

Local Population Projection Tool

Our Progress Since the 2015 Esri UC

June 29, 2016

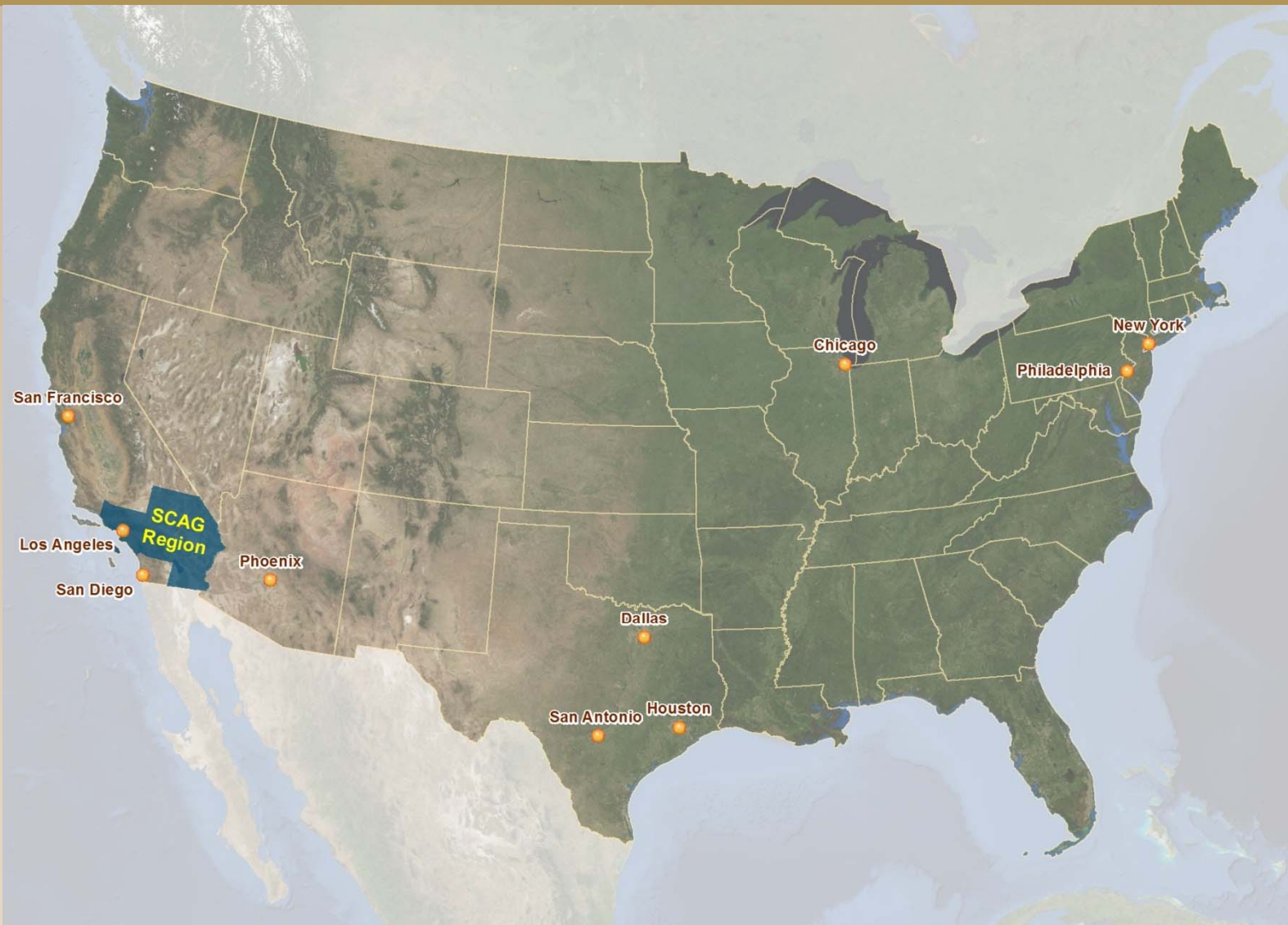
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Seo, Tom Vo, Abhishek Sharma,
Frank Wen



Agenda

- SCAG Introduction
- Research Background
- Recap of Last Year's Presentation
- Progress Made
- Issues Encountered
- Future Developments

SCAG Overview



SCAG Quick Facts



- Nation's largest Metropolitan Planning Organization (MPO)
- 6 counties and 191 cities
- 15 sub-regions
- 19 million people (2015)
- 38,000 square miles
- 16th-largest regional economy in the world
 - 2015 GRP: \$1,053 Billion

Research Background

- SCAG develops the long-term population and household growth forecast for the Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) at different levels of geography.
- Local jurisdictions in the SCAG region provide SCAG with the city-level population and household growth forecast allocated at the Transportation Analysis Zone (TAZ) level.
- Traditional approach focuses on total population size and household numbers for local jurisdictions. The Local Population Projection Tool has the power to be more specific.

Research Goals

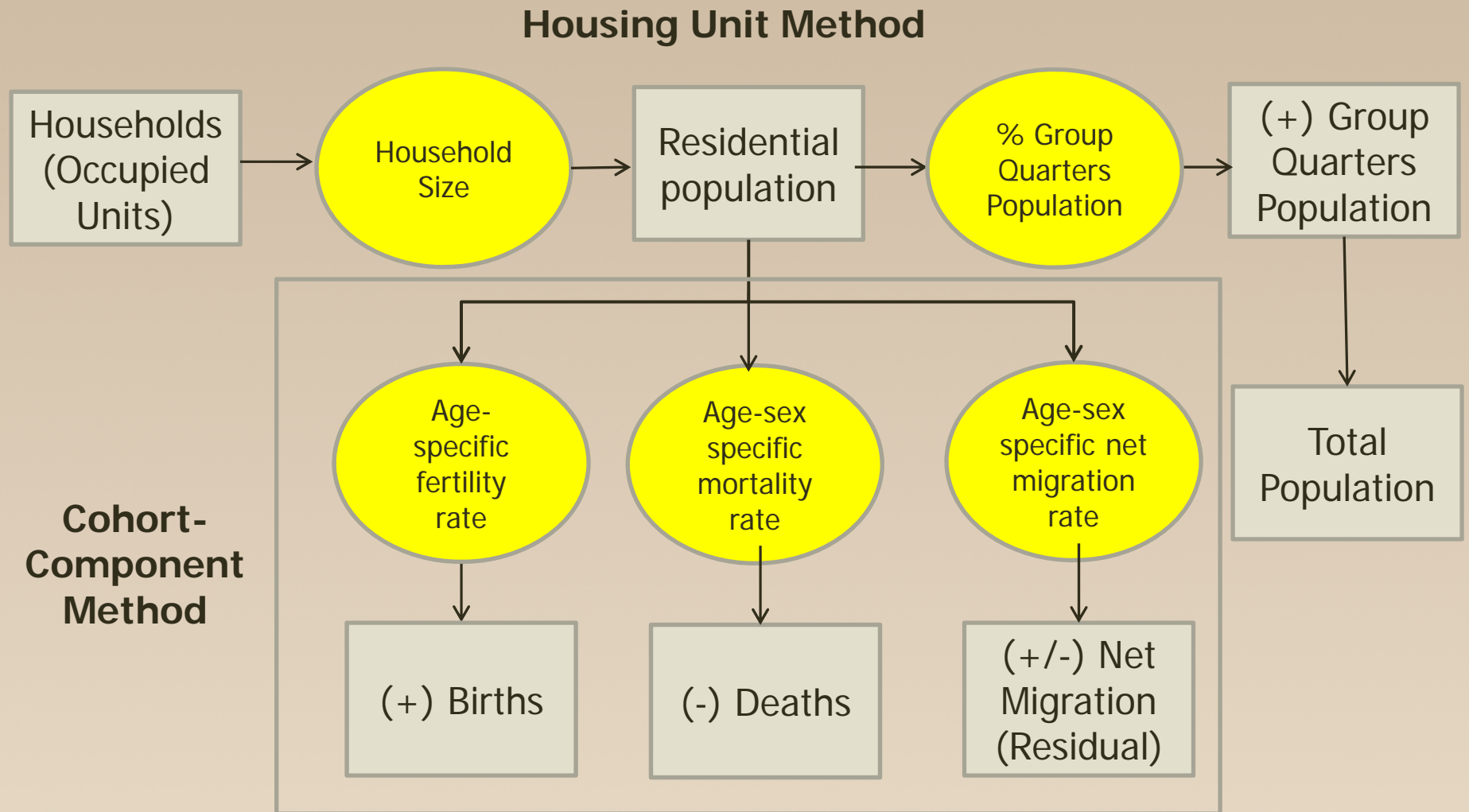
- To develop a useful GIS-based tool for local planners who work on local population and household projections
- To generate different population growth paths containing demographic characteristics (i.e. age and gender) and components of growth based on housing growth scenarios
- To help local jurisdictions to better prepare for diverse community service needs (e.g. school, housing, energy use, hospital, police, transportation)

Modeling Framework

- Methods used
 - Housing unit method
 - Cohort-component method
 - Local household forecasts

(Choi, Projecting Small Area Population Size and Components, Presented for Western Regional Science Association (WRSA) Annual Meeting, 2013)

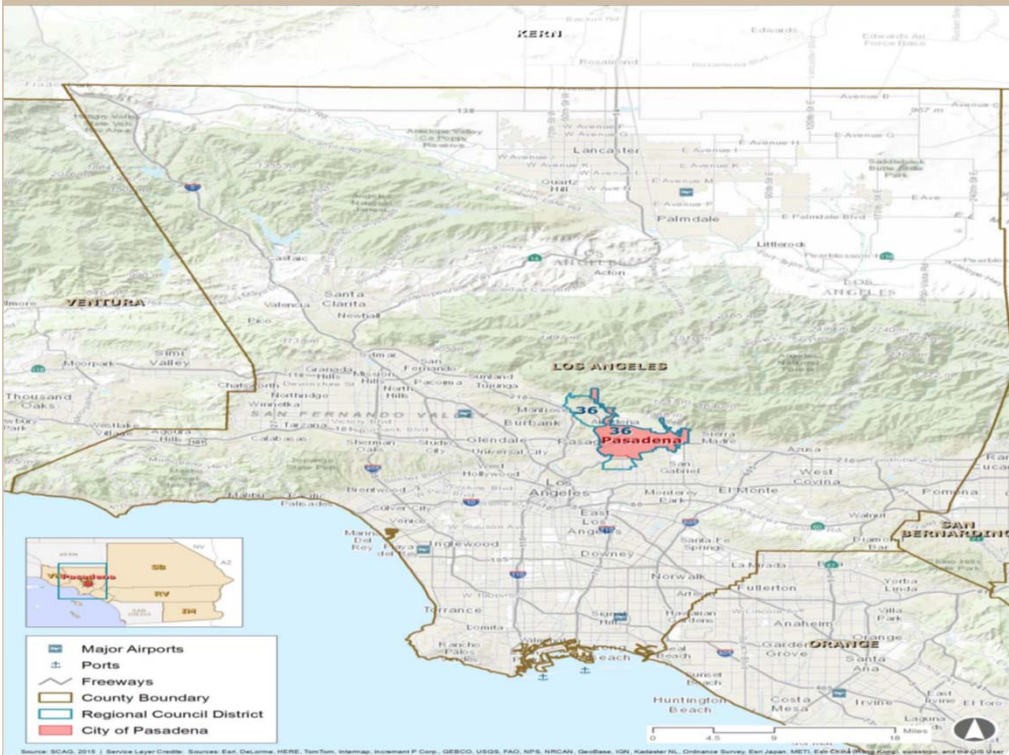
Modeling Framework



Research Outcome: Local Population Projection Tool

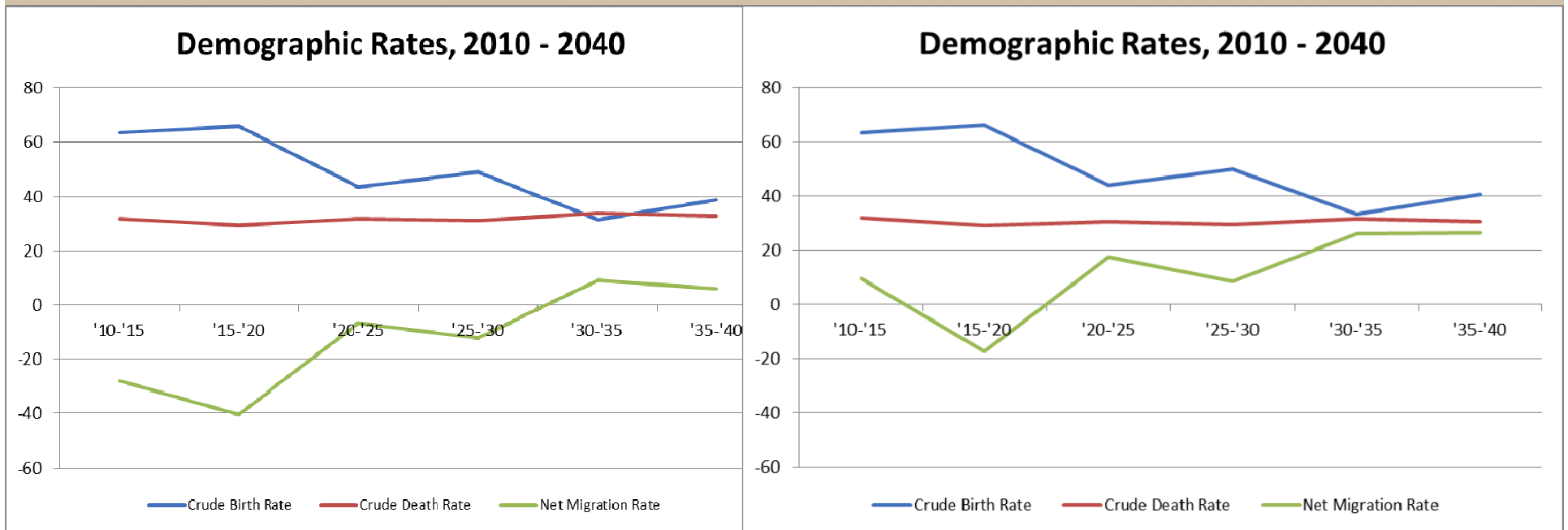
- GIS tool that allows local planners to:
 - Develop their own housing growth scenario
 - Produce the population projections with key demographic characteristics
 - e.g. components of population growth
 - e.g. share of the county growth
 - e.g. demographic rates
 - e.g. age and sex breakdown
- Can be linked to other expansion modules to observe the relationships between demographics and transportation

City Projections Demonstration: City of Pasadena



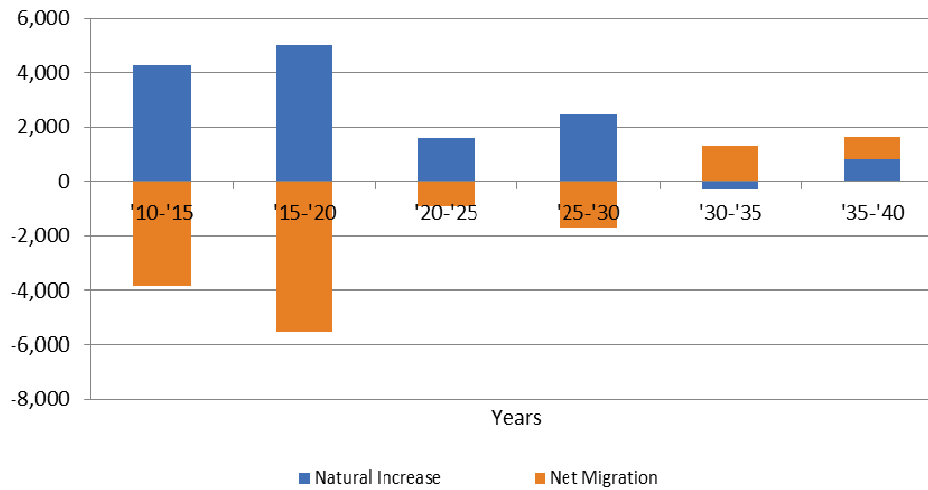
- 137,122 population and 55,270 households in 2010 (U.S. Census) and 111,000 jobs in 2012 (SCAG).
- 23.1 square miles of land area
- 5,936 people per square mile, 2.5 times more than LA county (2,420)
- The median age is 35.7, higher than LA county (34.8)
- Average household size of 2.5 people, lower than LA county (3.0)
- Household growth scenario (2010-2040): (1) low - 150% of 2000-2010 growth (2) high – 450% of 2000-2010 growth

Pasadena Demographic Rates, 2010-2040: Low Scenario vs. High Scenario

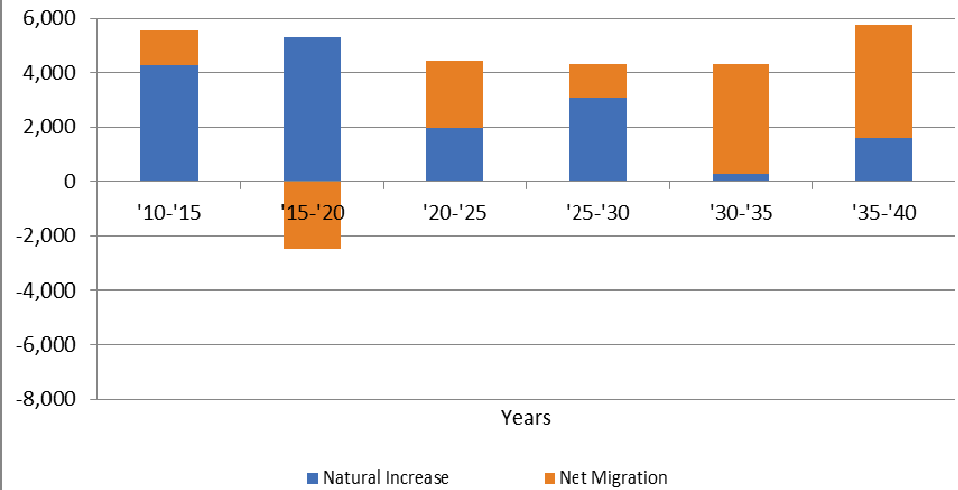


Pasadena Components of Population Growth, 2010-2040: Low Scenario vs. High Scenario

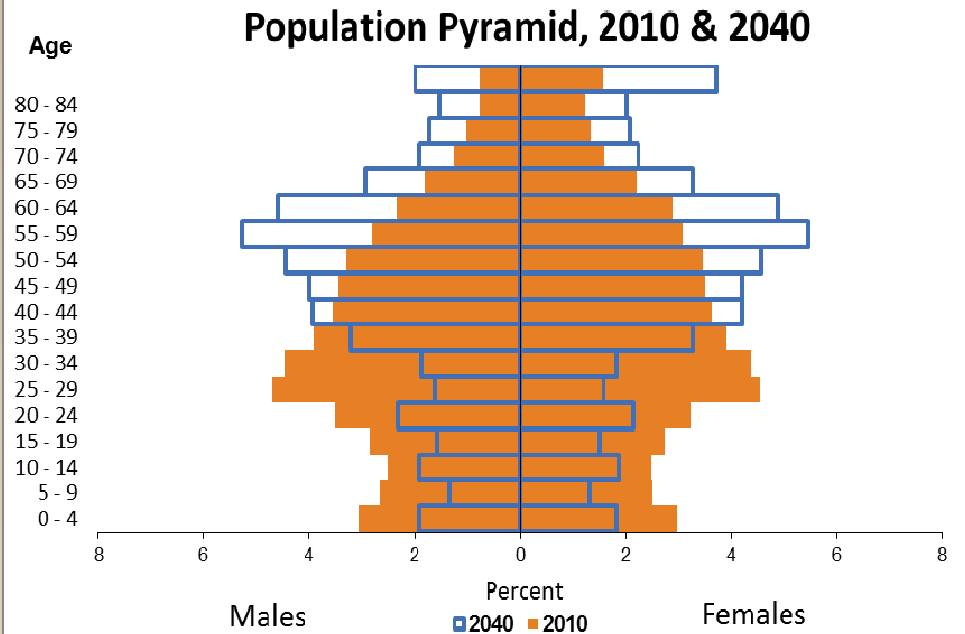
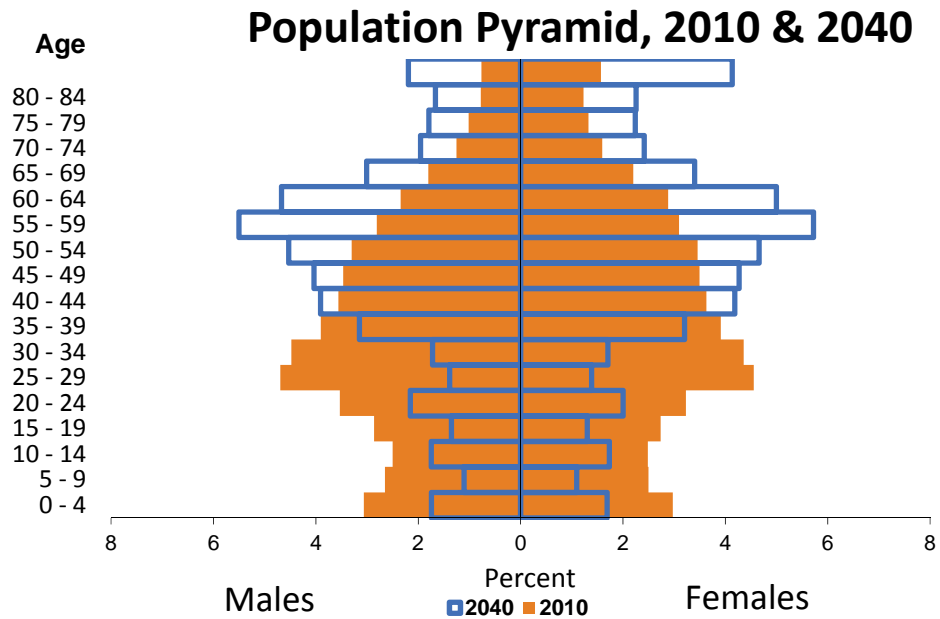
Components of Population Growth, 2010 - 2040



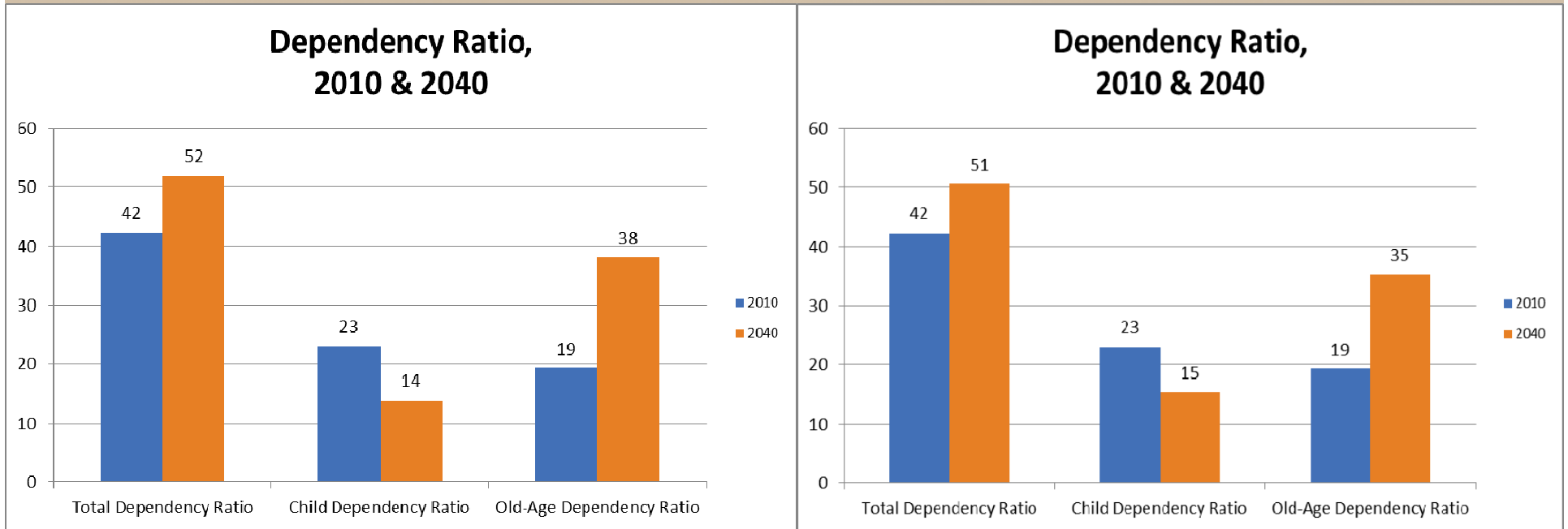
Components of Population Growth, 2010 - 2040



Pasadena Population Age Pyramid, 2010 & 2040: Low Scenario vs. High Scenario



Pasadena Population Dependency Ratio, 2010 & 2040: Low Scenario vs. High Scenario



Recap of Last UC & Progress

- **Last year:** Local Population Projection Tool prototype presented at the Esri UC
 - One city only (Oxnard)
 - User updates were not aggregated to city level (i.e. TAZ only)
 - No city-level data summaries
 - No field aliases
 - Values could not be reset to match SCAG forecasts
 - Standard Esri appearance
- **Now:** Complete Version 1.0 ready for testing

2015 Prototype

Local Population Projection Tool - SCAG

Inputs

County:

City:

Projection Method:

Preset Demand Scenarios

Select the 2010 - 2040 household growth as a percentage of the 2000 - 2010 growth:

Low (150%)

Moderate (300%)

High (450%)

OR enter the number of expected new households between 2010 and 2040:

Custom GIS Method

Select the following option:

General Plan/SCAG Growth Forecast Baseline

and enter the number of expected new households between 2010 and 2040:

The "General Plan" option will redirect you to SCAG's editable socioeconomic data webmap.

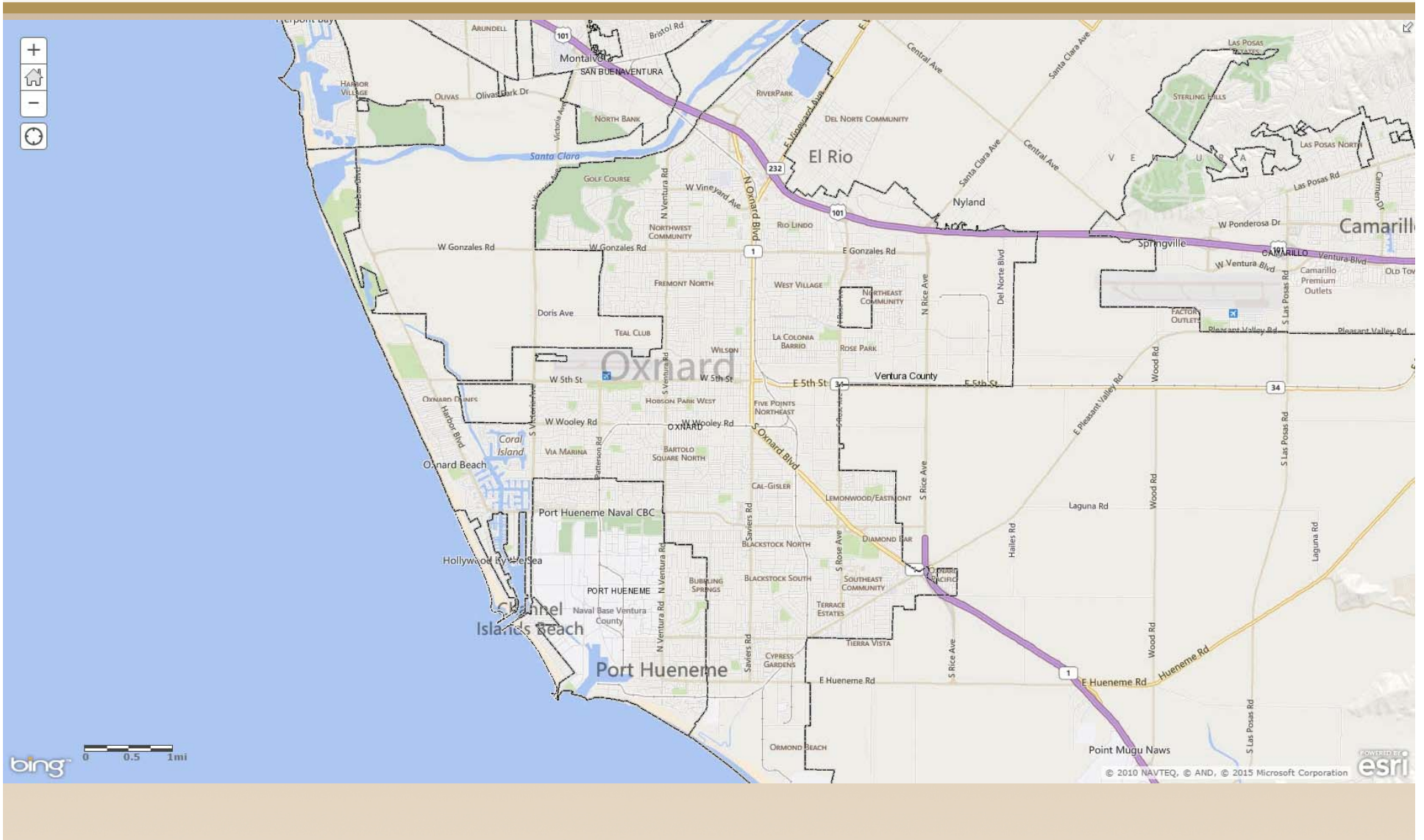
Once on the webmap, manually update the household growth by Traffic Analysis Zone (TAZ). Then copy the city's total 2010 - 2040 household growth from the online summary into this text box ----->

Outputs

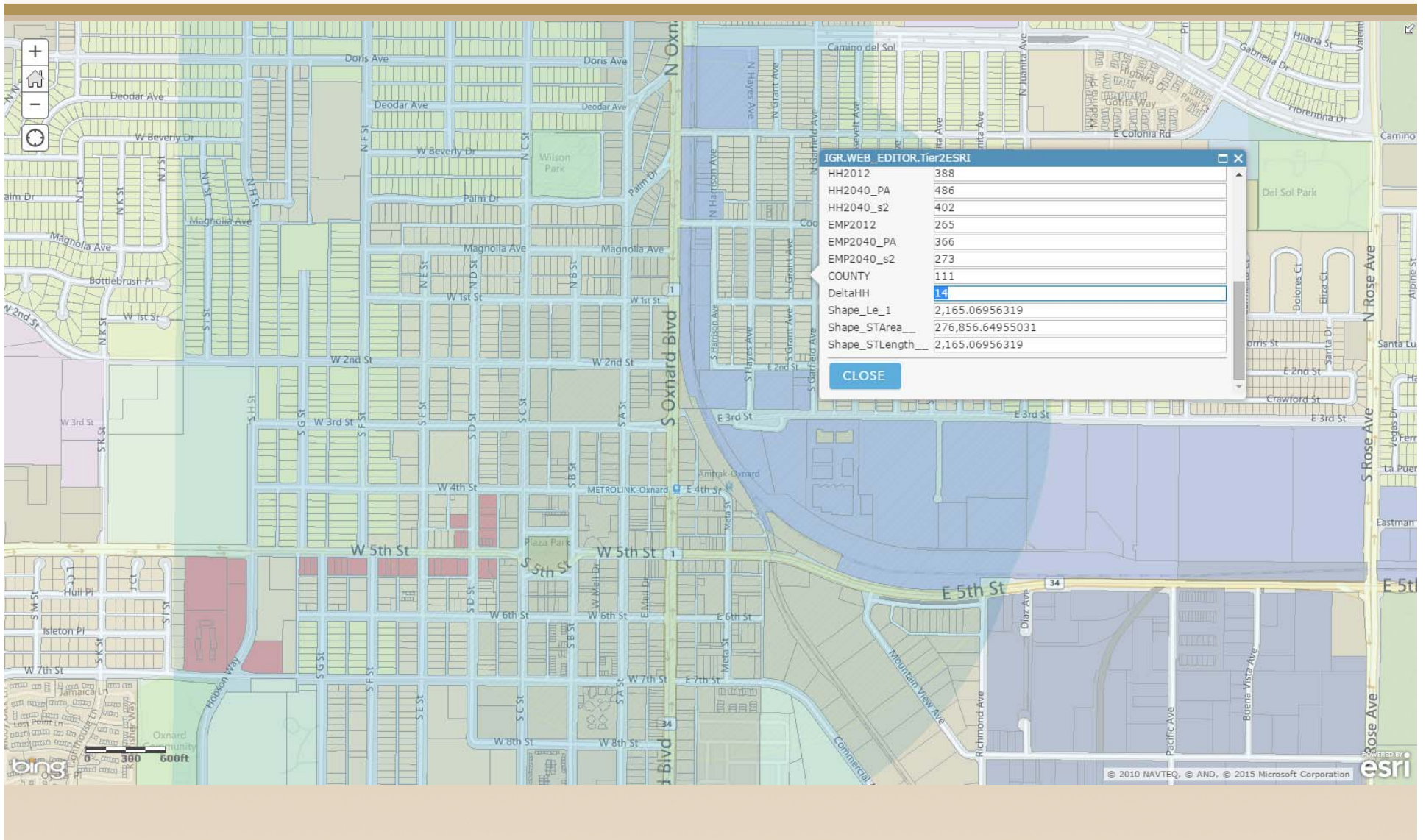
Click on a tab to view the corresponding aspects of the projected population growth. Click the arrows on the right to view more options.

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Last Revised: February 9, 2016 at 2.12pm

2015 Prototype



2015 Prototype



2016: Development Tools Used

- Esri
 - ArcGIS Online
 - Web AppBuilder
 - Custom Widgets
 - REST API
 - Map Services (reference layers)
 - Feature Services (editable layers)
 - Geoprocessing Services (user updates)
 - ArcGIS Desktop
 - Microsoft
 - Excel
 - Visual Basic for Applications

2016 Interface (Excel)



Local Population Projection Tool (VMT Edition)

Beta Version

Last Revised: May 24, 2016 at 2.40pm

Select a City from **ONE** of the following county drop-down menus:

Imperial County:

Los Angeles County:

Orange County:

Riverside County:

San Bernardino County:

Ventura County:

Jurisdiction Selection

Calibrate

<--- Click here **after** selecting a city.

2016 Interface (Excel)

Preset Demand Scenarios

 ▼

Low: The household growth for the next 3 decades will each be 50% that of 2000 - 2010.

Moderate: The household growth for the next 3 decades will each be 100% that of 2000 - 2010.

High: The household growth for the next 3 decades will each be 150% that of 2000 - 2010.

Households Added in Selected Scenario: **Moderate (6693 households)**

OR

Custom Scenario *(this will ignore the value from the Preset Demand Scenario)*

Create a custom scenario by editing SCAG's household growth forecast at the TAZ geography on the SCAG web mapping system to calculate the 2010 - 2040 change in households.

Open TAZ Web Map

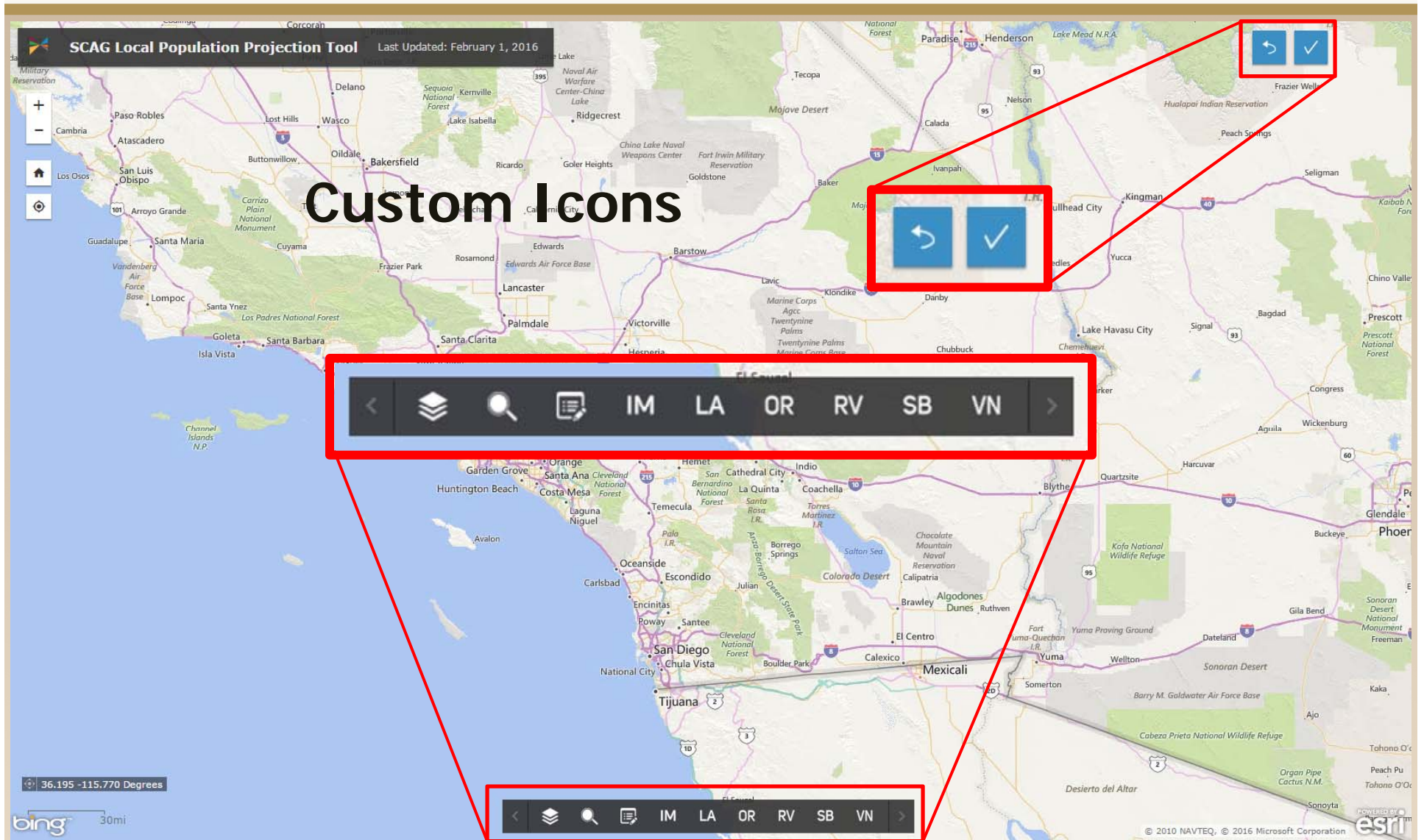
Then, enter the expected household change between 2010 and 2040 in the box below:

Run

After clicking 'Run', open the "Outputs" sheet to see the results.

Projection
Method

2016 Interface (ArcGIS Online)



2016 Interface (ArcGIS Online)

The screenshot displays two side-by-side panels from the ArcGIS Online 2016 interface. The left panel, titled 'Zoom to City', contains a search bar and a list of counties with right-pointing chevrons: Imperial County, Los Angeles County, Orange County, Riverside County, San Bernardino, and Ventura County. Below this list is a red 'Clear Results' button. The right panel, titled 'Map Layers', shows a dropdown menu set to 'West Hollywood' and a list of land use categories, each with a colored square icon: 1110 - Single Family Residential (yellow), 1120 - Multi-Family Residential (orange), 1130 - Mobile Homes and Trailer Parks (light orange), 1140 - Mixed Residential (greenish-yellow), 1100 - Other Residential (dotted green), 1210 - General Office Use (red), 1200 - General Commercial (light red), 1220 - Retail and Commercial Services (pink), 1221 - Regional Shopping Center (light pink), 1230 - Other Commercial (dark red), 1233 - Hotels and Motels (dark brown), 1240 - Public Facilities (light blue), 1250 - Special Use Facilities (medium blue), 1260 - Education K-12 (light purple), 1265 - Education - College (medium purple), and 1300 - General Industrial (dark blue).

Zoom to City

Click one of the following task items to execute the query.

- Imperial County >
- Los Angeles County >
- Orange County >
- Riverside County >
- San Bernardino >
- Ventura County >

Clear Results

Map Layers

West Hollywood

- 1110 - Single Family Residential
- 1120 - Multi-Family Residential
- 1130 - Mobile Homes and Trailer Parks
- 1140 - Mixed Residential
- 1100 - Other Residential
- 1210 - General Office Use
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- 1220 - Retail and Commercial Services
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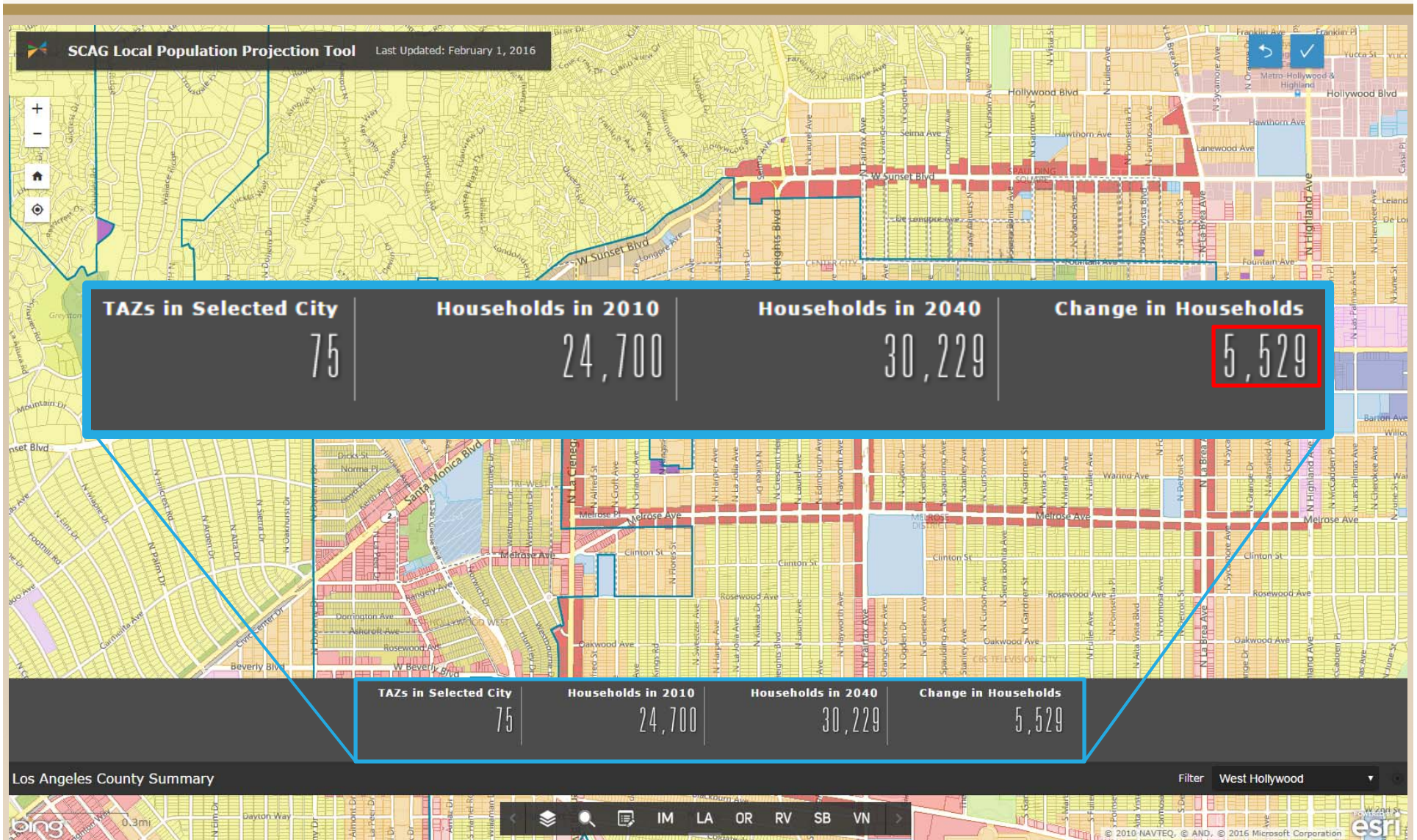
2016 Interface (ArcGIS Online)

The screenshot displays the ArcGIS Online interface for the year 2016. The main map shows a street grid in Los Angeles County, with a specific area highlighted in blue. Two pop-up windows are overlaid on the map:

- Edit Household Change:** This window is titled "Edit Household Change" and contains a large white box with the text "Unnecessary blank space". Below the text is a toolbar with navigation and editing icons.
- Los Angeles County CityTAZ:** This window displays demographic data for the City of West Hollywood. The data is as follows:

City	Value
City	West Hollywood
Households in 2010	1,221
Households in 2040	1,374
Change in Households (2010 - 2040)	153

2016 Interface (ArcGIS Online)



2016 Interface (Excel)

Preset Demand Scenarios

 ▼

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Households Added in Selected Scenario: **Moderate (6693 households)**

OR

Custom Scenario *(this will ignore the value from the Preset Demand Scenario)*

Create a custom scenario by editing SCAG's household growth forecast at the TAZ geography on the SCAG web mapping system to calculate the 2010 - 2040 change in households.

Open TAZ Web Map

Then, enter the expected household change between 2010 and 2040 in the box below:

5,529

Run

After clicking 'Run', open the "Outputs" sheet to see the results.

Projection
Method

ArcGIS Web App Issues

- Processing Times
 - Layers can be slow/occasionally not load at all
 - Addressed by splitting up TAZ and land use feature servers by county
- Filter widget is inflexible
 - Unable to populate a filter list with cities based on a county selection
 - Instead, a list of all cities and all counties is shown
 - Addressed by creating 6 filters – one for each county TAZ layer
- Inconsistent Developer & Back-End Controls
 - e.g. Disabling geometry updates within Web AppBuilder does nothing if the back-end allows it

ArcGIS Web App Issues

- Versioning
 - No way to temporarily update features without also editing original values within geodatabase
 - Addressed by creating duplicate fields:
 - e.g. Original 2040 Households (locked)
 - e.g. New 2040 Households (editable)
 - To reset values, GP server is used to copy original field into edited field
 - » Problematic if multiple users are updating cities within the same county simultaneously
 - » Need to consider login credentials – Is it efficient to create 197 separate ArcGIS Online accounts?

ArcGIS Web App Issues

- Summary Failures
 - After the third or fourth summary within a session, the summary table stops loading
 - User has to refresh the window to view new city summaries

Future Improvements

- Parcel-level household growth editing
- Preventing user conflict
 - Possibilities:
 - Allocate jurisdictions an access time
 - Login credentials to restrict versioning
- Custom-area growth summaries
 - Planners and developers may be concerned with population growth within a specific area rather than within a whole city
 - e.g. Within a development that crosses the borders of two cities
 - e.g. Within a planning district that intersects only a few TAZs

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