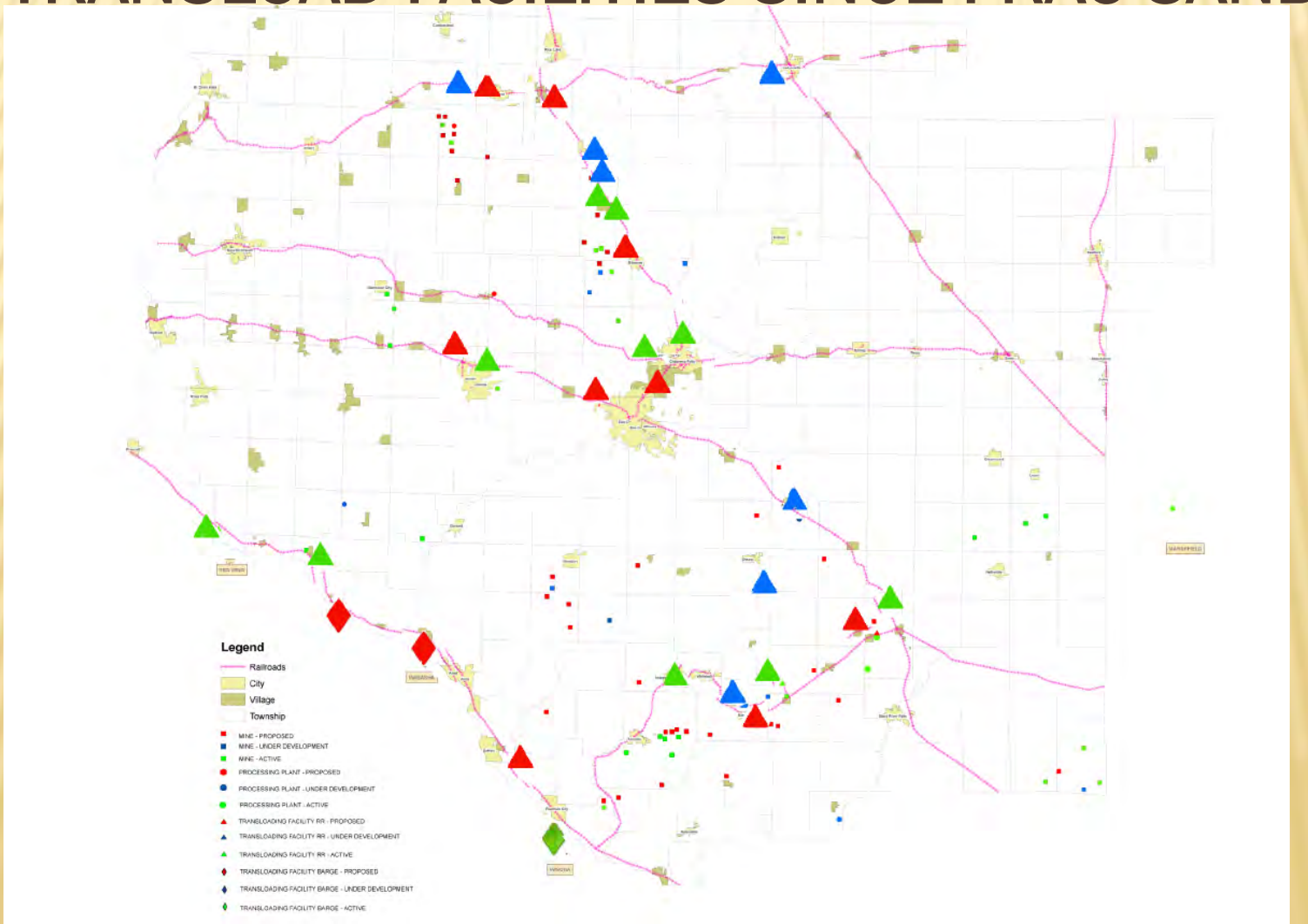
FRACTURE SAND – LOGISTICS

TRANSLOAD FACILITIES SINCE FRAC SAND



FRACTURE SAND – LOGISTICS

TRANSLOAD FACILITIES SINCE FRAC SAND

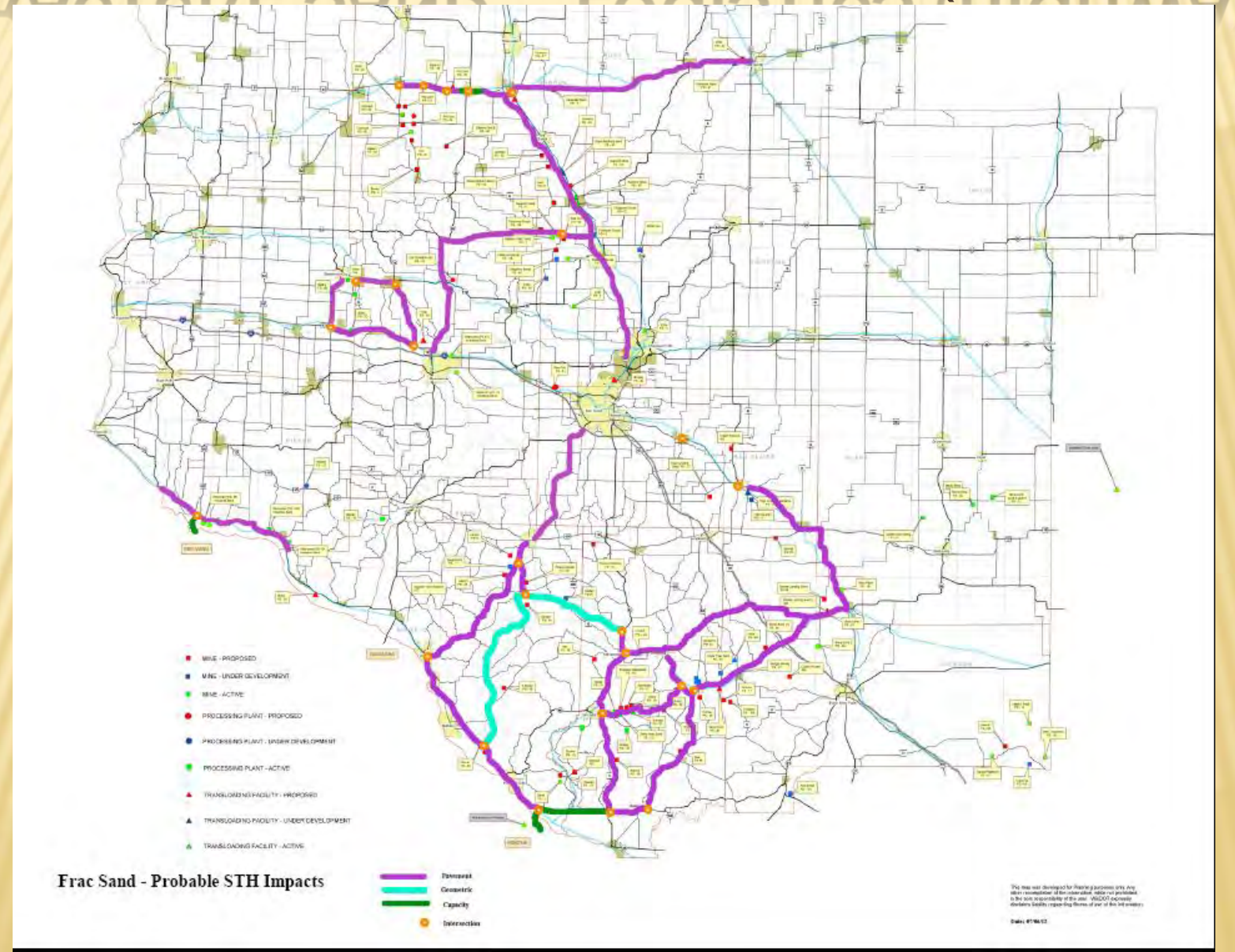


FRACTURE SAND – LOGISTICS

- Increase % Trucks
  - System deterioration rate goes up
- Intersection locations with local system
  - Most mines are located on local road system
- Increased % trucks on small % of highways
  - All sand heads toward transload facilities

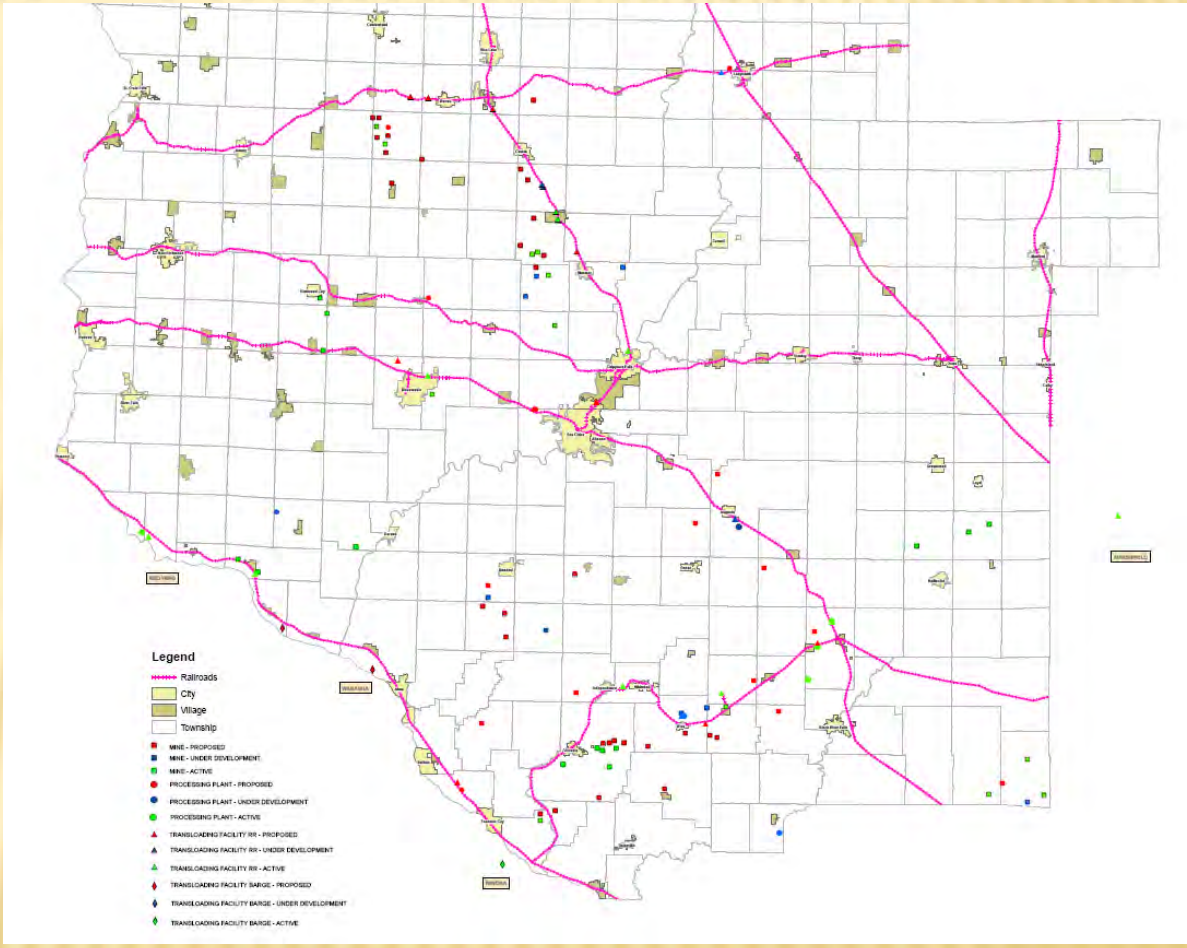
➢ “Convergence Impacts”

FRACTURE SAND – LOGISTICS (HIGHWAYS)



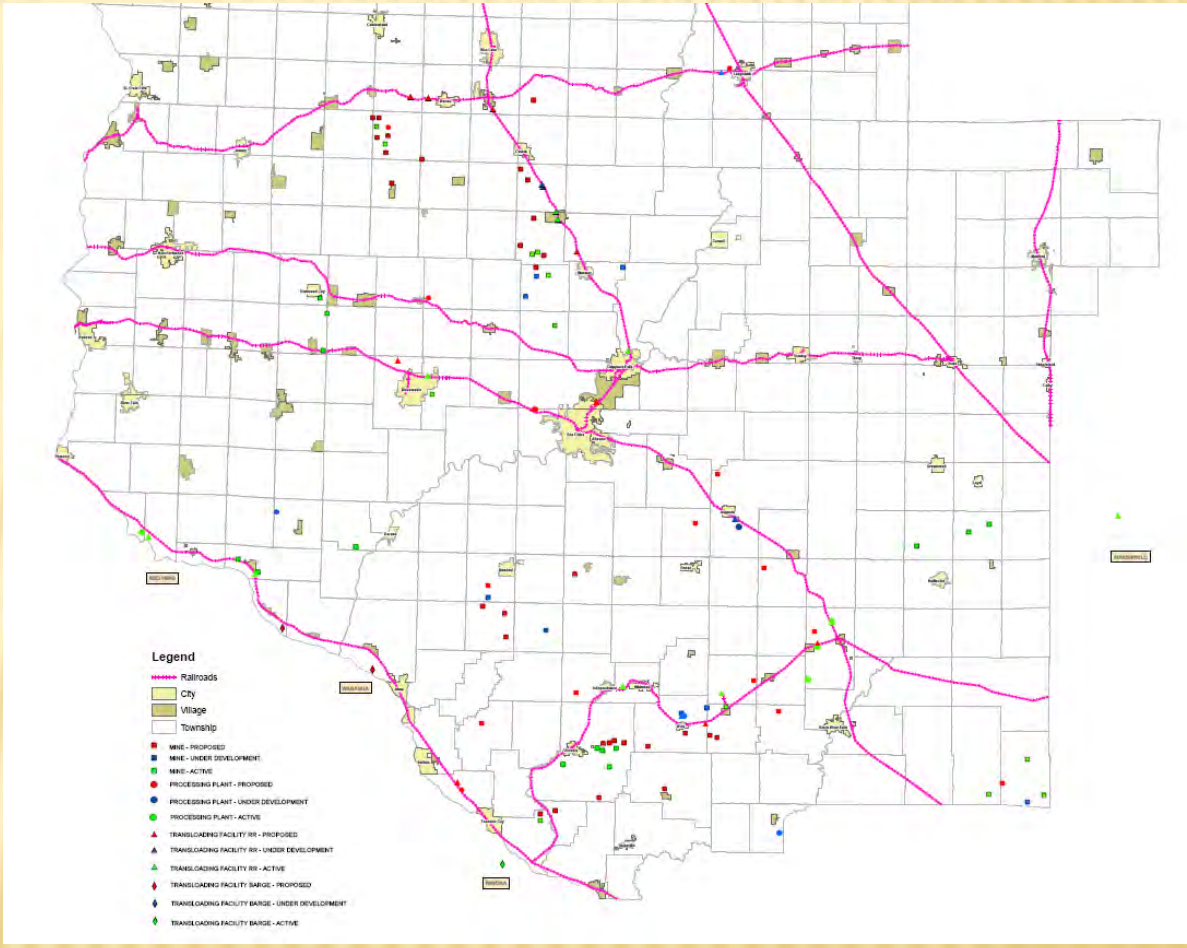
FRACTURE SAND – LOGISTICS (RAIL)

- RAIL
  - Mainline Density
  - Limited Transload Locations
  - Siding availability
  - Car Availability
  - Infrastructure Limits
    - Structures



FRACTURE SAND – LOGISTICS (WATER)

- MISSISSIPPI BARGE
  - Goes South
  - Doesn't go West
  - Weather
  - Port Availability
- Port of Milwaukee
- Twin Ports



TRANSPORTATION TOOL BOX

What's in it:

- Route Assessment
- Transportation Safety Impact Assessment
- Traffic Impact Analysis
- Intergovernmental Cooperation
  - Permitting is local responsibility
  - Impact mitigation through local permit process
    - Opposition groups look to WisDOT as a 'higher authority' to stop
    - Mines look to WisDOT as a 'higher authority' to say ok

INDUSTRY MATURATION & STABILIZATION

Supply:

- 2011 – 28 million tons in US Production
- Estimates project 15% annualized growth
- Existing NW Wis mines have capacity exceeding 60 million tons/year

Demand:

- Oil Prices/Supply
- Gas Prices/Supply
- New Technology
  - Proppants
  - Alternate Methods to fracking
  - Other Energy Sources
- International Markets

Logistics:

- Getting sand to transload facilities
- Rail/Barge Limitations
- Increasing Market Share to Limited Number of Firms