Indiana Center for Coal Technology Research

Northwest Coal Corridor

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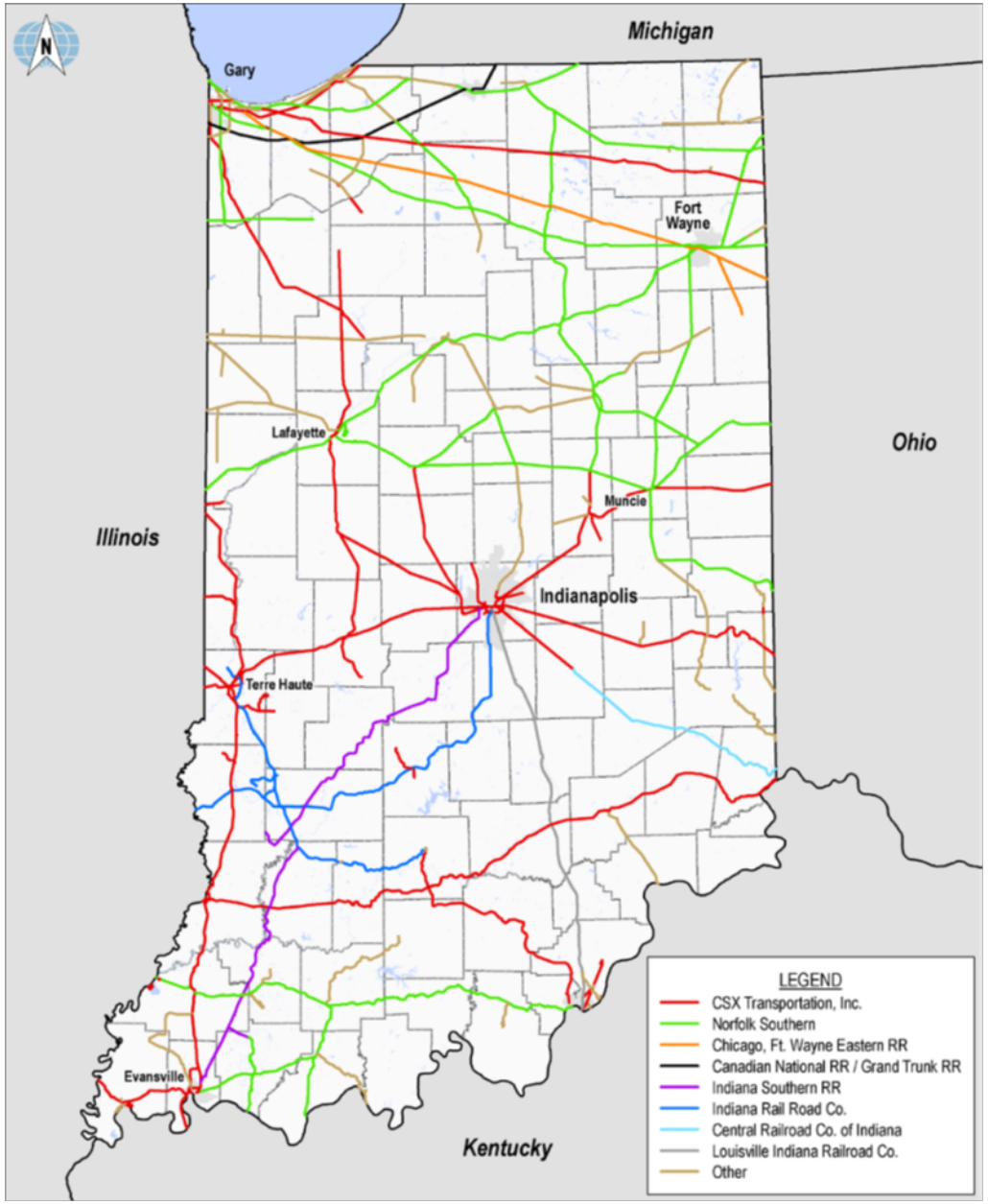
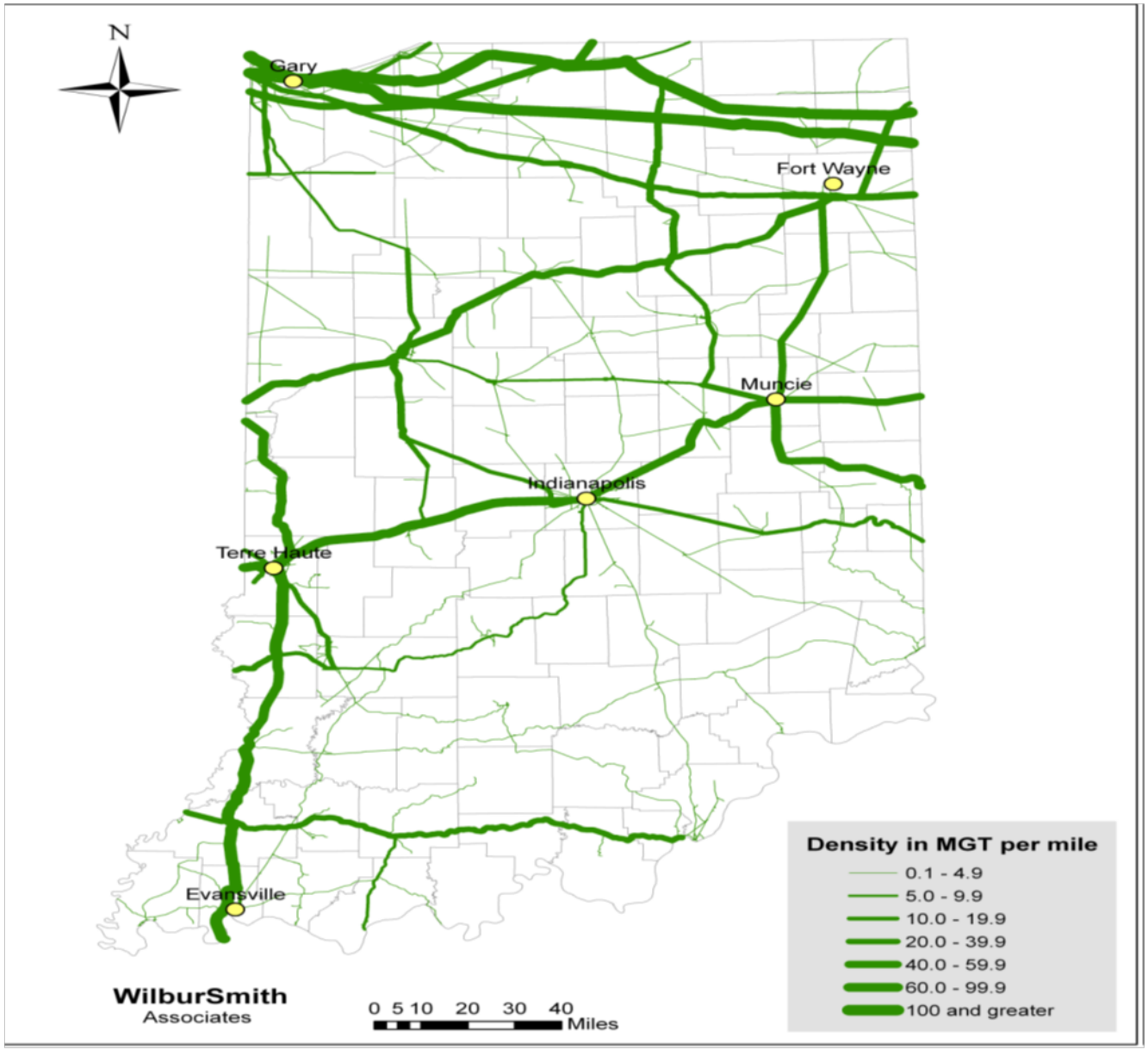
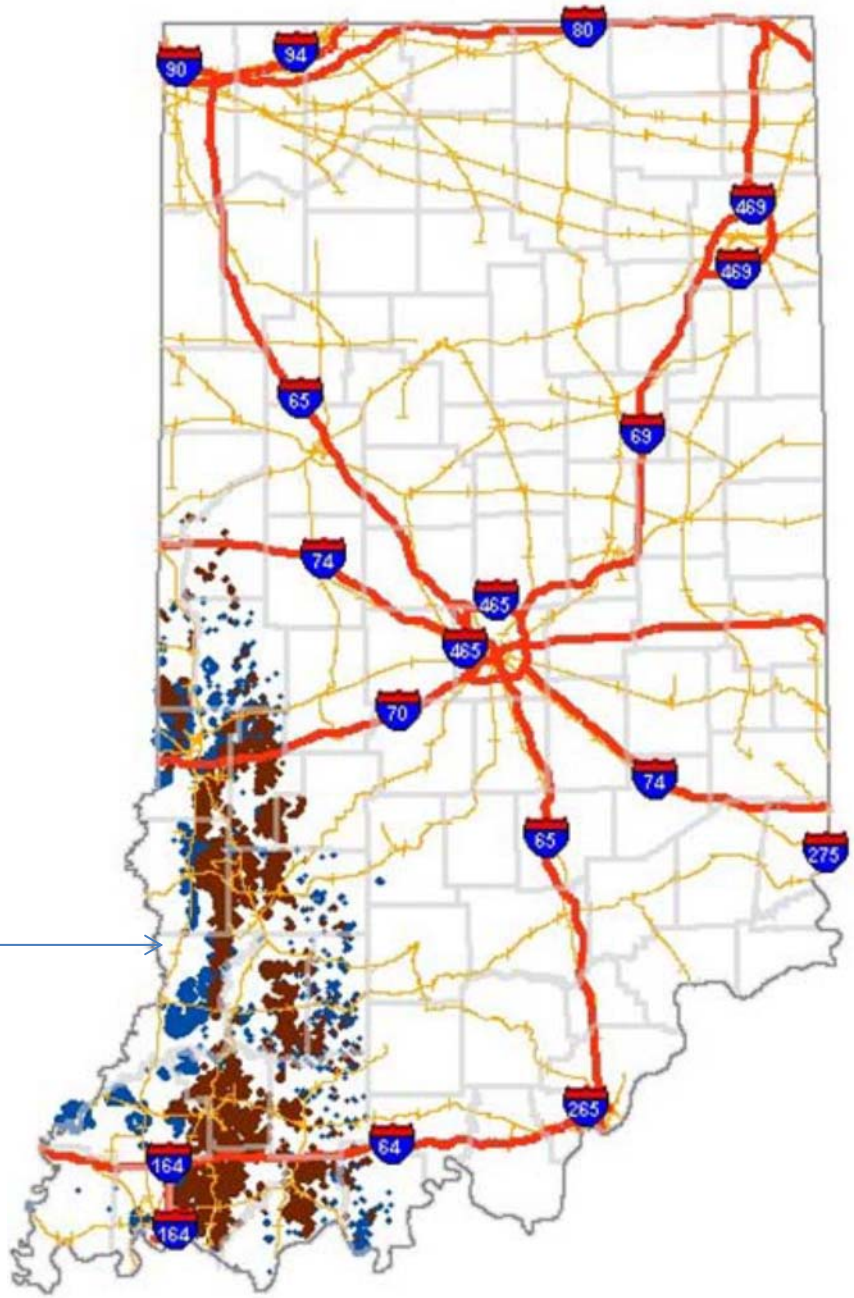
PURDUE UNIVERSITY NORTH CENTRAL

Project History

- Premise of the Project - There is no direct North/South rail route
  - Analysis of coal movement **within** Indiana
    - 10 mines, 10 power plants
    - Indiana Coal Corridor
  - Integration of rail with water
    - Port of Indiana
    - Ohio River


Michigan
Gary
Fort Wayne
Lafayette
Ohio
Muncie
Illinois
Indianapolis
Terre Haute
Evansville
Kentucky
LEGEND
CSX Transportation, Inc.
Norfolk Southern
Chicago, Ft. Wayne Eastern RR
Canadian National RR / Grand Trunk RR
Indiana Southern RR
Indiana Rail Road Co.
Central Railroad Co. of Indiana
Louisville Indiana Railroad Co.
Other


N
Gary
Fort Wayne
Muncie
Indianapolis
Terre Haute
Evansville
Density in MGT per mile
0.1 - 4.9
5.0 - 9.9
10.0 - 19.9
20.0 - 39.9
40.0 - 59.9
60.0 - 99.9
100 and greater
WilburSmith
Associates
0 5 10 20 30 40
Miles



Indiana Coal

Project Methodology

- Use a known route as a base scenario
- Construct experimental routes using intuition
- Supplement existing routes with abandoned routes if necessary
- Use computer simulation to generate cycle times for experimental routes
  - Account for variability
  - Account for congestion, breakdowns, right of ways, etc.

Project Assumptions

- Linton, IN was used as the origination point of Indiana coal
- Trains are 110 car, 286,000 pound capacity

Constructing Rail Routes

- Segments between Stations
  - Mileage
  - Active/Owner
  - Trackage Rights
  - Signaling Systems
  - # tracks on mainline
  - Density
  - Class

Class

- Federal Railroad Administration Classification System for Train Speed based on quality of track

Class	Max Speed
1	10
2	25
3	40
4	60
5	80
6	110

Density

- Classification based upon millions of gross ton miles per year

Density	GTMY
0	< 1
1	1 - 4.9
2	5 - 9.9
3	10 - 19.9
4	20 - 39.9
5	40 - 59.9
6	60 -99.9
7	> 100

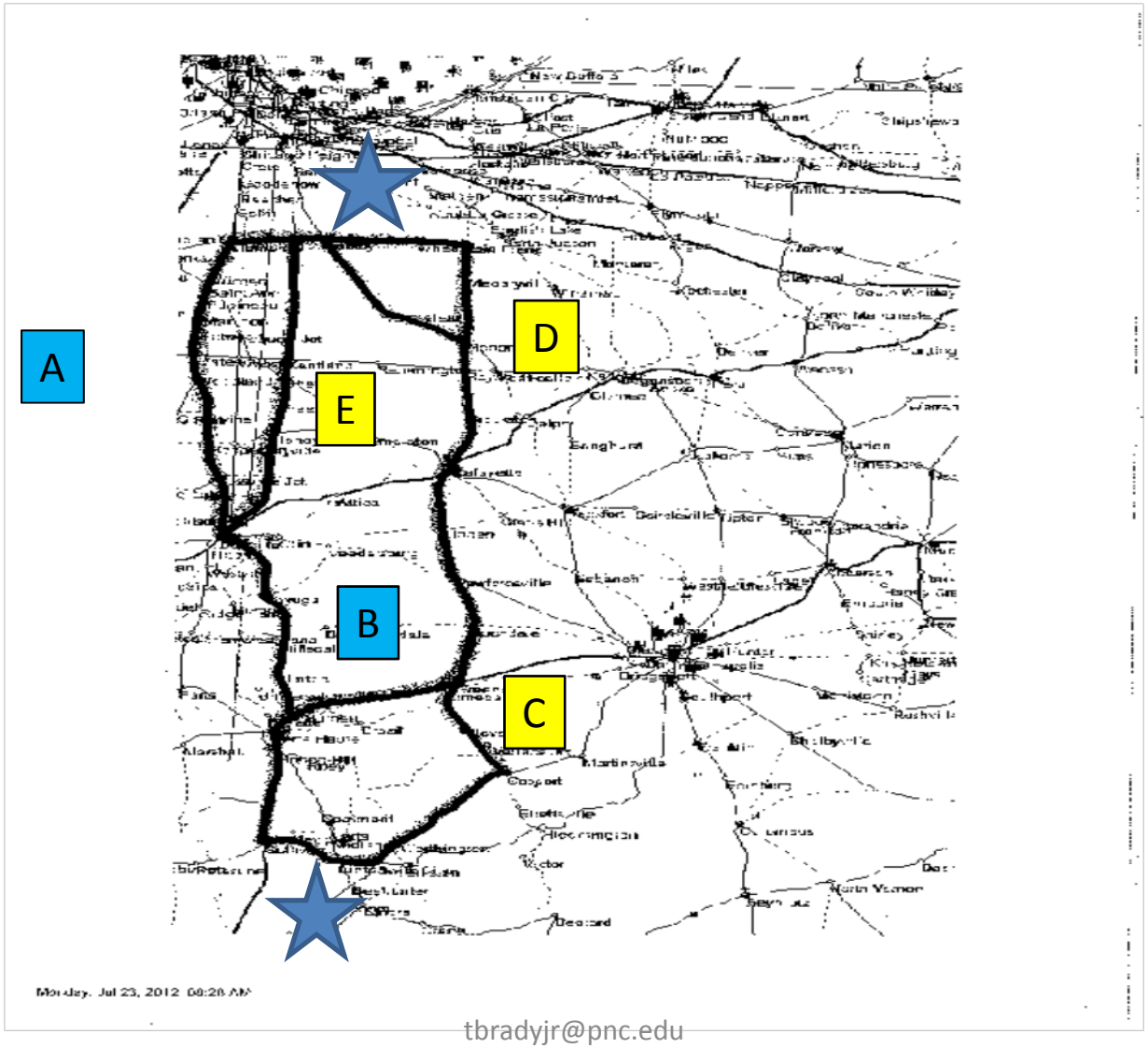
Ideal Route

- Minimize
  - Number of Owners
  - Mileage
  - Density
- Maximize
  - Class

Part I
Indiana Coal to Wheatfield

- Research Question: How do we get southern Indiana coal to northern Indiana?

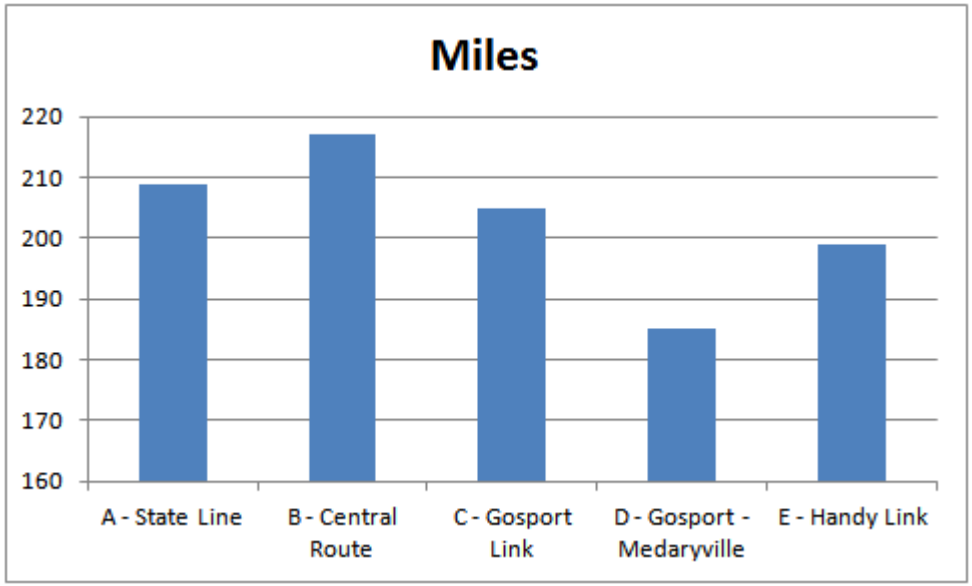
Routes



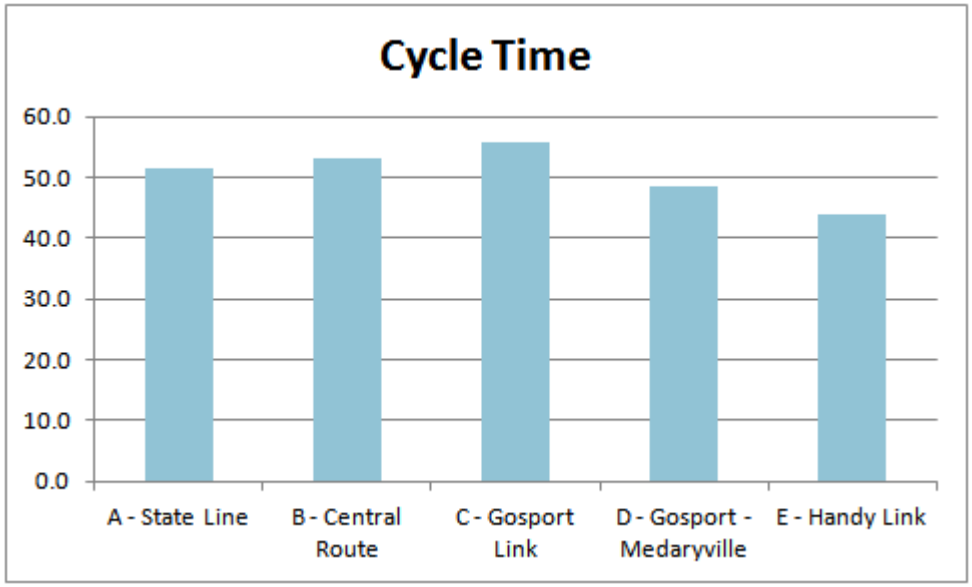
Indiana Results

Scenario	Miles	Segments	Operators	# RW's	% RW	% Abandon	Signals	Main %	Density	Class	Cycle Time
A - State Line	209	29	4	3	65%	0%	4	24%	3.86	1.18	51.4
B - Central Route	217	10	3	3	47%	0%	5	16%	2.62	1.17	53.0
C - Gosport Link	205	16	5	2	44%	6%	3	0%	1.68	1.31	55.9
D - Gosport - Medaryville	185	16	4	2	31%	19%	3	0%	1.38	1.26	48.6
E - Handy Link	199	24	5	3	38%	25%	4	0%	1.9	1.06	44.0

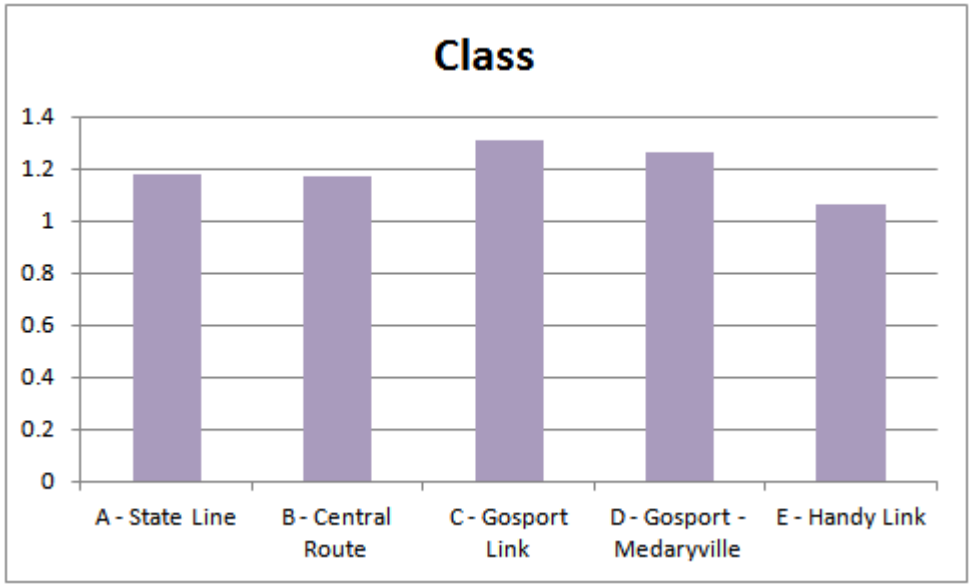
Route Mileage



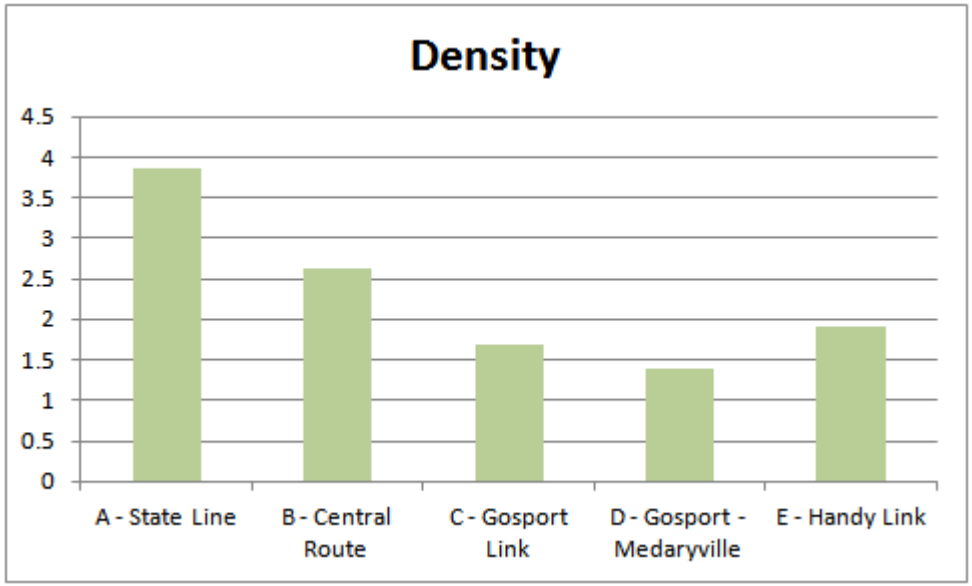
Route Cycle Time



Average Route Class



Average Route Density

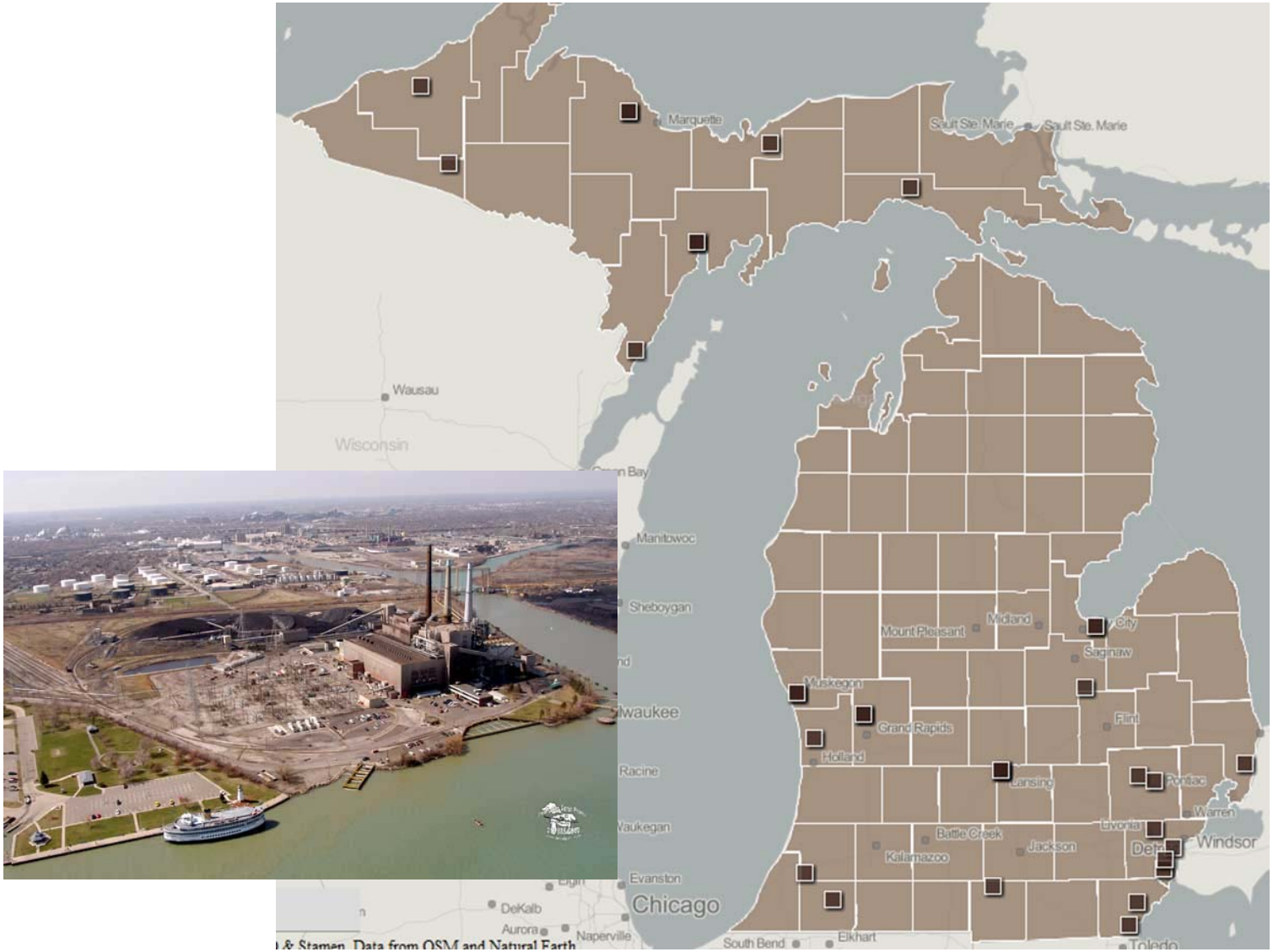


Part II
Indiana Coal to Michigan

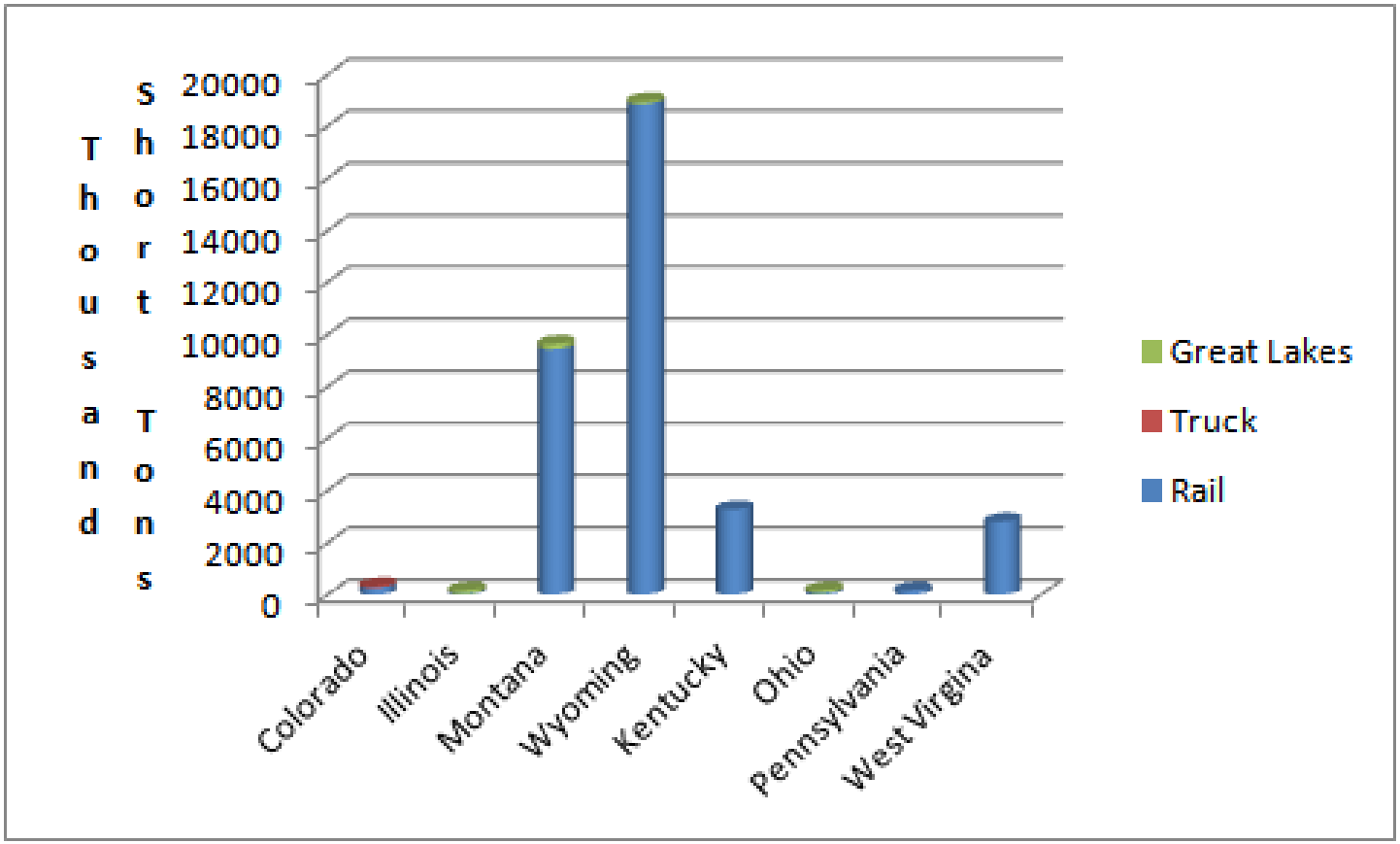
- Research Question: How do we get coal from southern Indiana to select Michigan destinations

Michigan and Coal

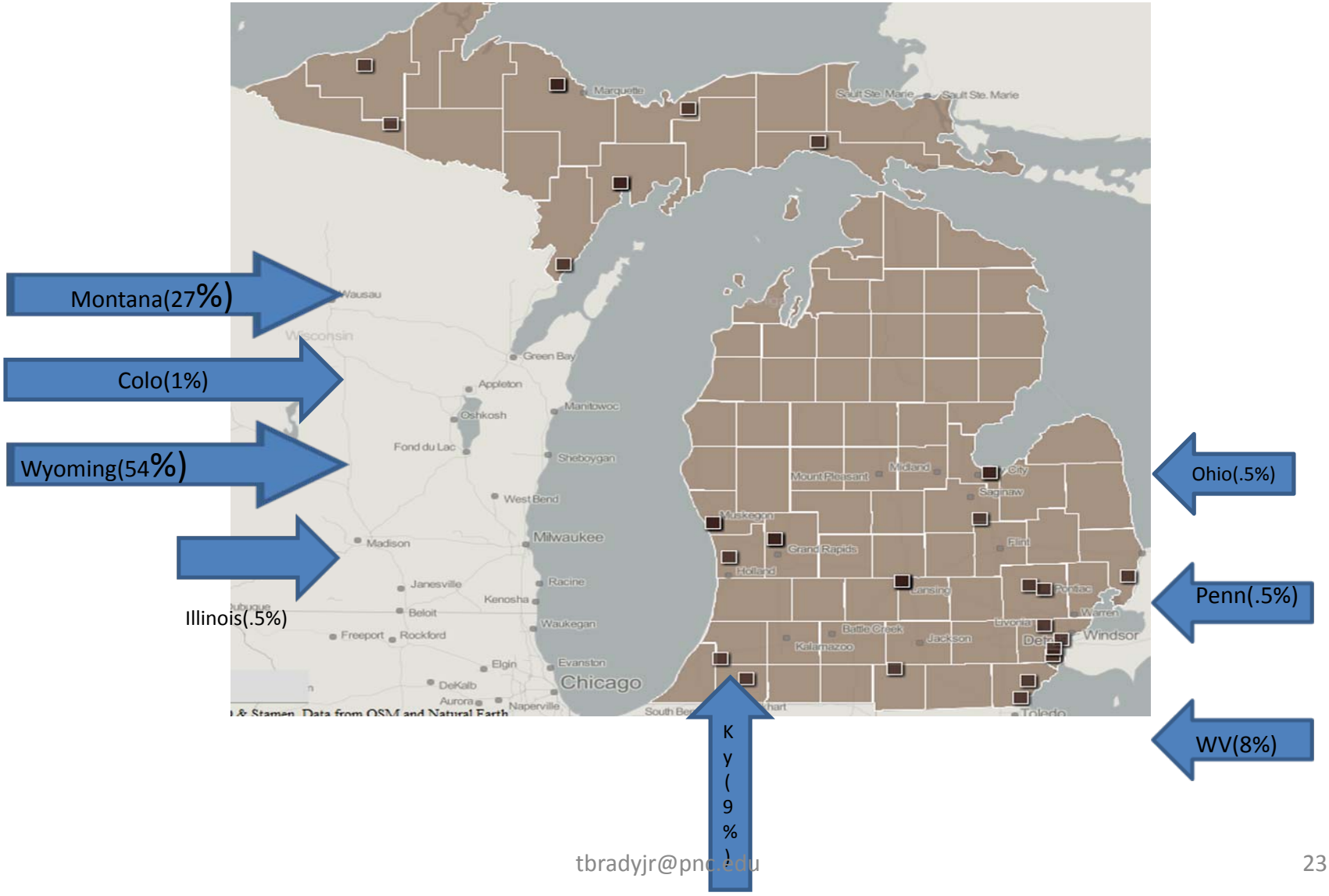
- Michigan has 88 coal-fired power plants at 33 locations, producing 12,891 megawatts
- 49 are larger than 50MW
  - Monroe = 3280MW
  - St. Clair = 1547MW
  - Campbell = 1540MW
  - Belle River = 1395MW
- These plants consume approximately 33,120,930 short tons of coal per year


Marquette
Sault Ste. Marie
Sault Ste. Marie
Wausau
Wisconsin
Manitowoc
Sheboygan
Mount Pleasant
Midland
Saginaw
Muskegon
Grand Rapids
Flint
Holland
Racine
Lansing
Pontiac
Warren
Livonia
Battle Creek
Jackson
Kalamazoo
Windsor
Evanston
Chicago
DeKalb
Aurora
Naperville
South Bend
Elkhart
Toledo

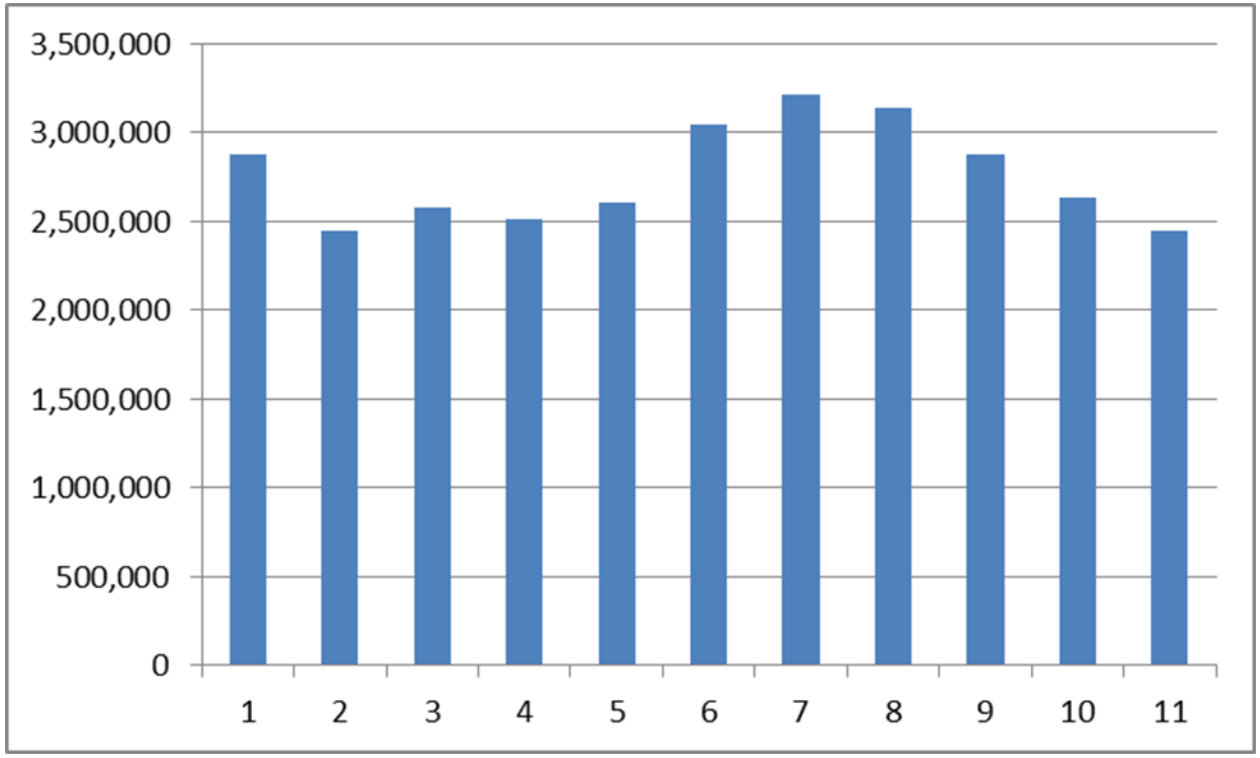
Where Does Michigan Get It's Coal From?



A Different Perspective



Michigan Coal Consumption Pattern



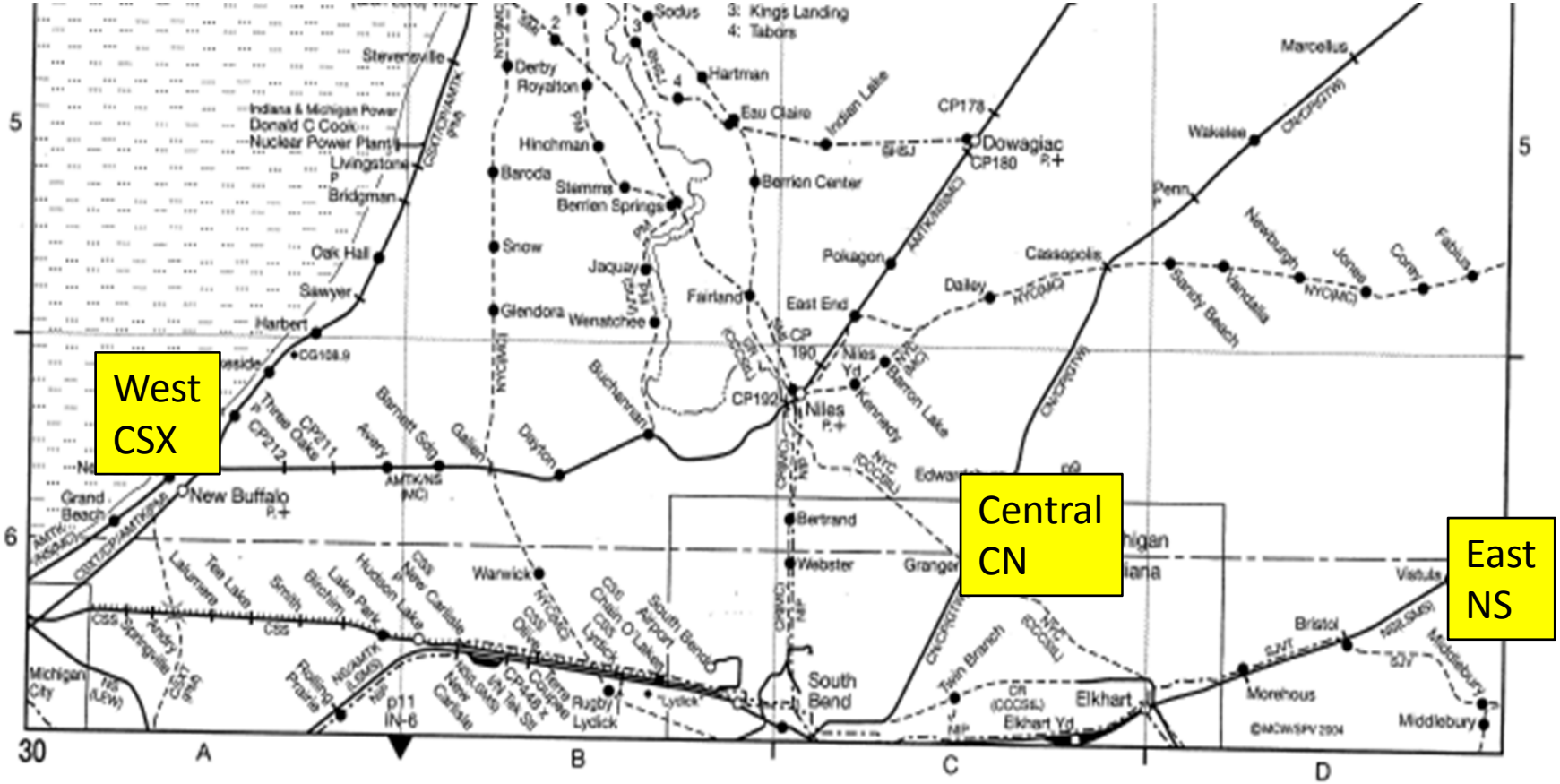
Plants Chosen for this Study

- Close to the Western side of Michigan
- Close to water
- Near Indiana rail interface
  - Filer, Manistee
  - Cobb, Warren, Muskegon
  - Sims, Campbell, Grand Haven
  - Eckert, Simon, Erickson, Lansing
  - DeYoung, Holland

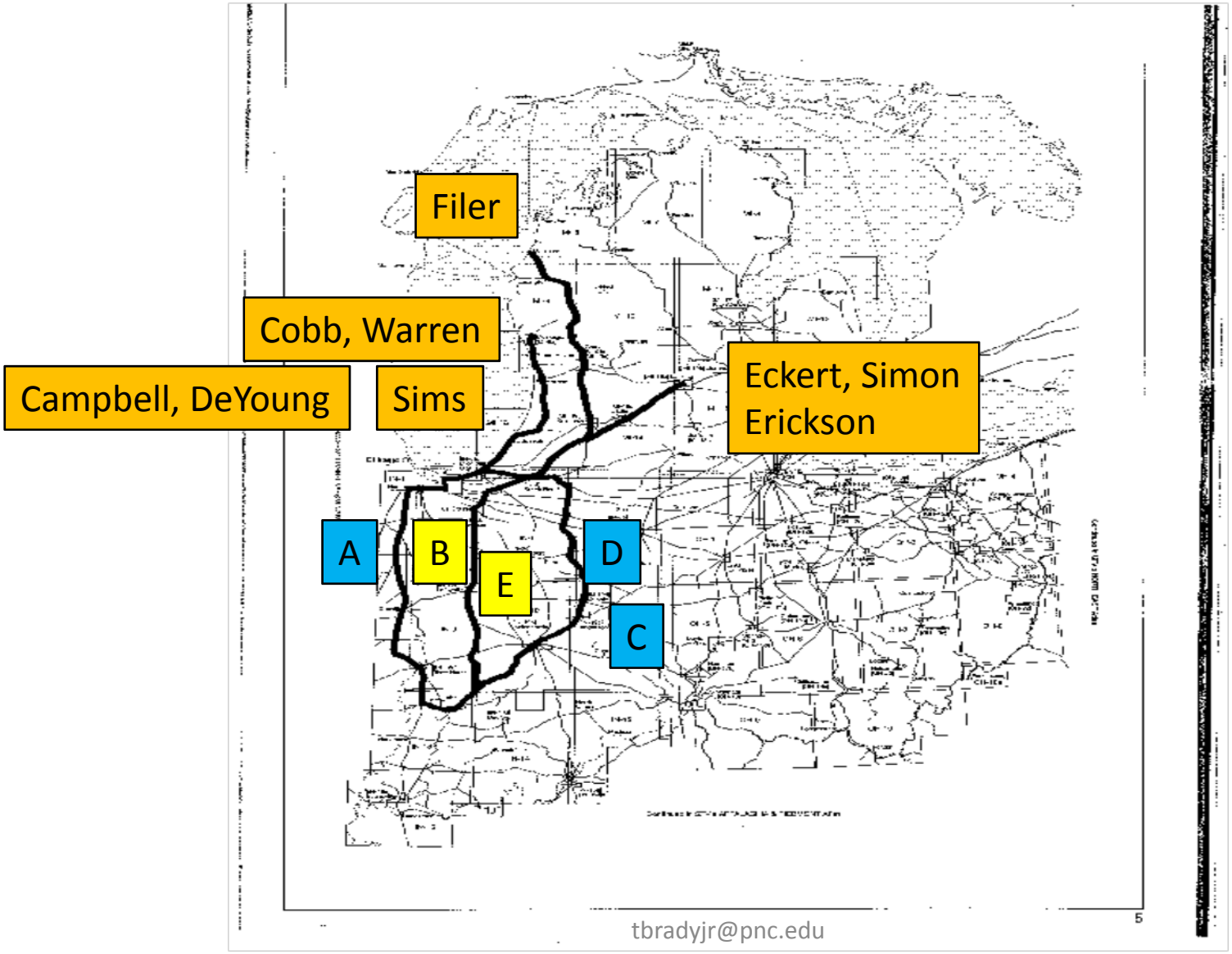
Supplying Michigan with Indiana Coal

- 3 Main Gateways
  - West - New Buffalo(CSX)
  - Central – South Bend(CN)
  - East – Vistula(Norfolk Southern)
- 3 Indiana Routes
  - West – State Line, Griffith, MC
  - Central – Gosport – Medaryville, MC
  - East – Indianapolis, Goshen, South Bend

Indiana – Michigan Rail Interface



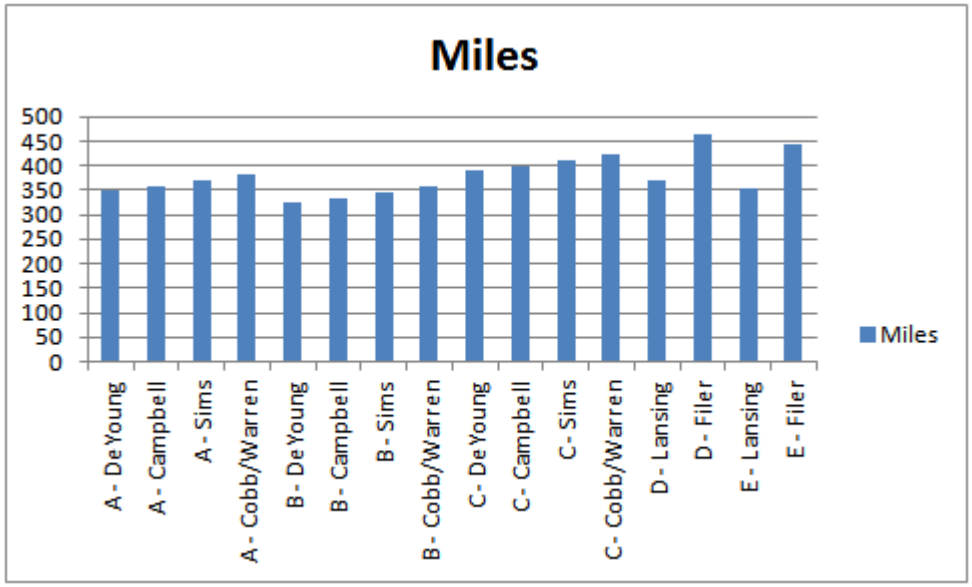
Routes


Filer
Cobb, Warren
Campbell, DeYoung
Sims
Eckert, Simon
Erickson
A
B
E
D
C

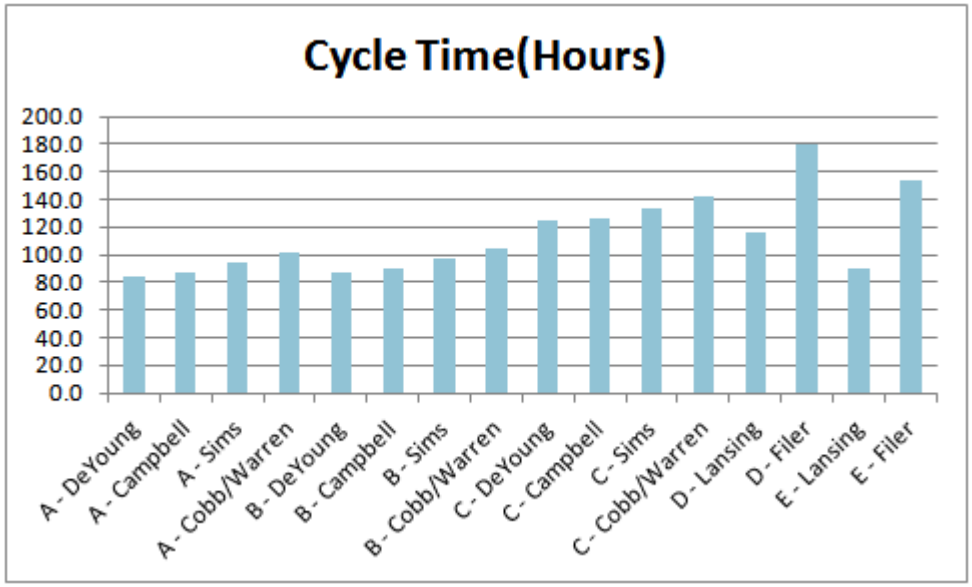
Michigan Results

Scenario	Miles	Segments	Operators	# RW's	% RW	% Abandon	Signals	Main %	Density	Class	Cycle Time
A - DeYoung	349	49	6	2	57%	0%	5	24%	3.9	1.16	84.4
A - Campbell	359	50	6	2	56%	0%	5	24%	3.82	1.16	86.8
A - Sims	370	51	7	2	55%	0%	5	24%	3.74	1.22	94.1
A - Cobb/Warren	383	53	7	2	53%	0%	5	23%	3.64	1.27	101.4
B - DeYoung	325	34	6	3	18%	12%	4	6%	2.16	1.29	87.4
B - Campbell	335	35	6	3	17%	11%	4	6%	2.13	1.29	90.1
B - Sims	346	36	7	3	17%	11%	4	6%	2.09	1.34	96.7
B - Cobb/Warren	359	38	7	3	16%	11%	4	5%	2.05	1.4	104.8
C - DeYoung	391	35	8	3	9%	0%	4	14%	2.97	1.53	124.8
C - Campbell	400	36	8	3	8%	0%	4	14%	2.92	1.51	126.0
C - Sims	411	37	9	3	8%	0%	4	14%	2.87	1.55	132.9
C - Cobb/Warren	424	38	9	3	8%	0%	4	13%	2.81	1.6	141.5
D - Lansing	368	28	6	2	7%	0%	9	32%	3.58	1.51	115.9
D - Filer	462	32	7	3	9%	0%	4	13%	2.29	1.86	179.2
E - Lansing	352	33	6	7	21%	12%	12	36%	3.28	1.22	89.6
E - Filer	445	37	8	8	22%	11%	7	19%	2	1.65	153.1

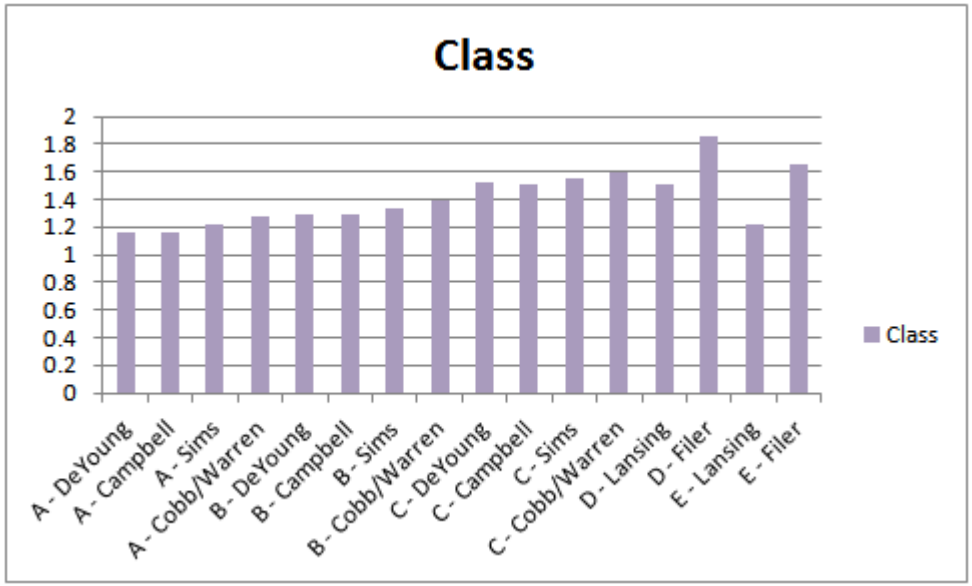
Route Mileage



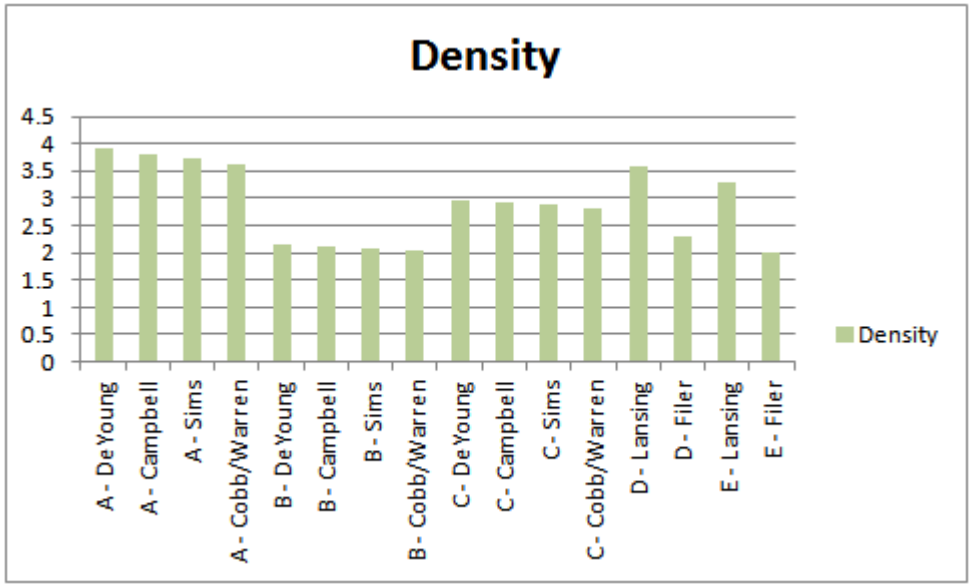
Route Cycle Time



Average Route Class



Average Route Density



Operational Aspects of Indiana to Michigan Coal Transport

- Assumptions
  - Fully supply Campbell
  - Unit train of 14,000 tons
  - Cycle times from simulation model
- # of Unit Trains Needed
  - Route A, 4
  - Route B, 4
  - Route C, 5

Summary

- The lack of a Class 4 or above true North/South rail route through Indiana contributes to costly or non-existent business opportunities
- Abandoned routes formerly provided North/South access
- Marginal improvement in routes can make a large financial impact due to the scale of coal transportation/consumption
- A combined water route using the Port of Indiana may enable export opportunities as well