



# Southwest Wisconsin Park and Ride Site Ranking Model

Presentation to MTMUG

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# Project Objectives

- ▣ Rank Potential Park and Pool or Park and Ride locations in Southern Wisconsin
- ▣ Provide recommendations by County of top 3 sites
- ▣ Include other site-specific factors in ranking

# Study Area





# Modeling Approach

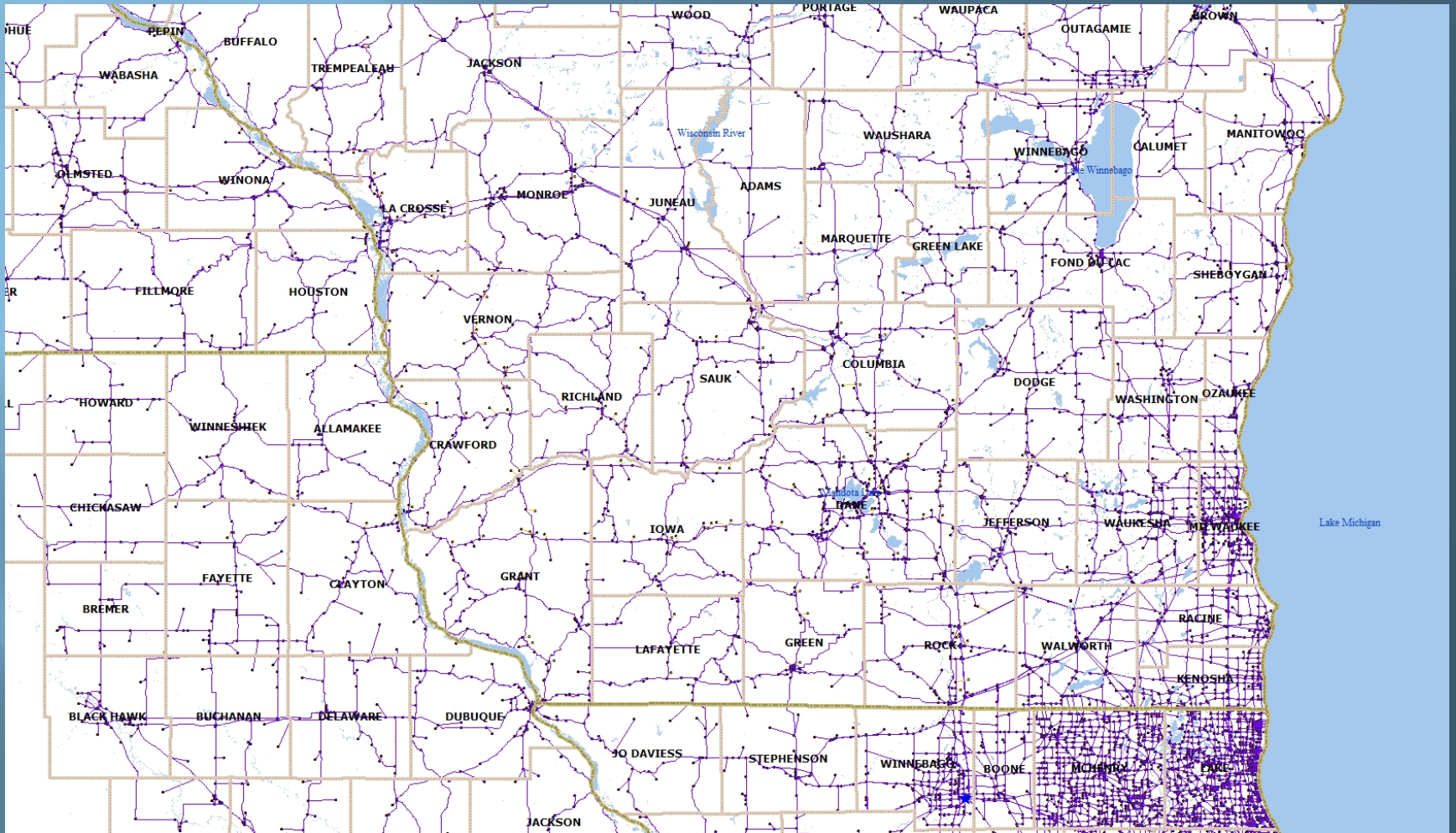
1. Create a network and zone system using Zip Code boundaries and state/interstate highways
2. Identify all “feasible” PNR/KNR locations as dummy zones – Connect with Zero time connectors
3. Create a comprehensive Time and Distance Skim between zones and PNR/KNR locations
4. Identify travel sheds for employer locations



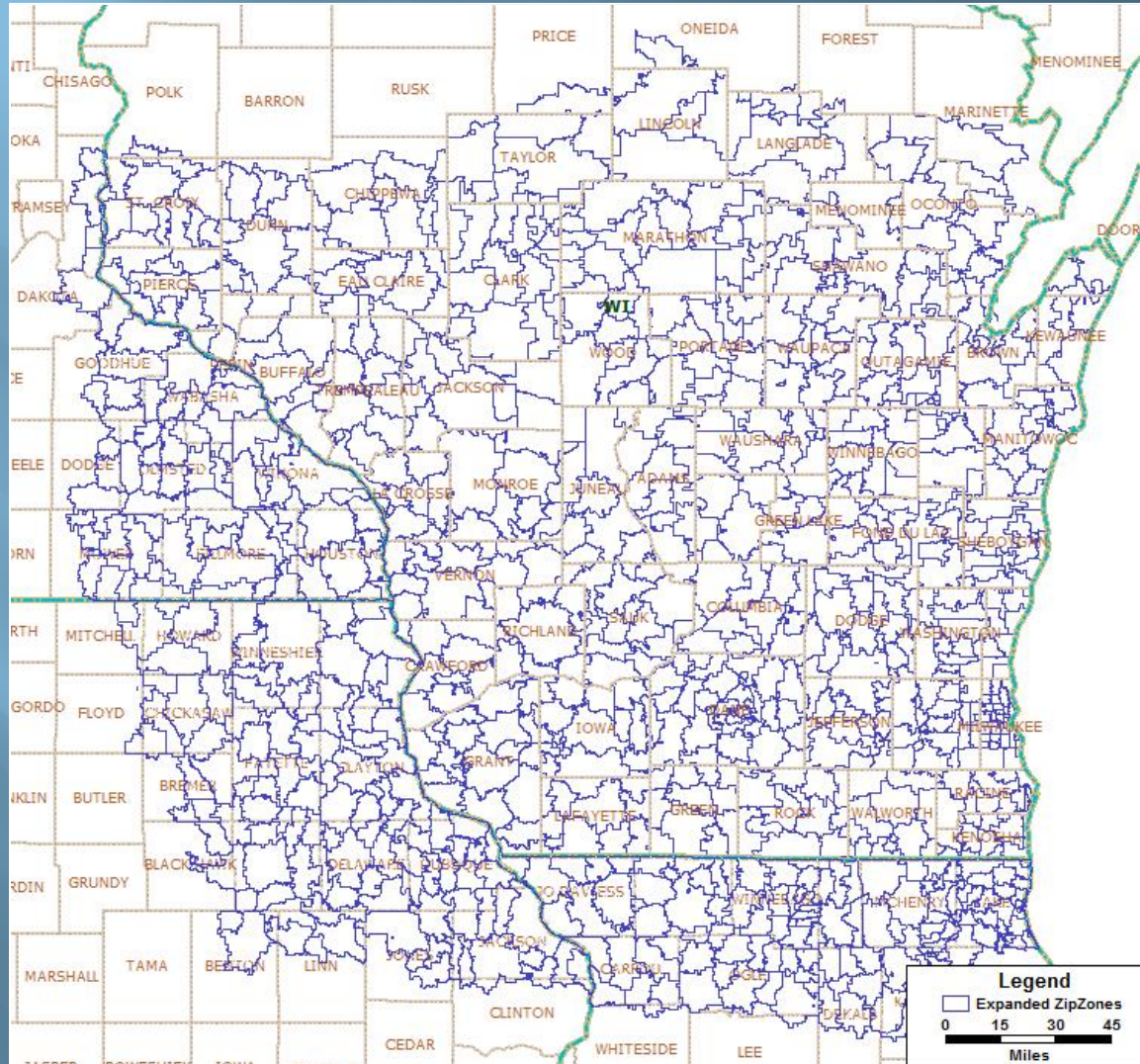
# Modeling Approach, Continued

5. Develop 3 Home-Work Trip tables
  1. Madison-Oriented (University, Hospital, State Gov't)
  2. LEHD Worker Flows
  3. Study Area Major Employers
6. Import trips and skims to a spreadsheet
7. Apply binomial choice model to estimate PNR/PNP use

# Network



# Zone System





# PNR Site Ranking Model

- ▣ Resides in a spreadsheet format
- ▣ Each run takes 6-8 minutes
- ▣ Output of PNR Site Ranking Model
  - PNR Ranking by Large Employer
  - PNR Ranking for Madison Area (integrates parking fee/transit)
  - PNR Ranking for LEHD Worker Flow Data





# PNR Site Model Assumptions

- ▣ PNR Sites identified by the client were used. 120 final sites were coded into the network with some sites being blended due to network scale. One mile buffer was used.
- ▣ Three PNR types were used, per the DOT
  - Informal Park and Ride
  - Proposed PNR
  - Vanpool
- ▣ Screening to limit diversion routes and irrational paths.

$\text{Carpool} \leq 1.3 * \text{Non-Carpool}$

and

$\text{Drive to PNP/PNR lot} < \text{Non-Carpool}$



# Model Formulation

$$CPShare = \frac{e^{U_{Carpool}}}{e^{U_{Carpool}} + e^{U_{Private\ Auto}}}$$

# Utility Expressions

$$U_{Private\ Auto} = C_{ivt} \times IVT_d + C_{cost} \times ((Dist_d \times AOPC) + PrkCost_{DA})$$

$$U_{Carpool} = C_{ivt} \times IVT_{c1} + C_{cost} \times Dist_{c1} \times AOPC + CPIVTFactor \times C_{ivt} \times IVT_{c2} + CPCOSTFactor \times C_{cost} \times Dist_{c2} \times AOPC + CPCOSTFactor \times C_{cost} \times PrkCost_{CP} + C_{cost} \times TrnFare$$

$CPIVTFactor = 0.5$  = Discount factor to reduce utility for time spent during shared ride portion

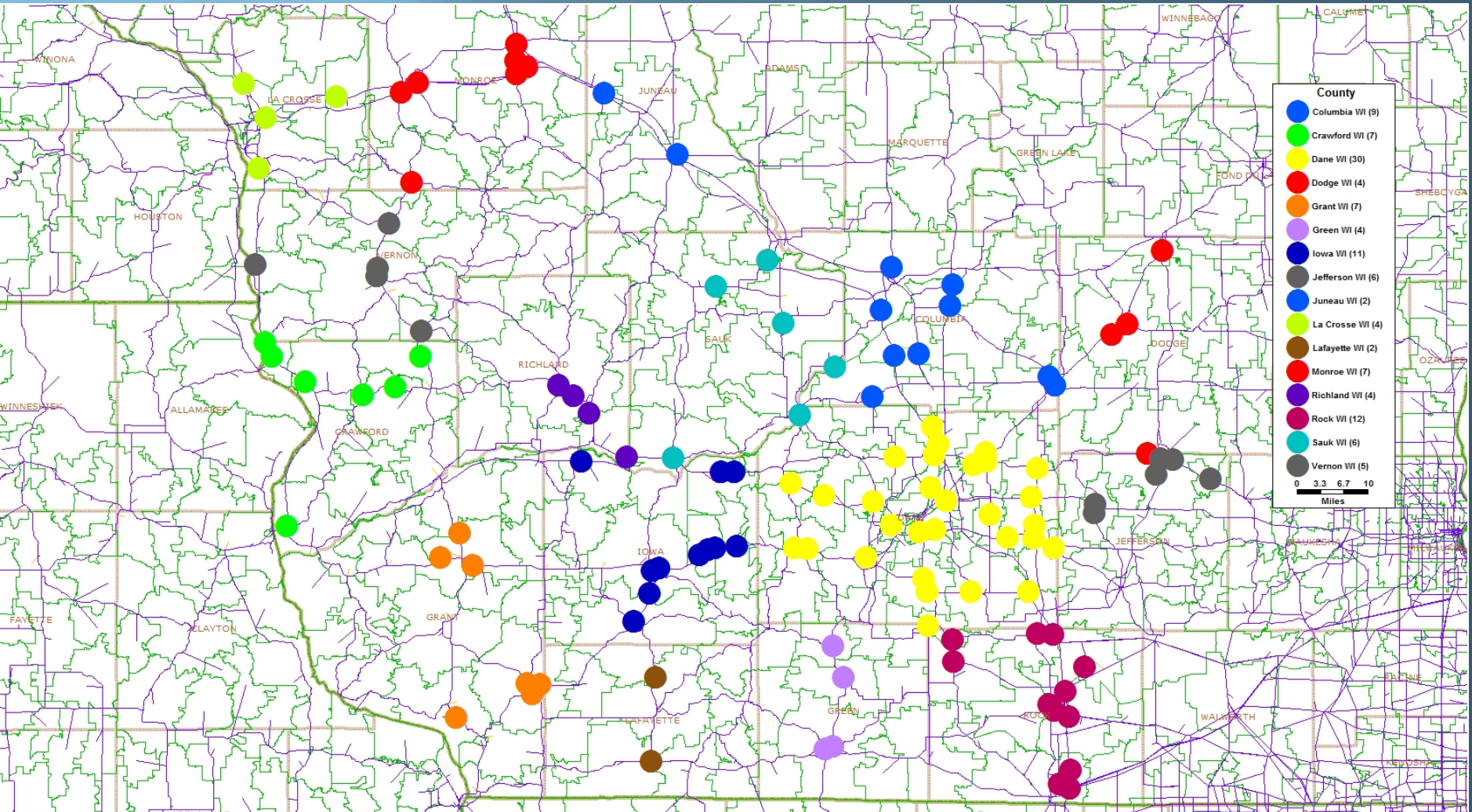
$CPCOSTFactor = 0.5$  = Discount factor to reduce utility for travel distance spent during shared ride portion



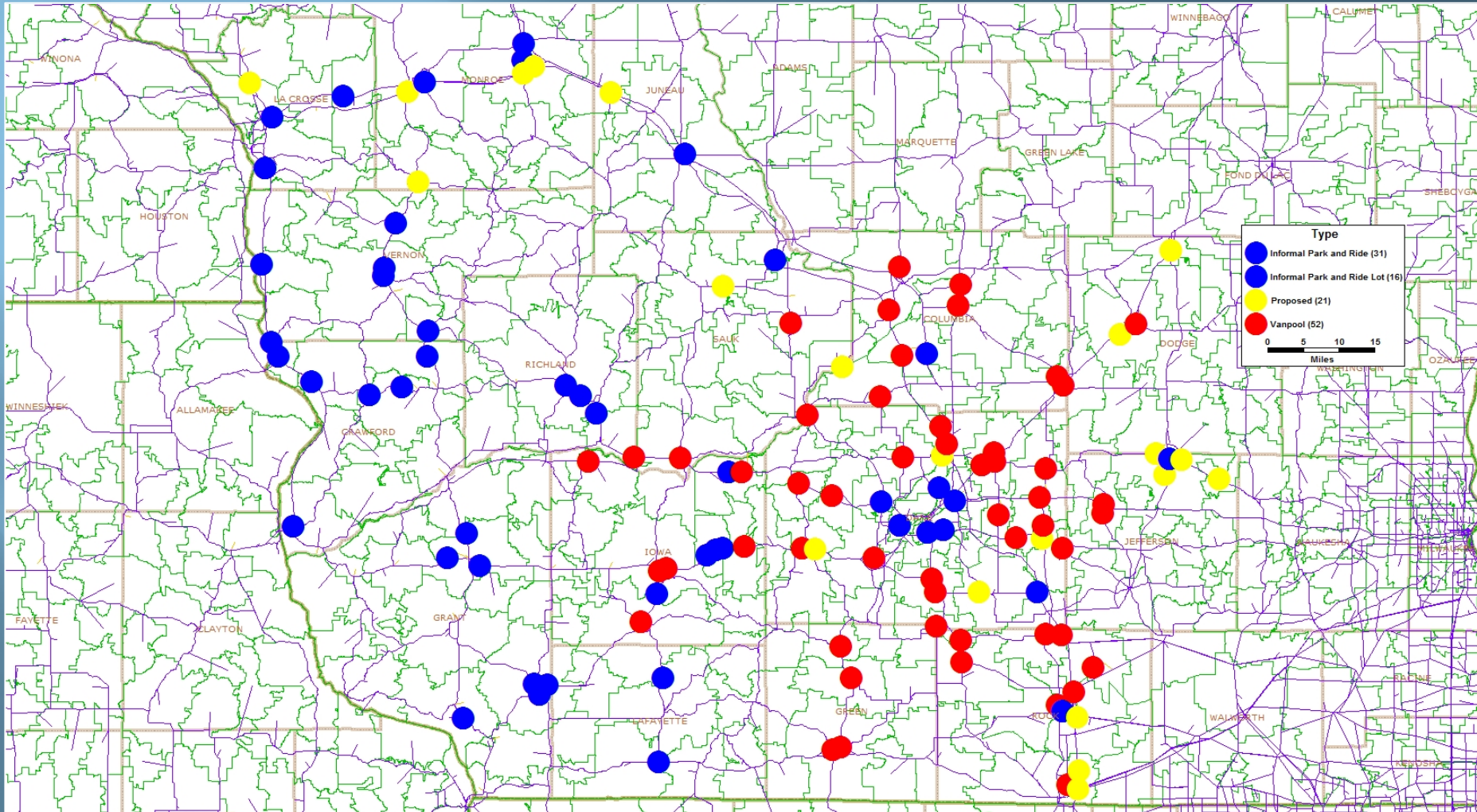
# Other Model Parameters

- ▣ In-Vehicle time Coefficient =  $-0.025$
- ▣ Value of time = \$15.00/hr
- ▣ Fuel Price = \$3.20/hr
- ▣ Fleet MPG = 21.0 mpg

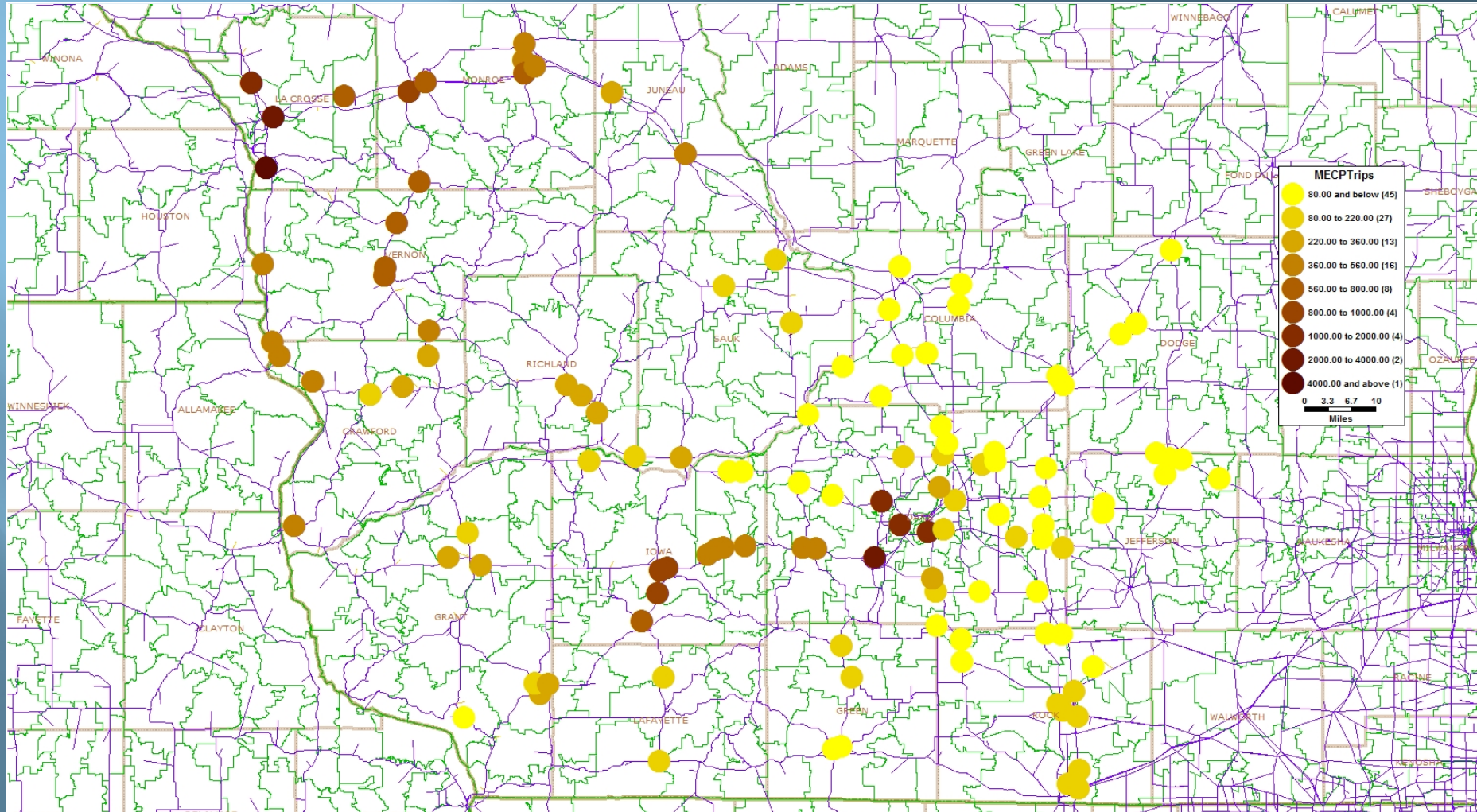
# Sites by County



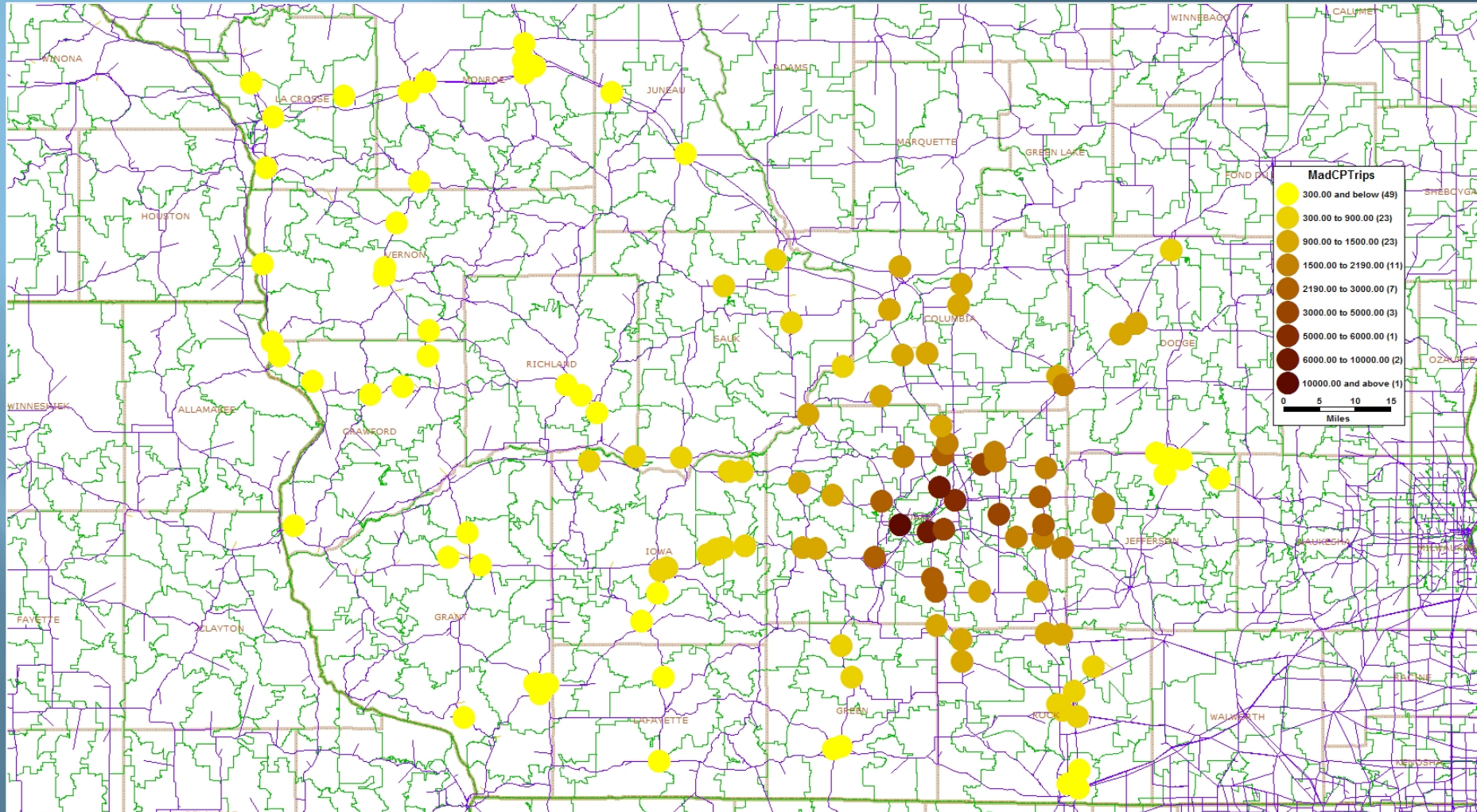
# Sites by PNR Type



# Major Employer Demand

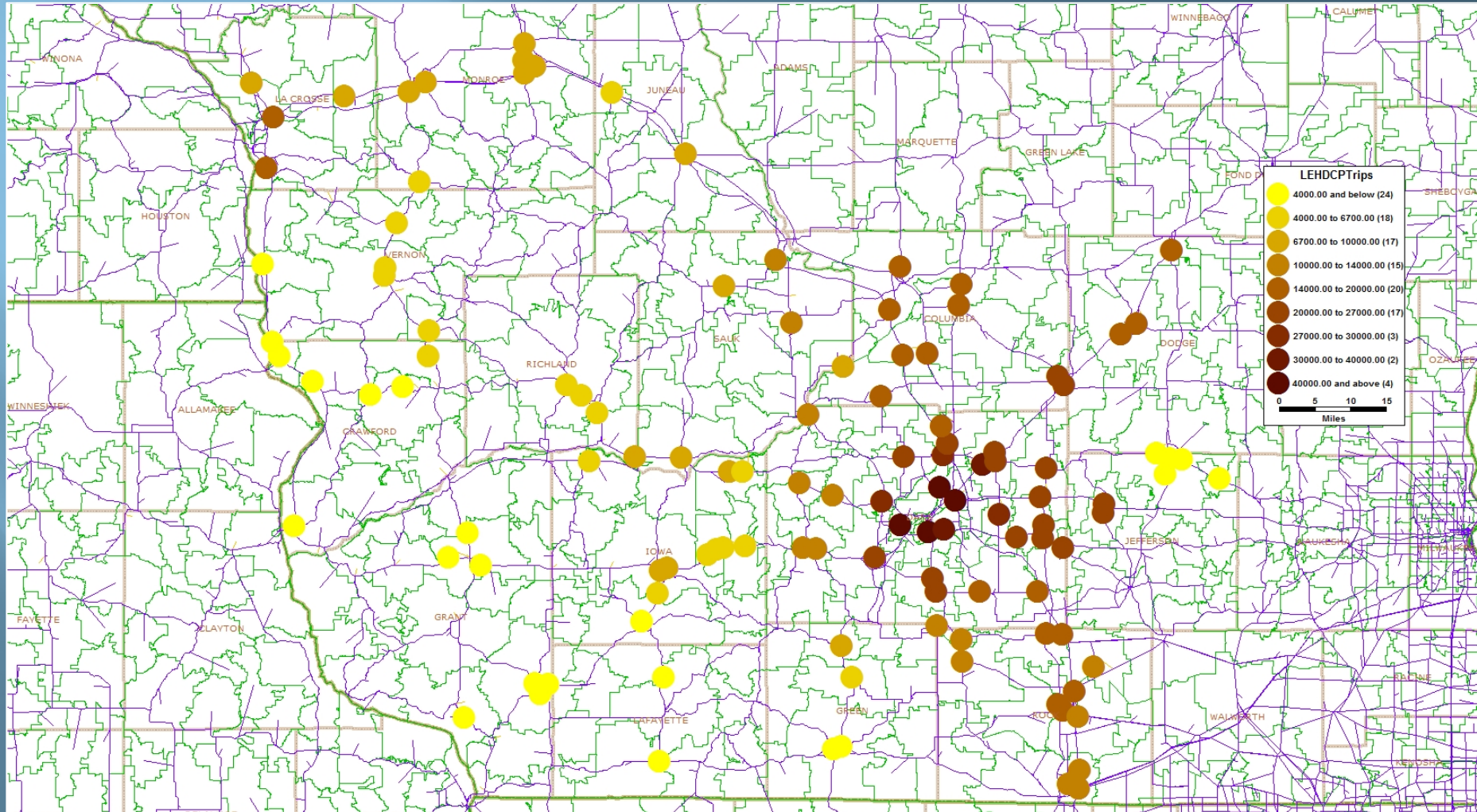


# State, UW, Hospital Employment

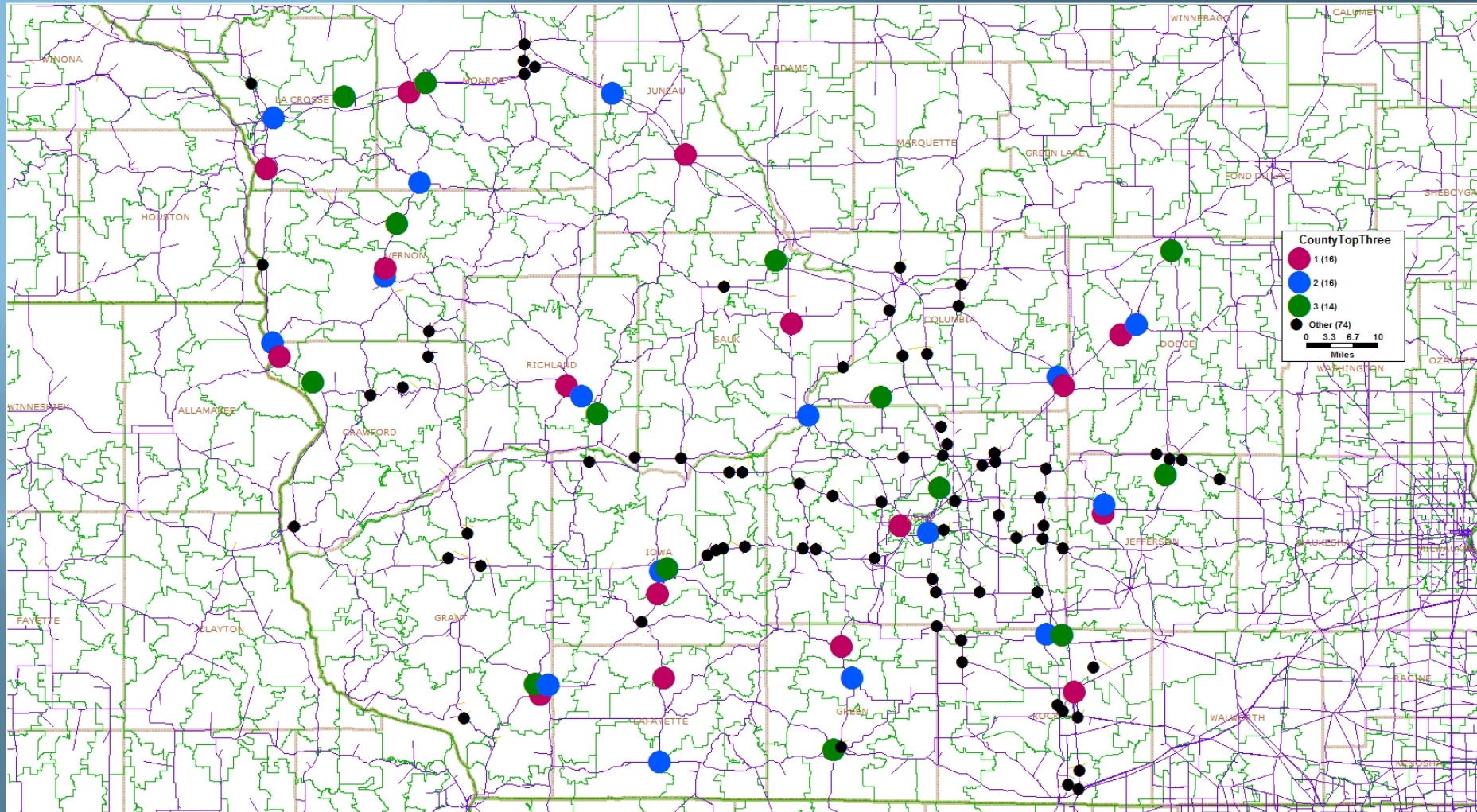




# LEHD Employment



# Top Three PNR Sites by County





# Work Completed

- ▣ Comprehensive Zip Code zone expansion
- ▣ Comprehensive highway network expansion to match
- ▣ Integration of the 151 WISDOT Park and Ride sites
- ▣ Addition of Parking Fee in selected Zip Codes
- ▣ Identification of seven transit access points (Madison area)
- ▣ Identification of the Park and Ride “shed” for each point – to disallow irrational trips
- ▣ Review and reprocessing of all demand data.
- ▣ Calculation/Ranking of each candidate PNR site (Spreadsheet Model)
- ▣ Summary tabulation in spreadsheet format



# Limitations of the Model

- ▣ Aggregation of geography - Zip code geography assumes that everyone who lives and works in the same zip code can carpool
- ▣ Behavioral sensitivity – items such as scheduling, household structure, income, auto availability, and other are not explicitly included.
- ▣ Evaluates, but does not locate, where PNR sites will be effective.



# Strengths of the Model

- ❑ Flexible – can be used to test alternative values of time, screening criteria, gas prices and/or additional PNR sites
- ❑ Output is very robust – for any site we can dig into results reviewing trip length frequency, origins and destinations, and specific market shares and other.
- ❑ Objective and consistent – treats all sites exactly the same.
- ❑ The three employee markets provide the means of conducting a many-faceted analysis.



# Summary

- ▣ The Park and Ride Site Ranking Model resides in a spreadsheet format and can be applied using the three existing travel markets
  - LEHD market is recommended for the initial pass since it covers all employment
  - Keep in mind the results must be interpreted in the context of zip code geography
- ▣ Next test may be a corridor such I-90 between Madison and Rockford (Dane or Rock County) where there is opportunity to locate a PNR lot.



Thank You!

QUESTIONS?