



# CTPP Status Report



September 2016

U.S. Department of Transportation  
Federal Highway Administration  
Bureau of Transportation Statistics  
Federal Transit Administration



AASHTO Standing Committee on Planning  
TRB Census Subcommittee

## *Save the Date*

*Census Data Conference*

*November 14-17, 2017 – Kansas City, Missouri*

*Sponsored by the CTPP Oversight Board and TRB*

*Stay tuned for more details*

### **Census Transportation Planning Product (CTPP) Highlights**

*Penelope Weinberger, AASHTO,  
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#### **Special Tabulation:**

On May 31, 2016, AASHTO submitted the table request to the Census Bureau for the special tabulation of the 2012 to 2016 ACS data. On August 18, 2016, the Census Bureau accepted the tab as requested. The tab will include 116 residence-based tables, 55 workplace-based tables and 25 home-to-work flow tables. Delivery is anticipated in late 2018, or early 2019. Although this tab is smaller than the current tab it is the result of

a huge effort on the part of the transportation community to pare down to an acceptable product. The tab will still go through standard and special disclosure.

#### **Highlights from the CTPP Oversight Board annual meeting held in Providence, RI:**

- Received the good news of the tabs acceptance by the Census Bureau.
- Finalized mission statement and charge, roles and responsibilities.
- Agreed to emphasize training and outreach, research, and data for the coming year.

#### **The CTPP Mission Statement:**

*The CTPP is a State DOT-funded, cooperative program that produces special tabulations of American Community Survey (ACS) data that have enhanced value for transportation planning, analysis and strategic direction. Additionally, the program provides universal access to that data, funds and conducts research, and provides training and technical assistance to the transportation planning community, all to increase understanding of the needs of the traveling public in support of policy and programming decision making.*

## ACS Products Updates

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The Census Bureau has been working on a series of American Community Survey (ACS) based products. Below are the highlights and updates on the upcoming and recent data releases.

### ACS 2015 Releases

The Census Bureau is releasing on two 2015 ACS datasets this year:

- 2015 ACS 1-year estimates (for geographies of at least 65,000 population) was released on September 15, 2016.
- 2011-2015 ACS 5-year estimates for all geographies will be released on December 8, 2016.

ACS 3-year datasets are no longer available starting from the 2014 ACS products.

### Supplemental Products

In July 2016, the Census Bureau released the ACS supplemental products consisting of 2014 ACS 1-Year Supplemental Estimates and 2011-2014 ACS 5-Year Replicate Estimates.

### 2014 ACS 1-Year Supplemental Estimates

The 2014 ACS 1-year supplemental estimates include 58 detailed tables based on the 1-year microdata for geographies with populations of 20,000 or more. ACS data users might find these supplemental estimates particularly useful as substitutes to the eliminated 3-year ACS datasets.

Two basic commuting tables are included in the supplemental estimates:

1. K200801 Means of Transportation to Work.
2. K200802 Travel Time to Work.

These supplemental estimates are available on both [American FactFinder \(AFF\)](#) and the [Census application programming interface \(API\)](#). All supplemental tables start with prefix “K”, they can easily be found in AFF by searching “K\*”.

### 2014 ACS 5-year Variance Replicate Estimates Tables

The replicate estimates allow advanced data users to calculate margin of error (MOE) for their customized collapsed geography or tables. The variance replicate estimate tables consist of estimates, margins of error, and 80 variance replicates for 107 basic demographic 2010-2014 ACS tables, these tables:

- Allow data users to compute variances using a methodology similar to what was used during ACS production. Approximation formulas, which could not capture the covariance between estimates, were previously used by most users to calculate the MOEs for aggregate estimates.
- Allow data users to calculate MOEs for custom collapses or aggregate estimates across geographies.
- Include two commuting tables: Means of Transportation and Mean Travel Time.

A [Statistical Testing Tool](#) developed by the Census Bureau will help data users test the statistical differences between ACS tables.

[Replicate estimates](#) are available on the Census Bureau’s File Transfer Protocol (FTP) site.

[Aggregating MOEs](#) instructions and examples can be found in Census Bureau website.

## Updating NHTS with ACS Data to Provide Annual Travel Behavior Data for Transportation Decision-Making

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### Background and Objective

The National Household Travel Survey (NHTS) program provides transportation professionals and the American public valuable data for a wide range of applications regarding transportation. In part due to financial constraints, the NHTS is now conducted on a five- to eight-year cycle. As a result, understanding of the most recent shifts and trends in travel behavior is limited by the available data. In contrast, the American Community Survey (ACS) collects key socioeconomic data of communities in the US on a continuing basis throughout the year. Since socioeconomic characteristics play a key role in determining travel behavior, it is hypothesized that information contained in the ACS could be used to interpolate the NHTS travel behavior data for those interim years when the NHTS is not available. The objectives of this project are to explore the relationship between the ACS and the NHTS, and to determine if and how it is possible to interpolate the NHTS data using insights gained from the ACS data.

### Methodology and Results

As the first attempt to interpolate NHTS data with the ACS, we reproduced the following standard tables and figures from the [NHTS Summary Travel Trends \(STT\) report](#):

- Table 1. Summary Statistics on Demographic Characteristics and Total Travel.
- Table 8. Annual Person Trips per Household by Household Income.

- Table 11. Daily Trip and Travel Rates per Person by Trip Purpose.
- Table 19. Percent of Households without a Vehicle within Metropolitan Statistical Area (MSA) Size Group.
- Table 25. Distribution of Workers by Usual Commute Mode.
- Table 29. Distribution of Person Trips by Start Time of Trip.
- Figure 7. Trends in Household Distribution by Number of Household Vehicles.

Since the NHTS and the ACS share a significant amount of socioeconomic and commute information, it is feasible to directly reproduce some of the summaries using the ACS data. An initial review of both surveys reveals that the following characteristics in the NHTS are directly accessible from the ACS:

- Household size.
- Household vehicles.
- Workers by usual commute mode.
- Household income.
- Age of the respondent.
- Zero-vehicle households by MSA size.
- Usual trip start time.

As an example, Figure 1 shows a reproduction of Figure 7 in the STT report along with the household vehicle ownership information in the ACS 2008—1 Year and the ACS 2013—1 Year summary datasets. The ACS data present a satisfactory

replication of the patterns shown in the NHTS.

On the other hand, the NHTS and the ACS also differ in many aspects such as the sampling method, survey methodology, and time frames. Because of these differences, the following variables in the NHTS summary report are not available in ACS:

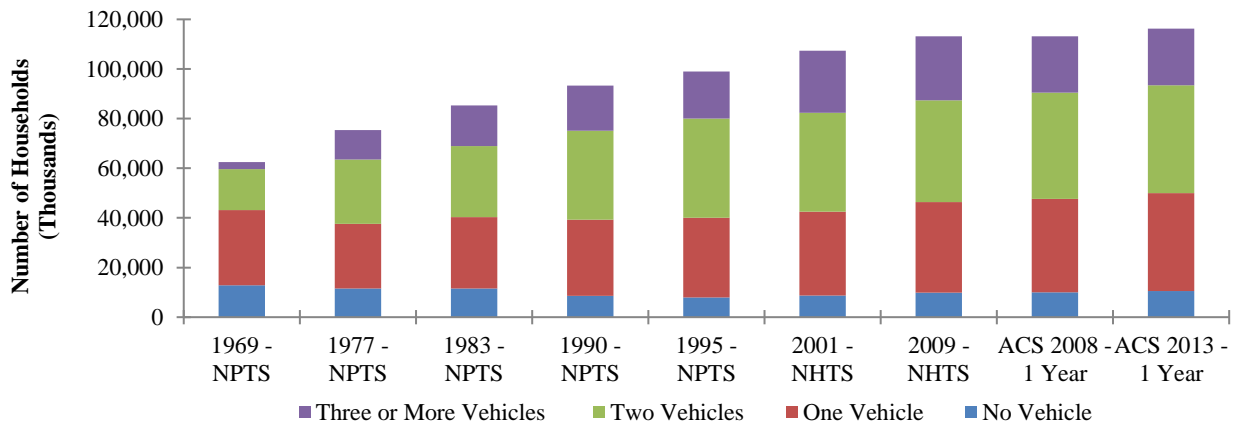
- Household vehicle trips.
- Household vehicle miles traveled.
- Person trips.
- Person miles traveled.

Predictive models are needed to reproduce these travel behavior indicators using the ACS data. We estimated a linear regression model for each of the variables using the 2009 NHTS data. The explanatory variables were limited to those that are also available in ACS. Various specifications of the models were tested with different combinations of explanatory variables. The best model specification was identified

using cross-validation where two thirds of the sample were selected to estimate the parameters of the model. The resulting model was then used to predict the travel behavior of the other one third of the sample. The best model was selected based on the smallest prediction error.

The performance of each model was later tested by backcasting the same travel behavior indicators reflected in the 2001 NHTS data by using the available information from the 2000 Census as independent variables. The performance of the models was evaluated based on the difference between the predicted values and the values observed in the 2001 NHTS.

Table 1 summarizes the final results of the backcasting application. In general, the models for aggregate measures of trips and for vehicle miles traveled (VMT) performed fairly well providing predictions that were within 2.0 to 6.9 percent of the observed targets for trips and VMT.



**Figure 1: Trends in Household Distribution by Number of Household Vehicles**

Source: 1969, 1977, 1983, 1990 and 1995 NPTS, 2001 and 2009 NHTS, and 1-year Summaries from 2008 and 2013 ACS.

Travel Behavior Indicator (in Millions)	Observed 2001 NHTS	Predicted Values	Percent Difference
Household Vehicle Trips	265,858	259,133	-2.5%
Household VMT	2,274,769	2,188,839	-3.8%
Person Trips	384,485	357,962	-6.9%
Person Miles of Travel	3,783,979	3,863,421	2.1%

**Table 1: Observed 2001 NHTS Observed and Predicted Values Comparisons**

## Conclusions

Both model development and model validation tasks in this effort linked NHTS datasets with other data sources to develop relationships that estimate NHTS travel behavior indicators for intermediate years between waves of NHTS data collection. The choice of a linear model and aggregate-level application should be considered as a first step in moving towards a means to perform a more reliable temporal transfer of the NHTS data. While, linear models performed reasonably well for reproducing aggregate measures, a more sophisticated approach is needed to predict travel behavior measures for key socioeconomic segments.

Finally, the upcoming 2016 NHTS dataset will provide an additional data point to further evaluate the models developed in this study, and to refine future efforts to link these data sources by employing more rigorous analytical approaches.

## CTPP Tract-to-Tract Commute Visualization

Mark Evans, Mobyus, [mark@mobyus.com](mailto:mark@mobyus.com)

*This article is about an animated commute map created and published by Mark Evans in May 2016. The map is at <http://bigbytes.mobyus.com/commute.aspx>.*

Earlier this year, I started a blog called “[I Like Big Bytes](http://ilikebigbytes.com/)” (<http://ilikebigbytes.com/>). My first small project was inspired by [Alasdair Rae](#), an urban studies and planning academic at the University of Sheffield in the UK. His blog, “[Stats, Maps n Pix](http://www.statsmapsnpix.com/)” (<http://www.statsmapsnpix.com/>), has a lot of great projects in the area of geographically oriented data and visualizations. At one point, he did a series of gifs that showed tract to tract commute flows in specific urban areas of the US and the UK. I decided to create an interactive version that allows the user to choose any county in the US and see the same information.

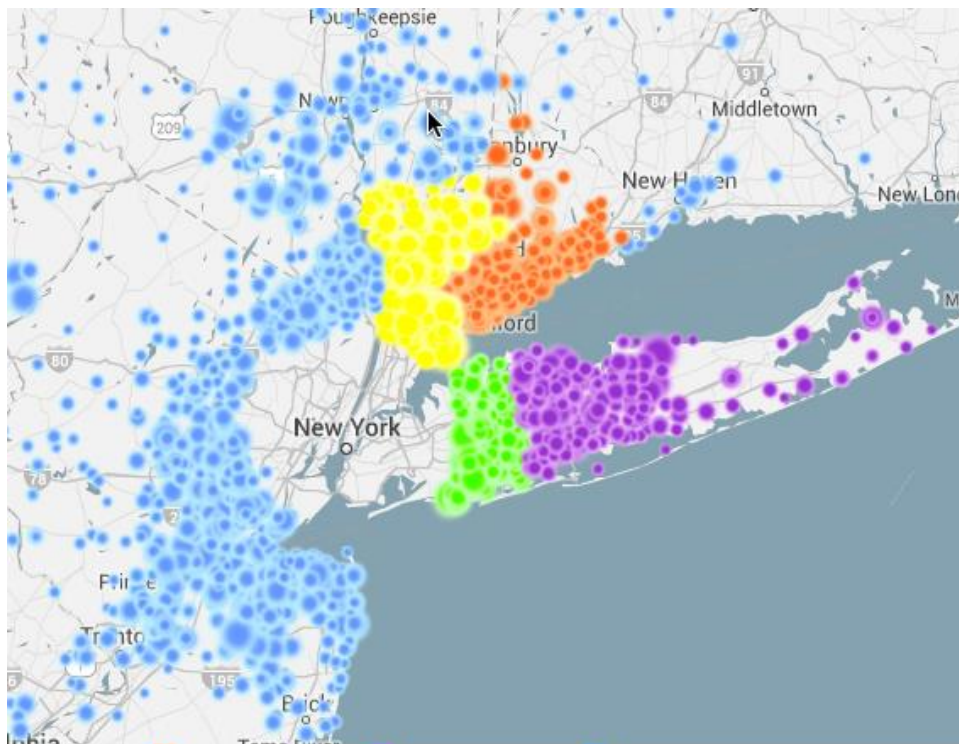


Figure 2: Commute Flow Map of New York Region

This project is based on the CTPP 2006-2010 tract to tract Data. It uses Google Maps, and animates the dots on top of the map. The tool itself is fairly intuitive, as shown in Figure 3, you can choose the state and county you want to view from the dropdown at upper left. The page will request the information and start to display. The default commute distance criterion is 20 to 100 miles. This means that the commute distance—as measured from the center of each the two tracts (work and home)—is between 20 and 100 miles. Clicking on the text will open a control that allows you to adjust these criteria.

You may notice that performance will suffer as the number of distinct tract-tract flows increases. This is a limitation of in-browser Javascript animation and will vary depending on the machine you are using.

Selecting full criteria (all available commutes) for New York County will not animate smoothly!

Each dot displayed on the map represents one distinct tract-tract flow that meets the criteria you have specified. Shown in

Figure 4, when the animation is paused, you can click on a dot to get more information about that particular flow.

The number of estimated commuters (in this case, 35) and the Coefficient of variation (CoV) (73 percent) are displayed. There are also a few other things you can do using this menu:

- Center the map on this particular dot (“Marker”).
- Open a new tab with Google Maps centered on one of the two tracts. Click on the bolded text in the title (“Lonoke County” or “Pulaski County”) to do this.
- Open a new tab with the best Google Maps driving route between the two tracts (again, this is using the geographic center of the tract).
- Open a tab from “[make Loveland.com](http://make Loveland.com)” with more information about a tract by clicking on “Home tract info” or “Work tract info”.

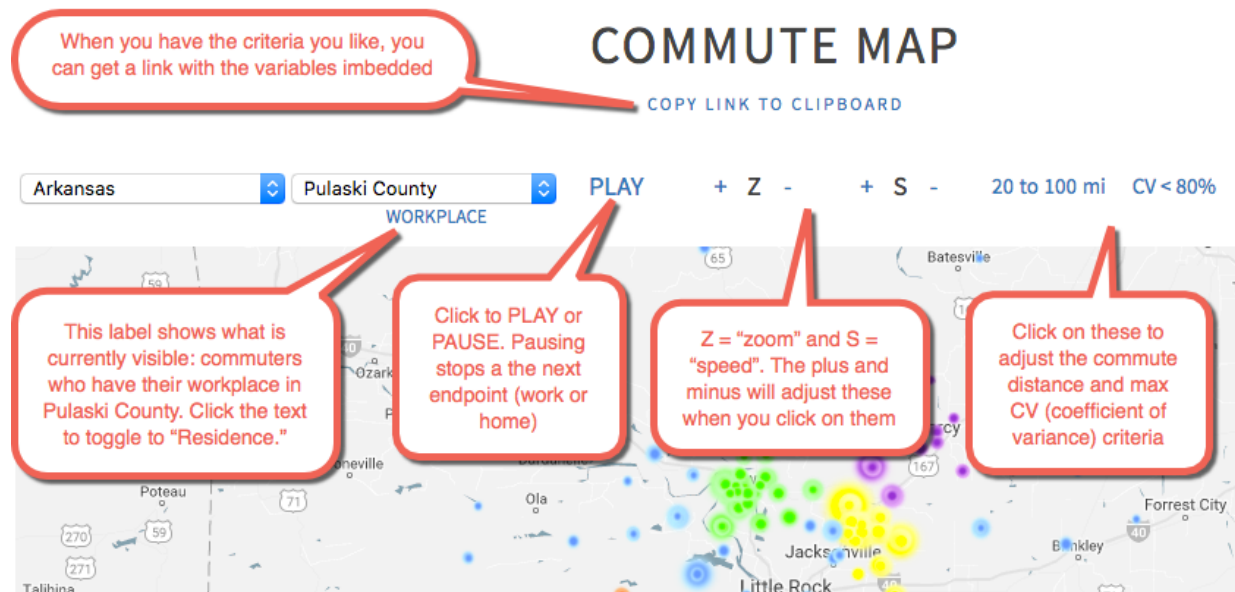
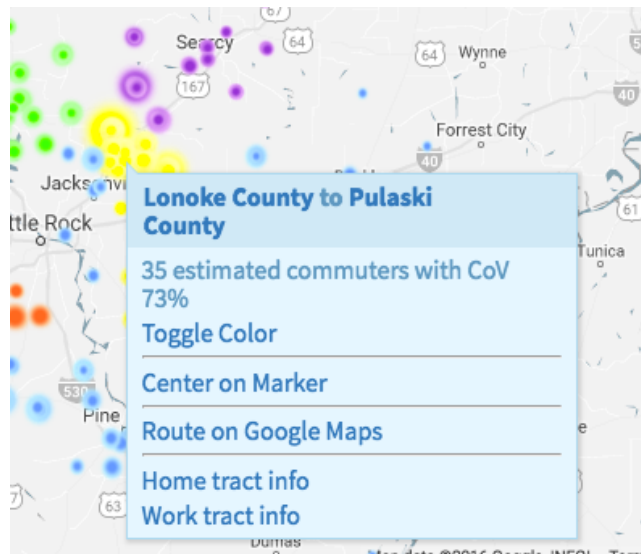


Figure 3: Commute Flow Map Interface and Instructions

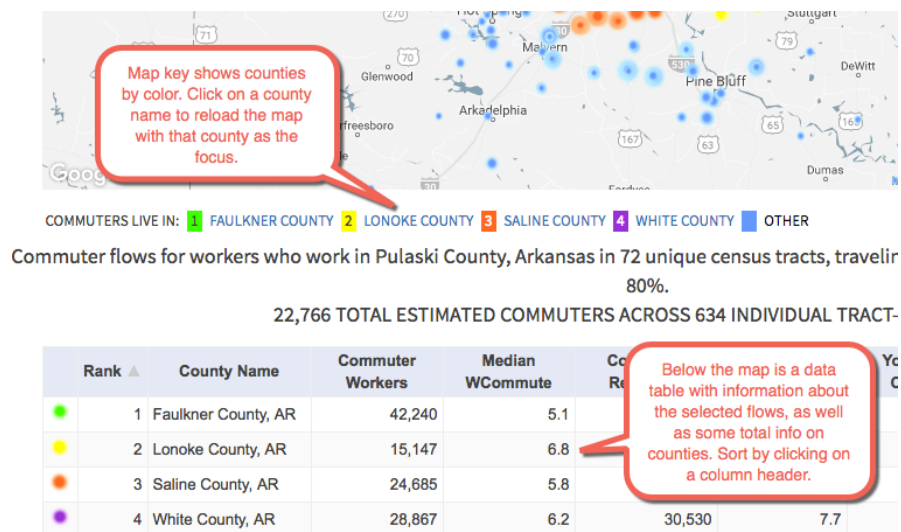


**Figure 4: Commuting Flow Point with Detailed Information**

Directly below the map is a key of counties with the most commuters represented in the selected set of commute flows. The counties are labeled and correspond to the colors of the dots on the map. The county names are also “clickable” and, if selected, will reload the map and replace the target county with the county you selected.

Further down the webpage (Figure 5), you will see a table of summary data by county of the selected flows. The counties that are included in the map key are noted with the corresponding colors in the table. You can sort the table by clicking on column headers.

The reception to the commute map was very gratifying. Once it got picked up by [wired.com](http://wired.com), it spread rapidly and I got a lot of positive feedback and over 300,000 page hits. Alasdair Rae, who I mentioned earlier, contacted me and we created a new version for [England and Wales](http://bigbytes.mobyus.com/commuteuk.aspx) (<http://bigbytes.mobyus.com/commuteuk.aspx>) using data that he had available. Based on media requests, I also created special multi-county versions for the [Atlanta Metro Area](http://bigbytes.mobyus.com/commuteatlanta.aspx) (<http://bigbytes.mobyus.com/commuteatlanta.aspx>) and [Silicon Valley](http://bigbytes.mobyus.com/commutesiliconvalley.aspx) (<http://bigbytes.mobyus.com/commutesiliconvalley.aspx>).



**Figure 5: Commuting Flow Table**

## CTPP Contact List

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CTPP 2006-2010 Data: <http://ctpp.transportation.org/Pages/5-Year-Data.aspx>

CTPP website: [http://www.fhwa.dot.gov/planning/census\\_issues/ctpp/](http://www.fhwa.dot.gov/planning/census_issues/ctpp/)

FHWA website for Census issues: [http://www.fhwa.dot.gov/planning/census\\_issues](http://www.fhwa.dot.gov/planning/census_issues)

AASHTO website for CTPP: <http://ctpp.transportation.org>

1990 and 2000 CTPP data downloadable via Transtats: <http://transtats.bts.gov/>

TRB Subcommittee on census data: <http://www.trbcensus.com>

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### CTPP Listserv

The CTPP Listserv serves as a web-forum for posting questions and sharing information on Census and ACS. Currently, more than 700 users are subscribed to the listserv. To subscribe, please register by completing a form posted at: <http://www.chrispy.net/mailman/listinfo/ctpp-news>.

On the form, you can indicate if you want emails to be batched in a daily digest. The website also includes an archive of past emails posted to the listserv.