

# Learning to Use the ACS for Transportation Planning *Report on NCHRP Project 8-48*

*presented to*

**TRB Census Data for Transportation Planning Meeting**

*presented by*

**Kevin Tierney**

**Cambridge Systematics, Inc.**

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**Transportation leadership you can trust.**

# National Cooperative Highway Research Program Project 8-48 Project Activities

- Review current and potential use of census-related data in transportation planning
- Compare residence-based, workplace-based and home-to-work outputs from ACS and census long form for use in transportation planning applications
- Prepare ACS guidebook
- Recommend new transportation data products based on ACS data

# ACS for Transportation Planning Benefits

- **Key Census Bureau objectives are likely to be achieved with ACS implementation**
  - Improve the year 2010 Decennial Census
  - Operational schedules and budgets close to predicted levels
- **ACS data quality is likely to be superior to that of the Census Long Form in terms of nonsampling error**
- **ACS data will be available more frequently**
- **ACS data will be more timely**

# ACS for Transportation Planning Challenges

- **Sampling error is higher for ACS than for the Long Form (smaller sample sizes)**
- **Data disclosure avoidance will prevent many smaller area analyses that transportation users would like to do, including some that are possible with Census 2000 data**
- **ACS differences from the Census Long Form place limits on our ability to bridge analyses between Year 2000 data and ACS data**

# Data Quality Improvement

## ACS Three Year Averages versus Census 2000 Long Form

Characteristic	ACS (1999-2001)	Census 2000
Self Completion Non-Response Rate	44.7%	31.9%
Total Housing Unit Non-Response Rate	4.4%	9.7%
Occupied Housing Unit Non-Response Rate	5.2%	8.7%
<i>Allocation Rates</i>		
Population Item Total Allocation Rate	6.5%	11.2%
Occupied Housing Unit Total Allocation Rate	7.7%	15.8%
Vacant Housing Unit Total Allocation Rate	23.2%	19.8%
Population and Occupied Housing Unit Total Rate	6.9%	12.8%
<i>Sample Completeness Rates</i>		
Housing Sample Completeness	92.9%	90.3%
Household Population Sample Completeness	90.4%	91.1%

Source: Census Bureau, 2004.

# Data Timeliness

## Improved Transportation Planning Analyses

- **Analyses of large geographic areas using the most recent Decennial Census data may require the use of data that is 12 to 14 years old**
- **The same analyses using the most recent ACS data can use data that is 8 to 19 months old**
- **Smaller area analyses will require the combination of data from the past several years, but not nearly as far back as the Decennial Census data**

# Data Frequency

## Improved Transportation Planning Analyses

- **ACS can better temporally match with other transportation data sources**
  - Household and on-board surveys
  - Transportation ground count data
  - Transportation level-of-service data
- **ACS supports the development of time series trend analyses**
  - Transportation trend analyses
  - Demographic / land-use analyses

# Sample Size

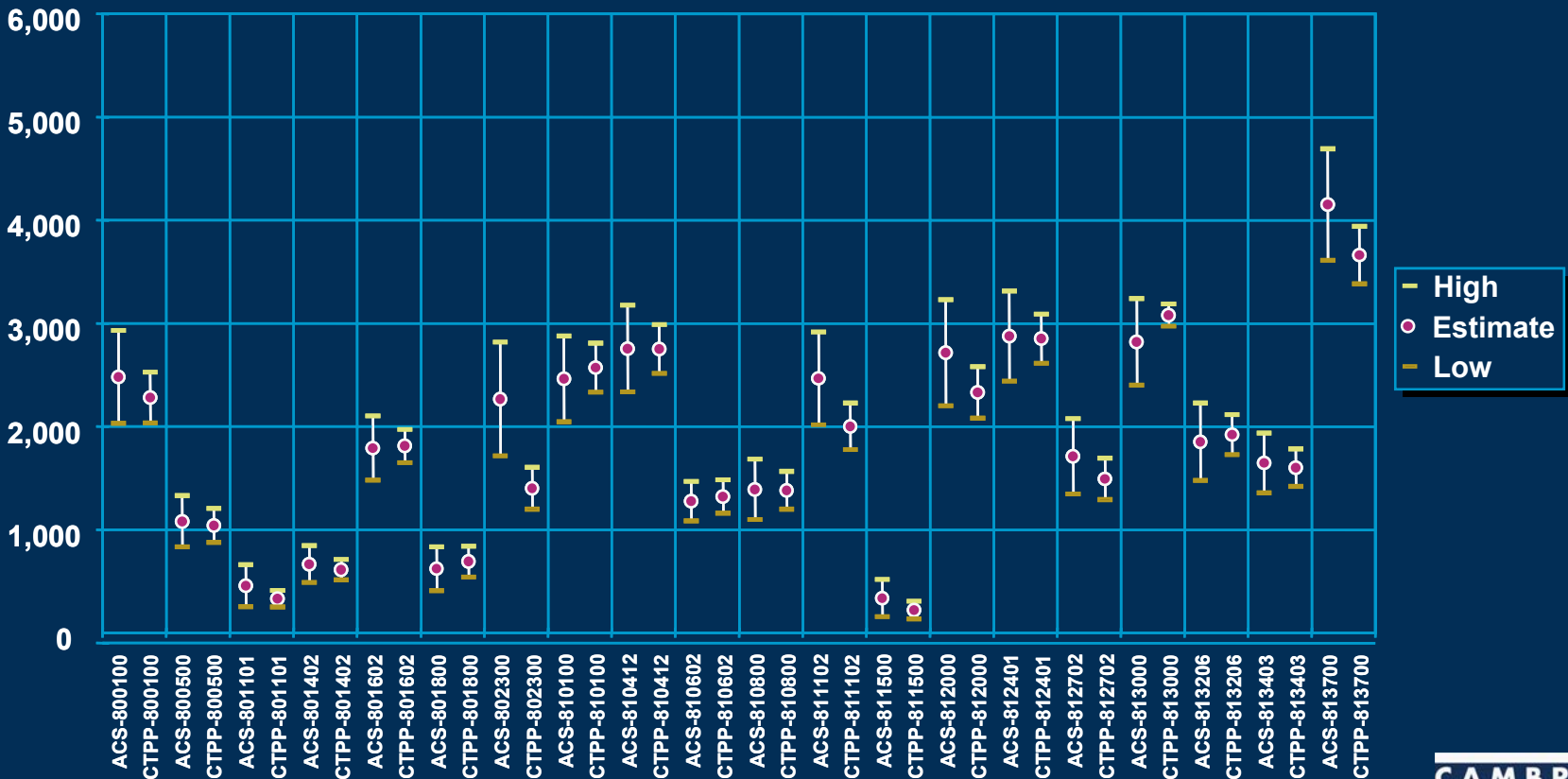
## Challenges for Transportation Planning Analyses

- **Wider confidence intervals**
- **Need for multiyear averaging**
- **Additional threats of sample loss**
  - **Potential future funding limitations**
  - **Voluntary, rather than mandatory participation**

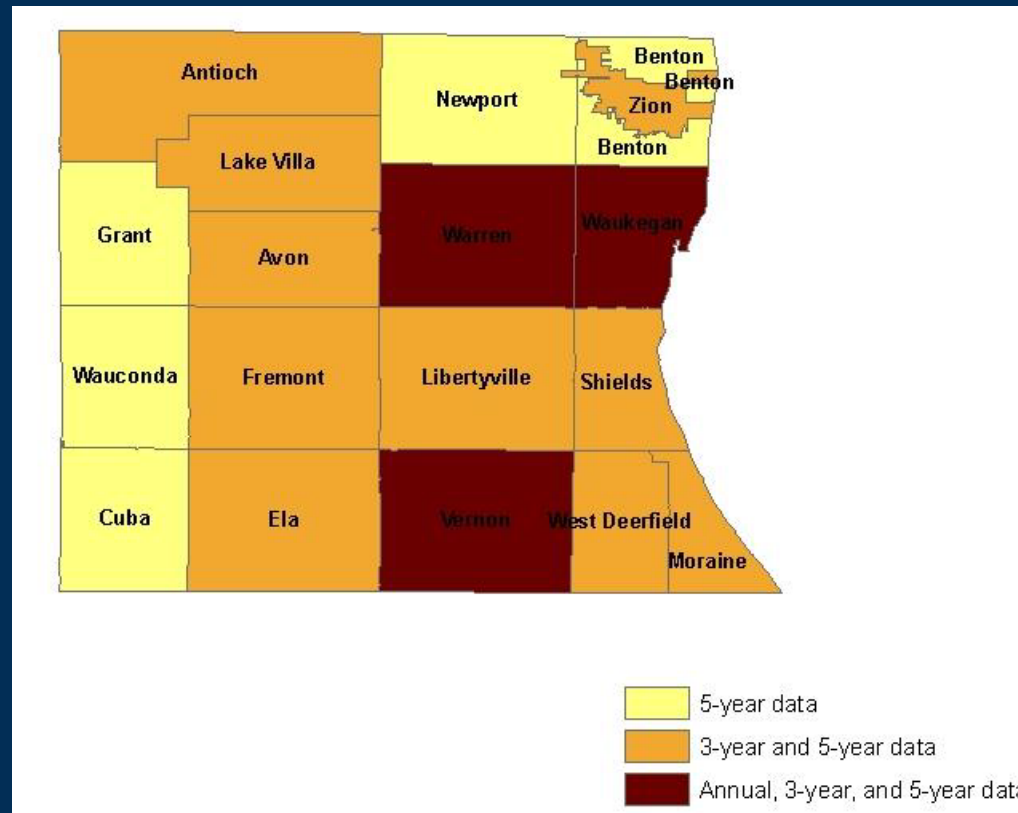
# Sample Size Confidence Levels

- Sampling error is higher for ACS than for the Long Form (smaller sample sizes)

Number of Workers

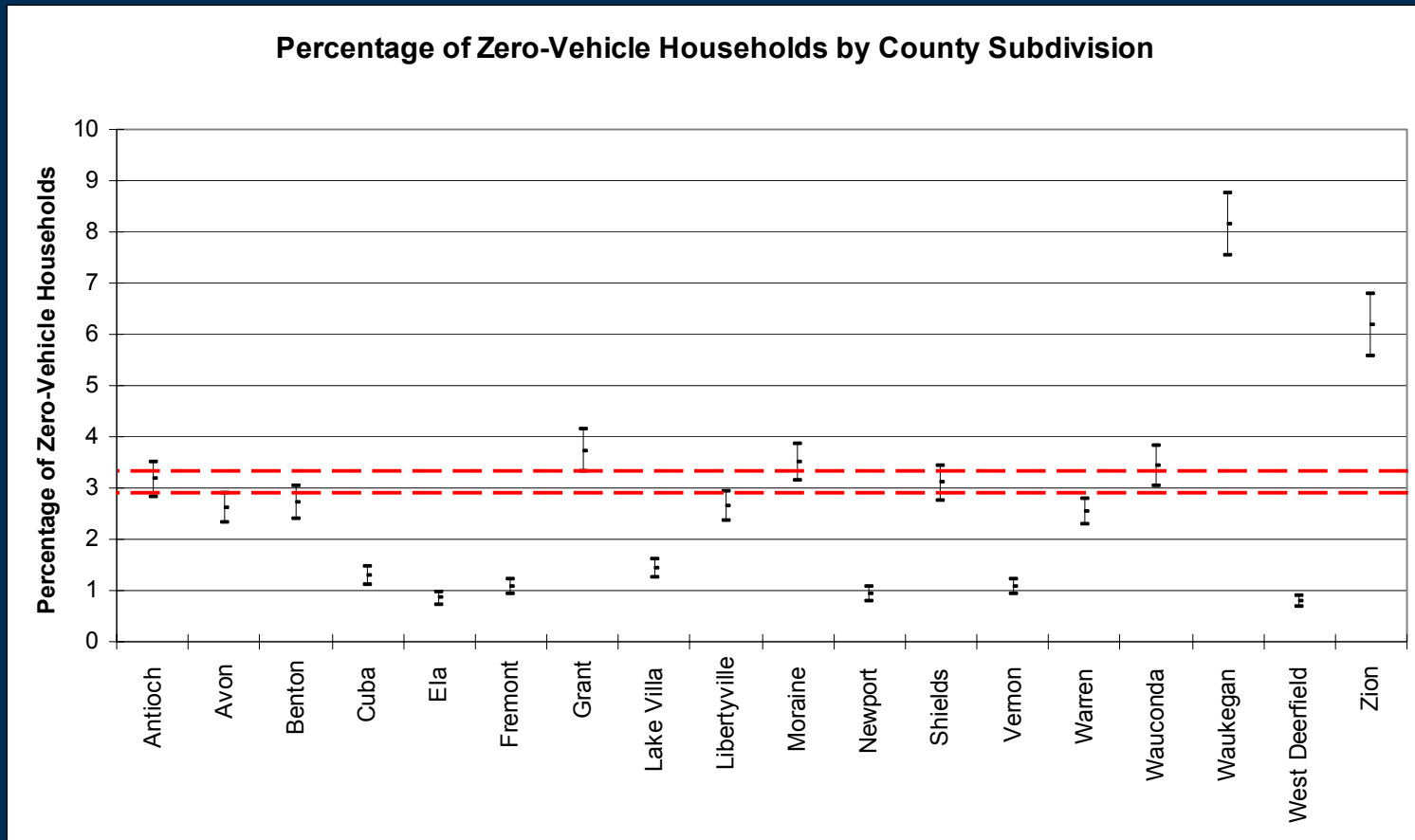


# Sample Size Multi-year Data Averaging



# Sample Size

## Challenges of Analyzing Different Multiyear Periods



# Sample Size

## Challenges of a voluntary ACS

- **Making ACS voluntary, rather than mandatory, will result in:**
  - **Significant reduction in the self-completion mail response rate (over 20 %)**
  - **Increase in annual costs by at least \$ 59.2 million to maintain reliability**
  - **And/or reduction in the reliability of estimates because of the reduction in the total number of completed interviews**

# Disclosure Limitations

## Challenges for Transportation Planning Analyses

- Disclosure limits will significantly limit small area analyses commonly performed by transportation planners
- Example of disclosure effects on Census 2000 vs. ACS for Multnomah County

Data	Part 3: Without Thresholds		Part 3: With Thresholds		Part 1
	Total Records	Total Workers	Total Records	Total Workers	Total Workers
Census 2000	8,228	207,120	2,644	147,080	199,220
ACS	6,368	181,563	1,673	118,234	202,024

# Comparisons with Census 2000 Demographic Estimates

<b>Estimate Category</b>	<b>ACS (1999-2001) – Census 2000</b>
<b>Sex</b>	<b>Small</b>
<b>Age</b>	<b>Moderate</b>
<b>Race</b>	<b>Large*</b>
<b>Hispanic Origin</b>	<b>Large</b>
<b>Relationship</b>	<b>Large</b>
<b>Tenure</b>	<b>Moderate</b>
<b>Household by Type</b>	<b>Large</b>
<b>Housing Occupancy</b>	<b>Large</b>

Source: Census Bureau, 2004.

\* Large is defined as nine or more of 36 test counties; small as fewer than four counties.

# Comparisons with Census 2000

## Social Estimates

<b>Estimate Category</b>	<b>ACS (1999-2001) – Census 2000</b>
<b>School Enrollment</b>	<b>Moderate</b>
<b>Educational Attainment</b>	<b>Moderate</b>
<b>Marital Status</b>	<b>Moderate</b>
<b>Grandparents as Caregivers</b>	<b>Small</b>
<b>Disability</b>	<b>Large*</b>
<b>Nativity and Place of Birth</b>	<b>Moderate</b>
<b>Region of Birth/Foreign Born</b>	<b>Small</b>
<b>Language Spoken at Home</b>	<b>Large</b>
<b>Ancestry</b>	<b>Large</b>

Source: Census Bureau, 2004.

\* Large is defined as nine or more of 36 test counties; small as fewer than four counties.

# Comparisons with Census 2000 Housing Estimates

<b>Estimate Category</b>	<b>ACS (1999-2001) – Census 2000</b>
<b>Units in Structure</b>	<b>Large*</b>
<b>Year Structure Built</b>	<b>Large</b>
<b>Number of Rooms</b>	<b>Large</b>
<b>Year Householder Moved into Unit</b>	<b>Small</b>
<b>Number of Vehicles</b>	<b>Moderate</b>
<b>House Heating Fuel</b>	<b>Moderate</b>
<b>Occupants per Room</b>	<b>Large</b>
<b>Housing Value</b>	<b>Moderate</b>
<b>Mortgage Status and Selected Owner Costs</b>	<b>Small</b>

Source: Census Bureau, 2004.

\* Large is defined as nine or more of 36 test counties; small as fewer than four counties.

# Comparisons with Census 2000 Economic Estimates

<b>Estimate Category</b>	<b>ACS (1999-2001) – Census 2000</b>
<b>Employment Status</b>	<b>Large*</b>
<b>Commuting to Work</b>	<b>Moderate</b>
<b>Occupation</b>	<b>Small</b>
<b>Industry</b>	<b>Small</b>
<b>Class of Worker</b>	<b>Moderate</b>
<b>Household Income</b>	<b>Moderate</b>
<b>Income by Type</b>	<b>Large</b>
<b>Family Income</b>	<b>Small</b>
<b>Poverty Status</b>	<b>Small</b>

Source: Census Bureau, 2004.

\* Large is defined as nine or more of 36 test counties; small as fewer than four counties.

# Comparisons with Census 2000

## Questionnaire and Data Collection Differences

- **Questionnaire and data collection implementation differences**
  - Residency definition
  - Reference dates
  - Minor wording changes
- **Questionnaire changes over time will further hinder comparison to Decennial Census and previous ACS data**
- **Geographic definition differences**

# Comparisons with Census 2000

## Questionnaire Resident Definition Differences

- **Residency definitions are different between Long Form and ACS**
  - **Long Form: usual residence concept**
    - One place where the person spends most of the time
  - **ACS: current residence concept and the “two month” rule**
    - Recognizes that people can live in more than one place over the course of a year
    - Suits the ACS because of continuous data collection
    - Is especially important in seasonal areas

# Comparisons with Census 2000

## Questionnaire Reference Period Differences

- **Reference time periods are different between Long Form and ACS**
  - **Long Form: reference period for a characteristic is a point in time → April 1 of the Decennial year**
  - **ACS: reference period for a characteristic is:**
    - **An average over 12 months for annual estimates**
    - **An average over 3 years for a 3-year moving average estimate**
    - **An average over 5 years for a 5-year moving average estimate**

# Comparisons with Census 2000

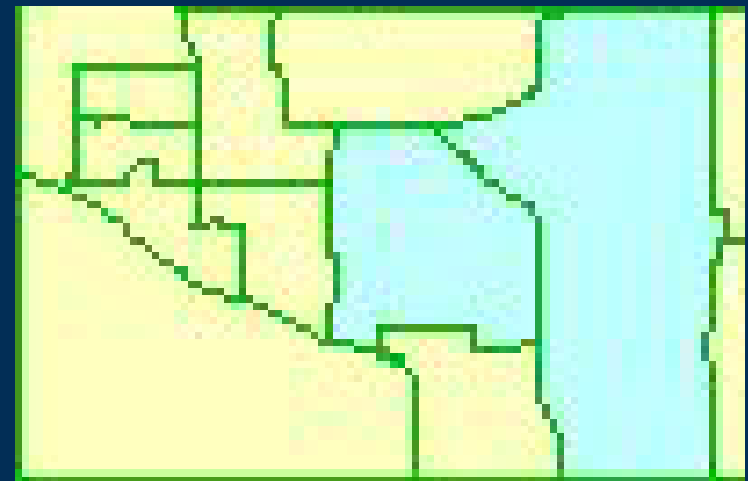
## Questionnaire Wording Differences

- **The wording of some questions is different between Long Form and ACS**
  - **Wording and order of introductory data items**
    - ACS collects detailed information on 5 household members
    - Long Form collects detailed information on 6 household members
  - **Wording differences in the instructions for the housing questions**
  - **Effect on trend analysis when there are wording changes**

# Comparisons with Census 2000

## Geographic Definition Differences

- ACS annual and multi-year estimates summarized by the geographic definitions of the final year of the estimates
- Definitional changes and annexations need to be accounted for



# Guidebook

## ACS User Concerns

### ● Census Data Analyses

- Descriptive Analyses
- Trend Analyses
- Transportation Market Analyses
- Travel Survey Development and Analyses
- Travel Demand Modeling Analyses

### ● User Concerns

- Data Frequency Improvements
- Data Timeliness Improvements
- Sample Size Limitations
- Multiyear Averaging Issues
- Data Disclosure Issues
- Bridging between Census 2000 and ACS
- Data Presentation

# Considerations in Defining Transportation Data Products and Special Tabulations

- **Data needs vary by transportation users**
- **Considerably more transportation planning data may be available from standard ACS tabulations than from standard Decennial Census products**
- **Census Bureau and FHWA have raised concerns about how analysts will treat overlapping multiyear averages**

# Considerations in Defining Transportation Data Products and Special Tabulations

- **Availability of flow data special tabulations with acceptable suppression is in question**
- **Ability to define customized geographic areas for tabulations will be limited**
- **Opportunity to average more than five years of data to increase sample sizes, but the number of years that can be pooled together will reach a practical limit especially in fast growing areas**