

Introduction

When working with demographic data, nothing is more important than the quality of the data being presented. Since the Census is only taken every 10 years, update methodology is a very important factor when dealing with demographics. That is why Scan/US customers choose to utilize our demographic estimates and projections. These current-year estimates and five-year projections are built using a series of complex models developed and refined over the past *five censuses*!

Demographic Data Methodology

Scan/US, Inc. uses a number of government data series released at the US, State and County level to guide the demographic estimates and projections for all US counties. This is discussed further in the next section “Getting the Demographic Controls Right”.

Scan/US Inc. Update Methodology

Scan/US Inc. generates demographic updates for the current year and a five year projection for all US Census geographies, for Scan/US’s proprietary 5 digit ZIP boundaries, for our trademark MicroGrids and for US Postal Service (USPS) Carrier Route centroids. Collecting input and control data is a continual process. Scan/US, Inc. is currently releasing Demographic Updates twice a year in order to provide the most accurate and timely data for your location based decisions.

The following discussion of Scan/US, Inc’s demographic updates and cartography updates will present the case as to why Scan/US, Inc. is the leader in providing decision makers actionable data for their location based decisions.

Getting the Demographic Controls Right

Scan/US, Inc. uses a number of government data series released at the US, State and County level to guide the demographic estimates and projections for all US counties. The Census Bureau publishes the Current Population Survey (CPS) annually; the most current data point in the CPS is 12 to 18 months prior to the publication date of the CPS. These series include basic counts: population, housing units and group quarters

population, as well as detailed cross-tabulations of population by age, sex, race and Hispanic origin. The Census Bureau's National Population Projection Series, currently 2012-2060, provides the detail national annual projection of population by age, sex and race framework on which the lower level geography estimates are hung. The Bureau of Labor Statistics (BLS) provides the annual county level Labor Force Status series as well as current quarterly unemployment reports. The Bureau of Economic Analysis produces a county series on personal income.

In addition to these important traditional control series, the Census Bureau has now fully implemented the American Community Survey (ACS) Program. The ACS program has replaced the Census Long Form, which was distributed to a 7% sample of US households as a part of every census until the 2010 Census. The ACS five-year pooled survey now provides a reliable detailed socioeconomic profile for states, counties, county subdivisions, places, census tracts and block groups. The 2012 ACS 5 year pooled survey, published in late 2013, paired with the 2010 100% Census data for the same Census geography forms a baseline on which our annual demographic estimates and projections will be based.

Using current USPS active residential delivery counts as county controls.

The US Postal Service releases monthly delivery counts for all postal carrier routes in the United States. These residential and business delivery counts provide a current measure of households and businesses receiving mail across all 242,000 carrier routes in the United States. Carrier Route delivery statistics, summarized to the county level, provide current household data point for the estimate year. Thus Scan/US can identify counties experiencing rapid change which is not reflected in the CPS series due to its 12 to 18 month lag behind its publication date.

Modeling household income change

The Census Bureau publishes an annual series of detail household income tables for the United States from which Scan/US, Inc. generates an income category shift model for moving ACS five year income distributions forward over time. The ACS 5yr pooled income profiles at the lower levels of census geography are used to inform the estimates and projections of structural changes that cannot be captured in the US level income shift

model.

Moving from the county view of the United States to the ground truth

Getting it right at the county level is only part of the battle. The real challenge is to map that change on to the landscape at a geographic resolution that supports location based decisions down to local neighborhoods. This requires being able to track household change down to the level of a few city blocks, city blocks that were not even defined in 2010 Census. Scan/US, Inc. over the last two decades has developed and refined a proprietary cartography called Scan/US MicroGrids that reflects change down to $1/16^{\text{th}}$ of a square mile. The MicroGrid cartography is a network of cells of three sizes; large = 1 sq mile, medium = $1/4$ sq mile, and small = $1/16^{\text{th}}$ sq mile. MicroGrids exist where there is either housing or business development on the landscape, and grid size is determined by the density of that development. The smaller the grid the denser the development contained by the grid.

The MicroGrid cartography is updated annually. The key ingredients in this process are a current national mailing list of deliverable residential and business addresses summarized to ZIP+4s, and latitude/longitude coordinates for each ZIP+4. The 40 million or so ZIP+4s, with their current residential and business deliveries, are poured annually into the existing MicroGrid network, resulting in the addition of grids in new developing areas, or the subdivision of larger grids to better define the housing distribution in growing neighborhoods. The end results are a MicroGrid cartography that represents the current distribution of households and business throughout the United States down to $1/16^{\text{th}}$ of a square mile.

Updating the Demographic Profile at the Neighborhood Level

The current ZIP+4 residential counts are summarized to block groups within counties, and are used to calculate the participation rate of the block groups in the distribution of the county demographic estimates and projections. The base demographic profiles of the block groups are normalized to their new delivery count population and household estimates and then the block groups within the county are balanced across all demographic dimensions to the county estimates. The block group's detailed demographic profile then gets distributed to their blocks by

normalizing the blocks' base demographics to their new household and population controls and balancing each demographic dimension to the block group controls. The resulting block estimates are then used to build the demographic profiles of the MicroGrids through a block to MicroGrid cross reference which has household weights based on the ZIP+4 assignments.

All of this works fine if you are dealing with a block group that has a solid base demographic profile to build on. However, when dealing with block groups which had few or no households in the most current ACS 5yr release, but which is estimated to have gained a significant number of households over the last few years, some creativity is required. Under these circumstances we recruit the most likely demographic profile from an adjacent block group in order to imbue the new households with the demographic profile of the neighborhood.

The MicroGrid advantage

The MicroGrid cartography has improved the resolution of its view of the United States over the last decade. When the 2010 Census data were released in 2002, only 217,000 block Groups covered the United States. The block group is the lowest level of Census geography at which the Census Bureau releases a Population and Housing detailed demographic profile. In 2013 the Scan/US MicroGrid cartography had 2.5 million grids covering the U.S. The Scan/US MicroGrids provided a view of small area census demographics at 125 times the resolution of the block groups. This view, in addition to being finer grained, also provides greater clarity because the grids only exist where there is housing and business activity.

Consumer Spending Potential

Scan/US estimates small area consumer expenditures in some 98 categories for the current period. The consumer expenditure categories correspond to those reported in the Bureau of Labor Statistics integrated Interview and Diary survey data tables (CEX cross-tabulated tables for 2011-2012).

Average Expenditure Rates

Average expenditure rates reported in the Consumer Expenditures survey for consumer units stratified by householder age and income (7 x 16) were applied (by stratum) to the Scan/US block-level estimates of the consumer units distribution by age of householder and income. To match the CEX definition of consumer units, households were combined with non-institutional group quarters treated as 1-person households.

Per capita rates

Per capita rates were used in estimating food, apparel, health and other person-related expenditures. Per owner and per renter household rates were applied to expenditures on owned dwellings and rented dwellings respectively. Per vehicle rates were used for private transportation-related expenditures. Per household rates were applied to all other categories with the exception of fuel oil and public transportation. Fuel oil expenditures are based on the subset of households reported (in the 2012 ACS) as using fuel oil for house heating. Public transportation expenditure is based on the subset of households in a block with a deficit of vehicles (0 or fewer vehicles than workers).

Category, subtotal estimates, and reporting layers

Preliminary estimates for all categories were summed by CEX region and compared to CEX regional shares to produce regional calibration factors for each category.

Subtotal estimates of expenditures within an area were iteratively normalized to their next higher-level category total and ultimately to the area total.

Block-level estimates were accumulated to reporting layers: block groups, census tracts, counties, county subdivisions, places, states, MSAs, microgrids, Zips, and USPS carrier routes (the latter 3 by weighted aggregation).

Appendix: Tracking Residential Growth With MicroGrids

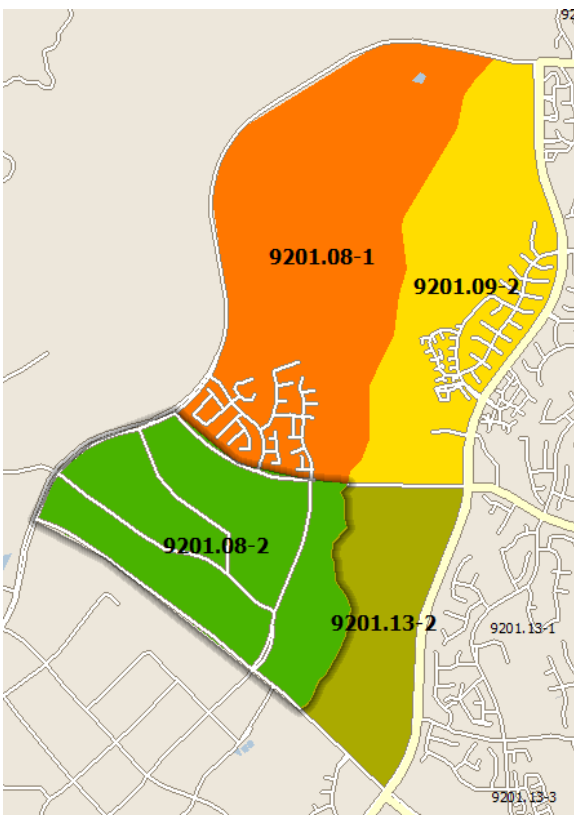
Scan/US MicroGrids™ are better at showing population change than either Census Block Groups, or Census Blocks.

This three-section appendix shows you how MicroGrids are better. First we present an overview, and then, in a more detailed look, we compare the MicroGrid view of households on the ground, compared with the BG/Block depiction. Finally we discuss one grid in detail.

1. The Study Area

Our 'study area' is a four block-group area in Santa Clarita, CA. This area illustrates how Scan/US shows change with its proprietary MicroGrid geography.

As of 2000, US Census records 12 households in these four block groups. The Scan/US 2010 mid-year estimates show 2,835 households in residence, 90% of them new since 2005.



Four Census block-groups showing streets based on TIGER 2009 streets



A 2009 satellite image shows the extent of development that is revealed in the Scan/US 2010 estimates. (Google Earth photo)

This table summarizes the residential development in this 1.64 square mile area between 2000 and 2010.

Block group	2000 Census		2010 estimates	
	Household population	Households	Household population	Households
9201.08-1	0	0	2585	834
9201.09-2	37	12	2204	701
9210.08-2	0	0	1508	486
9201.13-2	0	0	2522	814
Total	37	12	8819	2835

2. Zooming in to the Neighborhood: MicroGrids and Zip+4s and their relation to data

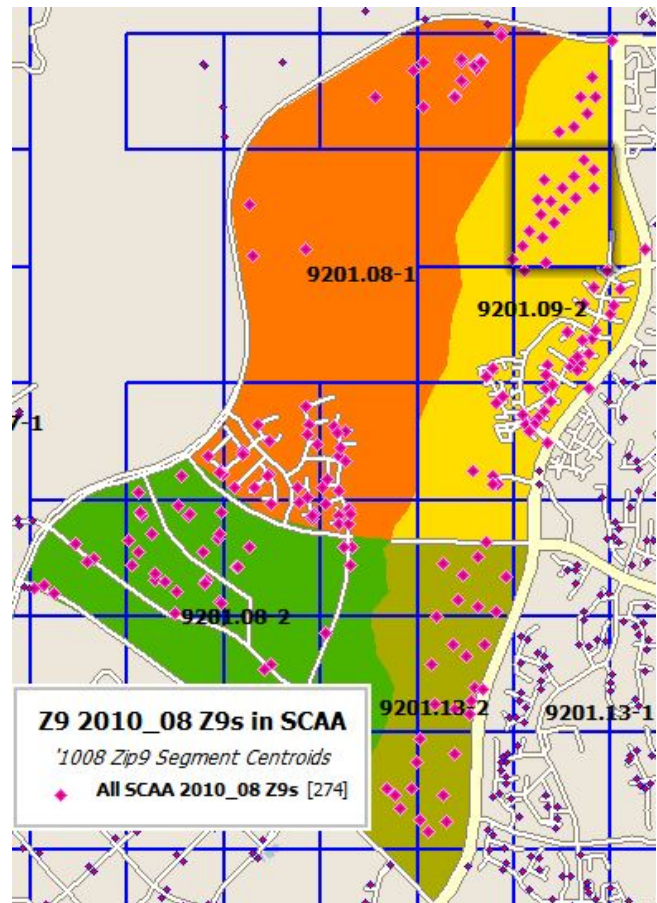
Using Zip+4 segment points, Scan/US tracks the placement of residential change more accurately than Census block groups or Census blocks.

Zip+4 segments are the basic units of the postal delivery system. Scan/US MicroGrid cartography, summarizing data from Zip+4 segments, brings residential change into focus at the resolution of 1/16th of a square mile.

The study area contains 4 block groups, 12 blocks, 25 MicroGrids and 274 Zip+4 segments. Residential saturation data (“drop counts”) for Zip+4s provide the data points for distributing block group estimates of household counts. How is this done?

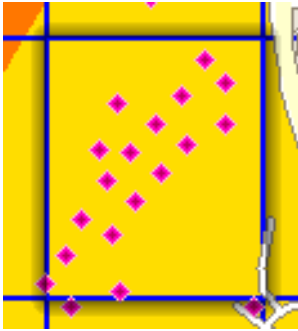
First the drop counts of the blocks within a block group are normalized and used as weights to distribute the block group’s updated demographics to the blocks. The resulting detailed demographics for the blocks are then rebalanced to conform to the parent block group’s demographic profile. The distribution of the balanced block updates to the MicroGrids is accomplished by using the current Zip+4 drop counts to calculate the proportion of block demographics that are to be assigned to the overlapping grids.

The MicroGrid highlighted on the map derives all of its characteristics from one block but the MicroGrid overlay of the study area shows that, in many cases, multiple blocks and block groups contribute to a particular grid’s demographic profile.



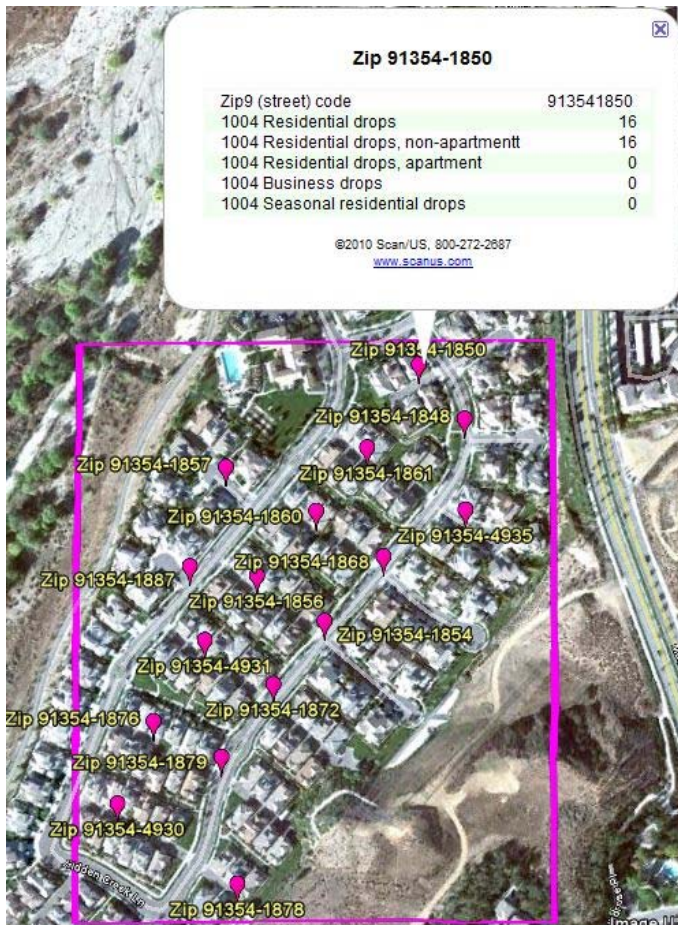
Scan/US MicroGrids (blue grid) and Zip+4 segments (purple diamonds) superimposed on Census 2000 block groups

3. Focus on MicroGrid 34118/2734.34



MicroGrid 34118/2734.34 from map on previous page, showing 16 Zip+4 segment locations

The satellite photo below shows the 16 Zip+4s overlaid by the grid. (The image was created using Scan/US “Locate in Google Earth,” a standard feature of the Scan/US software).



This grid contains the 16 Zip+4s listed below, along with their April 2010 “Drop Counts”.

The Zip+4 drop counts indicate where, how much and what type of development exists right down to a specific address range on a street.

The table below shows the four separate counts that are available for each Zip+4: single family (Napt), multi-family (Apt), business (Bus) and seasonal (Seas). These drop counts tell us that this MicroGrid neighborhood is made up of exclusively single family dwellings.

ZIP+4 code	TotRes	Napt	Apt	Bus	Seas
91354-1848	8	8	0	0	0
91354-1850	16	16	0	0	0
91354-1854	18	18	0	0	0
91354-1856	6	6	0	0	0
91354-1857	11	11	0	0	0
91354-1860	6	6	0	0	0
91354-1861	6	6	0	0	0
91354-1868	18	18	0	0	0
91354-1872	14	14	0	0	0
91354-1876	6	6	0	0	0
91354-1878	11	11	0	0	0
91354-1879	13	13	0	0	0
91354-1887	8	8	0	0	0
91354-4930	6	6	0	0	0
91354-4931	6	6	0	0	0
91354-4935	17	17	0	0	0
Grid totals	170	170	0	0	0

The 16 Zip+4 markers on the image pinpoint the housing associated with the drop counts. The “TotRes” drop count approximates “total housing units” not “occupied housing units” or households. A cursory rooftop count of the housing seen in this satellite image of the grid comes to 120 housing units (as of the date of the image) compared to the “TotRes” counts of grid total of 170. The Scan/US 2010 balanced estimate of total housing units in the grid is 108 units.

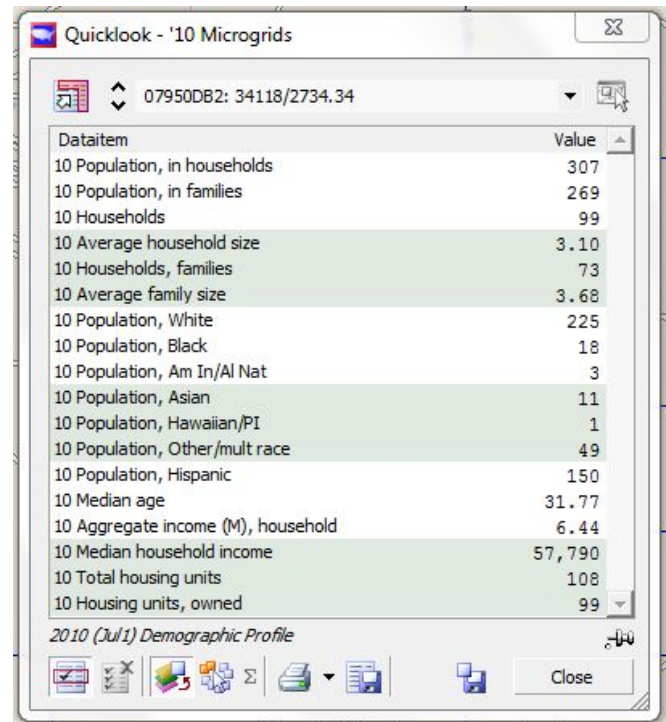
In conclusion: Scan/US Update Data

The Scan/US QuickLook for this MicroGrid displays about eighteen 2010 demographic variables selected from approximately 1000 values that are estimated and projected for every object on each geographic layer.

This grid is roughly 1/16th of a square mile in size and is estimated to contain 99 households with an average size of 3.10 persons; median household income is \$57,790, and an annual aggregate household income of \$6,440,000.

These numbers make this micro-neighborhood one that retailers would be glad to know is in their trade area. The neighborhood size of the MicroGrid and the demographic information it contains make it the ideal unit of geography for supporting small area location based decisions.

Scan/US updates the MicroGrid geography annually, adding new grids where Zip+4s have appeared for the first time. 196,117 grids were added this year to the 2010 MicroGrid cartography for a total of 2,552,006 MicroGrids covering the United States.



The screenshot shows a window titled "Quicklook - '10 Microgrids" with a close button in the top right. Below the title bar, there is a search icon and a text field containing "07950DB2: 34118/2734.34". The main content is a table with two columns: "Dataitem" and "Value". The table lists 18 demographic variables and their corresponding values. At the bottom of the table, there is a label "2010 (Jul1) Demographic Profile" and a "Close" button. The table data is as follows:

Dataitem	Value
10 Population, in households	307
10 Population, in families	269
10 Households	99
10 Average household size	3.10
10 Households, families	73
10 Average family size	3.68
10 Population, White	225
10 Population, Black	18
10 Population, Am In/Al Nat	3
10 Population, Asian	11
10 Population, Hawaiian/PI	1
10 Population, Other/mult race	49
10 Population, Hispanic	150
10 Median age	31.77
10 Aggregate income (M), household	6.44
10 Median household income	57,790
10 Total housing units	108
10 Housing units, owned	99