BTS - LED Pilot Study

Bureau of Transportation Statistics
LED Staff
Wende Mix, Contractor
Project Goals

• Develop a prototype model of local, state, and federal cooperation to produce annual Home to Work flow relationships.
• Illinois and Florida participated in this research.
• Enhancing ES-202 data for better establishment address geocodes.
  – Accuracy requirements - establishments geocoded by Census to roof top or block face level.
## Results

<table>
<thead>
<tr>
<th>Priority</th>
<th>Florida Number of Establishments</th>
<th>Illinois Number of Establishments</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>250,035</td>
<td>204,975</td>
</tr>
<tr>
<td>1</td>
<td>19,795</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>114,658</td>
<td>142,363</td>
</tr>
<tr>
<td>TOTAL</td>
<td>384,488</td>
<td>347,338</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Priority</th>
<th>Florida Total Employment</th>
<th>Illinois Total Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>4,075,597</td>
<td>4,341,350</td>
</tr>
<tr>
<td>1</td>
<td>502,427</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>2,002,997</td>
<td>1,773,886</td>
</tr>
<tr>
<td>TOTAL</td>
<td>6,581,021</td>
<td>6,115,236</td>
</tr>
</tbody>
</table>
## Results

<table>
<thead>
<tr>
<th>Priority 0 % Geocoded</th>
<th>Florida</th>
<th>Illinois</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establishments</td>
<td>65%</td>
<td>59%</td>
</tr>
<tr>
<td>Employment</td>
<td>62%</td>
<td>71%</td>
</tr>
</tbody>
</table>
## Results

<table>
<thead>
<tr>
<th></th>
<th>Total Returned Addresses</th>
<th>Total Returned Single Unit Addresses</th>
<th>Total Returned Multi-Unit Addresses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Florida</td>
<td>11,932</td>
<td>11,382</td>
<td>550</td>
</tr>
<tr>
<td>Illinois</td>
<td>67,345</td>
<td>45,801</td>
<td>21,544</td>
</tr>
<tr>
<td></td>
<td><strong>Total Returned Employment</strong></td>
<td><strong>Total Returned Single-Unit Employment</strong></td>
<td><strong>Total Returned Multi-Unit Employment</strong></td>
</tr>
<tr>
<td>Florida</td>
<td>441,845</td>
<td>336,453</td>
<td>105,392</td>
</tr>
<tr>
<td>Illinois</td>
<td>702,634</td>
<td>673,629</td>
<td>29,005</td>
</tr>
</tbody>
</table>
## Results

**Returned Addresses**

<table>
<thead>
<tr>
<th></th>
<th>Establishments</th>
<th>Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Florida</td>
<td>10%</td>
<td>22%</td>
</tr>
<tr>
<td>Illinois</td>
<td>47%</td>
<td>40%</td>
</tr>
</tbody>
</table>
## Results – Multi Units

### Illinois

<table>
<thead>
<tr>
<th>PRIORITY</th>
<th>EDUCATION</th>
<th>MEDICAL</th>
<th>PRIV_MISC</th>
<th>PUBLIC</th>
<th>EMP10KPLUS</th>
<th>TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>42</td>
<td>36</td>
<td>110</td>
<td>15</td>
<td>2</td>
<td>284</td>
</tr>
<tr>
<td>2</td>
<td>11</td>
<td>17</td>
<td>33</td>
<td>13</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>53</strong></td>
<td><strong>53</strong></td>
<td><strong>143</strong></td>
<td><strong>28</strong></td>
<td><strong>7</strong></td>
<td><strong>284</strong></td>
</tr>
</tbody>
</table>

### Multiple Addresses Returned

|            | 542   | 151   | 3,489  | 1,119  | 1,163      | 6,464  |

### Employment

|            | 71,662| 55,914| 180,317| 53,908 | 146,783    | 508,584|
The Richness of the LED Data for Transportation Planners

Commuting Information

e.g. If you live in the southern half of Lake County, IL, you are more likely to commute out of county.

If you live in the Northern half of Lake County, IL, you are more likely to commute within the of county.

Maps for 1999 (un-clean data) and 2001 (cleaned data)
Lake County, Illinois

**Commuting Patterns - 1999**

Circle size proportional to Total Workers Residing in the Tract
- Commute within Tract of Residence
- Commute within Lake Co.
- Commute outside Lake Co.

Source Data: LED Pilot OD Matrix 1999 Data
2000 Census Tract Population Centroids, U.S. Bureau of the Census
Commuting Patterns

Lake County, Illinois

Circle size proportional to Total Workers Residing in the Tract
- Commute within Tract of Residence
- Commute within Lake Co.
- Commute outside Lake Co.

Source Data: LED Prototype OD Matrix 9/2003
2000 Census Tract Population Centroids,
U.S. Bureau of the Census

Skyhill Partners
Specializing in Geographic Solutions
The Richness of the LED Data for Transportation Planners

Commuting Information

e.g. Most Out of County Commuters travel south to Cook Co. or West to McHenry Co.

NOTE: Extremely distant commutes identify areas for additional cleaning of ES202

Maps for 2001 (cleaned data)
Commuting Patterns

Out of County Flows
One dot = 10 Workers

Lake County, Illinois

Source Data: LED Prototype OD Matrix 9/2003

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Commuting Information

e.g. The most likely destination for commuters from Lake Co. to Cook Co. is downtown Chicago (Tract 320500).

The majority of these trips come from southeastern Lake Co.

Maps for 2001 (cleaned data)
Commuting Patterns
Lake Co tracts to Cook CO Tract
Max Flow to tract 320500
Lake County, Illinois

Source Data: LED Prototype OD Matrix 9/2003
2000 Census Tract Population Centroids,
U.S. Bureau of the Census

Number of Workers to
Cook Co Tract 320500
- 2 - 15
# 15 - 30
# 30 - 50
# 50 - 75
# 75 - 135
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Transit Planning Information

e.g. Low wage workers live primarily in the northern half of Lake County.

High wage workers live along Lake Michigan in the Southeastern part of the county.

The distribution of high wage workers to low wage workers is more disparate in the southern half of Lake Co.

Mean Monthly Pay is low in the north east part of Lake Co. but there are also relatively few workers in these tracks. Tracts with lots of Service establishments tend to have more workers with moderate to high monthly earnings. However, many tracts with workers earning high monthly pay have relatively few workers.

Maps for 2001 (cleaned data)
Average Wage by Tract of Residence
Lake County, Illinois

Source Data: LED Prototype OD Matrix 9/2003
2000 Census Tract Population Centroids,
U.S. Bureau of the Census
Lake County, Illinois

LED Average Earnings by Tract of Residence

Proportion of Workers in Living in a tract with average earnings

- Less than $12,000
- Between $12,000 and $35,000
- Greater than $35,000

Source Data: LED Prototype OD Matrix 9/2003
2000 Census Tract Population Centroids, Summary File 3,
U.S. Bureau of the Census

Skyehill Partners
Specializing in Geographic Solutions
Mean Monthly Pay and Number of Workers

Lake County, Illinois

Source Data: LED Prototype OD Matrix 9/2003
2000 Census Tract Population Centroids,
U.S. Bureau of the Census
The Richness of the LED Data for Transportation Planners

Transportation/transit Planning Information

e.g. What types of establishments are where most workers Work?

Few blocks with high presence of Agriculture, Forestry, Fishing establishments

Most tracts contain many Service establishments
However, the southwestern (lake front) tracts contain a high percentage of blocks with Service Establishments. Tracts heavy in Services are usually major work locations.

Tracts higher Manufacturing presence generally draw many workers. Lake Co. does not have many tracts with a High presence of manufacturing establishments.

High presence of Retail establishments are fairly dispersed throughout Lake County.

Maps for 2001 (cleaned data)
SIC Division:
Agriculture, Forestry, Fishing

Lake County, Illinois

Source Data: LED Prototype OD Matrix 9/2003
2000 Census Tract Population Centroids,
Summary File 3
U.S. Bureau of the Census
Lake County, Illinois

SIC Division: Services

Number of Blocks in Tract with Div. I Establishments

- 1 - 10
- 10 - 15
- 15 - 25
- 25 - 35
- 35 - 50

Number of People Working in Tract
- 1 - 500
- 500 - 1000
- 1000 - 2000
- 2000 - 5000
- 5000 - 10000

Source Data: LED Prototype OD Matrix 9/2003
2000 Census Tract Population Centroids,
Summary File 3
U.S. Bureau of the Census

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SIC Division: Manufacturing

Lake County, Illinois

Source Data: LED Prototype OD Matrix 9/2003
2000 Census Tract Population Centroids,
Summary File 3
U.S. Bureau of the Census

Number of Blocks in Tract with Div. D Establishments
- 1 - 3
- 3 - 5
- 5 - 8
- 8 - 12
- 12 - 18

Number of People Working in Tract
- 1 - 500
- 500 - 1000
- 1000 - 2000
- 2000 - 5000
- 5000 - 10000
How important is data cleaning?

• 1999 un-cleaned data indicates more out of county trips to more counties than the 2001 cleaned data.
  – Where 2001 has slightly fewer trips than 1999 reflects errors in the models as well as places for additional cleaning potential.

• At the tract level, more work is needed to verify the extraordinary loss of workers in Lake Co. between 1999 and 2001.
Change in Commuting Patterns

Change in No. of Workers from Lake County
1999 - 2001
- More Workers in 2001 (1-99)
- 1 - 500 more Workers in 1999
- 500 - 1500 more Workers in 1999
- 1500 - 4000 more Workers in 1999
- 4000 - 15,000 more Workers in 1999

Lake County, Illinois

Source Data: LED Prototype OD Matrix 9/2003
LED Pilot OD Table 1999 Data

Skyehill Partners
Specializing in Geographic Solutions
Change in Total Workers
By Place of Residence
Lake County, Illinois

Source Data: LED Prototype OD Matrix 9/2003
LED Pilot OD Table 1999 Data
2000 Census Tract Population Centroids,
U.S. Bureau of the Census
What about Integrating Census 2000 Data?

• How does it compare?
  – Ratio of workers to population pretty good. Would be better if LED OD table NOT tabulated at the BLOCK level.
  – More LED worker totals fall within the 90% Confidence interval around the Decennial estimate when taken from the Home Block Characteristics File
  – HOWEVER, the distribution of low, medium, and high wage workers appears more realistic using LED data.
Ratio of Workers * to Total Population
Lake County, Illinois

Source Data: LED Prototype OD Matrix 9/2003
2000 Census Tract Population Centroids,
Summary File 3
U.S. Bureau of the Census
Comparison of LED Workers and Decennial 2000 Workers at Place of Residence

Lake County, Illinois

Source Data: LED Prototype OD Matrix 9/2003
2000 Census Tract Population Centroids,
Summary File 3
U.S. Bureau of the Census

LED HB Workers
- # Significantly LESS than Decennial Estimate
- * Significantly MORE than Decennial Estimate
- @ No Different from Decennial Estimate

LED OD Workers
- # Significantly LESS than Decennial Estimate
- @ No Different from Decennial Estimate

(90% Confidence Interval calculated for the Decennial estimate of total workers)
Census 2000
Average Earnings
by Tract of Residence
Lake County, Illinois

Source Data: LED Prototype OD Matrix 9/2003
2000 Census Tract Population Centroids,
Summary File 3,
U.S. Bureau of the Census

Lake Michigan

Cook Co., IL

McHenry Co., IL
What’s Next!

• Have participating states work on cleaning the entire ES202 files.

• Have states incorporate multi-units into their systems and maintain these as multi-units.

• Make better use of SIC codes for look-up and validation.

• Bring the MPOs into the look-up process as soon as possible
Contacts

- Julia Lane, LED Census
- Caesar Singh, BTS
- Wende Mix, Skyehill Partners