ENVIRONMENTAL JUSTICE

REGIONAL TRANSPORTATION PLAN
2012–2035 RTP
SUSTAINABLE COMMUNITIES STRATEGY
Towards a Sustainable Future

Southern California Association of Governments

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ENVIRONMENTAL JUSTICE

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The concept of environmental justice is about equal and fair access to a healthy environment, with the goal of protecting underrepresented and poorer communities from incurring disproportionate environmental impacts. The SCAG region is vast and geographically distinct. It encompasses an area of more than 38,000 square miles with a population exceeding 18 million people, and has many geographically dispersed commercial and residential centers. The region includes heavily urban and entirely rural areas, as well as terrain that in some instances make air quality goals difficult to achieve. Demographically, it is one of the most diverse regions in the country, becoming the first to see the total population of Hispanics exceed that of Non-Hispanic Whites. The area is also quite economically diverse, and displays the extremes in household income.

Title VI and Environmental Justice Overview

Consideration of environmental justice in the transportation planning process stems from Title VI of the Civil Rights Act of 1964 (Title VI). Title VI establishes the need for transportation agencies to disclose to the public the benefits and burdens of proposed projects on minority populations. Title VI states that "No person in the United States shall, on the ground of race, color or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance." Additionally, Title VI not only bars intentional discrimination, but also unjustified disparate impact discrimination. Disparate impacts result from policies and practices that are neutral on their face (i.e., there is no evidence of intentional discrimination), but have the effect of discrimination on protected groups. The understanding of civil rights has expanded to include low-income communities, as further described below.

In the 1990's, the federal executive branch issued orders on environmental justice that amplified Title VI, in part by providing protections on the basis of income as well as race. These directives, which included President Clinton's Executive Order 12898 (1994) and subsequent U.S. Department of Transportation (DOT) and Federal Highway Administration (FHWA) orders (1997 and 1998, respectively), along with a 1999 DOT guidance memorandum, ordered every federal agency to make environmental justice part of its mission by identifying and addressing the effects of all programs, policies and activities on underrepresented groups and low-income populations. Reinforcing Title VI, these measures ensure that every federally funded project nationwide consider the human environment when undertaking the planning and decision-making process.

On August 4, 2011, seventeen federal agencies signed the "Memorandum of Understanding on Environmental Justice and Executive Order 12898." The signatories, including the U.S. Department of Transportation (DOT), agreed to develop environmental justice strategies to protect the health of people living in communities overburdened by pollution and to provide the public with annual progress reports on their efforts. The MOU advances agency responsibilities outlined in the 1994 Executive Order 12898 and directs each of the Federal agencies to make environmental justice part of its mission and to work with other agencies on environmental justice issues as members of the Interagency Working Group on Environmental Justice.

In response to this MOU, DOT revised its Environmental Justice Strategy. The revisions reinforce the DOT's programs and policies related to environmental justice and strengthen its efforts to outreach to minority and low-income populations. In addition, on September 29, 2011, the Federal Transit Authority (FTA) issued two proposed Circulars on Title VI and Environmental Justice to clarify the requirements and offer guidance. FTA Circular 4702.1A, Title VI Requirements and Guidelines for Federal Transit Administration Recipients (Docket No. FTA-2011-0054) provides information required in the Title VI Program, proposes changing the reporting requirement from every four years to every three years, and adds a requirement for mapping and charts to analyze the impacts of the distribution of State and Federal public transportation funds. SCAG has reviewed the proposed Circulars as additional guidance for the development of the 2012 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS). The FTA Circular 4703.1, Environmental Justice Policy Guidance for Federal Transit Administration Recipients (Docket number FTA-2011-0055) provides recommendations to MPOs (and other recipients of FTA funds) on how to fully engage environmental justice populations in the public transportation decision-making process; how to determine whether environmental justice populations would be subjected to disproportionately high and adverse human health or environmental effects as a result of a transportation plan, project, or activity; and how to avoid, minimize, or mitigate these effects. The proposed Circular does not contain any new requirements, policies or directives. Nonetheless, SCAG complies with the framework provided to integrate the principles of environmental justice into our decision-making processes.

In addition to Federal requirements, SCAG must comply with California Government Code Section 11135, which states that, "no person in the State of California shall, on the basis of race, national origin, ethnic group identification, religion, age, sex, sexual orientation, color, or disability, be unlawfully denied full and equal access to the benefits of, or be unlawfully subjected to discrimination under, any program or activity that is conducted, operated, or administered by the state or by any state agency, is funded directly by the state, or receives any financial assistance from the state."

The State of California also provides guidance for those involved in transportation decision-making to address environmental justice. In 2003, the California Department of Transportation (Caltrans) published the Desk Guide on Environmental Justice in Transportation Planning and Investments to provide information and examples of ways to promote environmental justice. The Desk Guide identified requirements for public agencies, guidance on impact analyses, recommendations for public involvement, and mitigation.

Finally, under Senate Bill 375 (SB 375), SCAG is required to include a Sustainable Communities Strategy within the RTP/SCS. The RTP/SCS represents the collective vision of the six counties in the SCAG region and provides a framework for the future development of our regional transportation system. Through SB 375, the California Air Resources Board (ARB) established targets for GHG reduction for cars and light trucks from the SCS. The targets for the SCAG region are 8 percent in 2020 and 13 percent in 2035, from 2005 levels. As part of the early target setting process, the ARB had appointed a Regional Target Advisory Committee (RTAC) to recommend factors to be considered and methodologies to be used for setting the targets. The RTAC report was finalized in September 2009 and included a recommendation on Housing and Social Equity. The report recognized the impact that policies to reduce Vehicle Miles Traveled (VMT) have on social equity, specifically that the provision of appropriately located affordable housing matches local wage levels. The RTAC further recommended that displacement and gentrification, as a result of changing land uses and increased housing costs, should be addressed and specifically avoided to the extent possible in the SCS. As a result of this recommendation and input from our environmental justice stakeholders, SCAG has updated its methodology to include new areas of analysis, including gentrification and displacement.

SCAG's Title VI Environmental Justice Policy & Program

As a government agency that receives federal funding, SCAG is required to conduct an environmental justice analysis for its Regional Transportation Plan. SCAG's environmental justice program includes two main elements: technical analysis and public outreach. Specifically, it is SCAG's role to ensure that when transportation decisions are made, low-income and minority communities have ample opportunity to participate in the decision-making process and that they receive an equitable distribution of benefits and not a disproportionate share of burdens.

Under federal policy, all federally funded agencies must make environmental justice part of their mission and adhere to three fundamental Title VI/environmental justice principles:

- To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.
- To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process.
- To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

To this end, SCAG has completed an ambitious environmental justice report that assesses the impacts of the 2012 RTP/SCS on environmental justice population groups, and provides a set of measures for the potential mitigation of any adverse impacts.

SCAG's Environmental Justice Outreach

A key component of the RTP/SCS development process is seeking public participation. Public input from our environmental justice stakeholders helped SCAG prioritize and address needs in the region. As part of the environmental justice outreach effort, SCAG compiled a list of key stakeholders to be contacted regarding RTP/SCS programs and policies. This list is comprised of over 300 individuals and organizations involved with the 2008 RTP as well as additional stakeholders, such as the South Coast Air Quality Management District's (SCAQMD) Environmental Justice Working Group, which included new groups such as local community advocates, air quality non-profit organizations, and unions. SCAG maintains this list regularly and allows interested persons to sign-up online for the mailing list.

SCAG held two environmental justice workshops and convened focus groups on the environmental justice analysis to ensure that all members of the public have an opportunity to participate meaningfully in the planning process. On June 24, 2010, SCAG held a workshop to review the planning process and familiarize the participants with the environmental justice analysis process. The workshop drew 37 participants from throughout the region, with webcasting made available from SCAG's regional offices.

The following is a summary of the main topics discussed at the workshop:

- SCAG was requested to give a presentation on the agency's transportation modeling process
- The environmental justice analysis should include baseline data of major issues facing the region
- Public health was identified as a topic that should be further analyzed
- Housing plus transportation affordability index should be included in the analysis
- Gentrification should be addressed, particularly with SB 375's emphasis on transit oriented development

As a result of these workshops, SCAG determined that new analysis areas were necessary to capture the concerns raised from our stakeholders. These new areas are discussed in greater depth below but include impacts from rail transportation, gentrification and displacement, pollution exposure along heavily traveled corridors, and impacts from revenue generating mechanisms such as congestion pricing.

On June 30, 2011, SCAG held a follow-up workshop to discuss the proposed new analysis areas with our stakeholders and to seek further input. In response to comments from the first workshop, SCAG also included a summary of the modeling process. This workshop drew 45 participants from all six regional offices (Ventura, San Bernardino, El Centro, Orange, Riverside and Downtown Los Angeles).

The participants provided thoughtful comments and feedback on SCAG's proposed analysis and planning process including:

- Particulate Matter ($PM_{2.5}$) should be analyzed in the Environmental Justice report
- The Environmental Justice community should be included early in the decision-making processes and advisory committees
- The report should identify communities of concern and compare those areas with the location of investments
- Maps should be produced that show long range trip projections compared to system capacity
- Housing should be included in the performance measures, including housing/jobs fit (costs vs. wages)
- The impacts of freight movement should be analyzed and mitigated

In response to comments made at the workshop, SCAG followed up by organizing focused meetings to further discuss the methodology and ensure that it addresses the concerns raised by our environmental justice stakeholders. Participants were also urged to attend subsequent public workshops. Many of those who attended the Environmental Justice workshops also attended the RTP/SCS workshops. Furthermore, to address the comments made during SCAG's workshops, the environmental justice analysis has been updated as follows:

- Focus more on non-motorized transportation
- Identify and quantify the primary environmental justice challenges in transportation in the region including the development of a baseline for key issues such as poverty, exposure to pollutants, and concentration of pollutants
- Bring public health to the forefront—focus on pollutants and cancer concentration in communities of concern
- Begin to analyze potential gentrification impacts from urban infill and transit oriented development
- Provide an environmental justice mitigation toolbox with recommended mitigation measures for subsequent projects

Summary of Performance Measures and Technical Approach

Performance Measures

In the development of this report, SCAG eleven performance measures to identify the existing social and environmental equity in the region and to address the impacts of the 2012 RTP/SCS on various environmental justice population groups. Detailed analysis is presented for the following eleven performance measures:

1. RTP revenue sources in terms of tax burdens
2. Share of transportation system usage
3. RTP/SCS investments
4. Impacts of proposed VMT fees
5. Distribution of travel time savings and travel distance reductions
6. Jobs-housing imbalance or jobs-housing mismatch
7. Accessibility to employment and services
8. Accessibility to parks
9. Gentrification and displacement
10. Environmental impact analyses (air, health, noise)
    a. Historical air quality (2004–06 and 2007-2009) and health impacts (2005)
        - Regional level
        - Environmental impacts along freeways and highly traveled corridors
        - Environmental impacts of plan and baseline scenarios (2020 and 2035
    b. Noise impacts
        - Aviation
        - Roadway
11. Rail-related impacts

As a precursor to the discussion regarding the eleven performance measures, an introductory analysis is also provided on the historical/projected growth and geographic distribution of various environmental justice population groups.

Technical Approach

The following section summarizes the technical approach employed for the 2012 RTP/SCS Environmental Justice analysis. Detailed methodologies explaining SCAG's approach to assessing impacts for each performance measure are available within their respective sections.

SCAG has established itself as a leader in environmental justice analyses and has been previously recognized for its technical approach to understanding the benefits and burdens of the agency's regional plan. Each planning cycle presents new and emerging concerns for the region to address. For example, in the 2008 RTP, SCAG analyzed accessibility to public parks including the distribution of parks by income and park accessibility by travel mode and income. In keeping with the trend of developing robust environmental analyses, the current RTP/SCS analyzes impacts from rail transport, exposure to pollutants along heavily traveled corridors, gentrification and displacement, and impacts from revenue generating mechanisms such as a VMT fee. As with previous RTPs, the goal of the 2012 RTP/SCS is to ensure that when transportation decisions are made, low-income and minority communities have ample opportunity to participate in the decision-making process and receive an equitable distribution of benefits rather than a disproportionate share of burdens.

THE 2012 RTP/SCS PLAN VERSUS BASELINE

The comparison of the Plan versus Baseline is the primary focus of the environmental justice analysis for the 2012 RTP/SCS. The basic concept is to compare the performance of the Plan (2035) to the Baseline scenario for 2035. For the purposes of this analysis, the Plan represents the selected strategy to guide the region's transportation planning over the next few decades. Baseline is defined as the set of all projects and investments currently underway or for which funds are already committed. Baseline represents "business as usual" and assumes current land use trends and the completion of projects currently under construction or with funding available for construction over the next few years. The data for the analysis is based on SCAG's regional travel demand model results.

IDENTIFYING DEMOGRAPHIC GROUPS

Identifying low-income and minority populations is necessary both for conducting effective public participation and for assessing the distribution of benefits and burdens of transportation plans and projects. For purposes of this analysis, SCAG focused on all low-income groups and minority populations. Executive Order 12898 and the DOT and FHWA Orders on Environmental Justice defines "minority" as persons belonging to any of the following groups, as well as "other" categories that are based on the self-identification of individuals in the U.S. Census:[1] Black, Hispanic, Asian, and American Indian and Alaskan Native. SCAG bases its analysis on the latest census data for ethnic/racial groups in the SCAG region by census tract and by transportation analysis zone (TAZ).

Poverty level is a federally established income guideline used to define persons who are economically disadvantaged as defined by the U.S. Department of Health & Human Services guidelines.[2] The poverty level applicable to the SCAG Region is chosen on the basis of regional average household size for the census year. For example, for a regional mean of 2.98 persons – rounded to 3 – per household, the threshold would consist of the sum of the value for the first person plus two additional people. The household counts in each income range are then used to determine the number and percentage of households in each census tract below the poverty level. In 2010, a family of three earning less than $17,374 was classified as living in poverty.[3]

Table 1 lists the demographic categories that are used in SCAG's environmental justice analysis. As noted above, this report refers to the areas with meaningfully greater populations based on these demographic categories as "Environmental Justice Communities."

TABLE 1 Demographic Categories

Ethnic/Racial/Other Categories (persons)	Income Categories (households)
White (Non-Hispanic)	Below Poverty Level
African-American	Income Quintile 1 (lowest)
American Indian	Income Quintile 2
Asian/Pacific Islander	Income Quintile 3
Hispanic (Latino)	Income Quintile 4
Other Racial Categories	Income Quintile 5
Disabled/Mobility Limited	
Age 65 and Above	
Non English Speaking	
Without High School Diploma	
Household Without a Car	
Foreign Born Population	
Sensitive Receptors: hospitals, daycare facilities, senior centers, parks/open spaces, schools	

1 Department of Transportation, Federal Highway Administration. Environmental Justice Emerging Trends and Best Practices Guidebook, Document Number: FHWA-HEP-11-024. August 2011.

2 Department of Transportation, Federal Highway Administration. Environmental Justice Emerging Trends and Best Practices Guidebook, Document Number: FHWA-HEP-11-024. August 2011.

3 Weighted average threshold. U.S. Census Bureau. Poverty Thresholds, available at http://www.census.gov/hhes/www/poverty/data/threshld/index.html

In addition to complying with federal guidance, SCAG also conducts income equity analyses by breaking down total regional income figures into five income quintiles. A quintile, by definition, is a category into which 20 percent of the ranked population falls. For each new analysis, SCAG defines regional income quintiles based on the most recent census data on household income. Once the income quintiles are established, the incidence of benefits and costs can be estimated and compared across these income categories for multiple data sets. Examples include the number of income tax returns, households, workers/commuters, and consumer units. From statistics provided by the US Census Bureau, the Bureau of Labor Statistics (BLS), Bureau of Transportation Statistics (BTS), and the National Household Travel Survey (NHTS), staff produced various distributions by income quintile, which were further allocated by ethnic groups within each income quintile. Moreover, behavioral differences determined primarily by income levels—categorized by income quintile—are processed for mode usages by trip purposes—work versus non-work, consumer expenditures by categories—taxable items and gasoline, adjusted gross income, tax paid, etc. With the framework and information described above, key 2012 RTP/SCS determinants can be allocated to geographic areas based on various mode usage distributions by income quintile and its share of household counts at areas as small as Tier 2 (11,000+ zones equivalent to census block groups) Transportation Analysis Zones (TAZs).

Using the 2005–09 American Community Survey (ACS), SCAG staff produced the regional income quintile distribution by household. In addition, ethnic distributions under each income quintile were also provided through the processing of ACS data. Examples are illustrated in the following Tables and Graphs.

TABLE 2 Income Distribution

Quintiles	Income Range
Quintile 1	$0 to $24,581
Quintile 2	$24,582 - $46,436
Quintile 3	$46, 437 - $73,554
Quintile 4	$73,555 - $99,999
Quintile 5	$100,000 and higher

Source: 2005–09 ACS, processed by SCAG Research, Analysis, and Information Services staff

TABLE 3 SCAG Region Household Distribution by Income Quintile: 2005–09 ACS

Area	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	Total Household
Imperial	15,411	11,320	8,625	6,925	4,124	46,405
Los Angeles	711,392	659,114	628,036	590,502	589,223	3,178,266
Orange	133,396	162,270	189,413	216,961	271,960	974,001
Riverside	123,795	134,950	136,237	138,473	111,730	645,185
San Bernardino	118,177	128,047	127,308	124,744	90,519	588,796
Ventura	35,795	42,266	48,346	60,361	70,410	257,178
SCAG	1,137,966	1,137,966	1,137,966	1,137,966	1,137,966	5,689,831

Source: 2005–09 ACS, processed by SCAG Research, Analysis, and Information Services staff

TABLE 4 SCAG Region Household Distribution by Income Quintile (%)

Area	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	Total Household
Imperial	33.2%	24.4%	18.6%	14.9%	8.9%	100%
Los Angeles	22.4%	20.7%	19.8%	18.6%	18.5%	100%
Orange	13.7%	16.7%	19.4%	22.3%	27.9%	100%
Riverside	19.2%	20.9%	21.1%	21.5%	17.3%	100%
San Bernardino	20.1%	21.7%	21.6%	21.2%	15.4%	100%
Ventura	13.9%	16.4%	18.8%	23.5%	27.4%	100%
SCAG	20.0%	20.0%	20.0%	20.0%	20.0%	100%

Source: 2005–09 ACS, processed by SCAG Research, Analysis, and Information Services staff

FIGURE 1 SCAG Region Household Distribution by Regional Income Quintile (2005–09 ACS)

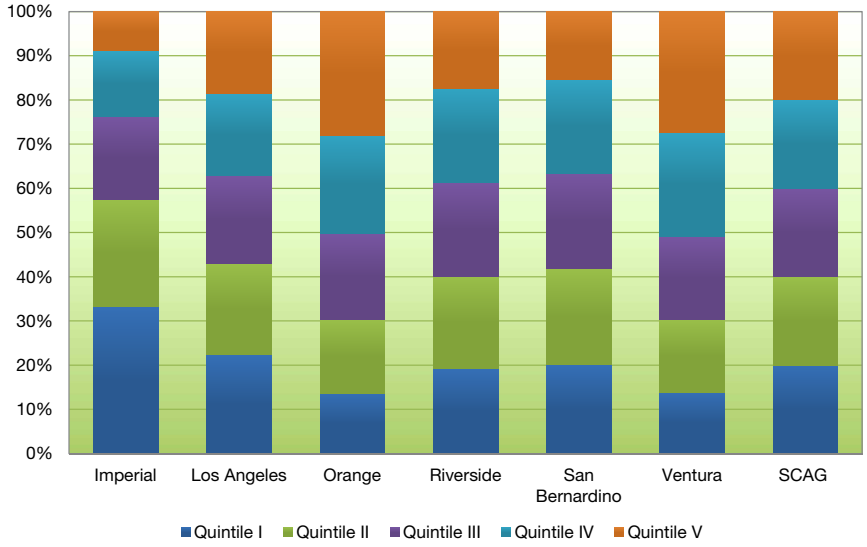


FIGURE 2 SCAG Region Hispanic Household Distribution by Regional Income Quintile (2005–09 ACS)

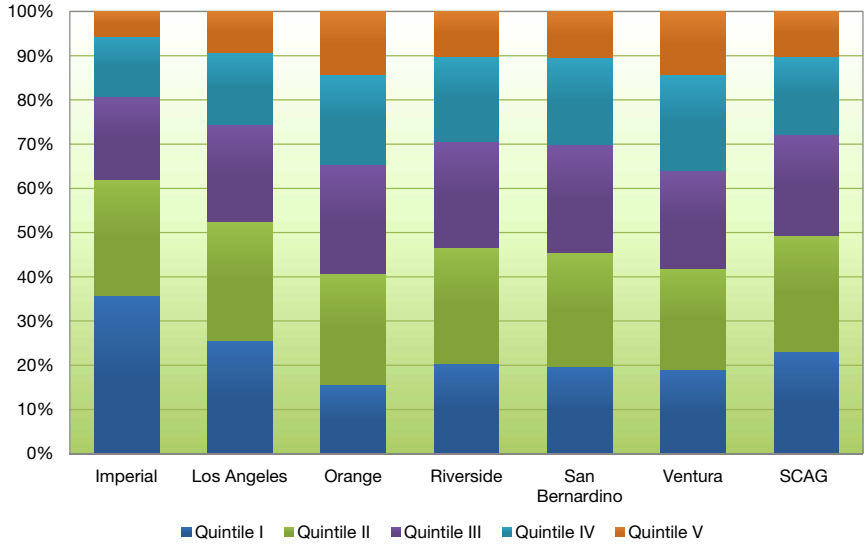
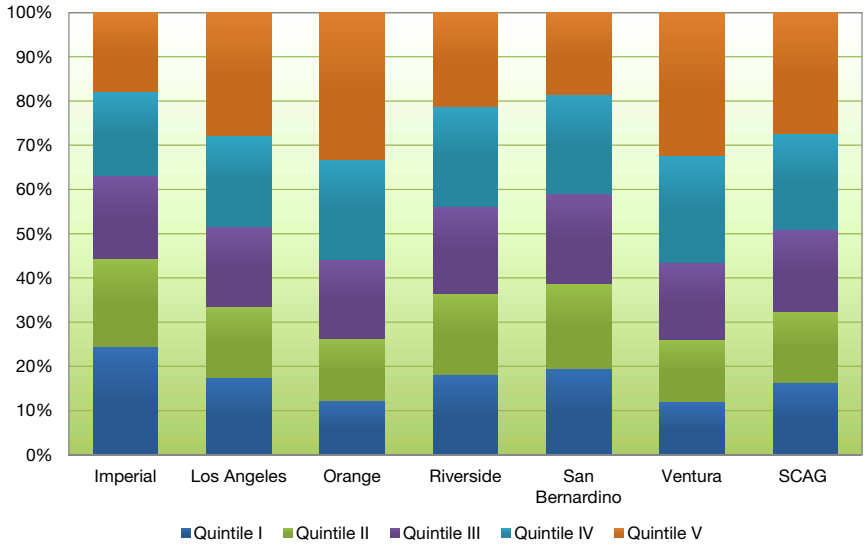


FIGURE 3 SCAG Region Non-Hispanic White Household Distribution by Regional Income Quintile (2005–09 ACS)



Snapshot of the Region

Existing Conditions and Growth from 2000 to 2005–09

This section describes existing conditions and is a new addition to SCAG's traditional Environmental Justice and Title VI Analysis, and represents a significant effort and improvement in expanding the scope of SCAG's analysis.

In response to many stakeholders' desire to understand the nature and geography of communities with high concentrations of minority, underserved, and low income groups, this section will identify clusters of environmental justice populations throughout the region and will provide data on their historical growth and interaction with the physical environment (emissions, air quality, and health outcomes). In addition, data will also be presented on environmental justice implications of jobs-housing balance and mismatch.

Introduction of the data

The most reliable source for demographic data at multiple geographies in the SCAG region is the US Census Bureau. In order to identify and analyze trends in population at the local and regional levels, two Census derived datasets will most often be compared in this analysis. Historical information for the year 2000 will be taken from the US Decennial Census. Due to the breadth of information available at small area geographies, the 2005–09 American Community Survey (ACS) will be used to illustrate existing conditions in the SCAG region. The five years of data allow SCAG to make statistically valid comparisons.

Regional Demographics

In the period ranging from 2005–09, population in SCAG grew to 17,737,412 from 16,516,006 in 2000, which is a 7 percent increase. When this figure is broken down by race and ethnicity, it can be seen that much of this growth can be attributed to significant population gains in some groups. Most notably, the Hispanic population in SCAG increased by 1,133,559 (17 percent) from 2000 to 2005–09. Asians and Pacific Islanders also experienced a significant increase over this period, with population growing by 329,022 (19 percent). More individuals also identified themselves as an "other" race in 2005–09 than was seen in the year 2000. The population of African Americans grew slightly by 2,076, while Whites and Native Americans experienced population decreases during this period. The following tables goes into greater detail on the population trends from 2000 to 2005–09.

This analysis includes immigration, language, age, education, poverty, income, and transportation. In terms of immigration, the population of foreign born individuals in SCAG grew from 5,113,398 in 2000 to 5,454,808 in 2005–09—an increase of 341,410 or 7 percent. The proportion of immigrants in the total population remained constant during this period at 31 percent. The non-English speaking population also grew from 668,601 to 787,192—an increase of 98,591 or 14 percent. The number of elderly individuals over 65 years of age increased as well, with this cohort increasing by 201,901 or 12 percent. In terms of poverty, there has been a decrease of 144,234 in the number of people below the poverty line—a 6 percent decrease. Educational attainment has also seen promising figures, with the instances of individuals not having a high school diploma decreasing by 144,234 to 2,517,107 for 2005–09. This 9 percent overall decrease caused the percentage of individuals without high school diplomas in the total population to decline from 27 percent in 2000 to 22 percent in 2005–09.

Households grew in the SCAG region by 7 percent from 5,386,491 in 2000 to 5,689,831 in 2005–09. Median household income experienced decline by 1 percent during these years and decreased from $66,240 in 2000 to $65,844 for 2005–09. Additional information on the breakdown of income by quintiles and demographic groups at the county level is shown in the tables below. The number of households without vehicles decreased during this period by 22 percent, from 542,242 in 2000 to 421,240 in 2005–09.

TABLE 5 Environmental Justice Variables and Demographic Changes in the SCAG Region 2000 to 2005–09

	2000	% of Total	2005–09	% of Total	Difference from 2000 to 2005–09	% Change
Total Population	**16,516,006**		**17,737,412**		**1,221,406**	**7%**
Ethnicity						
Hispanic	6,704,219	41%	7,837,778	44%	1,133,559	17%
Non-Hispanic	9,811,787	59%	9,899,634	56%	87,847	1%
Race (Non-Hispanic)						
Asian and Pacific Islander	1,721,035	10%	2,050,046	12%	329,011	19%
African American	1,188,900	7%	1,190,976	7%	2,076	0%
White	6,392,825	39%	6,243,089	35%	-149,736	-2%
Native American	61,145	0%	54,298	0%	-6,847	-11%
Other	447,882	3%	656,357	4%	208,475	47%
Immigration						
Foreign Born Population	5,113,398	31%	5,454,808	31%	341,410	7%
Language						
Non-English Speaking Population*	688,601	4%	787,192	5%	98,591	14%
Age						
Population 65+ Years	1,636,153	10%	1,838,054	10%	201,901	12%
Education						
Individuals without High School Diploma (or equivalent)**	2,759,140	27%	2,512,107	22%	-247,033	-9%
Poverty						
Individuals in Poverty	2,539,791	15%	2,395,557	14%	-144,234	-6%
Households	**5,386,491**		**5,689,831**		**303,340**	**6%**
Income						
Median Household Income	$50,922		$65,884			
Transportation						
Households without Vehicles	542,252	10%	421,240	7%	-121,012	-22%

** Non-english speaking population is measured for individuals 5 years of age or older*
*** Figures for education is constrained to individuals 25 years of age or older*
Sources: SCAG, 2000 Census, 2005–09 American Community Survey

TABLE 6 Income Quintiles and Median Household Income by County for 2000 and 2005–09
SCAG Region Title VI/Environmental Justice Considerations for the 2012 RTP/SCS: From 2000 Census

County	Population	Households	Age 65 & Above	Median Household Income	Income Quintile 1	Income Quintile 2	Income Quintile 3	Income Quintile 4
Imperial	142,361	39,384	14,516	$34,922	12,192	9,447	7,964	6,045
Los Angeles	9,519,338	3,133,774	926,970	$48,028	705,404	653,189	612,701	581,726
Orange	2,846,289	935,287	278,805	$64,100	114,539	153,390	185,621	217,898
Riverside	1,545,387	506,218	194,833	$45,857	104,378	109,229	107,974	104,320
San Bernardino	1,709,434	528,594	145,447	$45,091	111,781	114,712	115,741	109,091
Ventura	753,197	243,234	75,582	$63,344	29,905	38,230	48,197	59,118
SCAG	16,516,006	5,386,491	1,636,153	$50,922	1,078,198	1,078,198	1,078,198	1,078,198

County	Income Quintile 5	Population Under Poverty	Non-Hispanic Total	Non-Hispanic White	Non-Hispanic Black	Non-Hispanic Native American	Non-Hispanic Asian	Non-Hispanic Pacific Islander
Imperial	3,786	29,681	39,275	28,489	4,882	1,738	2,578	31
Los Angeles	583,259	1,674,599	5,275,851	2,946,145	891,194	26,141	1,123,964	24,376
Orange	264,706	289,475	1,969,838	1,455,470	40,153	8,735	383,977	8,005
Riverside	80,880	214,084	986,059	787,318	92,186	10,947	53,231	2,989
San Bernardino	77,514	263,412	1,039,532	749,224	147,488	10,249	77,205	4,601
Ventura	68,053	68,540	501,232	426,179	12,997	3,335	38,521	1,557
SCAG	1,078,198	2,539,791	9,811,787	6,392,825	1,188,900	61,145	1,679,476	41,559

County	Non-Hispanic Other	Hispanic Total	Foreign Born	Non-English Speaking	Households Without Car	Age 5 & Above	Age 25 & Over	Below High School
Imperial	1,557	103,086	45,783	11,163	4,367	131,530	83,632	34,258
Los Angeles	264,031	4,243,487	3,449,444	464,049	393,309	8,791,096	5,882,948	1,770,524
Orange	73,498	876,451	849,899	103,454	54,409	2,632,408	1,813,456	372,419
Riverside	39,388	559,328	293,712	43,559	35,832	1,425,927	936,024	234,473
San Bernardino	50,765	669,902	318,647	40,300	42,120	1,568,725	983,273	253,594
Ventura	18,643	251,965	155,913	26,076	12,215	697,367	471,756	93,872
SCAG	447,882	6,704,219	5,113,398	688,601	542,252	15,247,053	10,171,089	2,759,140

Source: 2000 Census and 2005–09 ACS, processed by SCAG Research, Analysis, and Information Service staff

TABLE 7 Income Quintiles and Median Household Income by County for 2000 and 2005–09
SCAG Region Title VI/Environmental Justice Considerations for the 2012 RTP/SCS: From 2000 Census

County	Population	Households	Age 65 & Above	Median Household Income	Income Quintile 1	Income Quintile 2	Income Quintile 3	Income Quintile 4
Imperial	0.9%	0.7%	10.2%	$34,922	31.0%	24.0%	20.2%	15.3%
Los Angeles	57.6%	58.2%	9.7%	$48,028	22.5%	20.8%	19.6%	18.6%
Orange	17.2%	17.4%	9.8%	$64,100	12.2%	16.4%	19.8%	23.3%
Riverside	9.4%	9.4%	12.6%	$45,857	20.6%	21.6%	21.3%	20.6%
San Bernardino	10.4%	9.8%	8.5%	$45,091	21.1%	21.7%	21.9%	20.6%
Ventura	4.6%	4.5%	10.0%	$63,344	12.3%	15.7%	19.8%	24.3%
SCAG Region Average	100.0%	100.0%	9.9%	$50,922	20.0%	20.0%	20.0%	20.0%

County	Income Quintile 5	Population Under Poverty	Non-Hispanic Total	Non-Hispanic White	Non-Hispanic Black	Non-Hispanic Native American	Non-Hispanic Asian	Non-Hispanic Pacific Islander
Imperial	9.6%	20.8%	27.6%	20.0%	3.4%	1.2%	1.8%	0.0%
Los Angeles	18.6%	17.6%	55.4%	30.9%	9.4%	0.3%	11.8%	0.3%
Orange	28.3%	10.2%	69.2%	51.1%	1.4%	0.3%	13.5%	0.3%
Riverside	16.0%	13.9%	63.8%	50.9%	6.0%	0.7%	3.4%	0.2%
San Bernardino	14.7%	15.4%	60.8%	43.8%	8.6%	0.6%	4.5%	0.3%
Ventura	28.0%	9.1%	66.5%	56.6%	1.7%	0.4%	5.1%	0.2%
SCAG Region Average	20.0%	15.4%	59.4%	38.7%	7.2%	0.4%	10.2%	0.3%

County	Non-Hispanic Other	Hispanic Total	Foreign Born	Non-English Speaking Share of Population 5 & Above	Households Without Car	Age 5 & Above	Age 25 & Over	Below High School Share of Population 25 & Over
Imperial	1.1%	72.4%	32.2%	8.5%	11.1%	92.4%	58.7%	41.0%
Los Angeles	2.8%	44.6%	36.2%	5.3%	12.6%	92.3%	61.8%	30.1%
Orange	2.6%	30.8%	29.9%	3.9%	5.8%	92.5%	63.7%	20.5%
Riverside	2.5%	36.2%	19.0%	3.1%	7.1%	92.3%	60.6%	25.0%
San Bernardino	3.0%	39.2%	18.6%	2.6%	8.0%	91.8%	57.5%	25.8%
Ventura	2.5%	33.5%	20.7%	3.7%	5.0%	92.6%	62.6%	19.9%
SCAG Region Average	2.7%	40.6%	31.0%	4.5%	10.1%	92.3%	61.6%	27.1%

Source: 2000 Census and 2005–09 ACS, processed by SCAG Research, Analysis, and Information Service staff

TABLE 8 Income Quintiles and Median Household Income by County for 2000 and 2005–09
SCAG Region Title VI/Environmental Justice Considerations for the 2012 RTP/SCS: From 2005–09 ACS

County	Population	Households	Age 65 & Above	Median Household Income	Income Quintile 1	Income Quintile 2	Income Quintile 3	Income Quintile 4
Imperial	160,034	46,405	16,656	41,815	15,411	11,320	8,625	6,925
Los Angeles	9,785,295	3,178,266	1,007,833	62,249	711,392	659,114	628,036	590,502
Orange	2,976,831	974,001	327,906	81,115	133,396	162,270	189,413	216,961
Riverside	2,036,304	645,185	232,413	62,487	123,795	134,950	136,237	138,473
San Bernardino	1,986,635	588,796	164,059	59,778	118,177	128,047	127,308	124,744
Ventura	792,313	257,178	89,187	79,955	35,795	42,266	48,346	60,361
SCAG	17,737,412	5,689,831	1,838,054	65,884	1,137,966	1,137,966	1,137,966	1,137,966

County	Income Quintile 5	Population Under Poverty	Non-Hispanic Total	Non-Hispanic White	Non-Hispanic Black	Non-Hispanic Native American	Non-Hispanic Asian	Non-Hispanic Pacific Islander
Imperial	4,124	31,850	38,253	26,646	5,270	1,812	3,096	144
Los Angeles	589,223	1,486,783	5,157,752	2,827,681	836,940	21,540	1,260,344	23,938
Orange	271,960	282,087	1,989,656	1,390,222	47,501	8,574	475,394	9,055
Riverside	111,730	245,454	1,156,505	865,067	119,210	10,634	103,617	4,907
San Bernardino	90,519	278,582	1,060,721	721,965	168,906	9,539	112,131	5,288
Ventura	70,410	70,801	496,747	411,508	13,149	2,199	50,602	1,530
SCAG	1,137,966	2,395,557	9,899,634	6,243,089	1,190,976	54,298	2,005,184	44,862

County	Non-Hispanic Other	Hispanic Total	Foreign Born	Non-English Speaking	Households Without Car	Age 5 & Above	Age 25 & Over	Below High School
Imperial	2,308	121,781	50,377	16,433	5,022	144,900	92,903	34,000
Los Angeles	340,916	4,627,543	3,468,593	519,338	300,914	9,056,154	6,266,988	1,534,921
Orange	107,532	987,175	894,422	105,612	45,416	2,760,481	1,942,395	330,770
Riverside	91,744	879,799	447,647	64,322	29,361	1,875,782	1,240,048	260,509
San Bernardino	80,419	925,914	419,196	50,395	30,028	1,824,193	1,156,887	262,832
Ventura	33,438	295,566	174,573	31,092	10,499	733,031	503,906	89,075
SCAG	656,357	7,837,778	5,454,808	787,192	421,240	16,394,541	11,203,127	2,512,107

Source: 2000 Census and 2005–09 ACS, processed by SCAG Research, Analysis, and Information Service staff

TABLE 9 Income Quintiles and Median Household Income by County for 2000 and 2005–09
SCAG Region Title VI/Environmental Justice Considerations for the 2012 RTP/SCS: From 2005–09 ACS

County	Population	Households	Age 65 & Above	Median Household Income	Income Quintile 1	Income Quintile 2	Income Quintile 3	Income Quintile 4
Imperial	0.9%	0.8%	10.4%	41,815	33.2%	24.4%	18.6%	14.9%
Los Angeles	55.2%	55.9%	10.3%	62,249	22.4%	20.7%	19.8%	18.6%
Orange	16.8%	17.1%	11.0%	81,115	13.7%	16.7%	19.4%	22.3%
Riverside	11.5%	11.3%	11.4%	62,487	19.2%	20.9%	21.1%	21.5%
San Bernardino	11.2%	10.3%	8.3%	59,778	20.1%	21.7%	21.6%	21.2%
Ventura	4.5%	4.5%	11.3%	79,955	13.9%	16.4%	18.8%	23.5%
SCAG Region Average	100.0%	100.0%	10.4%	65,884	20.0%	20.0%	20.0%	20.0%

County	Income Quintile 5	Population Under Poverty	Non-Hispanic Total	Non-Hispanic White	Non-Hispanic Black	Non-Hispanic Native American	Non-Hispanic Asian	Non-Hispanic Pacific Islander
Imperial	8.9%	19.9%	23.9%	16.7%	3.3%	1.1%	1.9%	0.1%
Los Angeles	18.5%	15.2%	52.7%	28.9%	8.6%	0.2%	12.9%	0.2%
Orange	27.9%	9.5%	66.8%	46.7%	1.6%	0.3%	16.0%	0.3%
Riverside	17.3%	12.1%	56.8%	42.5%	5.9%	0.5%	5.1%	0.2%
San Bernardino	15.4%	14.0%	53.4%	36.3%	8.5%	0.5%	5.6%	0.3%
Ventura	27.4%	8.9%	62.7%	51.9%	1.7%	0.3%	6.4%	0.2%
SCAG Region Average	20.0%	13.5%	55.8%	35.2%	6.7%	0.3%	11.3%	0.3%

County	Non-Hispanic Other	Hispanic Total	Foreign Born	Non-English Speaking Share of Population 5 & Above	Households Without Car	Age 5 & Above	Age 25 & Over	Below High School Share of Population 25 & Over
Imperial	1.4%	76.1%	31.5%	11.3%	10.8%	90.5%	58.1%	36.6%
Los Angeles	3.5%	47.3%	35.4%	5.7%	9.5%	92.5%	64.0%	24.5%
Orange	3.6%	33.2%	30.0%	3.8%	4.7%	92.7%	65.3%	17.0%
Riverside	4.5%	43.2%	22.0%	3.4%	4.6%	92.1%	60.9%	21.0%
San Bernardino	4.0%	46.6%	21.1%	2.8%	5.1%	91.8%	58.2%	22.7%
Ventura	4.2%	37.3%	22.0%	4.2%	4.1%	92.5%	63.6%	17.7%
SCAG Region Average	3.7%	44.2%	30.8%	4.8%	7.4%	92.4%	63.2%	22.4%

Source: 2000 Census and 2005–09 ACS, processed by SCAG Research, Analysis, and Information Service staff

Historical Geographic Distribution of Demographic Groups

The existing guidance suggests that a concentration of a minority population may exist if the percentage of the minority population in a given area is "meaningfully greater" than the percentage of the minority population in the larger general population of the region.

For the purposes of this analysis, clusters of Environmental Justice populations were identified by grouping census tracts with concentrations of specific demographic groups that exceed the regional average. The establishment of these geographic cluster areas allows for an in depth analysis of the historical air quality and health factors of unique socioeconomic cohorts provided in the technical analysis below. The identified cluster areas and their shift over time are displayed below for each environmental justice variable for years 2000 and 2005–09. This report refers to these areas as "Environmental Justice Communities."

EXHIBITS 1 and **2** illustrate the census tracts that exceed the regional elderly population average of 10 percent in both 2000 and 2005–09. The areas exceeding the region's average share of elderly residents grew from 60 percent of the region in 2000 to 67 percent for 2005–09

EXHIBITS 3 and **4** illustrate the census tracts that exceed the regional average of population living below the poverty threshold (15 percent in 2000 and 14 percent in 2005–09). The areas exceeding the region's average share of residents below poverty decreased with 71 percent in the year 2000 and 69 percent in the years 2005–09.

EXHIBITS 5 and **6** illustrate the census tracts that exceed the regional average minority population (61 percent in 2000 and 65 percent in 2005–09). The areas exceeding the region's average share of minority population stayed the same between 2000 and 2005–09 at 72 percent.

EXHIBITS 7 and **8** show that the census tracts with more foreign born residents than the regional average (31 percent in both 2000 and 2005–09) decreased slightly from 68 percent in 2000 to 67 percent in 2005–09.

EXHIBITS 9 and **10** illustrate that those census tracts that exceed the regional average of non-English speakers (5 percent in both 2000 and 2005–09) increased from 74 percent in 2000 to 79 percent for years 2005–09.

EXHIBITS 11 and **12** illustrate the census tracts that exceed the regional average of households without a vehicle (10 percent in 2000 and 7 percent in 2005–09). The areas exceeding the region's average share of households without a vehicle grew from 68 percent the year 2000 to 73 percent percent for 2005–09.

EXHIBITS 13 and **14** illustrate the census tracts exceeding the regional average of those individuals without a High School diploma (27 percent in 2000 an 22 percent in 2005–09). The areas exceeding the region's average share of individuals without a High School diploma grew slightly from 74 percent percent for the year 2000 to 75 percent percent or years 2005–09.

EXHIBIT 1 Elderly Population (ages 65 and over) in 2000

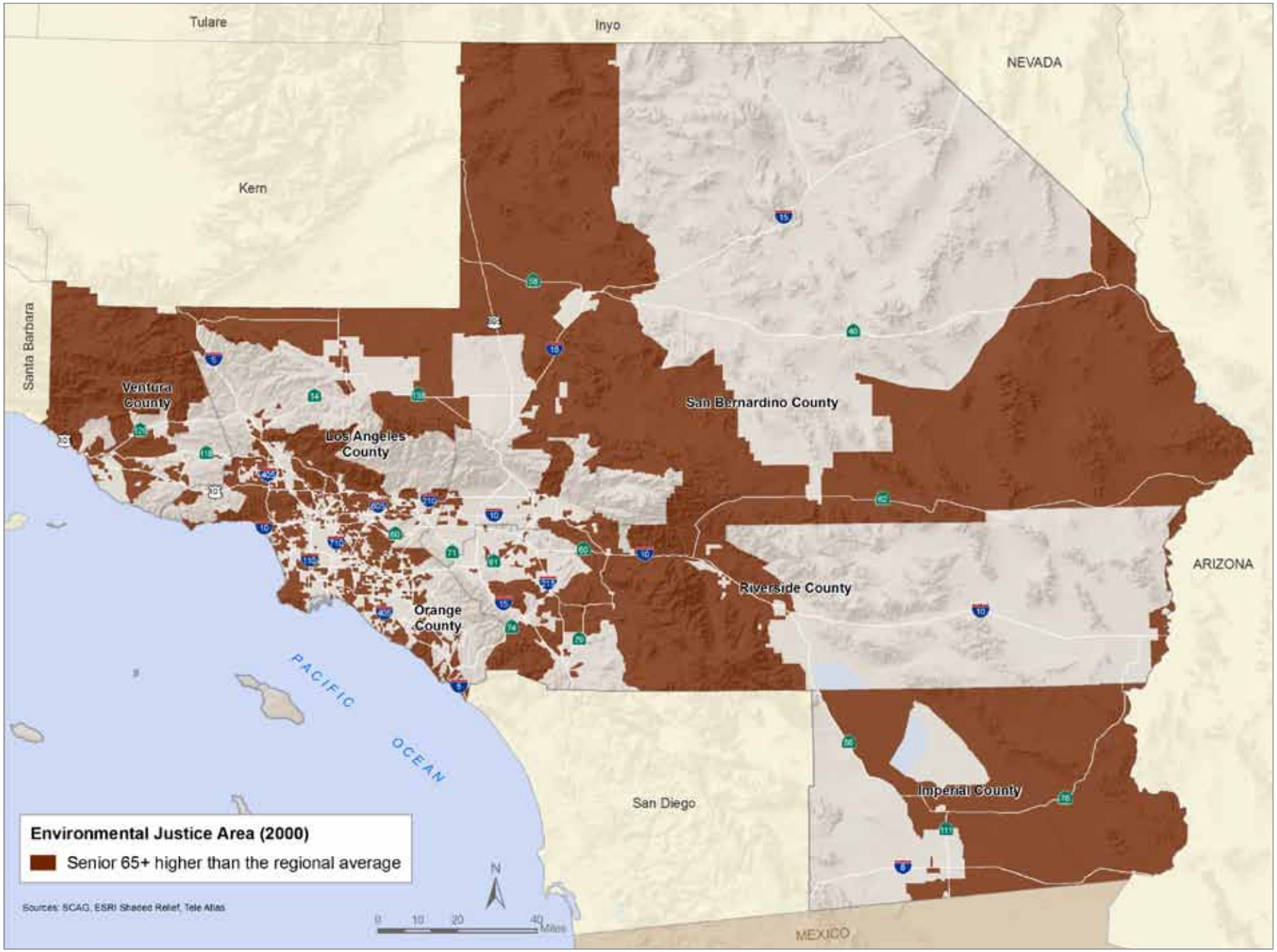


EXHIBIT 2 Elderly Population (ages 65 and over) in 2005–09

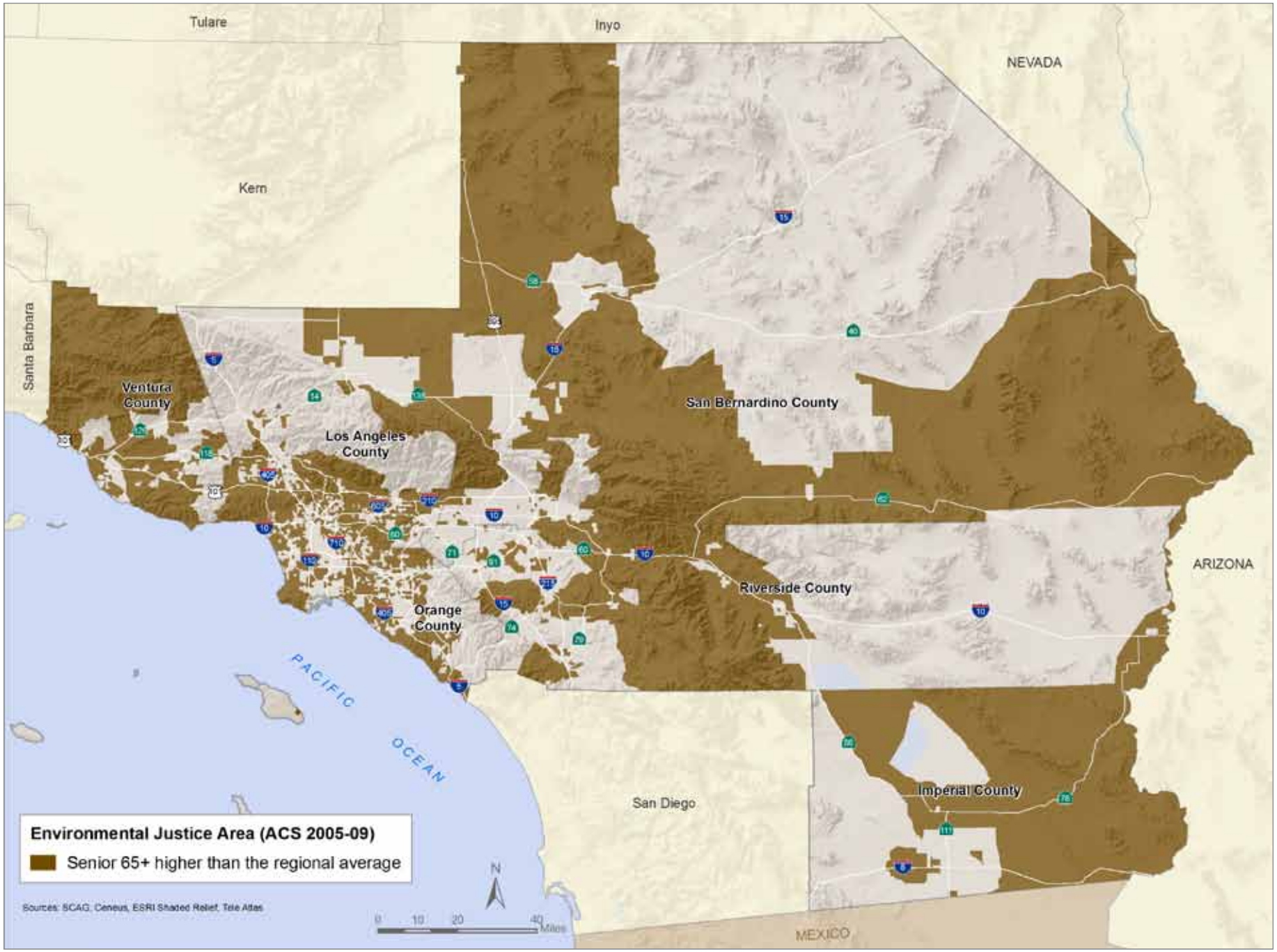


EXHIBIT 3 Poverty in 2000

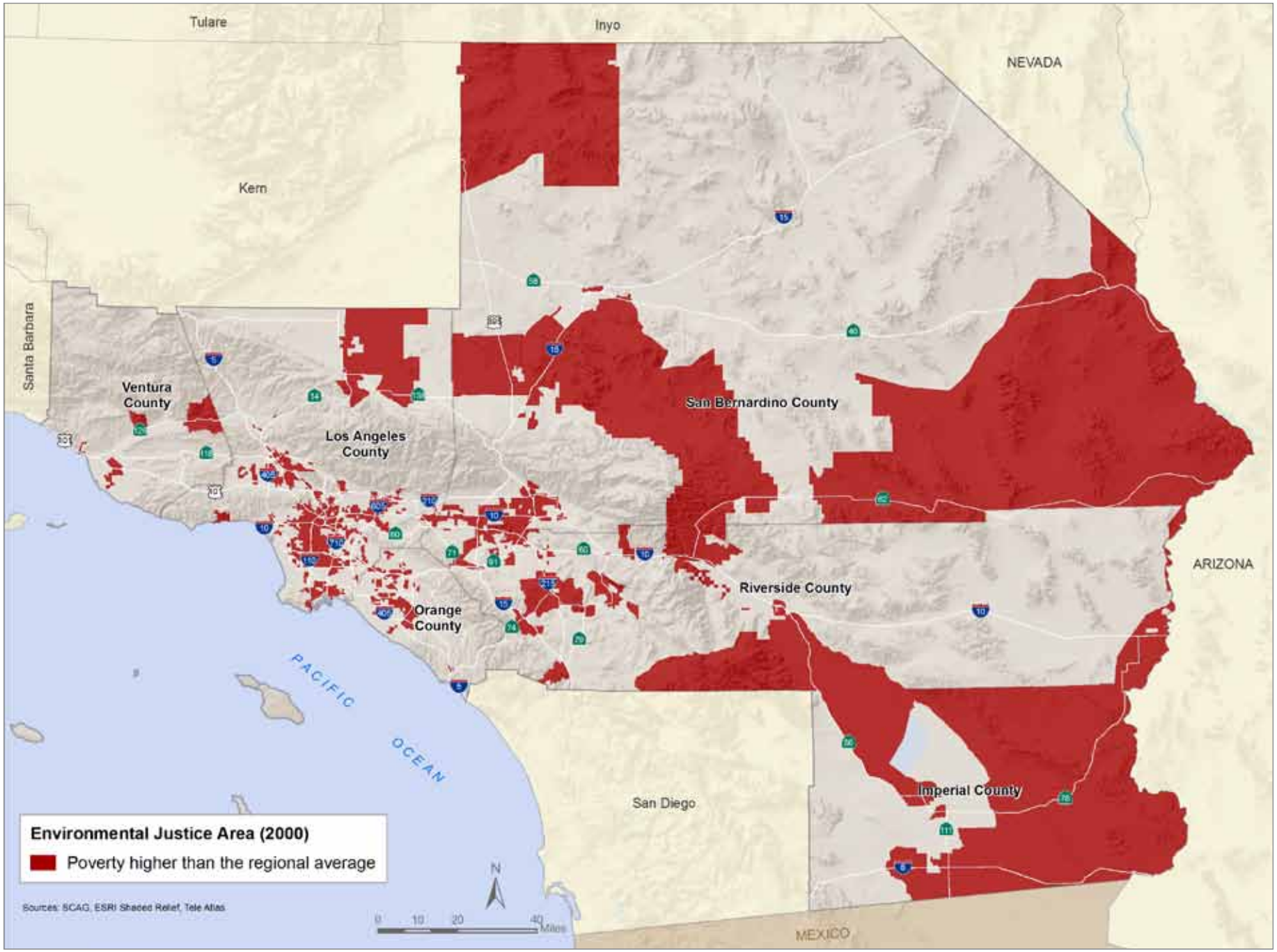


EXHIBIT 4 Poverty in 2005–09

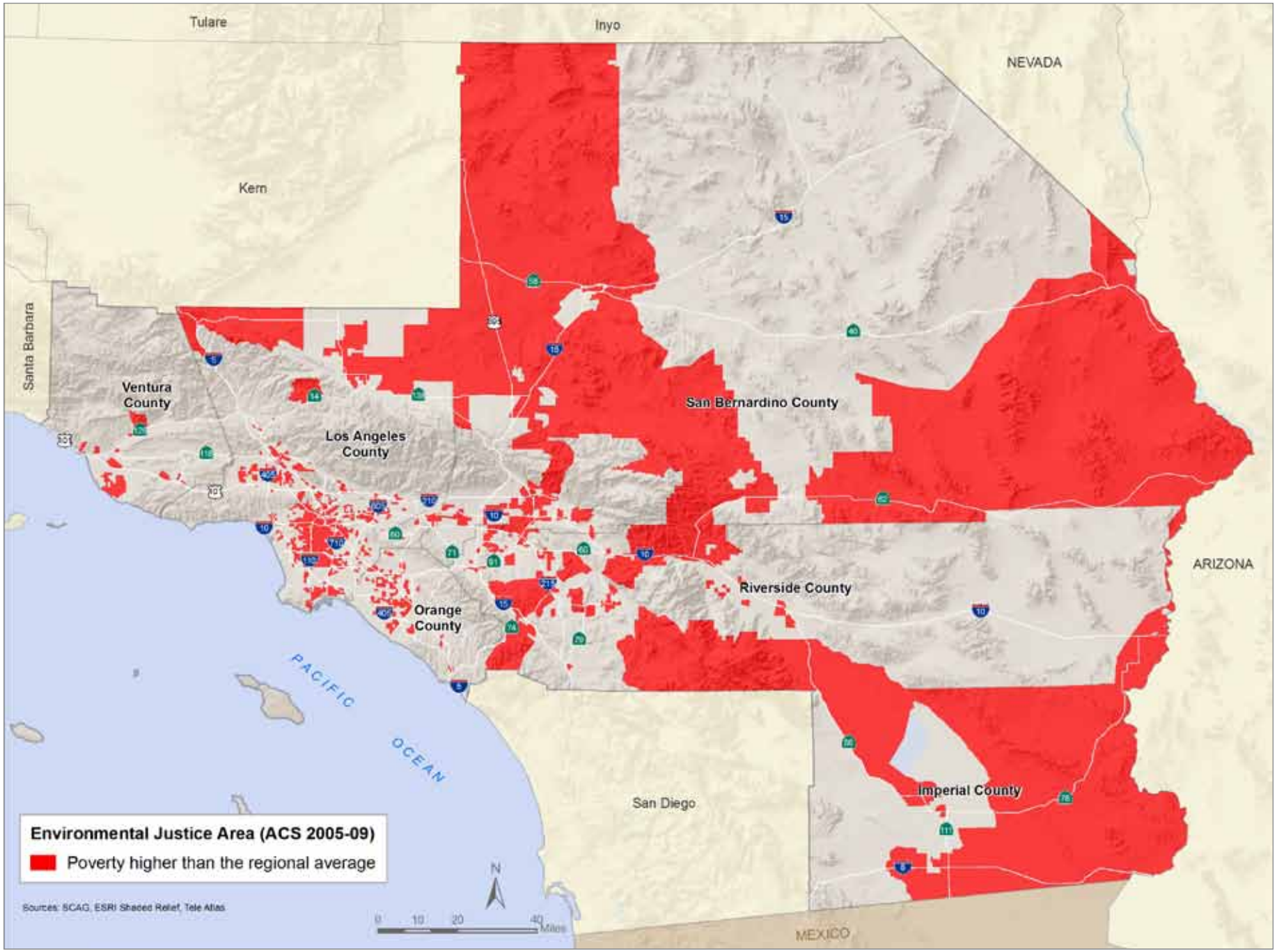


EXHIBIT 5 Minority Population in 2000

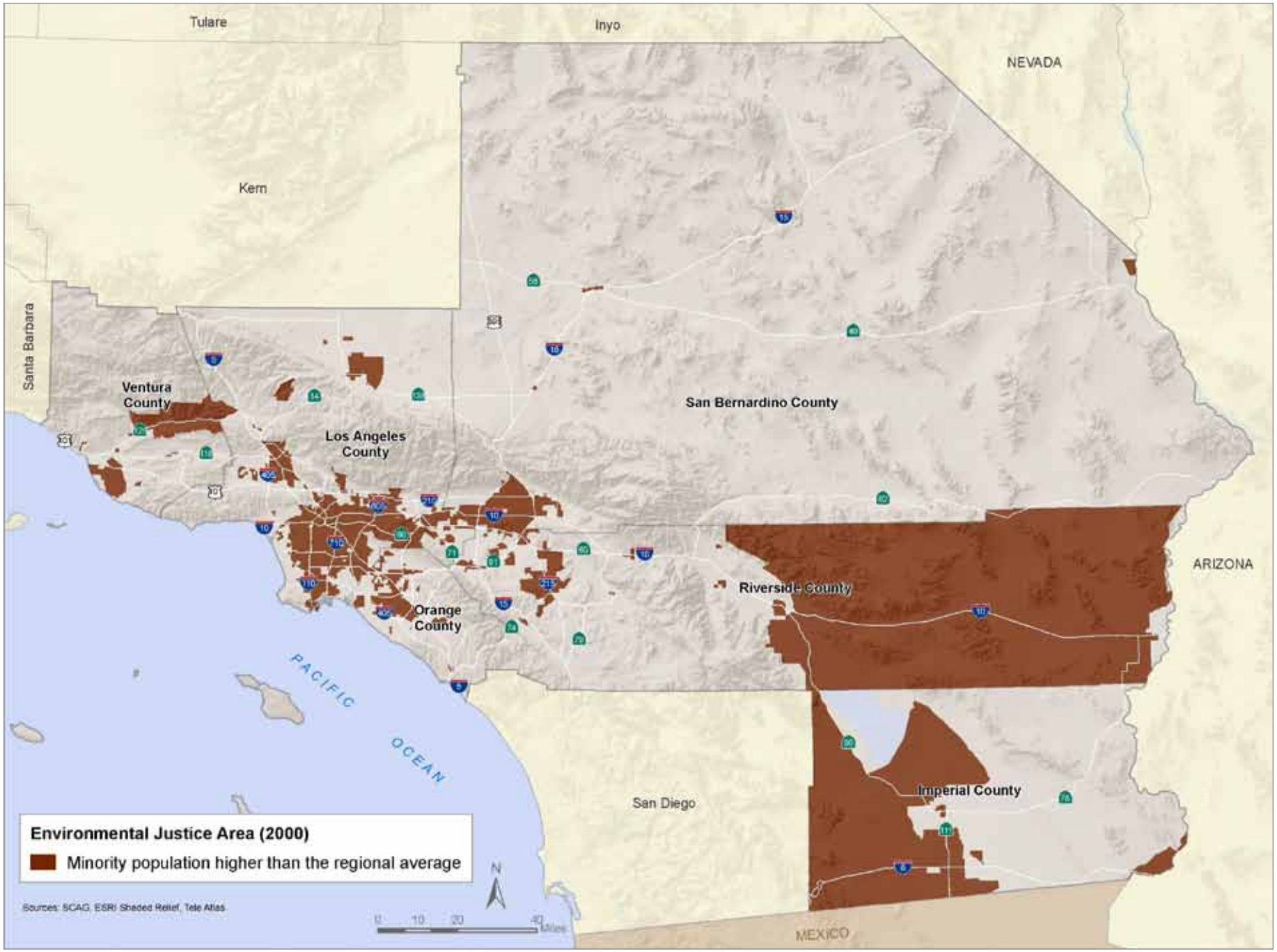


EXHIBIT 6 Minority Population in 2005–09

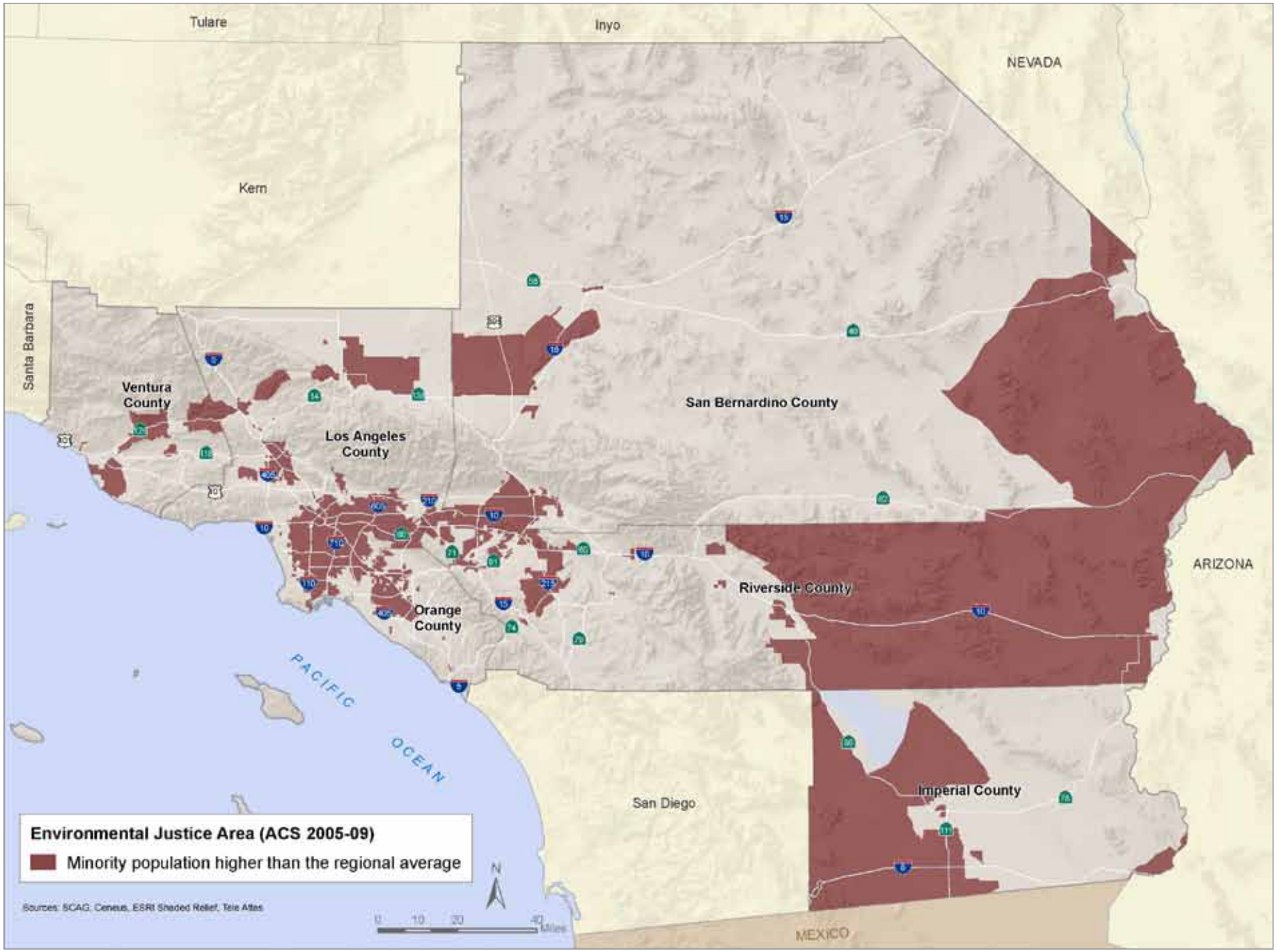


EXHIBIT 7 Foreign Born Population in 2000

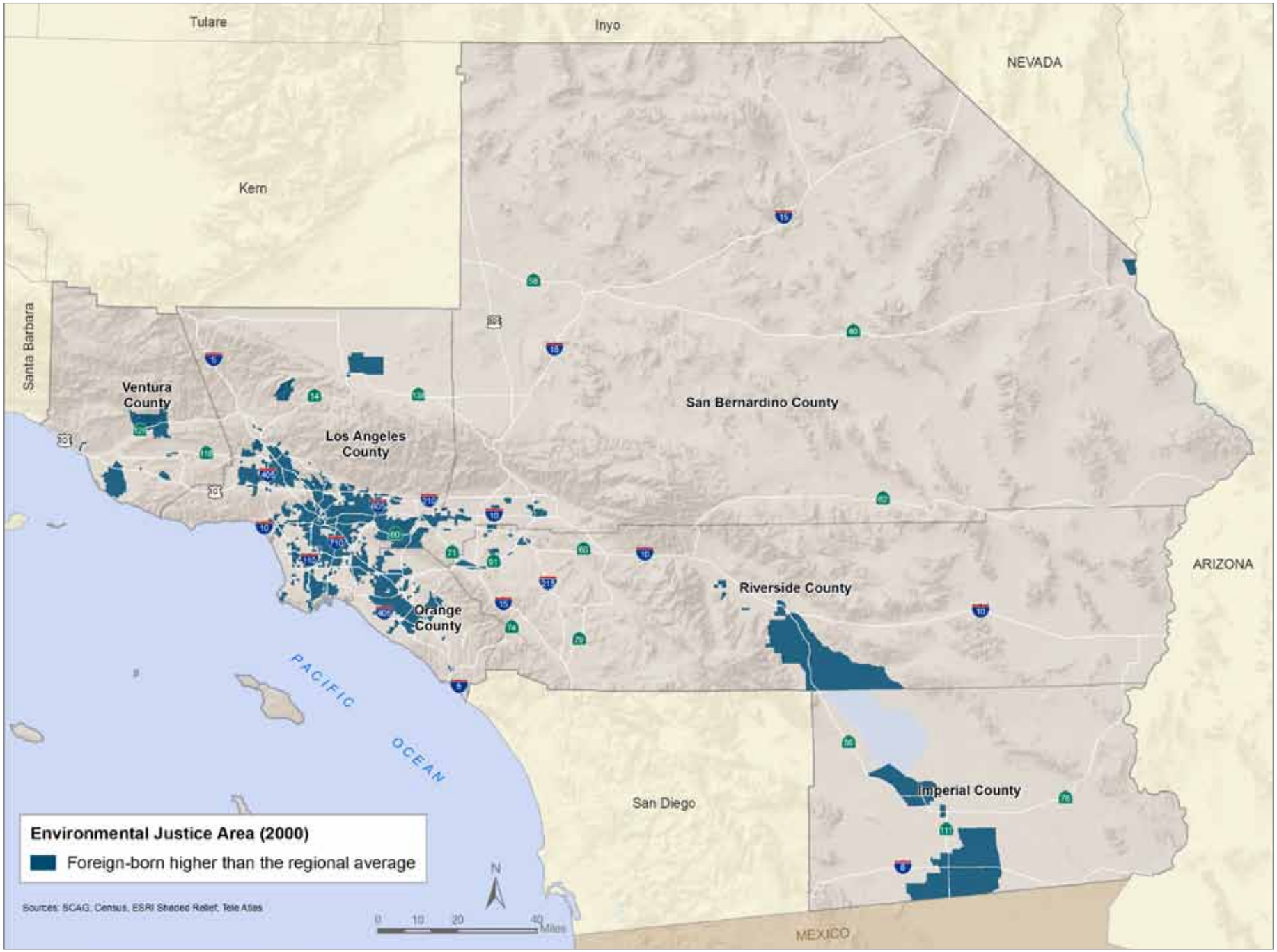


EXHIBIT 8 Foreign Born Population in 2005–09

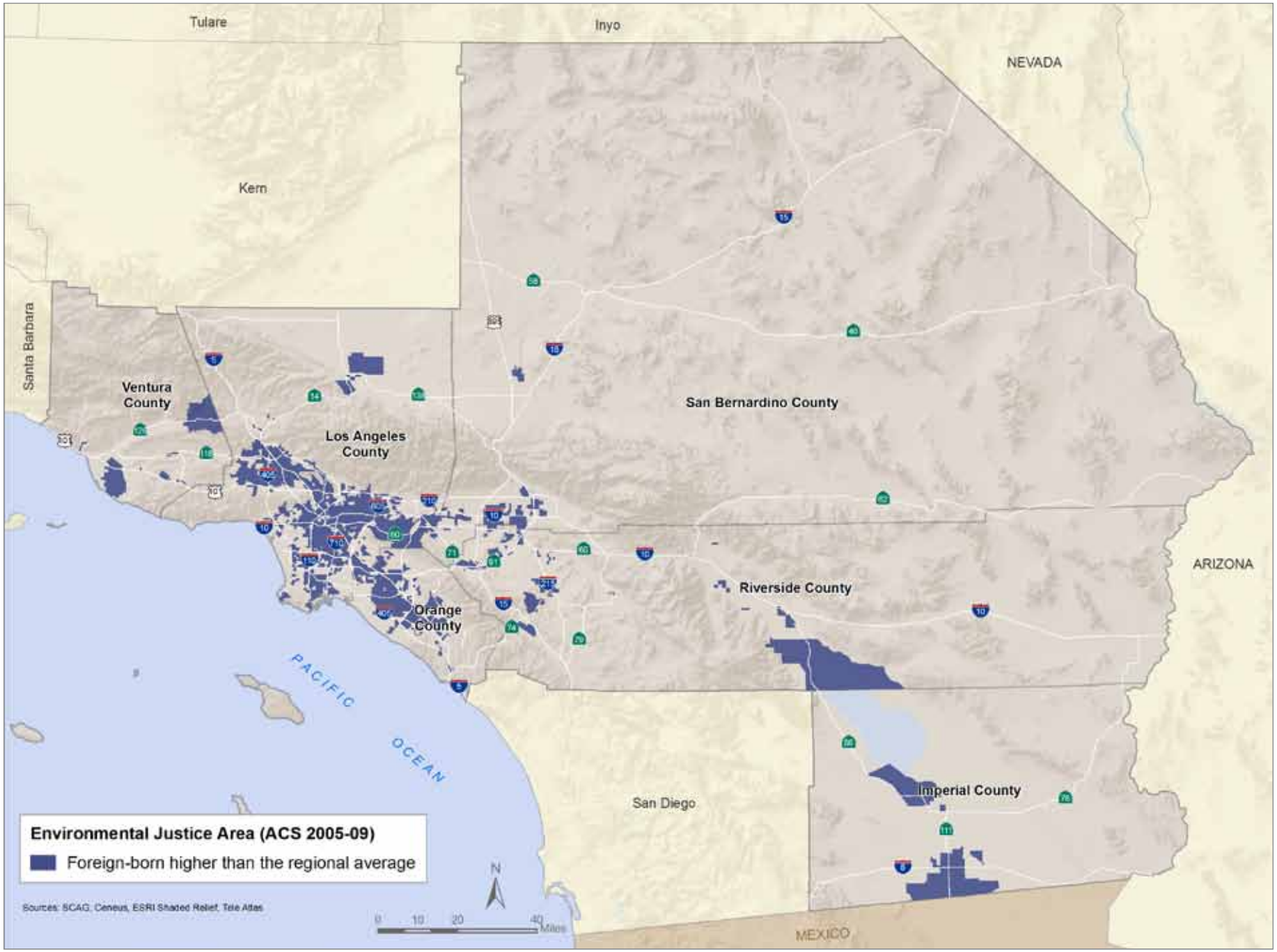


EXHIBIT 9 Non-English Speakers in 2000

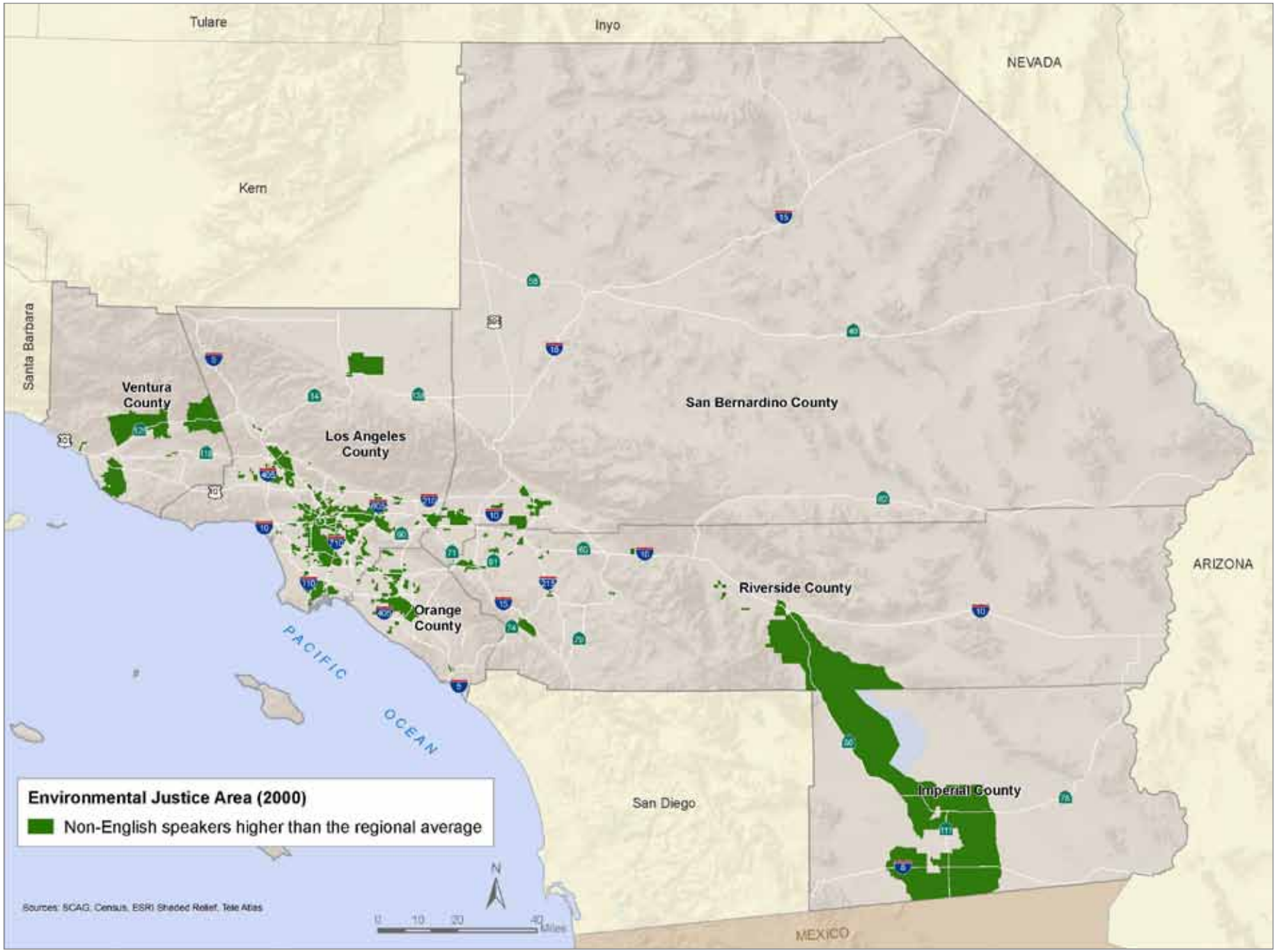


EXHIBIT 10 Non-English Speakers in 2005–09

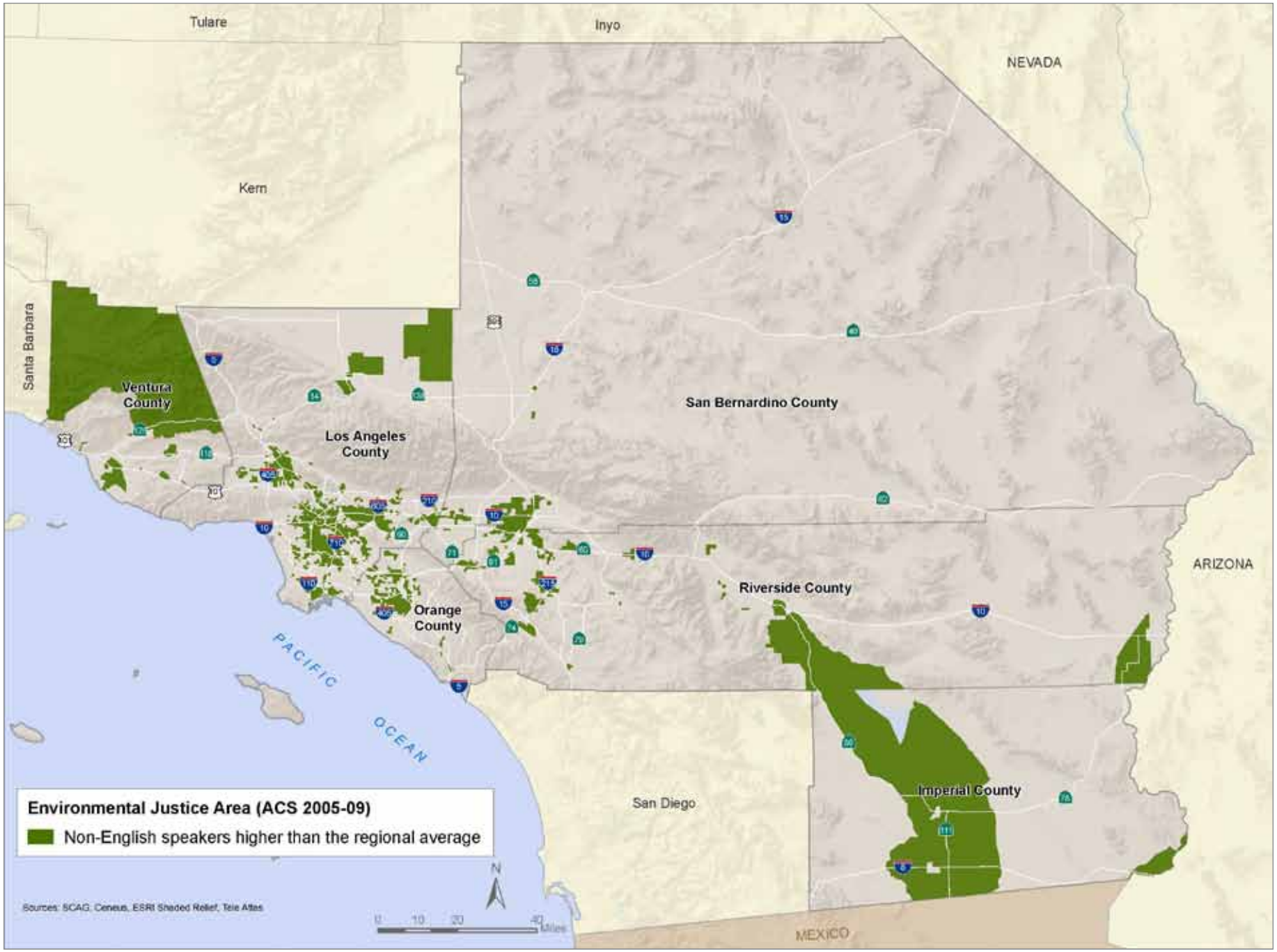


EXHIBIT 11 Households Without a Vehicle in 2000

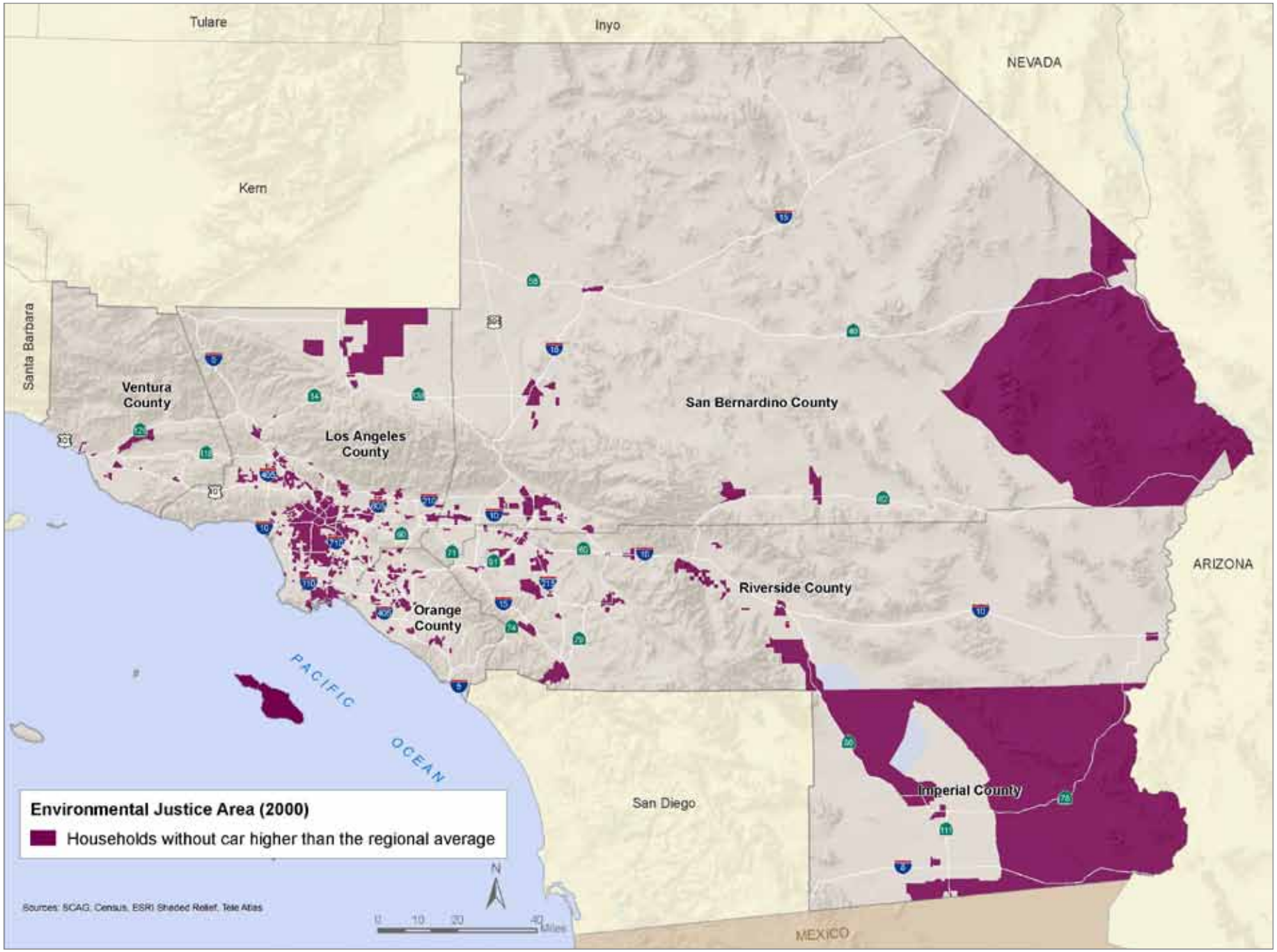


EXHIBIT 12 Households Without a Vehicle in 2005–09

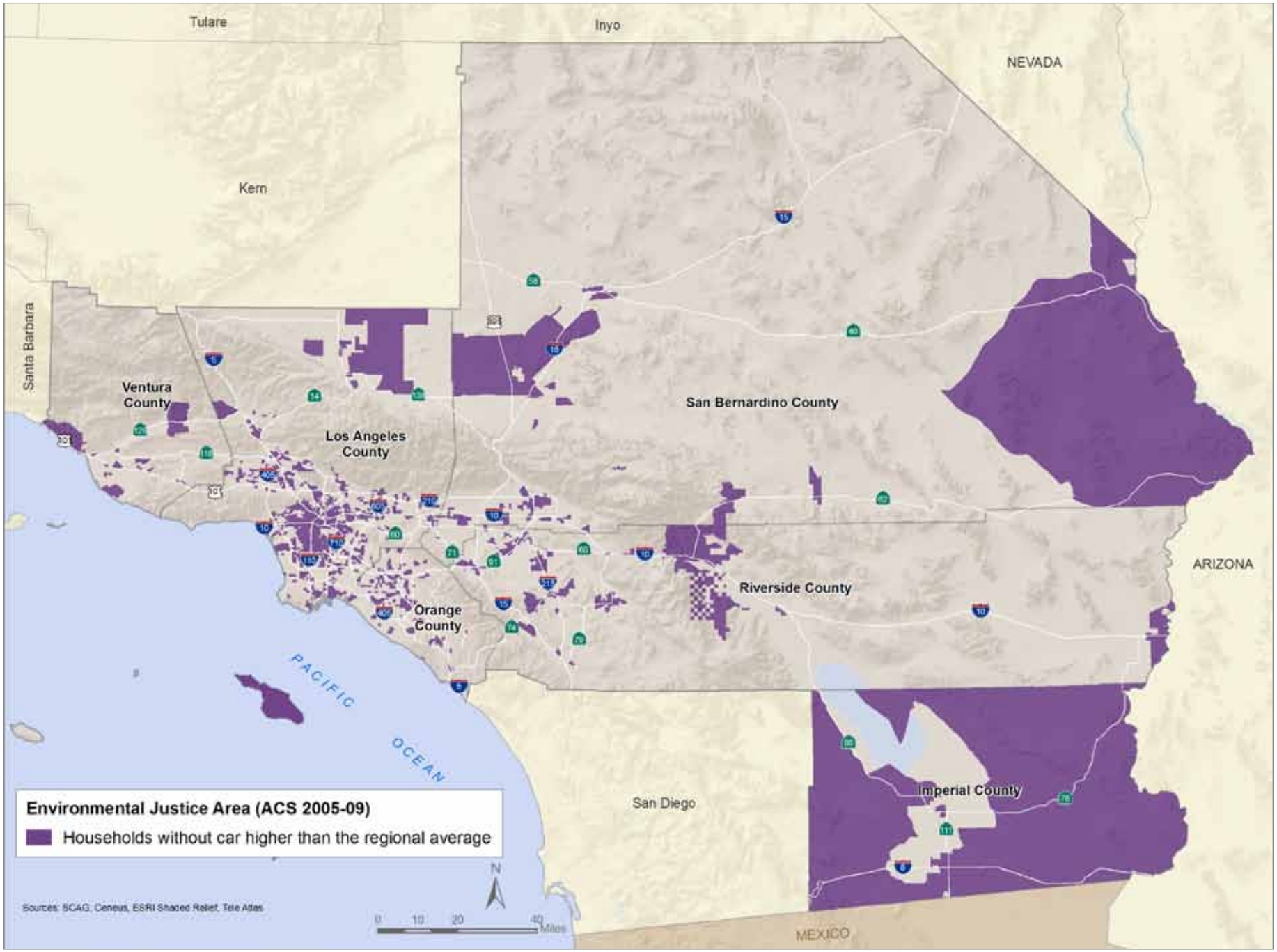


EXHIBIT 13 Population Without a High School Diploma in 2000

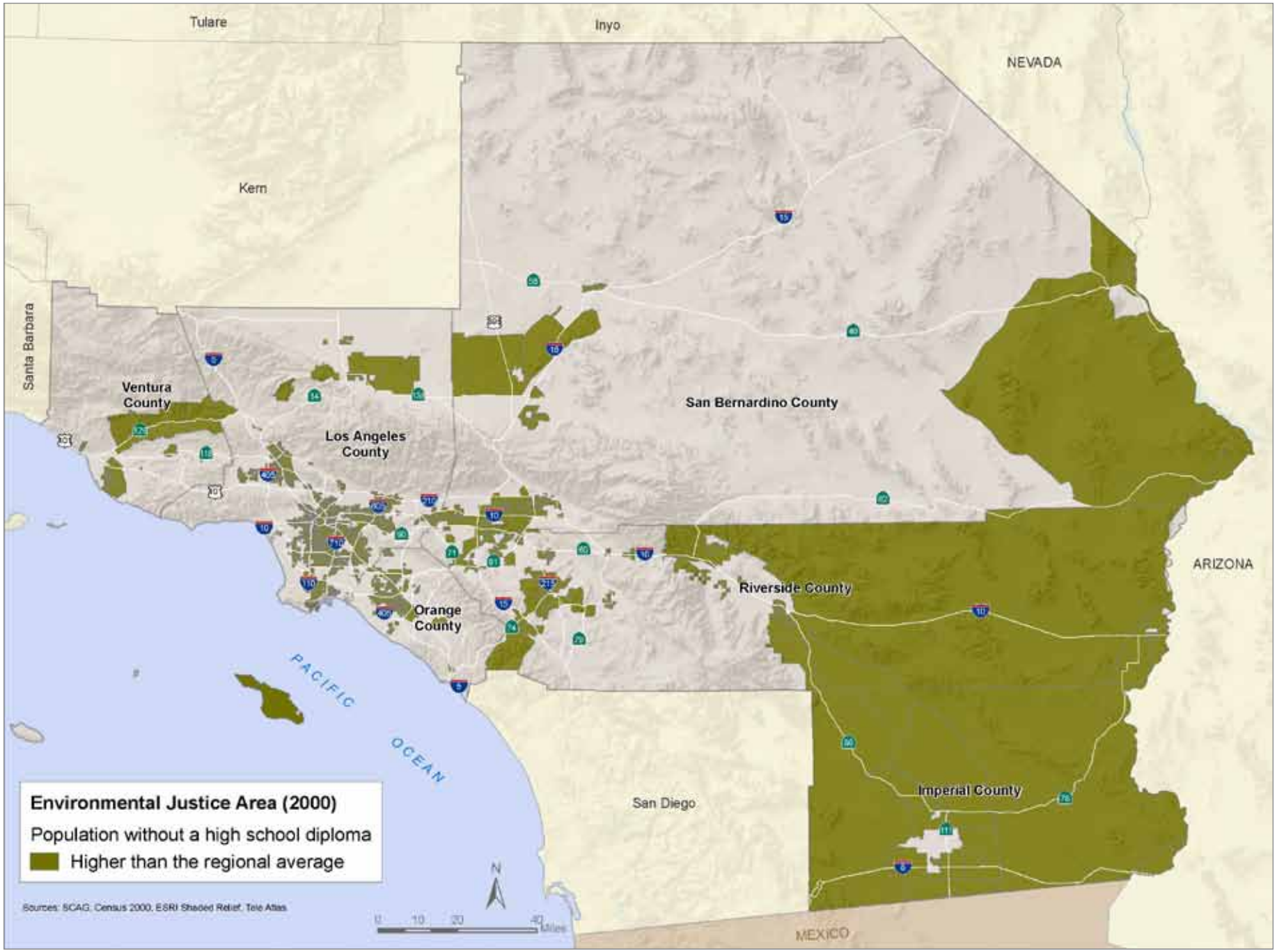
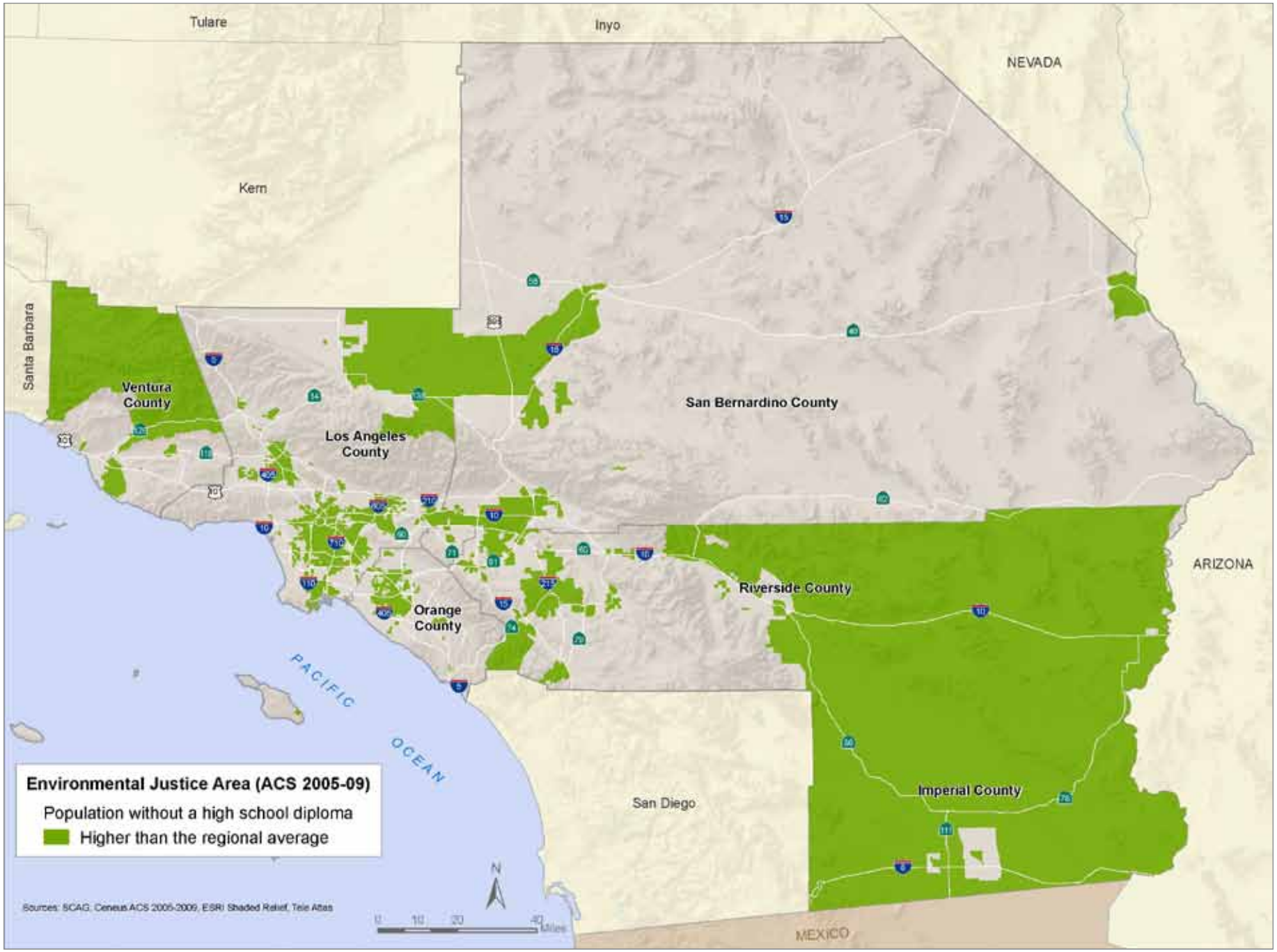


EXHIBIT 14 Population Without a High School Diploma in 2005–09



The following graph summarizes the demographic changes from the year 2000 and the 2005–09 time period. The population living below the poverty level decreased from 15.4 percent in 2000 to 13.5 percent in 2005–09. The minority population increased between the two comparison datasets from 61.3 percent to 64.8 percent.

FIGURE 4 SCAG Region, Title VI and Environmental Justice Population Thresholds & Changes

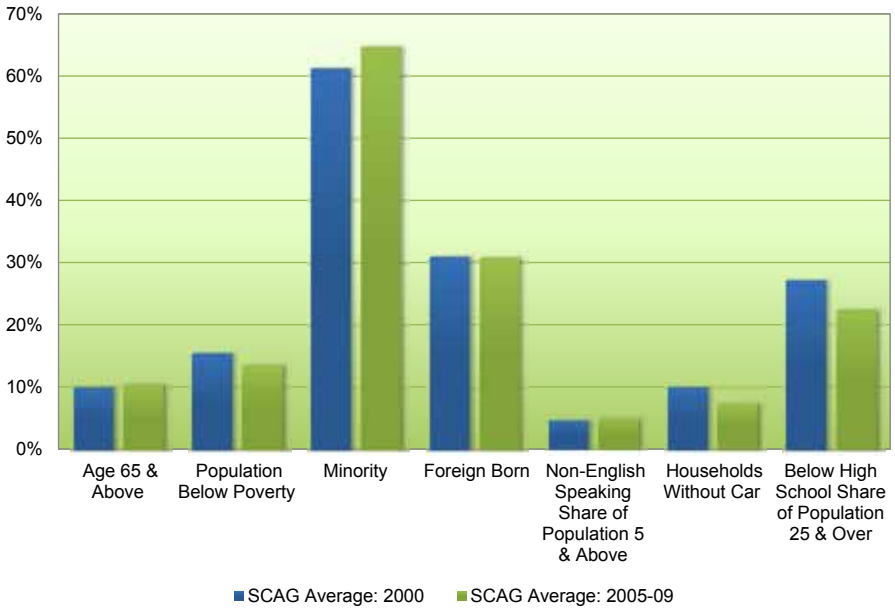
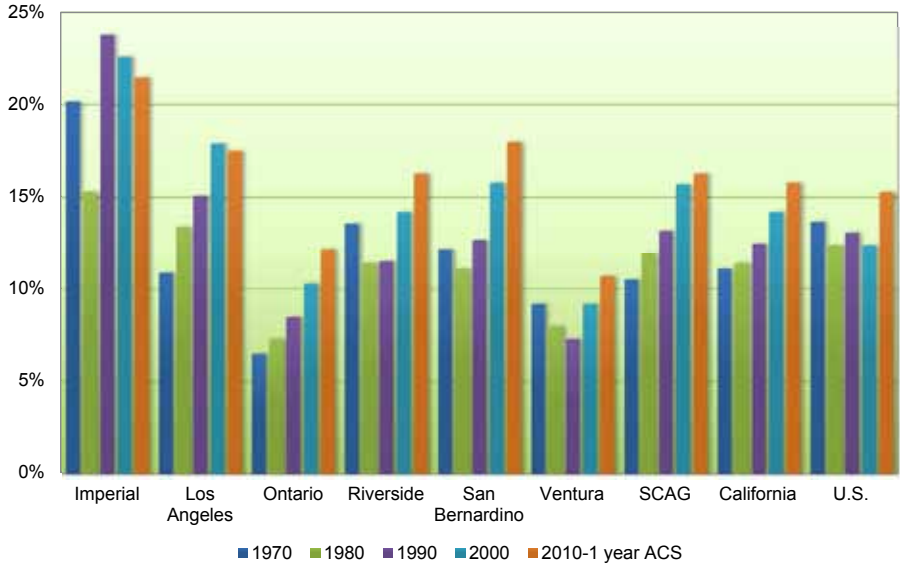


FIGURE 5 Poverty Rates for SCAG Region Counties, California, and U.S. (1970-2010)



Estimated and Projected Population Growth for Years 2008, 2020, and 2035

As past trends indicate, the SCAG region is projected to continue to experience population growth into the near and distant future. The population in the region is expected to grow to 22.1 million by 2035. The largest increase forecasted is seen in the Hispanic population, which is projected to grow 55 percent between 2008 and 2035. The next largest increases are for the Non-Hispanic White population at 24 percent and for people age 65 and over at 17 percent. The share of residents living at or below the poverty threshold is also expected to grow from 13.8 percent in 2008 to 14.5 percent in 2035. See Table 10: Projected Demographic Changes in the SCAG Region, 2008–2035.

TABLE 10 Projected Environmental Justice Variables and Demographic Changes in the SCAG Region 2008-2035

	2008	2020	2035	2008	2020	2035
Population	**17,887,885**	**19,695,541**	**22,140,614**			
Male	8,925,209	9,838,626	11,053,457	49.9%	50.0%	49.9%
Female	8,962,676	9,856,915	11,087,157	50.1%	50.0%	50.1%
Age 65 & over	1,853,336	2,571,366	3,689,590	10.4%	13.1%	16.7%
Disabled	1,535,461	1,748,133	2,069,038	8.6%	8.9%	9.3%
Hispanic	8,017,776	9,695,937	12,265,645	44.8%	49.2%	55.4%
Non-Hispanic White	6,148,030	5,876,272	5,204,238	34.4%	29.8%	23.5%
Non-Hispanic Black	1,239,733	1,295,708	1,353,043	6.9%	6.6%	6.1%
Non-Hispanic Native American	79,393	93,934	115,444	0.4%	0.5%	0.5%
Non-Hispanic Asian	2,067,352	2,352,751	2,732,190	11.6%	11.9%	12.3%
Non-Hispanic Others	335,601	380,939	470,054	1.9%	1.9%	2.1%
Poverty 1 (# of Household below Poverty)	800,588	908,571	1,059,369	13.8%	14.1%	14.5%
Poverty 2 (# of Household between poverty and 1.5xP)	503,143	569,548	662,142	8.7%	8.8%	9.0%
Poverty 3 (# of Household between 1.5xP and 2.0xP)	481,374	539,734	618,924	8.3%	8.4%	8.5%
Household by Income Quintile and Ethnicity						
Household	**5,812,319**	**6,460,229**	**7,321,090**			
Quintile 1	**1,192,952**	**1,273,540**	**1,473,667**	**21%**	**20%**	**20%**
Hispanic	369,883	593,346	792,838	6.4%	9.2%	10.8%
Non-Hispanic White	548,214	354,585	304,861	9.4%	5.5%	4.2%
Non-Hispanic Black	139,661	138,518	135,066	2.4%	2.1%	1.8%
Non-Hispanic Native American	5,845	7,570	10,155	0.1%	0.1%	0.1%
Non-Hispanic Asian	98,528	137,980	176,955	1.7%	2.1%	2.4%
Non-Hispanic Others	30,821	41,541	53,792	0.5%	0.6%	0.7%
Quintile 2	**1,151,386**	**1,290,233**	**1,452,250**	**20%**	**20%**	**20%**
Hispanic	496,346	646,682	838,544	8.5%	10.0%	11.5%
Non-Hispanic White	422,450	380,689	315,141	7.3%	5.9%	4.3%
Non-Hispanic Black	93,755	97,434	94,519	1.6%	1.5%	1.3%

	2008	2020	2035	2008	2020	2035
Non-Hispanic Native American	5,363	6,718	8,785	0.1%	0.1%	0.1%
Non-Hispanic Asian	96,070	113,768	139,051	1.7%	1.8%	1.9%
Non-Hispanic Others	37,402	44,942	56,210	0.6%	0.7%	0.8%
Quintile 3	**1,151,856**	**1,292,542**	**1,456,797**	**20%**	**20%**	**20%**
Hispanic	431,226	575,315	764,382	7.4%	8.9%	10.4%
Non-Hispanic White	487,083	445,641	373,816	8.4%	6.9%	5.1%
Non-Hispanic Black	83,703	88,985	88,703	1.4%	1.4%	1.2%
Non-Hispanic Native American	5,230	6,658	8,706	0.1%	0.1%	0.1%
Non-Hispanic Asian	111,070	134,792	168,461	1.9%	2.1%	2.3%
Non-Hispanic Others	33,544	41,151	52,729	0.6%	0.6%	0.7%
Quintile 4	**1,154,118**	**1,298,280**	**1,464,362**	**20%**	**20%**	**20%**
Hispanic	339,045	467,095	642,122	5.8%	7.2%	8.8%
Non-Hispanic White	575,279	540,244	466,054	9.9%	8.4%	6.4%
Non-Hispanic Black	74,993	83,144	86,688	1.3%	1.3%	1.2%
Non-Hispanic Native American	5,093	6,789	9,134	0.1%	0.1%	0.1%
Non-Hispanic Asian	131,932	165,266	213,609	2.3%	2.6%	2.9%
Non-Hispanic Others	27,776	35,742	46,755	0.5%	0.6%	0.6%
Quintile 5	**1,162,007**	**1,305,634**	**1,474,014**	**20%**	**20%**	**20%**
Hispanic	227,223	345,477	522,251	3.9%	5.3%	7.1%
Non-Hispanic White	704,783	668,145	577,622	12.1%	10.3%	7.9%
Non-Hispanic Black	58,220	69,434	76,369	1.0%	1.1%	1.0%
Non-Hispanic Native American	4,379	6,055	8,547	0.1%	0.1%	0.1%
Non-Hispanic Asian	144,822	186,639	247,265	2.5%	2.9%	3.4%
Non-Hispanic Others	22,580	29,884	41,960	0.4%	0.5%	0.6%

Source: Based on 2000 Census and 2005–09 ACS, processed and projected by SCAG Research, Analysis, and Information Service staff

Performance Areas Analysis

The following section describes the methodology and findings for each of the twelve performance areas analyzed as part of this Environmental Justice Report, which was previously outlined earlier in this report. Each analysis of a performance area is comprised of extensive data including maps, charts and graphs to show the results in multiple formats. This section begins with a benefits and burdens analysis, which includes determining the existing share of transportation system usage by income and race/ethnic group. Next, it describes investment share and taxes paid by income and ethnicity. This comparison allows the reader to understand how the benefits and burdens of the 2012 RTP/SCS are distributed among Environmental Justice Communities.

The next performance area describes the distribution of travel time and distance savings to better understand how the region's population groups, particularly those in low-income and minority households, experience the investments.

The next area relates to the Jobs-housing mismatch and builds on the benefits and burdens discussion to explore how investments affect employment and travel decisions. For example, there are concerns that workers are priced out of housing near jobs thereby resulting in long travel distances.

As with benefits and burdens, accessibility is another foundation of an environmental justice analysis. As such, the next performance area focuses on accessibility to services including employment, shopping opportunities, and parks.

For the first time, a discussion of gentrification and displacement issues is included herein, which have been concerns raised related to the RTP/SCS land use strategies. This is a new area of Environmental Justice analysis for SCAG and no similar report or analysis can be found around the nation. SCAG offers a methodology and monitoring framework for future research, monitoring, and analysis regarding displacement and gentrification concerns with land use development in the high quality transit areas (HQTA). The report further provides the socioeconomic makeup of areas with major transit stops and corridors, key indicators and their changes since 2000 related to possible gentrification or displacement to assess whether the HQTA or transit oriented community (TOC) areas have experienced any displacement of low-income and minority populations. The analysis raised the environmental concerns of redirecting growth into HQTA/TOC when overlapping with 500 feet freeway buffer areas.

Since land use benefits at small geographic areas (i.e., parcel, grid cell) are either hard to estimate, or understated by the regional transportation model, the report analyzes and presents socioeconomic and travel behavior for people in the HQTA/TOC areas. Based on the analysis, SCAG developed a "4D Statistical Model" to analyze land use strategies and capture additional VMT reduction benefits for the 2012 RTP/SCS.

The final series of performance areas discuss the environmental impacts of the 2012 RTP/SCS on minority and low-income populations. This analysis goes beyond the financial and travel time burdens discussed above and focuses on the potential disproportionate impacts from air and noise emissions. The analysis further describes if proximity to freeways or rail facilities result in health impacts to low-income and minority populations.

(1) RTP Revenue Sources in Terms of Tax Burdens by Income and Ethnicity

SCAG reports expenditure distributions in several ways. First, SCAG estimates the share of total RTP expenditures allocated to each category of household income. This is done by totaling expenditures on each type of mode (bus, HOV lanes, commuter/high-speed rail, highways/arterials, and light/heavy rail). These expenditures are then allocated to income categories based on each income group's tendency to use these modes.[4] SCAG analyzed the distribution of Plan expenditures based on mode usage information by income quintile.

The Bureau of Labor Statistics (BLS) Consumer Expenditure Survey (CES) program consists of two surveys, the Quarterly Interview Survey and the Diary Survey, which provide information on the buying habits of American consumers, including data on their expenditures, income, and consumer unit (families and single consumers) characteristics. The CES is important because it is the only Federal survey to provide information on the complete range of consumers' expenditures and incomes, as well as the characteristics of those consumers. It is used by economic policymakers examining the impact of policy changes on economic groups, by businesses and academic researchers studying consumers' spending habits and trends, by other Federal agencies, and, perhaps most importantly, to regularly revise the Consumer Price Index market basket of goods and services and their relative importance.

[4] Caltrans. Desktop Guide: Environmental Justice in Transportation Planning Investments. January 2003.

SCAG uses consumer expenditure survey data, in particular the tabulation showing the share of aggregate expenditures by income quintile, to assess regional expenditures by taxable sales category and adjusted gross income in order to estimate transportation funding contributions or taxes paid by income quintile. The basic assumption of this application is that results from the national survey can be applied in the SCAG region as a whole as well as any transportation analysis zone (TAZ) or a combination of TAZs if the analysis is done by income quintile. This application could work well for categories showing very stable trends in areas such as the taxable sales (i.e., gasoline, grocery, vehicle consumptions, medical expenses, etc.).

The following table presents the SCAG taxable sales and expenditure allocation by income quintile in 2008 from data collected by the California Board of Equalization and Franchise Tax Board. As can be seen in the table, households in the SCAG region spent $25,856 million in 2008 at service (gas) stations, the lowest income quintile household's share of gasoline consumption—90 percent of service station sales are gasoline—was just over 9 percent, while the highest income quintile household accounted for almost 31 percent of gasoline sales. In terms of expenditures on vehicle purchase, the lowest income quintile household accounted for just 4 percent of all new vehicle sales and just only 7.5 percent for used vehicles. This is not surprising because many low income households cannot afford the cost of vehicle ownership including maintenance, insurance and the purchase of gasoline.

The CES indicates that lower income quintile households predominately owned used and older cars. This situation has implications in terms of fuel efficiency—low income households pay proportionally more on gasoline and gasoline taxes than more affluent households who normally own newer vehicles that are more fuel efficient and allow them to travel further on the same amount of gasoline. Thus a VMT-based transportation finance system could correct the equity issue inherent with a funding system based on gasoline consumption, prices, and taxes.

TABLE 11 SCAG Region Taxable Sales by Retail Categories in 2008 and Shares by Income Quintile

Retail Stores Category	Taxable Sales	Consumer Expenditures by Household Income Quintile				
		Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Women's apparel	2,576,958	10.6	12.5	15.2	22.6	39.1
Men's apparel	524,706	8.5	11.9	14.8	23.5	41.4
Family apparel	6,946,135	10.6	11.8	14.4	18.9	44.3
Shoes	1,406,529	13.6	14.2	15.5	24.0	32.7
Apparel stores group	11,454,328	10.7	12.8	15.1	22.6	38.8
General merchandise stores	23,569,661	9.7	13.2	17.7	23.1	36.3
Drug stores	2,914,450	9.7	13.2	17.7	23.1	36.3
General merchandise group	26,484,111	9.7	13.2	17.7	23.1	36.3
Supermarkets	7,434,662	12.6	15.6	18.3	23.2	30.2
All other food stores	2,190,131	12.4	15.0	18.3	23.7	30.6
Food stores group	9,624,793	12.6	15.6	18.3	23.2	30.2
Limited-service restaurants	12,798,587	8.2	12.1	16.1	24.1	39.6
Full-service eating and drinking places	12,880,498	8.2	12.1	16.1	24.1	39.6
Eating and drinking group	25,679,085	8.2	12.1	16.1	24.1	39.6
Household and home furnishings	5,044,103	9.7	13.2	17.7	23.1	36.3
Household appliance dealers	3,453,794	8.0	10.6	16.6	23.3	41.5
Home furnishings and appliances	8,497,897	8.0	10.6	16.6	23.3	41.5
Building materials	12,200,684	8.1	12.2	16.9	23.1	39.7
New motor vehicle dealers	20,558,006	4.0	9.1	14.7	23.4	48.8
Used motor vehicle dealers	2,273,679	7.5	15.4	21.4	25.3	30.4
Automotive supplies and parts	2,603,024	8.6	13.3	17.9	24.9	35.4

Retail Stores Category	Taxable Sales	Consumer Expenditures by Household Income Quintile				
		Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
RV and all other vehicles	1,579,792	6.1	12.1	18.1	24.0	39.7
Automotive group	27,014,501	8.0	13.1	18.2	24.3	36.3
Service stations	25,856,476	9.1	14.9	19.9	25.2	30.9
Gifts, art goods, and novelties	774,022	11.0	12.8	16.8	21.6	37.7
Sporting goods	1,850,839	7.3	12.3	18.4	21.2	40.9
Florists	374,554	7.1	12.2	18.1	22.7	39.9
Photographic equipment and supplies	249,847	10.3	14.0	18.3	24.4	33.0
Musical instruments	549,264	8.8	13.2	18.4	22.8	37.0
Stationery and books	1,478,487	10.7	13.6	17.6	23.3	35.0
Jewelry	1,246,994	7.3	12.3	18.4	21.2	40.9
Office supplies, computer stores	6,944,118	11.9	14.7	17.7	24.5	31.2
Packaged liquor stores	1,250,294	8.3	12.4	15.8	24.3	39.4
Second-hand merchandise	259,230	7.1	12.2	18.1	22.7	39.9
Farm and garden supply stores	737,871	7.3	12.3	18.4	21.2	40.9
Fuel and ice dealers	193,901	9.1	14.9	19.9	25.2	30.9
Miscellaneous retail	10,115,304	7.1	12.2	18.1	22.7	39.9
Other retail stores	26,024,725	8.7	13.0	18.0	22.9	37.4
Business and Personal Services	10,316,858	6.4	10.5	15.8	23.4	44.0
All Other Outlets	69,618,100	7.1	12.2	18.1	22.7	39.9
SCAG Total in 2008	252,771,557					

Source: SCAG staff process 2008 Consumer Expenditures Survey by Bureau of Labor Statistics 2008 Taxable Sales in California Counties, State Board of Equalization, 2008

Different funding sources (i.e. income taxes, property taxes, sales, fuel, etc.) can impose disproportionate burdens on lower income and minority groups. Sales and gasoline taxes, which are the primary sources of funding for the region's transportation system, were evaluated for the purposes of this analysis. The amount of taxes paid was analyzed to demonstrate how tax burdens fall on various demographic groups. As in previous RTP Environmental Justice reports, the 2012 RTP/SCS environmental justice analysis examined in detail, the incidence or distribution of, the burden of taxation.

RESULTS

The 2012 RTP/SCS environmental justice analysis performed a comparative examination of the amount of taxes (sales, gasoline, and income) paid by the five respective income groups and by ethnicity. The following figure, **FIGURE 6** entitled "Share of Taxes Paid by Income Quintile," indicates that taxes paid as a percent of disposable income are expected to fall heavily on lower-income groups. This is the so-called "regressive" nature of the excise gasoline tax and retail sales tax levy on primarily consumer durable and non-durables that are necessities of daily living. The lower quintile groups (Quintile 1 and Quintile 2) are anticipated to pay 21.4 percent of all regional sales and gasoline taxes. Thus, those with limited financial means will not pay a disproportionate amount of overall taxes under the Plan compared with their usage of the transportation system and their shares of RTP/SCS investment.

FIGURE 6 Share of Taxes Paid by Income Quintile (2008)

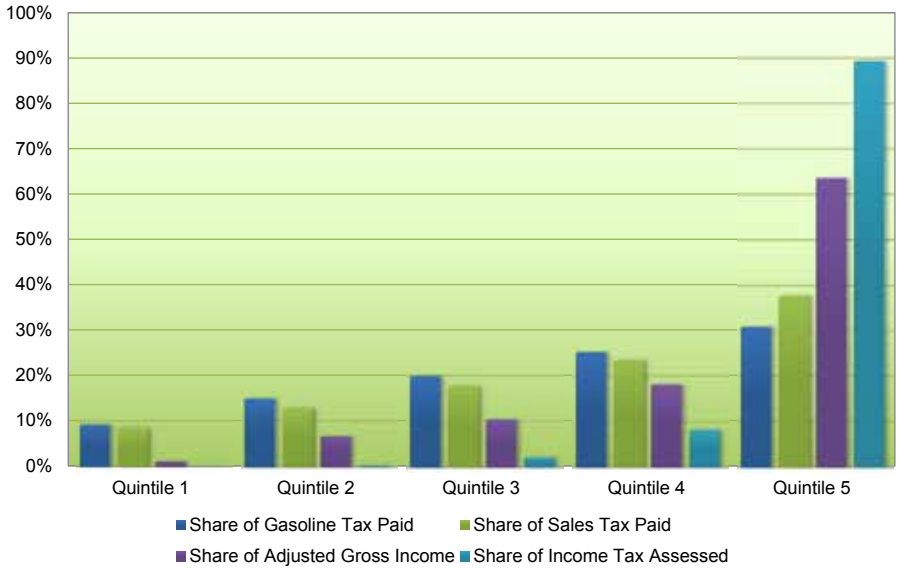


TABLE 12 SCAG Region Tax Burden Analysis: Income Tax, Retail Tax, and Gasoline Tax (2008)

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	Total
Total Adjusted Gross Income	5,090,304	30,630,777	48,035,955	82,919,580	291,153,498	457,830,113
Income Tax Assessed	7,712	67,730	392,622	1,503,377	16,467,164	18,438,605
Share of Adjusted Gross Income	1.1%	6.7%	10.5%	18.1%	63.6%	100.0%
Share of Income Tax Assessed	0.0%	0.4%	2.1%	8.2%	89.3%	100.0%
Income Tax Burden	0.15%	0.22%	0.82%	1.81%	5.66%	4.03%
Estimated Gasoline Tax Paid						
State Excise Tax ($0.18)	121,141	198,352	264,913	335,467	411,347	1,331,220
Federal Excise Tax ($.184)	123,833	202,760	270,800	342,922	420,488	1,360,802
Sales Tax on Gasoline	172,362	282,219	376,923	477,309	585,272	1,894,084
Total Tax Paid on Gasoline	417,336	683,330	912,635	1,155,699	1,417,107	4,586,106
Share of Gasoline Tax Paid	9.1%	14.9%	19.9%	25.2%	30.9%	100.0%
Gasoline Tax Burden	8.2%	2.2%	1.9%	1.4%	0.5%	1.0%
Taxable Sales & Sales Tax						
Estimated Taxable Sales	21,168,775	32,316,650	44,745,968	59,175,050	95,365,115	252,771,557
Estimated Sales Tax Paid	1,723,351	2,630,899	3,642,771	4,817,443	7,763,677	20,578,140
Share of Sales Tax Paid	8.4%	12.8%	17.7%	23.4%	37.7%	100.0%
Sales Tax Burden	33.9%	8.6%	7.6%	5.8%	2.7%	4.5%
Combined Sales & Gasoline Tax						
Estimated Sales & Gasoline Tax Paid	1,968,325	3,032,011	4,178,483	5,495,832	8,595,512	23,270,162
Share of Sales & Gasoline Tax Paid	8.4%	12.8%	17.7%	23.4%	37.7%	100.0%
Sales& Gasoline Tax Burden	38.7%	9.9%	8.7%	6.6%	3.0%	5.1%

Source: 2008 California Taxable Sales, State Board of Equalization Table 24 –Gasoline and Jet Fuel Tax Statistics, 1923-1924 to 2008-09, State Board of Equalization 2008-09 Annual Report California Income Tax Returns Statistic for 2008s, California Franchise Tax Board Consumer Expenditure Survey, 2008, Bureau of Labor Statistics

TABLE 13 SCAG Region Income Tax Return Analysis: 2008 Tax Year

	All Tax Returns	Adjusted Gross Income Quintile Ranges	Total Adjusted Gross Income	Total CA Income Tax Assessed	% of Total Adjusted Gross Income	% of Total Tax Assessed	Tax Assessed as % of Gross Income
Quintile 1	1,426,294	Up to $9,728	$5,090,304	$7,712	1.11%	0.04%	0.15%
Quintile 2	1,426,294	$9,729-$25,073	$30,630,777	$67,730	6.69%	0.37%	0.22%
Quintile 3	1,426,294	$25,074-$43,383	$48,035,955	$392,622	10.49%	2.13%	0.82%
Quintile 4	1,426,294	$43,384-$78,990	$82,919,580	$1,503,377	18.11%	8.15%	1.81%
Quintile 5	1,426,294	$78,991 & Above	$291,153,498	$16,467,164	63.59%	89.31%	5.66%
	7,131,470		$457,830,113	$18,438,605	100.00%	100.00%	4.03%

FIGURE 7 Tax Burdens by Income Quintile: Income, Sales and Gasoline Tax (2008)

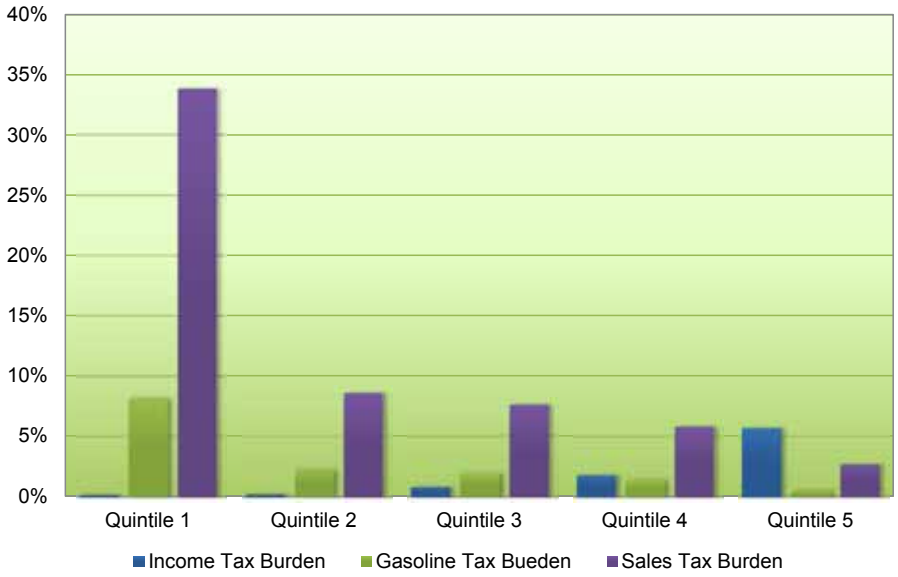
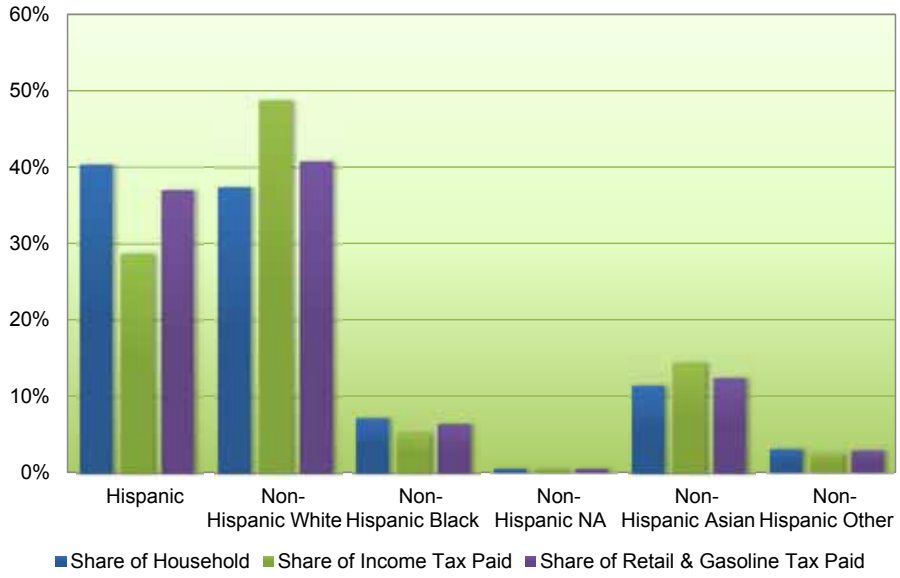


FIGURE 8 Share of Household and Tax Paid By Ethnicity (2008)



The following table, **TABLE 14** entitled "Projected RTP Funding Share by Ethnicity," indicates that tax burdens are expected to fall more heavily on non-minority groups with Non-Hispanic Whites paying 48.8 percent of the income taxes and 40.8 percent of retail and gasoline taxes.

TABLE 14 Projected RTP Funding Share by Ethnicity

	Share of Household	Share of Income Tax Paid	Share of Retail & Gasoline Tax Paid
Hispanic	40.3%	28.7%	37.0%
Non-Hispanic White	37.5%	48.8%	40.8%
Non-Hispanic Black	7.2%	5.2%	6.4%
Non-Hispanic NA	0.5%	0.5%	0.5%
Non-Hispanic Asian	11.5%	14.4%	12.4%
Non-Hispanic Other	3.0%	2.5%	2.9%

(2) Share of Transportation System Usage

In order to determine the existing level of system usage, SCAG analyzed the 2010 National Household Travel Survey (NHTS). The NHTS is a household-based travel survey conducted periodically by the Federal Highway Administration (FHWA). The NHTS is the authoritative source of national data on the travel behavior of the American public. The dataset allows analysis of daily travel by all modes, including characteristics of the people traveling, their households, and their vehicles. The 2009 data includes 69,817 households and 160,758 persons, and the travel diary data includes a total of 642,292 trips. It is a disaggregated database that allows aggregation of any variable as well as cross-categorization of the data with other variables. With its fairly large sample size and key variables typically used for travel behavior analysis, the NHTS data is a valuable resource for analyzing travel patterns.

With about 6,700 households and 15,000 individual samples in the SCAG region, the 2009 NHTS dataset provides valuable and sufficient observations to analyze both the demographic and travel characteristics of the SCAG region. This dataset along with SCAG's 2001 household travel survey are used as the basis for developing the SCAG region transportation system usage for different modes and by income quintile and ethnicity. In addition, the NHTS data set is used to provide information for analysis of the household characteristics and travel behaviors in high quality transit areas (HQTA), including ¼, and ½ mile buffer zones for Transit Priority Projects (TPP), Transit Oriented Communities (TOC) and rail/bus stations.

Based on 2009 NHTS data, the table presents SCAG region transportation mode usage by income quintile and by ethnicity for both work trips and all trips. Highlights in the table include:

Work Trips: Automobile (drive alone and car pool), accounting for just under 90 percent of all modes, is the dominant transportation mode for work trips. The next most popular mode is bus (6.1 percent), followed by non-motorized transportation (4 percent).

Most bus and urban rail riders are lower income quintile households—the lowest two income quintile households combined account for 84 percent of bus riders and 93 percent of urban rail riders. However, the data indicates a more balanced usage distribution by income groups for commuter rail, walk, bike and other modes. Furthermore, given the total number of mode usages, bus is far more important than urban rail for low income households for commuting purposes.

Compared with their share of total households and commuters, Hispanic commuter usage is disproportionately high in the following modes: Auto as passenger (67 percent), bus (84 percent), urban rail (93 percent), commuter rail (62 percent), and bike (51 percent).

All Trips: Transportation system usage by mode or all trips is used to allocate the RTP/SCS investment costs, mobility and accessibility benefits. Since only NHTS and SCAG's 2001 household travel survey data provide information about non-work trips, staff applied both data sets to develop the hybrid version of system usage by mode for all trips. It should be noted that the appropriate and accurate statistics on shares of usage by income quintile and by ethnicity is important because it directly affects the Environmental Justice analysis outcomes. This area is recommended for further refinement and research.

Highlights about all trips from statistics presented in the tables and figures below include:

Active transportation, in particular walking, becomes much more important for non-work trip purposes. It jumps to over 14 percent from just about 2.5 percent for work trips.

While accounting for 20 percent of total households, the lowest income quintile household's share of total transportation usage is less than 15 percent, and their share of auto mode as driver is less than 10 percent. On the other hand, low income households usage is disproportionately high in all other modes—bus, urban rail, commuter rail, walk and bike.

By ethnicity, Hispanics use disproportionately more bus, urban rail, and walk more often than their share of total household or population, while Non-Hispanic Whites use disproportionately high auto and bike modes similar to their mode usage for work trips.

Final consolidated transportation system usage tables by modes, by income quintile, and by ethnicity are shown below. Since projected growth by ethnicity in the SCAG region will show a very different ethnic composition in the future than the distribution today, for the 2012 RTP/SCS evaluation, household projection by income quintile by ethnicity as presented earlier is used to adjust and derive the appropriate usage shares by modes for different ethnicity groups.

TABLE 15 SCAG Region Transportation Mode Usage by Ethnicity

	Auto Mode	Bus	Commuter Rail	Urban Rail	Non-Motorized	Others	Total Usage	Household
Hispanic	39.2%	44.1%	38.2%	43.2%	41.1%	40.1%	**39.6%**	40.3%
Non-Hispanic White	38.7%	33.2%	39.4%	34.6%	36.6%	37.5%	**38.2%**	37.5%
Non-Hispanic Black	6.8%	8.8%	7.1%	7.8%	7.5%	7.4%	**6.9%**	7.2%
Non-Hispanic Native American	0.5%	0.6%	0.5%	0.5%	0.5%	0.5%	**0.5%**	0.5%
Non-Hispanic Asian	11.8%	10.2%	11.9%	10.7%	11.2%	11.5%	**11.7%**	11.5%
Non-Hispanic Others	3.0%	3.2%	2.9%	3.2%	3.1%	3.0%	**3.0%**	3.0%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	**100.0%**	100.0%

Source: SCAG staff process NHTS dataset, 2001 SCAG travel Survey, and 2012 RTP/SCS EJ data set

TABLE 16 SCAG Region Transportation Mode Usage by Income Quintile

	Auto Mode	Bus	Commuter Rail	Urban Rail	Non-Motorized	Others	Total Usage	Household
Quintile 1	12.8%	53.1%	23.3%	28.9%	27.7%	26.1%	**16.6%**	20.0%
Quintile 2	18.4%	28.9%	18.6%	29.4%	23.0%	16.9%	**19.5%**	20.0%
Quintile 3	20.0%	8.6%	9.7%	16.8%	15.2%	19.0%	**18.9%**	20.0%
Quintile 4	22.5%	6.1%	14.1%	19.0%	16.7%	16.7%	**21.0%**	20.0%
Quintile 5	26.2%	3.3%	34.4%	5.9%	17.4%	21.2%	**24.0%**	20.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	**100.0%**	100.0%

Source: SCAG staff process NHTS dataset, 2001 SCAG travel Survey, and 2012 RTP/SCS EJ data set

TABLE 17 SCAG Region Total Person Trips by Income Quintile and by Mode

	Auto-Driver	Auto-Passenger	Bus	Commuter Rail	Urban Rail	Walk	Bike	Other	Sum
Quintile 1	1,213,860,638	941,383,693	345,530,302	6,172,223	7,865,823	816,097,258	79,514,356	97,357,020	3,507,781,312
Quintile 2	1,992,498,032	1,117,710,295	187,916,163	6,788,521	8,018,885	684,507,615	57,668,611	63,077,666	4,118,185,787
Quintile 3	2,426,372,093	951,845,958	55,853,919	2,543,000	4,578,629	468,302,572	23,434,623	70,843,070	4,003,773,863
Quintile 4	2,717,725,722	1,082,561,769	39,534,477	1,849,525	5,170,900	483,487,643	56,275,068	62,035,601	4,448,640,706
Quintile 5	3,172,733,590	1,246,335,867	21,741,731	7,224,255	1,605,048	512,114,636	50,265,991	79,024,781	5,091,045,899
Total	11,523,190,075	5,339,837,582	650,576,592	24,577,524	27,239,285	2,964,509,724	267,158,649	372,338,136	21,169,427,567
Quintile 1	34.6%	26.8%	9.9%	0.2%	0.2%	23.3%	2.3%	2.8%	100.0%
Quintile 2	48.4%	27.1%	4.6%	0.2%	0.2%	16.6%	1.4%	1.5%	100.0%
Quintile 3	60.6%	23.8%	1.4%	0.1%	0.1%	11.7%	0.6%	1.8%	100.0%
Quintile 4	61.1%	24.3%	0.9%	0.0%	0.1%	10.9%	1.3%	1.4%	100.0%
Quintile 5	62.3%	24.5%	0.4%	0.1%	0.0%	10.1%	1.0%	1.6%	100.0%
Total	54.4%	25.2%	3.1%	0.1%	0.1%	14.0%	1.3%	1.8%	100.0%
Quintile 1	10.5%	17.6%	53.1%	25.1%	28.9%	27.5%	29.8%	26.1%	16.6%
Quintile 2	17.3%	20.9%	28.9%	27.6%	29.4%	23.1%	21.6%	16.9%	19.5%
Quintile 3	21.1%	17.8%	8.6%	10.3%	16.8%	15.8%	8.8%	19.0%	18.9%
Quintile 4	23.6%	20.3%	6.1%	7.5%	19.0%	16.3%	21.1%	16.7%	21.0%
Quintile 5	27.5%	23.3%	3.3%	29.4%	5.9%	17.3%	18.8%	21.2%	24.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: 2010 NHTS, processed by SCAG Research, Analysis, and Information Service staff

TABLE 18 SCAG Region Total HBW Person Trips by Income Quintile and by Mode

	Auto-Driver	Auto-Passenger	Bus	Commuter Rail	Urban Rail	Walk	Bike	Other	Sum
Quintile 1	184,815,703	50,438,540	72,898,196	1,410,037	3,876,826	17,456,022	13,539,008	5,188,810	349,623,141
Quintile 2	282,940,894	45,223,197	51,336,705	2,423,366	4,705,050	10,975,739	5,262,679	4,706,717	407,574,348
Quintile 3	433,953,635	42,976,361	7,127,680	1,950,520	-	6,346,053	1,569,981	9,886,591	503,810,821
Quintile 4	483,984,009	27,675,391	8,227,681	646,731	544,041	20,536,718	10,097,292	10,069,792	561,781,656
Quintile 5	548,103,864	24,898,831	7,743,712	-	105,879	6,125,730	6,849,515	9,979,638	603,807,170
Total	1,933,798,105	191,212,319	147,333,975	6,430,655	9,231,796	61,440,262	37,318,475	39,831,549	2,426,597,137
Quintile 1	52.9%	14.4%	20.9%	0.4%	1.1%	5.0%	3.9%	1.5%	100.0%
Quintile 2	69.4%	11.1%	12.6%	0.6%	1.2%	2.7%	1.3%	1.2%	100.0%
Quintile 3	86.1%	8.5%	1.4%	0.4%	0.0%	1.3%	0.3%	2.0%	100.0%
Quintile 4	86.2%	4.9%	1.5%	0.1%	0.1%	3.7%	1.8%	1.8%	100.0%
Quintile 5	90.8%	4.1%	1.3%	0.0%	0.0%	1.0%	1.1%	1.7%	100.0%
Total	79.7%	7.9%	6.1%	0.3%	0.4%	2.5%	1.5%	1.6%	100.0%
Quintile 1	9.6%	26.4%	49.5%	21.9%	42.0%	28.4%	36.3%	13.0%	14.4%
Quintile 2	14.6%	23.7%	34.8%	37.7%	51.0%	17.9%	14.1%	11.8%	16.8%
Quintile 3	22.4%	22.5%	4.8%	30.3%	0.0%	10.3%	4.2%	24.8%	20.8%
Quintile 4	25.0%	14.5%	5.6%	10.1%	5.9%	33.4%	27.1%	25.3%	23.2%
Quintile 5	28.3%	13.0%	5.3%	0.0%	1.1%	10.0%	18.4%	25.1%	24.9%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: 2010 NHTS, processed by SCAG Research, Analysis, and Information Service staff

TABLE 19 SCAG Region Total Person Trips by Ethnicity and by Mode

	Auto-Driver	Auto-Passenger	Bus	Commuter Rail	Urban Rail	Walk	Bike	Other	Sum
Non-Hispanic White	5,478,481,953	1,794,429,686	64,944,043	8,457,249	3,644,434	950,936,166	113,317,859	140,064,934	8,554,276,325
Non-Hispanic Black	867,675,843	373,957,180	58,418,632	8,588,439	4,379,101	248,619,306	27,986,548	31,152,728	1,620,777,778
Non-Hispanic Asian	1,027,312,023	493,301,915	29,172,958	1,354,675	4,428,393	198,443,794	12,225,587	18,688,375	1,784,927,720
Non-Hispanic NA	93,263,025	18,969,699	14,815,329	-	-	28,175,905	3,164,019	1,215,645	159,603,621
Hispanic	4,145,011,029	2,661,344,063	500,080,424	5,806,403	15,670,846	1,614,104,249	115,776,687	191,834,652	9,249,628,352
Others	309,449,169	161,038,974	16,064,836	370,759	332,666	64,876,976	3,289,856	11,586,178	567,009,416
Total	11,921,193,042	5,503,041,517	683,496,223	24,577,524	28,455,441	3,105,156,397	275,760,556	394,542,513	21,936,223,211
Non-Hispanic White	64.0%	21.0%	0.8%	0.1%	0.0%	11.1%	1.3%	1.6%	100.0%
Non-Hispanic Black	53.5%	23.1%	3.6%	0.5%	0.3%	15.3%	1.7%	1.9%	100.0%
Non-Hispanic Asian	57.6%	27.6%	1.6%	0.1%	0.2%	11.1%	0.7%	1.0%	100.0%
Non-Hispanic NA	58.4%	11.9%	9.3%	0.0%	0.0%	17.7%	2.0%	0.8%	100.0%
Hispanic	44.8%	28.8%	5.4%	0.1%	0.2%	17.5%	1.3%	2.1%	100.0%
Others	54.6%	28.4%	2.8%	0.1%	0.1%	11.4%	0.6%	2.0%	100.0%
Total	54.3%	25.1%	3.1%	0.1%	0.1%	14.2%	1.3%	1.8%	100.0%
Non-Hispanic White	46.0%	32.6%	9.5%	34.4%	12.8%	30.6%	41.1%	35.5%	39.0%
Non-Hispanic Black	7.3%	6.8%	8.5%	34.9%	15.4%	8.0%	10.1%	7.9%	7.4%
Non-Hispanic Asian	8.6%	9.0%	4.3%	5.5%	15.6%	6.4%	4.4%	4.7%	8.1%
Non-Hispanic NA	0.8%	0.3%	2.2%	0.0%	0.0%	0.9%	1.1%	0.3%	0.7%
Hispanic	34.8%	48.4%	73.2%	23.6%	55.1%	52.0%	42.0%	48.6%	42.2%
Others	2.6%	2.9%	2.4%	1.5%	1.2%	2.1%	1.2%	2.9%	2.6%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: 210 NHTS, processed by SCAG Research, Analysis, and Information Service staff

TABLE 20 SCAG Region Total HBW Person Trips by Ethnicity and by Mode

	Auto-Driver	Auto-Passenger	Bus	Commuter Rail	Urban Rail	Walk	Bike	Other	Sum
Non-Hispanic White	880,703,892	40,816,496	16,281,919	1,472,150	649,920	15,539,890	18,483,390	19,111,437	993,059,093
Non-Hispanic Black	114,734,762	7,745,516	2,540,308	-	-	6,274,345	-	547,008	131,841,940
Non-Hispanic Asian	186,528,614	11,786,142	5,004,816	969,470	-	13,385,131	-	472,592	218,146,765
Non-Hispanic NA	13,260,810	-	836,637	-	-	-	-	-	14,097,447
Hispanic	760,567,454	131,269,061	131,978,460	3,989,035	8,581,876	24,003,694	19,132,095	17,595,513	1,097,117,189
Others	47,742,966	4,786,283	1,552,306	-	-	2,470,575	-	2,395,359	58,947,489
Total	2,003,538,498	196,403,499	158,194,445	6,430,655	9,231,796	61,673,635	37,615,485	40,121,909	2,513,209,922
Non-Hispanic White	88.69%	4.11%	1.64%	0.15%	0.07%	1.56%	1.86%	1.92%	100.00%
Non-Hispanic Black	87.02%	5.87%	1.93%	0.00%	0.00%	4.76%	0.00%	0.41%	100.00%
Non-Hispanic Asian	85.51%	5.40%	2.29%	0.44%	0.00%	6.14%	0.00%	0.22%	100.00%
Non-Hispanic NA	94.07%	0.00%	5.93%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Hispanic	69.32%	11.96%	12.03%	0.36%	0.78%	2.19%	1.74%	1.60%	100.00%
Others	80.99%	8.12%	2.63%	0.00%	0.00%	4.19%	0.00%	4.06%	100.00%
Total	79.72%	7.81%	6.29%	0.26%	0.37%	2.45%	1.50%	1.60%	100.00%
Non-Hispanic White	44.0%	20.8%	10.3%	22.9%	7.0%	25.2%	49.1%	47.6%	39.5%
Non-Hispanic Black	5.7%	3.9%	1.6%	0.0%	0.0%	10.2%	0.0%	1.4%	5.2%
Non-Hispanic Asian	9.3%	6.0%	3.2%	15.1%	0.0%	21.7%	0.0%	1.2%	8.7%
Non-Hispanic NA	0.7%	0.0%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%
Hispanic	38.0%	66.8%	83.4%	62.0%	93.0%	38.9%	50.9%	43.9%	43.7%
Others	2.4%	2.4%	1.0%	0.0%	0.0%	4.0%	0.0%	6.0%	2.3%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: 210 NHTS, processed by SCAG Research, Analysis, and Information Service staff

FIGURE 9 SCAG Region Transportation Usage by Mode and by Income Quintile: All Trips

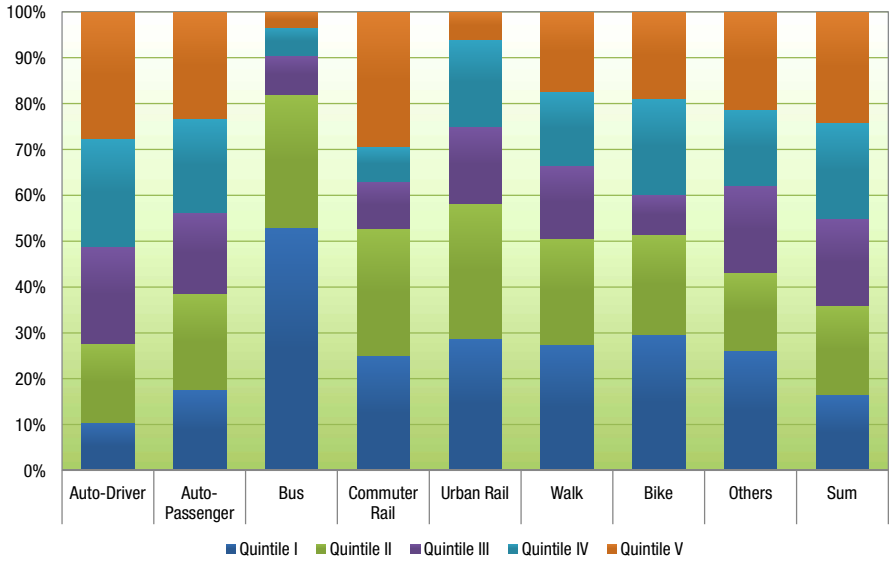
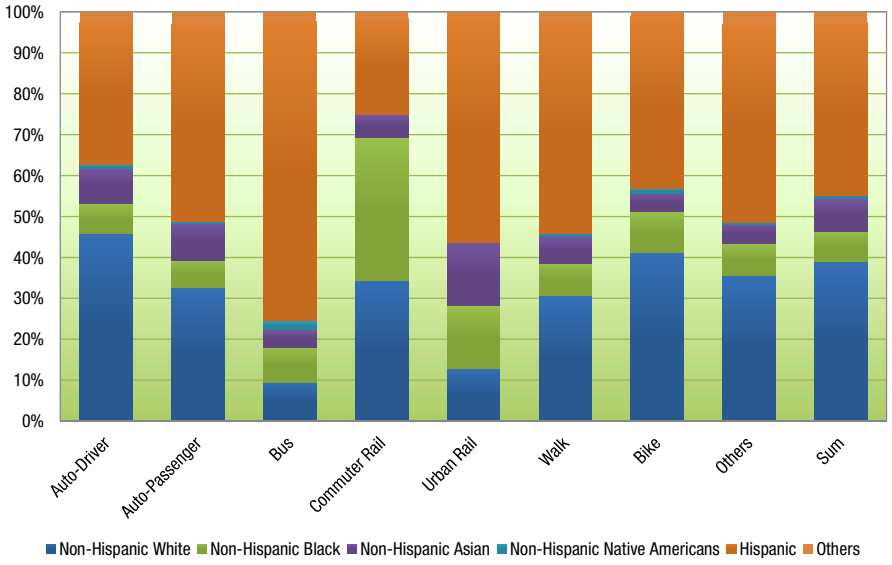


FIGURE 10 SCAG Region Transportation Usage by Mode and by Ethnicity: All Trips



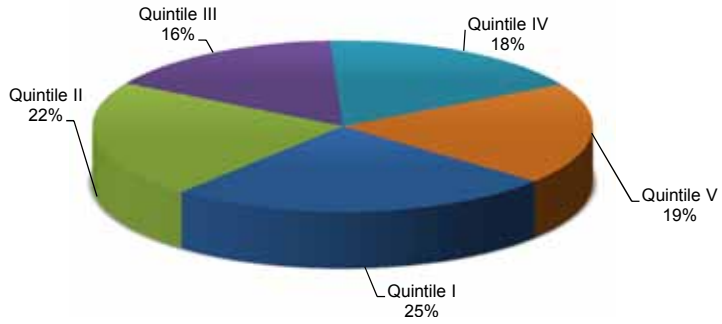
(3) RTP Project Investment Share by Income and Ethnicity

One of the most prominent environmental justice issues is the transportation investment strategy, which can impact the transportation choices of low income and minority communities. A disproportionate allocation of resources for various transit investments can indicate a pattern of discrimination. Such was the case in the landmark civil rights class action lawsuit *Labor/Community Strategy Center v. Los Angeles County Metropolitan Transportation Authority (MTA)* in October 1996. The lawsuit, which eventually led to a court-order Consent Decree, charged that MTA's investment and service priorities disproportionately allocated resources to rail transit over bus ridership, an expenditure pattern discriminatory to low-income and minority communities.

As a regional MPO, SCAG aims to identify and address the Title VI and the environmental justice implications of its planning processes and investment decisions. This analysis intends to determine where the 2012 RTP/SCS is putting its investments and will evaluate whether resources are being allocated equitably. The 2012 RTP/SCS utilized a benefit assessment method that considered to what extent various socioeconomic groups were receiving value from existing and funded transportation investments. SCAG compared the total share of transportation funding borne by low-income households against other income groups. In this analysis, SCAG reported expenditure distribution in several ways. First, SCAG estimated the share of total RTP expenditures allocated to each category of household income. This was done by totaling expenditures on each type of mode (bus, HOV lanes, commuter/high speed rail, highways/arterials, and light/heavy rail). These expenditures were then allocated to income categories based on each income group's use-share of these modes.

The figure below, Transportation Investments by Income Quintile, presents the findings for percent of total investments, which looks at the raw dollars and compares the amounts spent on low-income and high-income households. The results in the 2012 RTP/SCS revealed that approximately 25 percent of Plan investments will be allocated to the lowest quintile group (compared with the group system usage of just under 17 percent), while 19 percent will be invested for the highest income category (Quintile 5) with total transportation system usage of almost 25 percent. In other words, transportation investments would go to modes likeliest to be used by lower-income households.

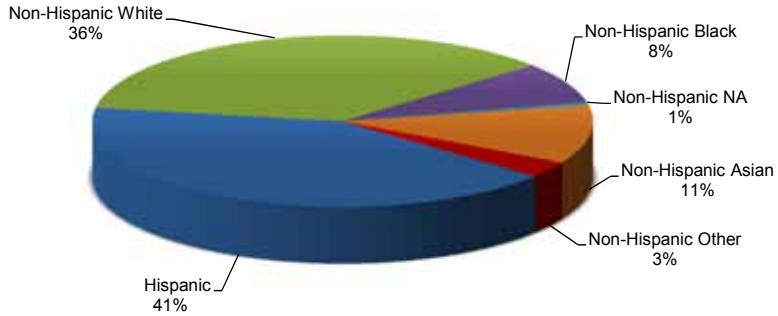
FIGURE 11 2012 RTP Transportation Investment by Income Quintile



The next figure, Transportation Investments by Ethnic/Racial Category, evaluates the distribution of transportation investments by various ethnic/racial categories. The current analysis for the 2012 RTP/SCS reveals that Plan investments will be distributed equitably on the basis of system usage by ethnic/racial groups. Transportation investments would go to modes most likely to be used by lower-income households.

For Hispanics, the share of Plan investments (41 percent) is close to this group's share of system usage (39.6 percent); for Whites, the share of Plan investments was at 36 percent, while their system usage was 38.2 percent; for African-Americans, the share of Plan investments (8 percent) also exceeded their share of system usage (6.9 percent).

FIGURE 12 2012 RTP Transportation Investment by Ethnicity



(4) Impacts from Transportation Funding Based on VMT Fees

METHODOLOGY

This is a new analysis area based on the finance strategy in the 2012 RTP/SCS, which recommends a vehicle mile traveled (VMT) based user fee which would be assessed beginning in the year 2025. This VMT fee would be implemented to replace the gasoline tax, and is estimated to cost about $0.05 (in 2011 dollars) per mile and indexed to maintain purchasing power starting in 2025. The implementation of this strategy requires actions of both the State Legislature and Congress. The recommended strategy is consistent with recommendations from two national commissions to move towards a mileage-based user fee system. Immediate steps necessary to take include coalescing state and national partners to fund further RD&D (Research Development & Demonstration) in advance of a 2025 broad based implementation.

The following discusses the environmental justice impacts of a VMT-based user fee and will also assess the measure's likely impact on growth distribution in the future due to the implementation of VMT fees using SCAG's PECAS land use model.

In comparing the VMT-based user fees finance system with the traditional gas tax based transportation funding system, the following points arise:

- The gas tax and the VMT-based user fee are similar in nature in that they both are highly regressive—lower income households will pay a disproportionately higher percentage of their income for both a gasoline tax or a VMT-based user fee than is paid by higher income groups.
- The VMT-based user fee is less "regressive" than the gasoline tax because it removes the advantages that higher income households have due to their access to relatively new and more fuel efficient vehicles. In general, new passenger vehicles are normally 15-20 percent more fuel efficient than the general auto fleet. Thus, given the equivalent dollar amount of gas tax and VMT-based user fees, higher income drivers (who usually own newer and much more fuel efficient vehicles) will now have to pay more in the VMT-based fee system than they have in the existing gasoline tax based transportation funding environment.
- Moreover, as analyzed in the previous section on job-housing and workers-job fit, most long distance commuters are high income wage earners who can afford the VMT-based user fees. On the other hand, low income households, minorities, and households without vehicles will be similarly or less impacted under a VMT-based fee system than is the case with the traditional gasoline tax.

SCAG developed an integrated transportation–land use model, based on the PECAS framework, to help analyze the land use impact from the VMT user fee scenario. For additional detail on the model, please see the Integrated Growth Forecast Technical Appendix. Since the model has not been peer reviewed, and not fully calibrated with the best available regional data, its output shall not be considered as SCAG's official position on the scenario. Nonetheless, a review would be useful in understanding the impact considered as the market's response to a feasible future.

To parameterize the VMT fee scenario for a model run, the following assumptions were applied:

- Current gasoline tax, $0.364 per gallon, would gradually increase until 2025 to $0.50 per gallon.
- Subsequently, a $0.05 per mile of VMT fee would replace the gasoline tax at year 2026.
- Relative to the PECAS model's base year, 2007, the travel cost would be 10 percent higher in year 2025 than in 2007. Between 2008 and 2024, this cost increase is linear. At year 2026, the travel cost would be 20 percent higher than in 2007, and thereafter stabilized.

RESULTS

With and without a change in travel costs, the PECAS model estimated the total number of households and jobs at 302 CSAs (Community Statistical Areas). The difference in zonal allocation is the impact of increased travel cost. PECAS evaluates the spatial utility for economic activities, such as production, exchange and consumption, such that the regional total of households and jobs are allocated to each zone according to the estimated utility. High travel cost means increases in disutility in the model; therefore, economic actors would try to avoid interactions with longer distances, which would result in 'tighter' concentrations in certain areas.

TABLES 21 and **22** summarize the number of households and jobs over the 14 sub-regions, respectively. Note that this allocation is not identical to the socioeconomic data set provided for the RTP process. What the table shows is a set of estimated figures according to the modeled market, while the official socioeconomic data was created from a thorough process that is detailed in the Growth Forecast Technical Appendix.

Comparing the allocation in year 2035, Imperial County gains about 1 percent of households; yet, losses 0.8 percent of jobs under the VMT fee scenario relative to the base case. In Los Angeles County, only North Los Angeles and Las Virgenes-Malibu subregions are estimated to have fewer households due to the VMT fee. Interestingly, the main job centers in Los Angeles County are estimated to have fewer jobs under the scenario, including the City of Los Angeles, Westside Cities Council of Governments and South Bay Cities Council of Governments. San Bernardino County would lose about 0.2 percent of households. Overall, however, the difference is not significant.

TABLE 21 PECAS Estimated Number of Households by Subregion

County	Subregion	2007	2020			2035		
			Base Scenario	VMT Fee Scenario	% Change to Base 2020	Base Scenario	VMT Fee Scenario	% Difference from Base to VMT Fee Scenario
Imperial	Imperial County	48,984	63,895	64,540	1.009	75,188	75,906	0.955
Los Angeles	North Los Angeles	179,481	200,441	200,340	-0.050	227,335	227,207	-0.056
	City of Los Angeles	1,314,418	1,440,083	1,440,529	0.031	1,618,555	1,618,768	0.013
	Arroyo Verdugo	127,848	140,072	140,113	0.029	157,349	157,368	0.012
	San Gabriel Valley	536,191	589,153	589,264	0.019	662,617	662,629	0.002
	Westside Cities	144,804	158,920	159,008	0.055	178,948	179,014	0.037
	South Bay Cities	280,163	308,566	308,686	0.039	348,385	348,453	0.020
	Gateway Cities	599,899	653,939	654,118	0.027	731,196	731,266	0.010
	Las Virgenes-Malibu	31,669	36,126	36,130	0.011	41,858	41,855	-0.007
	County Total	3,214,472	3,527,299	3,528,188	0.025	3,966,243	3,966,558	0.008
Orange	Orange County	982,731	1,080,947	1,081,134	0.017	1,218,957	1,218,971	0.001
Riverside	CVAG	160,451	192,760	192,511	-0.129	225,592	225,395	-0.087
	WRCOG	503,381	602,362	602,718	0.059	693,578	694,598	0.147
	County Total	663,831	795,122	795,229	0.013	919,170	919,993	0.090
San Bernardino	SANBAG	598,350	697,982	696,340	-0.235	805,089	803,532	-0.193
Ventura	VCOG	263,414	296,682	296,497	-0.062	338,225	337,911	-0.093
Region Total		**5,771,783**	**6,461,928**	**6,461,928**	**0.000**	**7,322,871**	**7,322,871**	**0.000**

TABLE 22 PECAS Estimated Number of Jobs by Sub-Region

County	Subregion	2007	2020			2035		
			Base Scenario	VMT Fee Scenario	% Change to Base 2020	Base Scenario	VMT Fee Scenario	% Difference from Base to VMT Fee Scenario
Imperial	Imperial County	58,053	73,631	72,975	-0.891	84,747	84,105	-0.758
Los Angeles	North Los Angeles	189,775	196,791	196,878	0.044	221,412	221,506	0.042
	City of Los Angeles	1,725,666	1,798,023	1,797,960	-0.004	1,988,714	1,988,679	-0.002
	Arroyo Verdugo	231,146	239,332	239,311	-0.009	261,790	261,773	-0.006
	San Gabriel Valley	734,696	759,945	760,056	0.015	842,372	842,490	0.014
	Westside Cities	328,400	340,409	340,328	-0.024	375,161	375,081	-0.021
	South Bay Cities	435,594	442,938	442,864	-0.017	485,343	485,274	-0.014
	Gateway Cities	846,983	851,471	851,432	-0.005	933,875	933,843	-0.003
	Las Virgenes-Malibu	61,550	66,848	66,842	-0.009	74,172	74,168	-0.005
	County Total	4,553,810	4,695,757	4,695,673	-0.002	5,182,839	5,182,814	0.000
Orange	Orange County	1,648,076	1,711,698	1,711,927	0.013	1,890,340	1,890,615	0.015
Riverside	CVAG	181,897	227,668	227,655	-0.006	268,522	268,521	0.000
	WRCOG	497,027	562,744	563,297	0.098	686,557	687,015	0.067
	County Total	678,923	790,412	790,952	0.068	955,079	955,536	0.048
San Bernardino	SANBAG	685,628	753,656	753,616	-0.005	881,488	881,409	-0.009
Ventura	VCOG	377,817	391,682	391,692	0.003	441,635	441,651	0.004
Region Total		**8,002,308**	**8,416,836**	**8,416,836**	**0.000**	**9,436,129**	**9,436,129**	**0.000**

The shift in activity allocation caused by the additional travel cost can be better captured with maps. **EXHIBIT 15** shows the difference in households between the base case and VMT-based fee scenario. As indicated in the map, households are leaving due to additional travel costs, from those zones in outlying areas, and are relocating into a few centers, including Los Angeles Downtown, Beach Cities, and many cities in Los Angeles County. Similarly, both western Riverside County and the southern part of San Bernardino County are receiving additional growth in several centers.

In general, households are moving towards the close and nearby centers in response to the high travel cost. In the future, Downtown Los Angeles could be the center of gravity in the region, and it could be the first place to concentrate. However, the additional 10 percent in travel costs is not high enough to push a significant number of households into Downtown Los Angeles. Instead, dramatic growth is seen in three places region-wide, which are portions of the City of Los Angeles, the western portion of Riverside County, the southern portion of San Bernardino County, and the eastern section of Imperial County. **FIGURE 13** depicts the conceptual centers for household shifts under the scenario.

Jobs showed a distinctly different shift pattern. The most noticeable difference from the household shifting pattern is observed in Los Angeles County. Instead of coming into the urban center, jobs are moving away from the Downtown Los Angeles area to either north Los Angeles County or western Riverside County.

In general, the results suggest that with higher travel costs region-wide as reflected in the VMT-based user fees, people and households will tend to move to nearby local centers where accessibility to job opportunities is plentiful, so as to offset the impacts from an increase in travel costs. On the other hand, employers will relocate to key locations to better align themselves with the newly emerging concentration of workers and households.

It is not clear if this change would happen in the estimated magnitude. Yet, in conjunction with a 3.5 percent estimated reduction in travel distance (see the Growth Forecast Technical Appendix for additional detail), its impacts on directional changes seem reasonable.

FIGURE 13 Household Shift

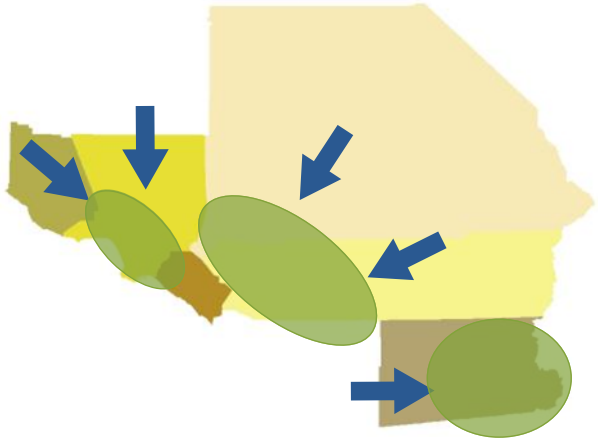


FIGURE 14 Job Shift

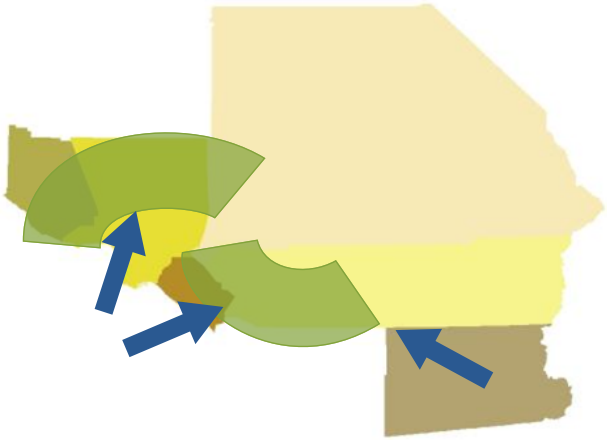


EXHIBIT 15 PECAS Estimated Changes in Households in Year 2035 Due to VMT Fee – Percent Difference

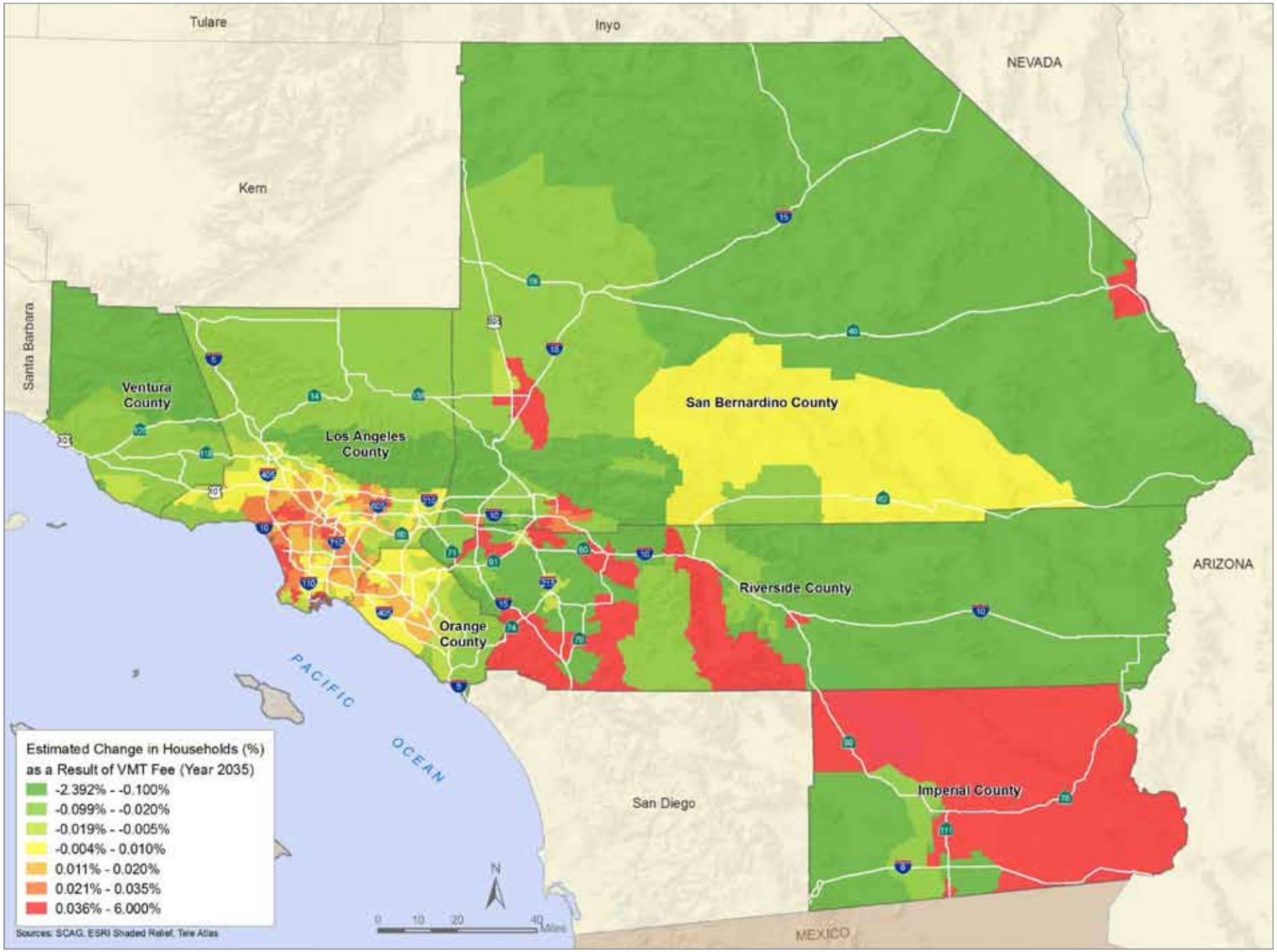
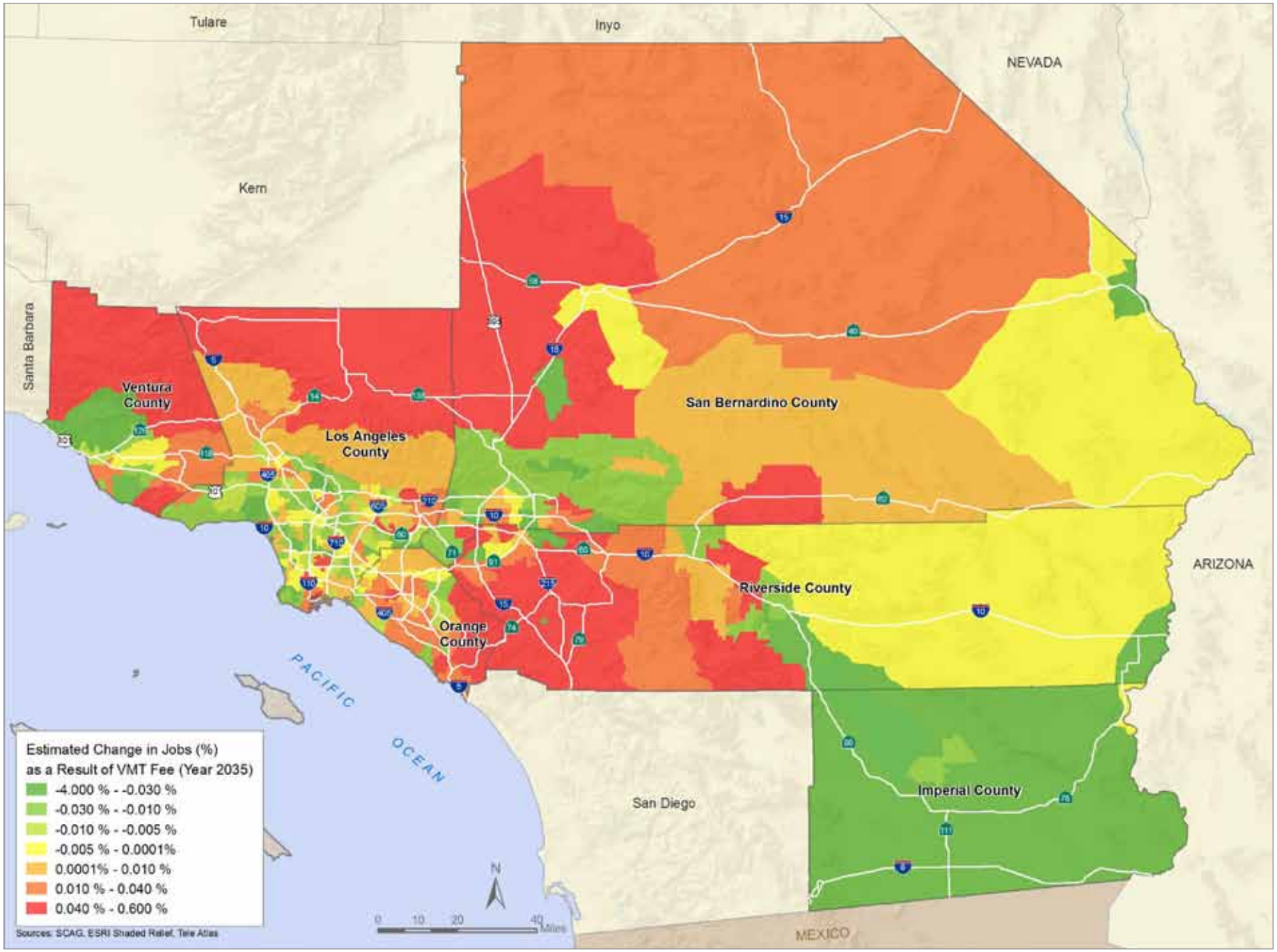


EXHIBIT 16 PECAS Estimated Changes in Jobs in Year 2035 Due to VMT Fee – Percent Difference



(5) Distribution of Travel Time Savings and Travel Distance Savings

METHODOLOGY

This analysis involved measuring the average travel time for both work trips and non-work trips. SCAG assesses the distribution of travel time savings that are expected to result from the Plan's implementation. SCAG conducted this analysis for transit (i.e. bus and light rail) and automobile. These travel time savings were reported as a proportion of the total travel time savings for each mode.

Travel time savings is one performance measure that SCAG analyzed to determine the share of benefits and burdens in using the regional transportation system for the region's population groups. For the 2012 RTP/SCS, transportation modeling results were used with data on mode usage by income and ethnicity to determine travel time savings. Results were calculated for trips made by automobile (the most common mode of travel) and for trips using transit (transit by local bus and/or by all transit).

SCAG assessed the distribution of travel time savings that are expected to result from the implementation of the 2012 RTP/SCS by analyzing demographic data and the associated mode usage statistics for each Transportation Analysis Zone (TAZ) in the region. With this input, an estimate for the time savings for each income and ethnic group can be identified for trips involving transit (i.e. local bus and all transit) and automobiles.

Another way of estimating benefits is to calculate savings in terms of person-miles traveled (PMT). These results indicate that the share of driving distance savings, similar to time savings, generally resembles the share of usage. This is another way of estimating the benefits of land-use strategies—locating homes nearer to work places and intensifying land-use—reflected in the Plan. Similar to the methodology used to estimate travel time savings, staff used the differences between the RTP/SCS and baseline scenario in trip distribution and distance to estimate per-mile travel benefits.

There are two ways to examine and to determine whether the RTP/SCS outcomes on travel time and person-mile changes are adequately allocated by various income/ethnicity groups. The first is to compare the distribution of total savings (benefits) by income/ethnicity with each group's usage of the system, share of RTP investment, and their contributions through gasoline and sales taxes to fund the transportation system. The second, is to examine whether relative improvements from proposed RTP/SCS strategies for each income/ethnicity group are generally in line with their usage—i.e., to ensure that every group benefits appropriately from the system investment and improvements in the 2012 RTP/SCS.

RESULTS

The two figures below present Share of System Usage, Taxes Paid, Travel Time Savings (auto, local bus, all transit), and Person-mile Changes (auto) by income/ethnicity. The other two figures present the relative improvements of travel time savings and person-mile reductions from implementation of the 2012 RTP/SCS. Highlights among the figures include the following:

- Share of travel times savings by income groups are generally consistent with the mode usage for each income group. Higher income quintile groups captured more savings in person hour traveled proportionally to their relative higher usage of auto mode. However, lower income groups received more benefits from transit related time savings for their higher usage in the transit mode.
- Person-mile travel changes are also in line with usage by income groups in terms of auto mode.
- Share of travel time savings and person-mile benefits by ethnic groups are also very balanced, and in line with each ethnic group's use of the transportation system.
- Lower income quintile groups received greater improvements in person-mile travel reductions and local bus travel time savings than higher income groups, and about the same level of improvement in person hour savings as higher income households. Alternatively, higher income households enjoyed a moderately better improvement in all transit mode time savings.
- Improvements in mobility and person-mile travel benefits are fairly similar and close for all ethnic groups.

FIGURE 15 Share of Travel Time and Person-Mile Travel Benefits by Income

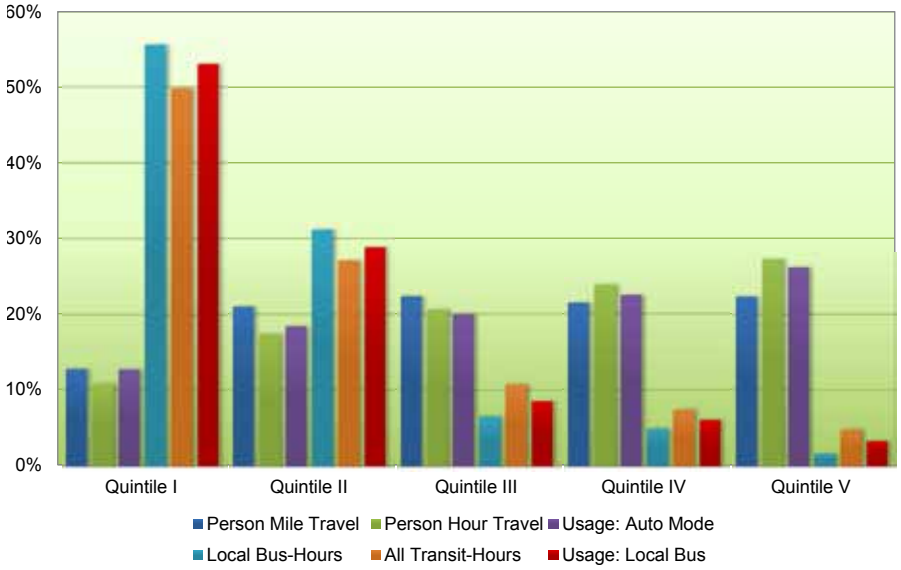


FIGURE 16 Share of Travel Time and Person-Mile Travel Benefits by Ethnicity

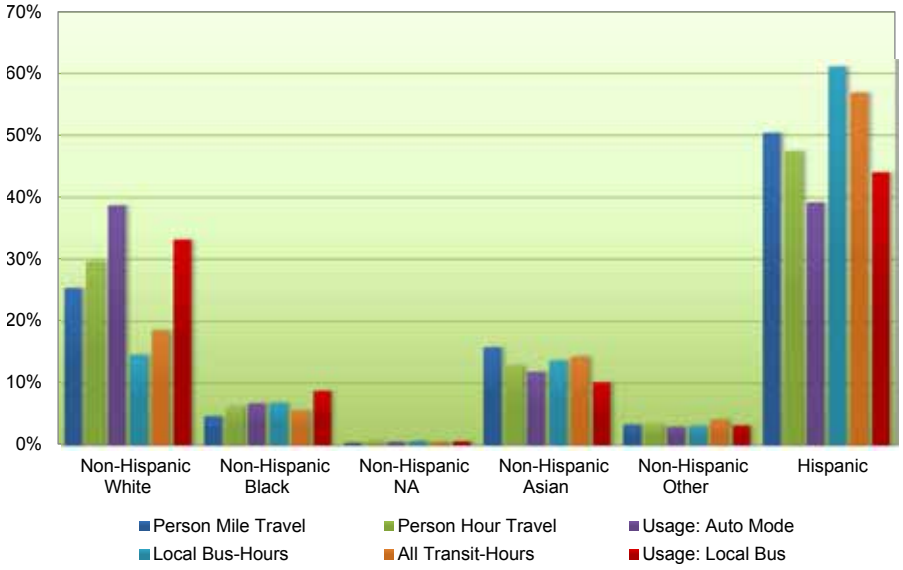


FIGURE 17 2012 RTP/SCS Improvement on Mobility and Person-Mile Travel by Income Quintile

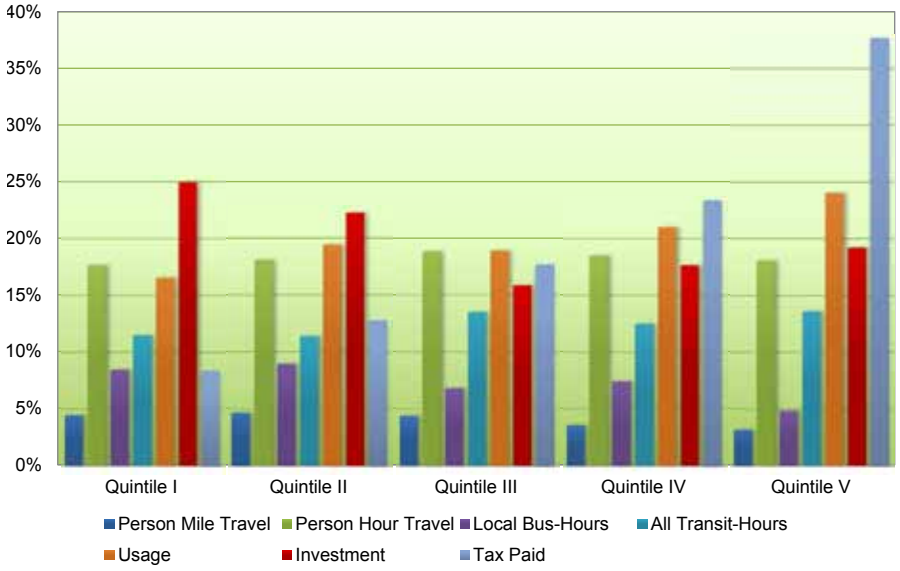
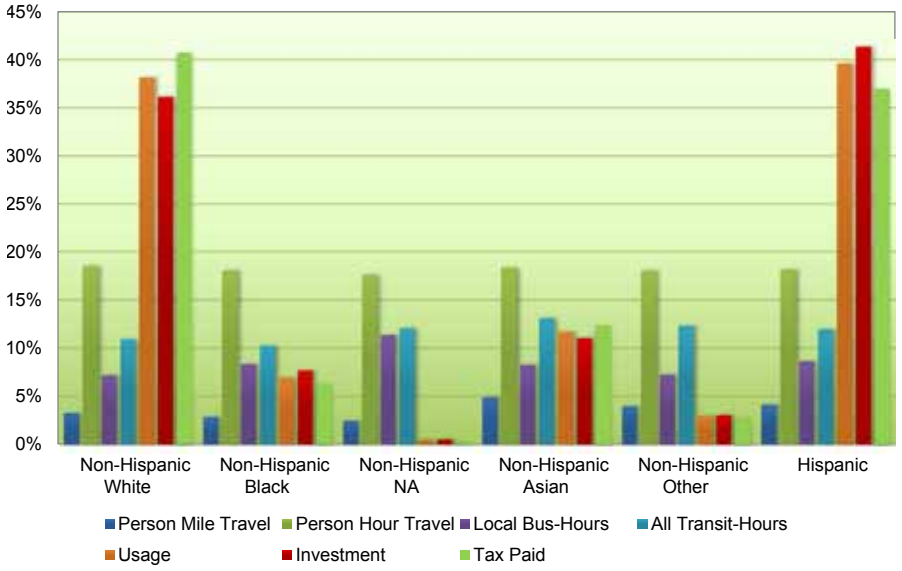


FIGURE 18 2012 RTP/SCS Improvement on Mobility and Person-Mile Travel by Ethnicity



(6) Jobs-Housing Imbalance or Jobs-Housing Mismatch

In modern urban transportation and land use literature and numerous discussions, forums, workshops, the subject of job-housing imbalance and job-housing mismatch is considered a key contributor to traffic congestion and, some argue, an impediment to environmental justice. Among the arguments:

- Workers are priced out from the job rich areas such that long distance travel and congestion are inevitable
- Coastal counties have not built enough housing and workers are forced to move to Inland counties where housing is affordable. This results in long distance commuting and traffic congestion

While this analysis is not expecting to allay all concerns of the jobs-housing imbalance and/or job- housing mismatch, however, the statistics are provided to investigate socio-economic profiles of long distance commuters—defined here as "inter-county commuters—such that stakeholders and policy makers can better understand the demographic composition of long distance commuters.

From an economics point of view, transportation and driving are expensive; workers without a car or people with less income who cannot afford vehicle or driving expenses have to either live close to their jobs where they can walk/bike or have access to transit. Moreover, since long distance commuting is expensive people will not do it unless there are subsidies to own a dependable vehicle, they have access to relatively fast and cheap transit, or have a well-paying job.

The following tables identify the median wages for inter-county and intra-county commuters using the 1990 Census, 2000 Census, and the most recent 2008 American Community Survey (ACS).

TABLE 23 Median Wage/Earnings for Workers by Place of Residence & Place of Work, 1990–2008

Residence	2008 Place of Work						
	Imperial	Los Angeles	Orange	Riverside	San Bernardino	Ventura	San Diego
Imperial	$20,804	$27,581	$28,369	$25,217	$23,641	$30,576	$27,581
Los Angeles	$40,978	$23,641	$26,005	-	$37,826	$40,978	$35,462
Orange	$39,402	$33,097	$19,701	$37,826	$28,369	$47,282	$31,521
Riverside	$22,065	$26,793	$23,641	$16,549	$33,097	-	$27,581
San Bernardino	$31,521	$31,521	$23,641	$86,684	$19,701	$45,706	$23,641
Ventura	$44,918	$56,738	$10,560	-	$60,679	$23,641	$20,489
San Diego	$43,342	$39,402	$37,826	$55,162	$63,043	$17,337	$25,217
Residence	**2000 Place of Work**						
	Imperial	Los Angeles	Orange	Riverside	San Bernardino	Ventura	San Diego
Imperial	$19,000	$16,000	$6,300	$10,400	$81,000	-	$25,200
Los Angeles	$20,000	$21,000	$27,900	$26,800	$22,400	$28,000	$21,000
Orange	$10,500	$41,000	$24,600	$30,000	$40,000	$35,000	$39,000
Riverside	$44,400	$40,000	$36,500	$18,000	$30,000	$40,000	$36,800
San Bernardino	$27,800	$35,000	$35,000	$27,000	$19,500	$42,000	$26,000
Ventura	-	$43,000	$45,000	$50,000	$40,000	$22,000	$45,000
San Diego	$30,000	$36,000	$40,000	$30,000	$19,000	$35,000	$23,600
Residence	**1990 Place of Work**						
	Imperial	Los Angeles	Orange	Riverside	San Bernardino	Ventura	San Diego
Imperial	$16,830	$6,991	$32,365	$16,364	$41,427	$7,664	$23,303
Los Angeles	$23,303	$22,008	$27,758	$25,892	$22,008	$29,776	$15,535
Orange	$23,303	$42,722	$23,303	$32,365	$33,660	$38,838	$38,838
Riverside	$12,946	$41,427	$37,543	$17,865	$31,070	$36,249	$31,718
San Bernardino	$51,784	$36,016	$36,249	$27,187	$19,419	$46,606	$32,365
Ventura	-	$44,016	$49,345	$38,191	$25,892	$20,714	$28,481
San Diego	$29,776	$37,543	$36,249	$27,187	$29,776	$33,660	$20,714

Sources: 2008 ACS PUMS (CPI adjusted to $ in 1999), 2000 PUMS 5% ($ in 1999), 1990 PUMS 5% (CPI adjusted to $ in 1999)

The statistics indicate that, almost without exception, all inter-county commuters command much higher wages than those commuters who work and live in the same county. Those commuters also command wages higher than workers who work and reside in their destination work counties. From an environmental justice perspective, this research does not provide definitive results. Rather, it raises additional questions that could be investigated to better understand how travel and income patterns impact low-income and minority populations.

Policy Implications:

A strong case could be made for imposing the VMT-based charges to the net inter-county commuting VMT (total inter-county commuting VMT—estimated VMT reach the county line) to address the transportation funding needs and relieve congestion.

Further research is needed to investigate the jobs-housing imbalance and jobs- housing mismatch issues and related policy implications more carefully. One observation, which remains valid today, and was provided in SCAG's Environmental Justice Report for the 1998 RTP, indicated that "for people who cannot afford a car for long distance travel, and have to cluster around certain areas, their mobility and accessibility are severely limited. An example is if growth of entry level jobs is primarily in suburban areas but is not served by public transit in peak hours, or is too far by walking/biking." The 2012 RTP/SCS transportation investment and land use strategies will provide relief for this concern. However, mitigation measures are required to address potential displacement, gentrification, build up in local congestion, and growth closer to emission sources. SCAG has suggested potential mitigation measures in an Environmental Justice Toolbox, at the end of this appendix.

(7) Accessibility to Employment and Services

METHODOLOGY

Accessibility is a foundation for social and economic interactions. As an indicator, accessibility is measured by the spatial distribution of potential destinations, the ease of reaching each destination, and the magnitude, quality and character of the activities at the destination sites. Travel costs are central: the lower the costs of travel, in terms of time and money, the more places that can be reached within a certain budget and, thus, the greater the accessibility. Destination choice is equally crucial: more destinations and the more varied the destinations, the higher the level of accessibility.

The analysis of accessibility for 2012 RTP/SCS Environmental Justice report includes the following:

- Investigate the distance-based accessibility of medical services and grocery/general merchandise stores which are within transportation modes for walking, biking, and using the local bus system for base year 2008. Staff used both 3-mile and 5-mile radii and compared Environmental Justice groups with the average population in terms of accessibility to medical service facilities and grocery/general merchandise stores.
- Presents both the base year job and shopping accessibility improvements through implementation of the 2012 RTP/SCS by three transportation modes—auto, local bus, and all transit, and two travel time intervals—30 and 45 minutes. However, this report only presents results for 45-minutes of travel.
- Applies the same analysis and methodology used for job and shopping accessibility for analyzing park accessibility for Environmental Justice Communities.

Employment and retail accessibility evaluates how well the transportation system is providing access to jobs and shopping for underrepresented populations. In this analysis, both employment and shopping accessibility is defined as the percentage of the population who can travel between work and home or between retail stores and home within 30 or 45 minutes during the morning peak period. The general procedures for these exercises are:

- Obtain Transportation Analysis Zone (TAZ) to TAZ travel time matrix by mode: auto, local bus, and all transit
- Identify medical facilities, grocery stores, and general merchandise stores from SCAG's employment database, and the projected growth of total employment and retail jobs within the study area
- Identify from SCAG's land use database all local, regional, state, and national parks
- For each TAZ, select all of the TAZs accessible with different transportation modes within 45-minutes of travel (30-minute travel time results are available upon request)
- Summarize total jobs, retail jobs, medical facilities, grocery/general merchandise stores, and acreage of parks

RESULTS

DISTANCE-BASED ACCESSIBILITY

The following figures present medical facility/grocery stores accessibility in 3-mile and 5-mile radius by key Environmental Justice interested groups.

As illustrated in both figures, most ethnic groups, lower income quintile households, and people in poverty live in areas with higher than average accessibility to medical facilities, grocery/general merchandise stores. These observations support the statement made earlier that because transportation and long distance travel are expensive, less affluent people will choose residential locations where they can walk, bike, or take transit to access jobs, shopping, or other essential services. The priority policy is to create job opportunities for less affluent people near transit or urban cores. Promoting development in TOD areas is a good policy, but the unintended impacts on displacement and gentrification need to be mitigated.

The analysis also indicates that several population groups—Non-Hispanic Native Americans, Non-Hispanic Black and others, elderly and disabled—have "very slightly" less than average accessibility to either medical services or grocery/general merchandise stores as those observed for Non-Hispanic White and higher-income quintile households. Since there is no mobility element in this analysis, the primary cause could be the residential locations of these population groups relative to the opportunities located in surrounding areas. It is recommended that additional monitoring and study occur to better understand d the accessibility issues for these four Environmental Justice groups (Non-Hispanic Native Americans, Non-Hispanic Black and others, elderly and disabled).

FIGURE 19 Local Stores and Medical Facilities within 3-Mile Radius Area (2008)

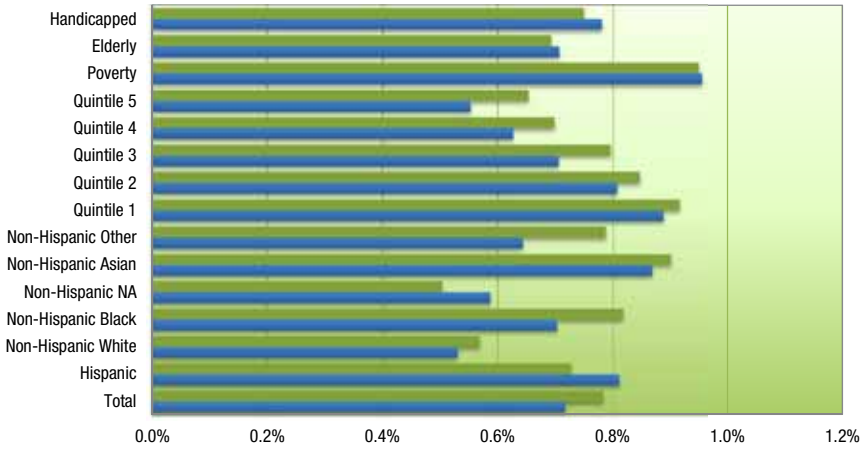
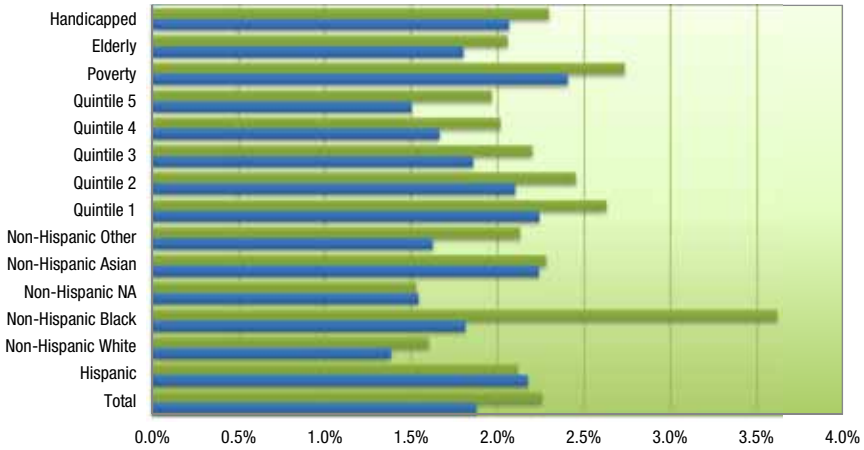


FIGURE 20 Local Stores and Medical Facilities within 5-Mile Radius Area (2008)



JOB AND SHOPPING OPPORTUNITY

Job and shopping accessibility calculations are presented in the following figures. The base year job and shopping accessibility and improvements from the 2012 RTP/SCS are shown in the following figures. Summary highlights from the base year job and shopping accessibility analysis include the following:

- Elderly population showed only above average accessibility to job opportunity by auto; all other measures come out slightly below average for both job and shopping accessibility. As mentioned earlier, staff plan to research and study further about residential location and land use in surrounding areas for this population group, in particular because the region is facing an aging population in the next 20-25 years.
- In general, lower income quintile households and population below poverty all showed higher job and shopping accessibility in base year 2008 under every transportation mode.
- As the case of distance-based accessibility, non-Hispanic Native Americans and non-Hispanic other, similar to non-Hispanic White, have below average accessibility in both job and shopping accessibility.
- Nonetheless, through the implementation of recommended strategies in the 2012 RTP/SCS, elderly, non-Hispanic Native American and non-Hispanic other will experience much better improvements than the average population in both job and shopping opportunities (See figures of the 2012 RTP/SCS Impact on Job/Shopping Opportunity).

FIGURE 21 Total Job and Shopping Accessibility by Mode: Population in Need: 2008

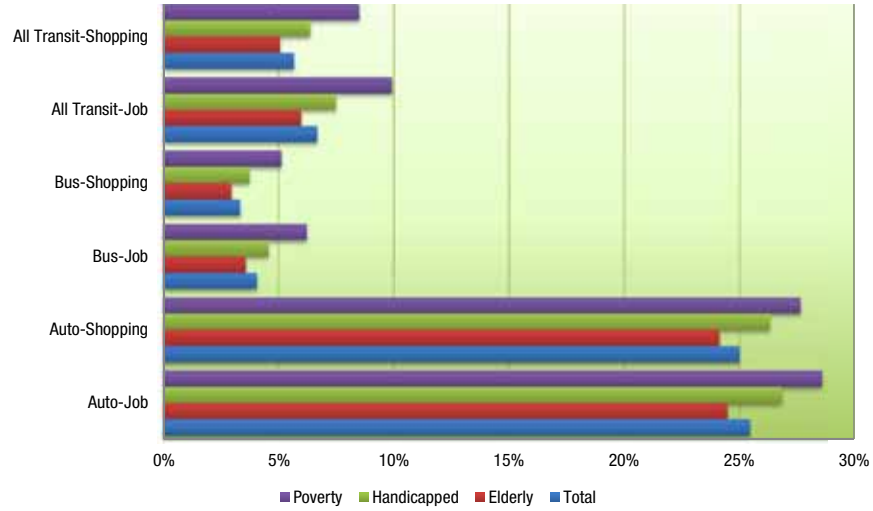


FIGURE 22 Total Job and Shopping Accessibility by Mode and Income: 2008

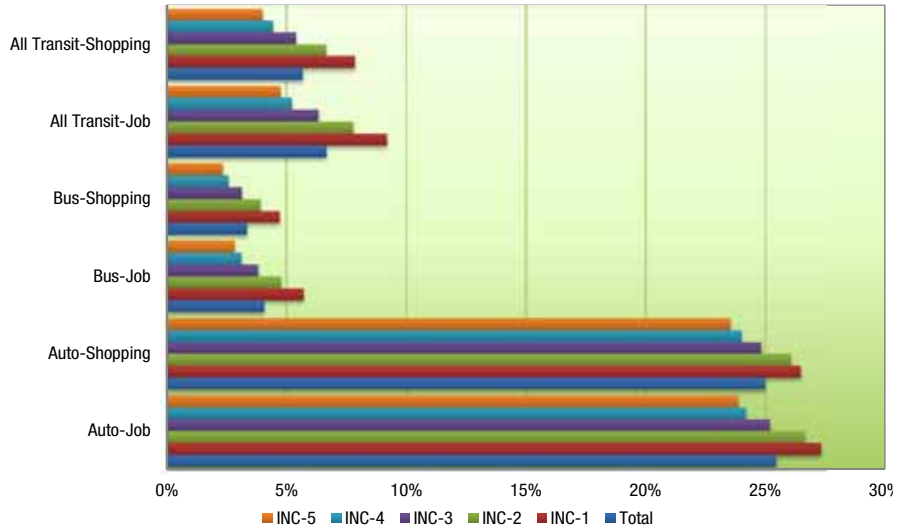


FIGURE 23 Total Job and Shopping Accessibility by Mode and Ethnicity (2008)

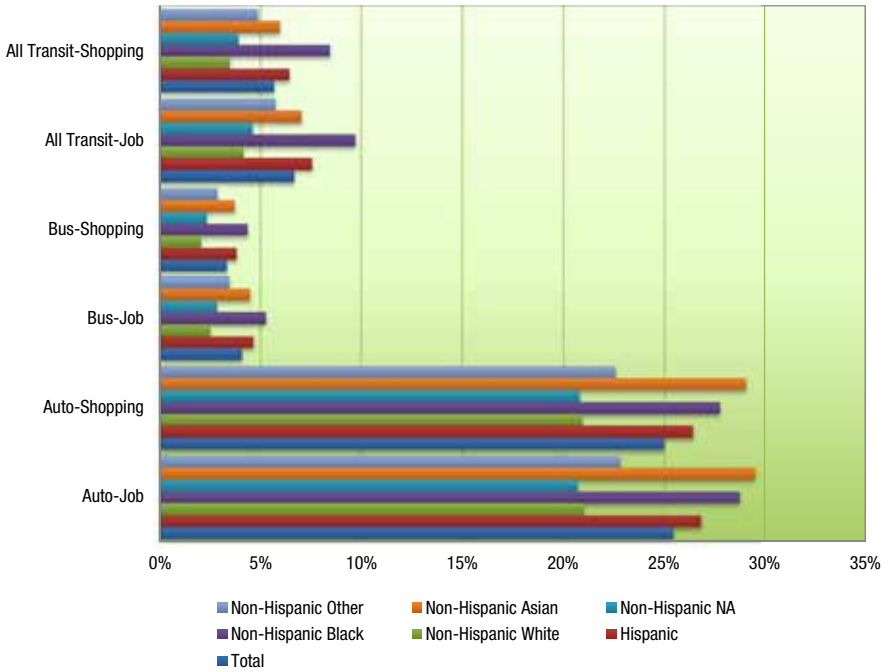


FIGURE 24 2012 RTP/SCS Impacts on Job and Shopping Accessibility: Population in Need

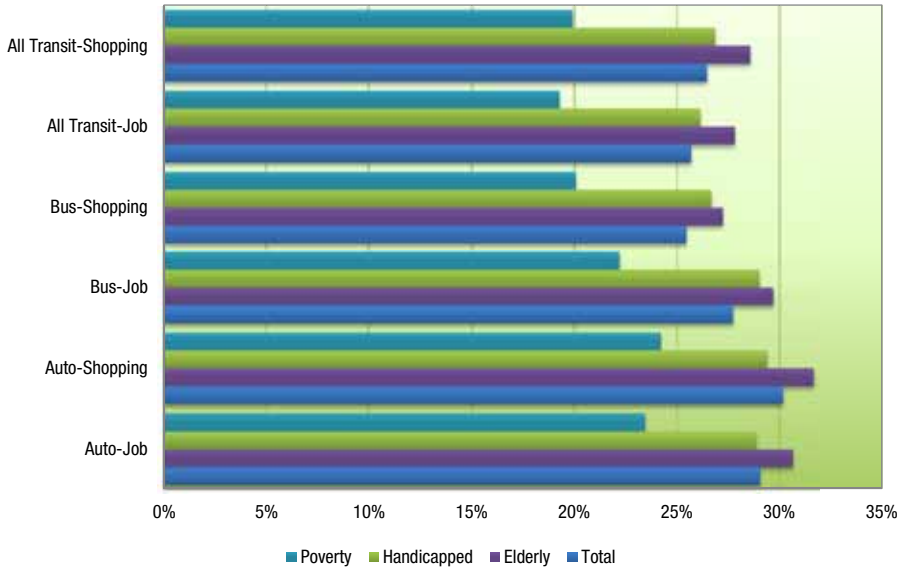


FIGURE 25 2012 RTP/SCS Impacts on Job and Shopping Accessibility by Mode and Income Quintile

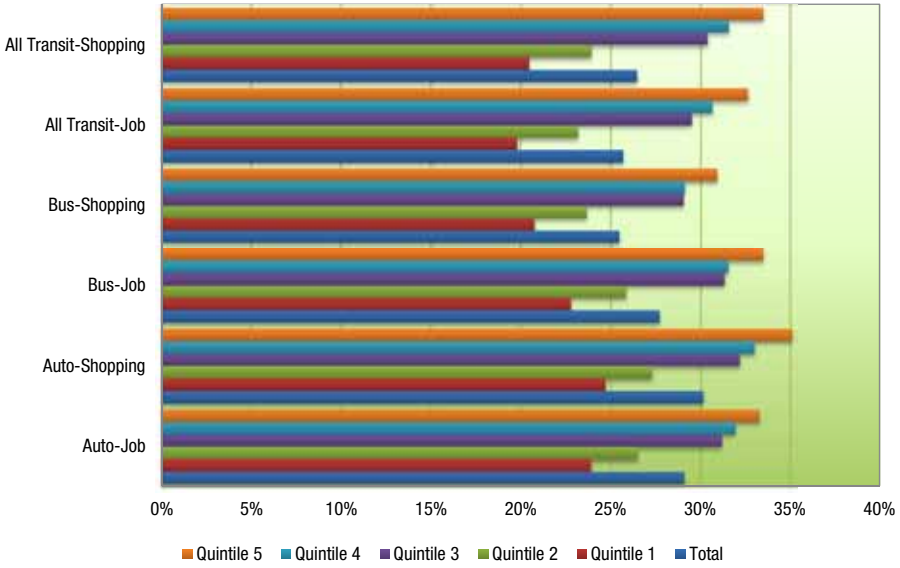


FIGURE 26 2012 RTP/SCS Impacts on Job and Shopping Accessibility by Mode and Ethnicity

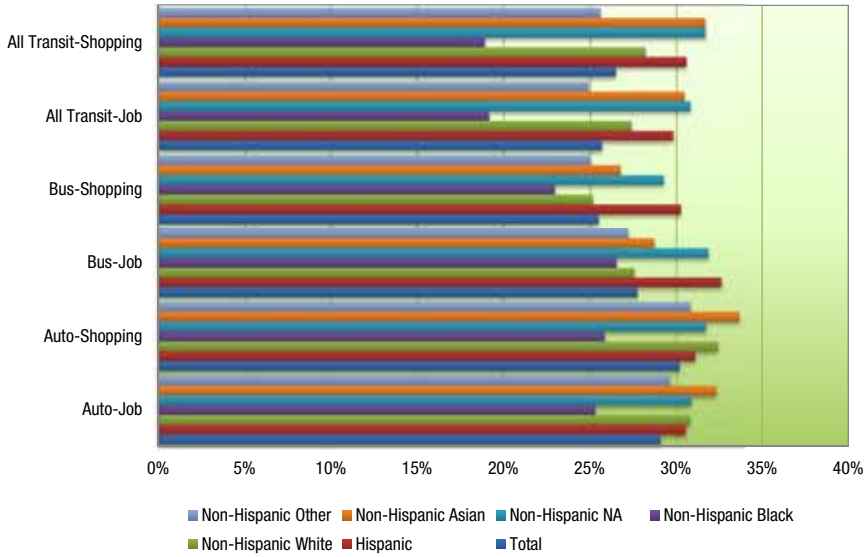


TABLE 24 2012 RTP/SCS Impacts on Job/Shopping Accessibility (45 Minutes of Travel) by Ethnicity

2008	Total	Hispanic	Non-Hispanic White	Non-Hispanic Black	Non-Hispanic NA	Non-Hispanic Asian	Non-Hispanic Other
Auto Mode: 45 minutes							
Total Job	25.44%	26.82%	20.99%	28.72%	20.67%	29.47%	22.78%
Shopping	24.98%	26.41%	20.92%	27.75%	20.78%	29.01%	22.58%
Local Bus: 45 minutes							
Total Job	4.06%	4.66%	2.49%	5.26%	2.83%	4.49%	3.46%
Shopping	3.34%	3.81%	2.06%	4.36%	2.33%	3.71%	2.85%
All Transit: 45 minutes							
Total Job	6.67%	7.55%	4.13%	9.69%	4.60%	7.03%	5.75%
Shopping	5.67%	6.42%	3.48%	8.43%	3.90%	5.95%	4.88%
2035 Baseline	**Total**	**Hispanic**	**Non-Hispanic White**	**Non-Hispanic Black**	**Non-Hispanic NA**	**Non-Hispanic Asian**	**Non-Hispanic Other**
Auto Mode: 45 minutes							
Total Job	20.93%	21.26%	16.98%	21.60%	16.46%	24.03%	18.85%
Shopping	20.61%	21.07%	16.87%	21.27%	16.51%	23.69%	18.66%
Local Bus: 45 minutes							
Total Job	3.57%	3.68%	2.11%	3.82%	2.27%	3.77%	2.96%
Shopping	3.09%	3.19%	1.82%	3.34%	1.96%	3.28%	2.56%
All Transit: 45 minutes							
Total Job	5.85%	6.03%	3.51%	7.11%	3.75%	5.90%	4.93%
Shopping	5.14%	5.32%	3.04%	6.37%	3.28%	5.17%	4.30%
2035 Plan	**Total**	**Hispanic**	**Non-Hispanic White**	**Non-Hispanic Black**	**Non-Hispanic NA**	**Non-Hispanic Asian**	**Non-Hispanic Other**
Auto Mode: 45 minutes							
Total Job	27.01%	27.75%	22.20%	27.05%	21.54%	31.79%	24.43%
Shopping	26.83%	27.62%	22.33%	26.76%	21.75%	31.65%	24.40%
Local Bus: 45 minutes							
Total Job	4.55%	4.88%	2.69%	4.84%	2.99%	4.85%	3.77%
Shopping	3.88%	4.16%	2.28%	4.11%	2.54%	4.15%	3.20%
All Transit: 45 minutes							
Total Job	7.35%	7.82%	4.47%	8.47%	4.90%	7.70%	6.15%
Shopping	6.50%	6.94%	3.90%	7.58%	4.32%	6.81%	5.40%

2035 Plan – 2035 Baseline	Total	Hispanic	Non-Hispanic White	Non-Hispanic Black	Non-Hispanic NA	Non-Hispanic Asian	Non-Hispanic Other
Auto Mode: 45 minutes							
Total Job	6.08%	6.49%	5.22%	5.46%	5.07%	7.76%	5.58%
Shopping	6.21%	6.54%	5.46%	5.49%	5.24%	7.96%	5.74%
Local Bus: 45 minutes							
Total Job	0.99%	1.20%	0.58%	1.01%	0.72%	1.08%	0.81%
Shopping	0.79%	0.97%	0.46%	0.77%	0.57%	0.88%	0.64%
All Transit: 45 minutes							
Total Job	1.50%	1.80%	0.96%	1.36%	1.15%	1.80%	1.23%
Shopping	1.36%	1.62%	0.86%	1.20%	1.04%	1.64%	1.10%
% Change (2035 Plan – Baseline)	**Total**	**Hispanic**	**Non-Hispanic White**	**Non-Hispanic Black**	**Non-Hispanic NA**	**Non-Hispanic Asian**	**Non-Hispanic Other**
Auto Mode: 45 minutes							
Total Job	29.0%	30.5%	30.8%	25.3%	30.8%	32.3%	29.6%
Shopping	30.1%	31.1%	32.4%	25.8%	31.7%	33.6%	30.8%
Local Bus: 45 minutes							
Total Job	27.7%	32.6%	27.5%	26.5%	31.8%	28.7%	27.2%
Shopping	25.5%	30.2%	25.2%	23.0%	29.2%	26.7%	25.0%
All Transit: 45 minutes							
Total Job	25.7%	29.8%	27.4%	19.1%	30.8%	30.4%	24.9%
Shopping	26.5%	30.6%	28.2%	18.9%	31.7%	31.6%	25.6%

TABLE 25 2012 RTP/SCS Impacts on Job/Shopping Accessibility (45 Minutes of Travel) by Income Quintile

2008	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Auto Mode: 45 minutes					
Total Job	27.31%	26.64%	25.17%	24.17%	23.84%
Shopping	26.47%	26.06%	24.82%	24.00%	23.52%
Local Bus: 45 minutes					
Total Job	5.71%	4.76%	3.82%	3.11%	2.83%
Shopping	4.71%	3.91%	3.14%	2.56%	2.33%
All Transit: 45 minutes					
Total Job	9.19%	7.79%	6.34%	5.22%	4.74%
Shopping	7.86%	6.63%	5.39%	4.42%	3.99%
2035 Baseline	**Quintile 1**	**Quintile 2**	**Quintile 3**	**Quintile 4**	**Quintile 5**
Auto Mode: 45 minutes					
Total Job	23.77%	22.03%	20.29%	19.60%	18.94%
Shopping	23.16%	21.67%	20.06%	19.49%	18.69%
Local Bus: 45 minutes					
Total Job	5.47%	4.14%	3.29%	2.62%	2.29%
Shopping	4.76%	3.59%	2.85%	2.27%	1.98%
All Transit: 45 minutes					
Total Job	8.74%	6.80%	5.44%	4.39%	3.85%
Shopping	7.74%	5.99%	4.78%	3.83%	3.35%
2035 Plan	**Quintile 1**	**Quintile 2**	**Quintile 3**	**Quintile 4**	**Quintile 5**
Auto Mode: 45 minutes					
Total Job	29.46%	27.87%	26.62%	25.85%	25.24%
Shopping	28.88%	27.58%	26.52%	25.92%	25.24%
Local Bus: 45 minutes					
Total Job	6.72%	5.21%	4.32%	3.45%	3.06%
Shopping	5.75%	4.44%	3.68%	2.93%	2.60%
All Transit: 45 minutes					
Total Job	10.46%	8.38%	7.05%	5.73%	5.11%
Shopping	9.32%	7.43%	6.23%	5.04%	4.47%

2035 Plan – 2035 Baseline	Total	Hispanic	Non-Hispanic White	Non-Hispanic Black	Non-Hispanic NA
Auto Mode: 45 minutes					
Total Job	5.68%	5.84%	6.33%	6.26%	6.30%
Shopping	5.72%	5.91%	6.46%	6.43%	6.55%
Local Bus: 45 minutes					
Total Job	1.25%	1.07%	1.03%	0.83%	0.77%
Shopping	0.99%	0.85%	0.83%	0.66%	0.61%
All Transit: 45 minutes					
Total Job	1.73%	1.58%	1.61%	1.34%	1.26%
Shopping	1.58%	1.43%	1.45%	1.21%	1.12%
% Change (2035 Plan – Baseline)	**Total**	**Hispanic**	**Non-Hispanic White**	**Non-Hispanic Black**	**Non-Hispanic NA**
Auto Mode: 45 minutes					
Total Job	23.9%	26.5%	31.2%	31.9%	33.3%
Shopping	24.7%	27.3%	32.2%	33.0%	35.1%
Local Bus: 45 minutes					
Total Job	22.8%	25.9%	31.3%	31.5%	33.5%
Shopping	20.7%	23.6%	29.0%	29.1%	30.9%
All Transit: 45 minutes					
Total Job	19.8%	23.2%	29.5%	30.7%	32.6%
Shopping	20.5%	23.9%	30.4%	31.6%	33.5%

TABLE 26 2012 RTP/SCS Impacts on Job/Shopping Accessibility (45 Minutes of Travel) by Population in Need

2008	Poverty	Elderly	Handicapped
Auto Mode: 45 minutes			
Total Job	28.57%	24.47%	26.82%
Shopping	27.64%	24.11%	26.30%
Local Bus: 45 minutes			
Total Job	6.21%	3.59%	4.55%
Shopping	5.12%	2.95%	3.73%
All Transit: 45 minutes			
Total Job	9.91%	5.96%	7.47%
Shopping	8.49%	5.07%	6.36%
2035 Baseline	**Poverty**	**Elderly**	**Handicapped**
Auto Mode: 45 minutes			
Total Job	23.93%	20.18%	22.10%
Shopping	23.33%	19.95%	21.81%
Local Bus: 45 minutes			
Total Job	5.57%	3.11%	3.92%
Shopping	4.85%	2.70%	3.40%
All Transit: 45 minutes			
Total Job	8.86%	5.16%	6.48%
Shopping	7.86%	4.53%	5.71%
2035 Plan	**Poverty**	**Elderly**	**Handicapped**
Auto Mode: 45 minutes			
Total Job	29.54%	26.37%	28.47%
Shopping	28.98%	26.27%	28.21%
Local Bus: 45 minutes			
Total Job	6.80%	4.03%	5.06%
Shopping	5.82%	3.43%	4.31%
All Transit: 45 minutes			
Total Job	10.57%	6.59%	8.18%
Shopping	9.43%	5.82%	7.24%

2035 Plan – 2035 Baseline	Poverty	Elderly	Handicapped
Auto Mode: 45 minutes			
Total Job	5.61%	6.18%	6.37%
Shopping	5.65%	6.32%	6.41%
Local Bus: 45 minutes			
Total Job	1.24%	0.92%	1.14%
Shopping	0.97%	0.73%	0.91%
All Transit: 45 minutes			
Total Job	1.71%	1.43%	1.69%
Shopping	1.56%	1.29%	1.53%
% Change (2035 Plan – Baseline)	**Poverty**	**Elderly**	**Handicapped**
Auto Mode: 45 minutes			
Total Job	23.4%	30.6%	28.8%
Shopping	24.2%	31.7%	29.4%
Local Bus: 45 minutes			
Total Job	22.2%	29.7%	29.0%
Shopping	20.1%	27.2%	26.7%
All Transit: 45 minutes			
Total Job	19.3%	27.8%	26.1%
Shopping	19.9%	28.6%	26.8%

(8) Accessibility to Parks

METHODOLOGY

Public parks serve all residents. National parks, state parks, and numerous community parks are all found within the SCAG region. However, not all parks are created equal. Not all neighborhoods and people have equal access to these cherished public resources (see Map 1: Distribution of Parks and Low-income Households). Some neighborhoods have more open space, some parks are better maintained, some are built so that those with disabilities can enjoy them, and some parks are safer. SCAG conducted additional analysis on accessibility to parks for the 2012 RTP/SCS.

Three types of parks were considered for the environmental justice analysis: 1) local parks; 2) state parks; and 3) national parks. The acreage of each park type in all TAZs was identified. The underlying assumption is that the more acreage of parks that can be reached within a certain travel time and cost, the greater the park accessibility within a community.

Similar to the method for measuring job accessibility, park accessibility is defined as the percentage of park acreage reachable within 45 minutes of travel via 1) automobile; 2) local bus; and 3) all transit options. SCAG's existing typical weekday model was utilized for the analysis, as there is currently no weekend transportation model for the region.

RESULTS

The results of this park accessibility analysis by auto, local bus, and all transit modes within 45 minutes of travel are presented in following table and figures. General conclusions from the table and figures include:

- Park accessibility statistics indicate that park accessibility by transit is much lower than that by automobile for all groups. This is true for all parks, national, state, or local parks. By transit, there is almost no access to national parks, and very limited access to state parks in all scenarios—base year 2008, baseline, or under the plan. This observation is consistent with the conclusions of the 2008 RTP Environmental Justice report that there is a near complete lack of public transportation services into, in particular, the National Forests.
- Income quintiles IV and V will have moderately higher access to either state and/or local parks in the region via automobile. Population groups showing marginally lower accessibility to national parks by auto include: non-Hispanic black, income Quintile 1 and V, and population below poverty. As to state park accessibility by auto, all population groups show slightly lower than average accessibility except for non-Hispanic white and the two higher income quintile households. More Environmental Justice population groups, including Hispanics, non-Hispanic Asians, income Quintile 2, and the disabled population show higher than average accessibility to local parks than the average population in the region.
- In addition to elderly, non-Hispanic Native Americans and non-Hispanic other, further analysis should also focus on non-Hispanic blacks where their park accessibility by auto is below the average for all parks. However, the 2012 RTP/SCS provides improvements for these population groups than accessibility changes for the rest of the region's population groups.

EXHIBIT 17 Low-Income Households in 2008

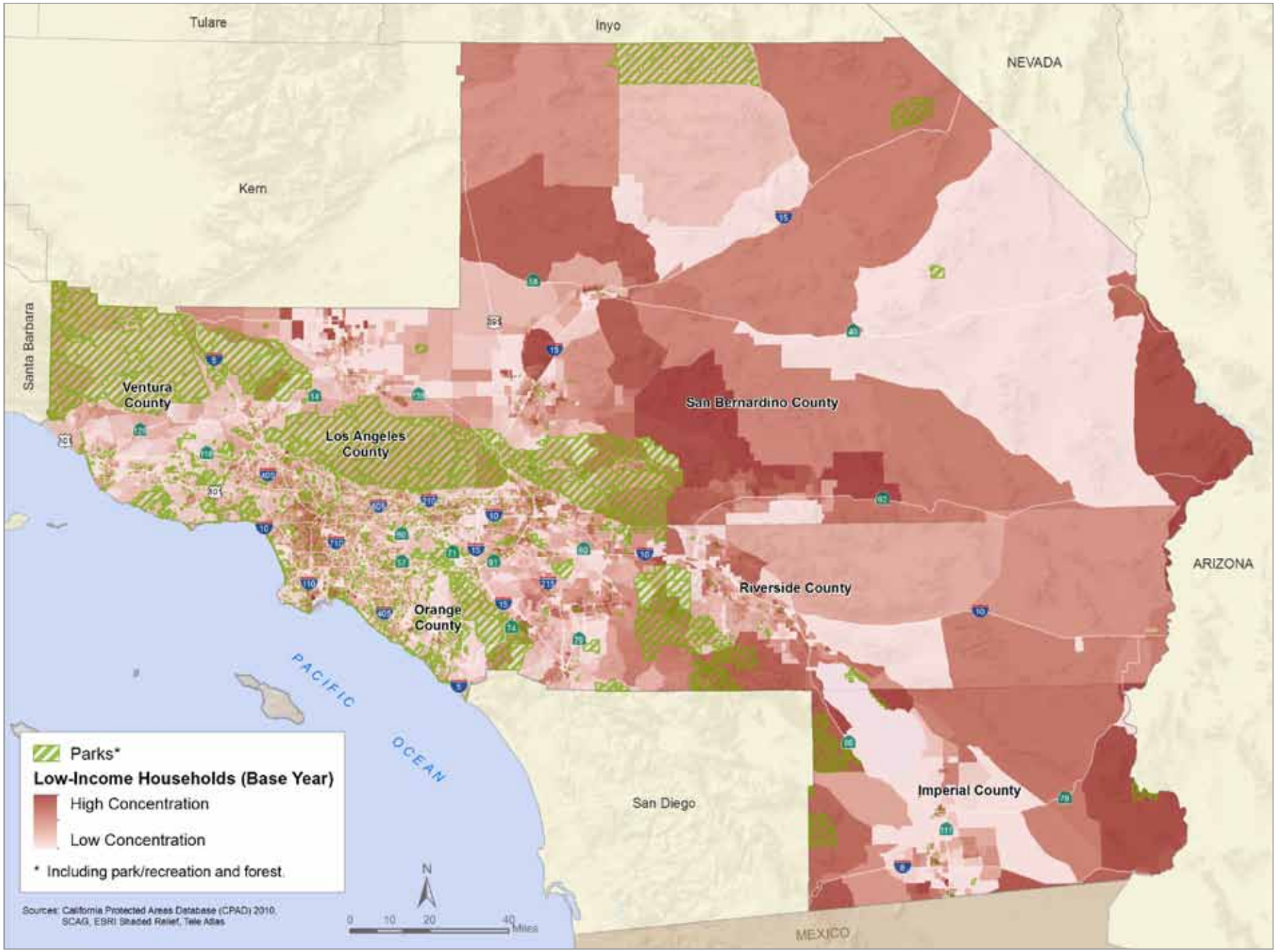


EXHIBIT 18 Minority Population in 2008

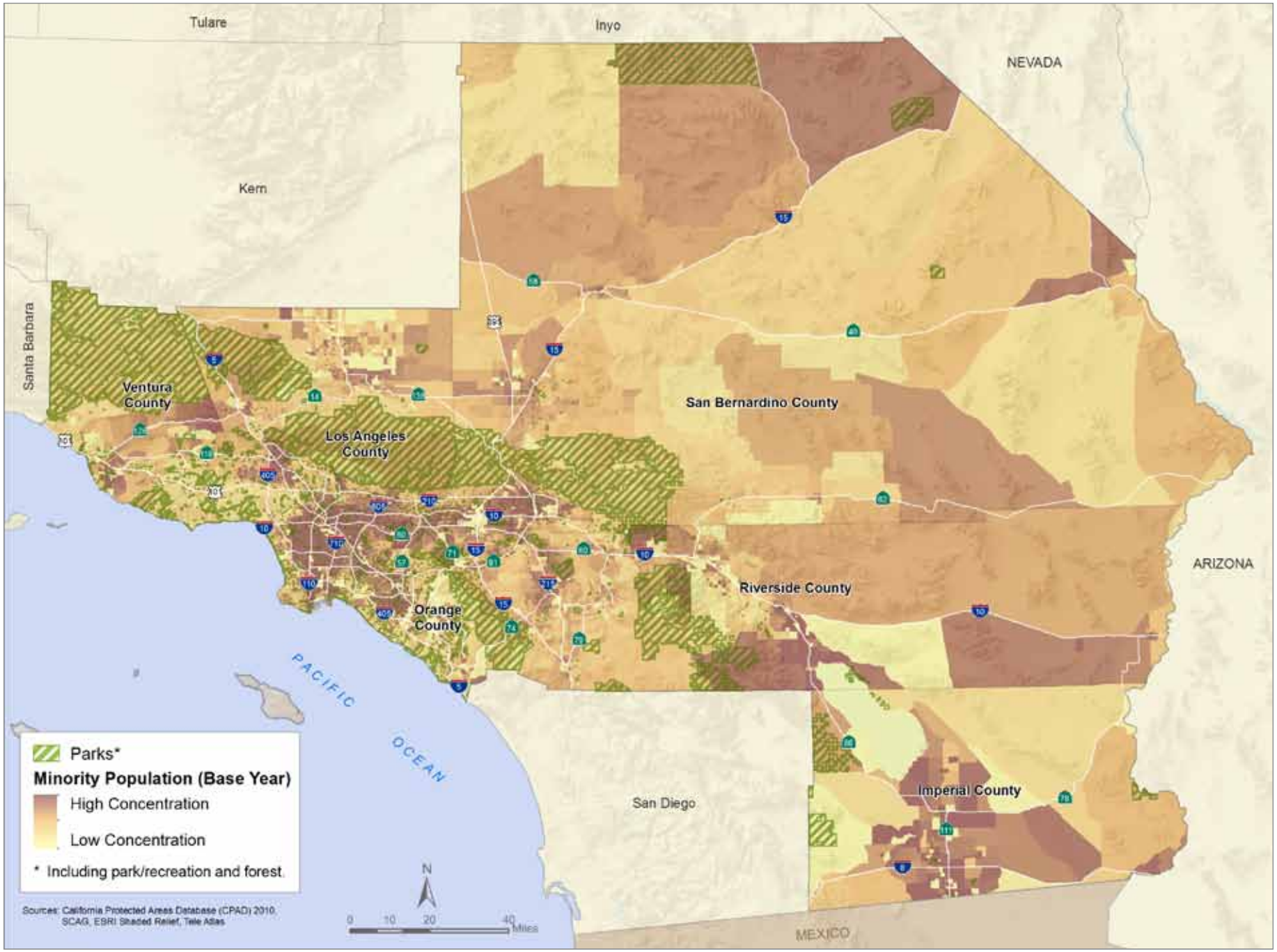


FIGURE 27 Park Accessibility by Automobile within 45 Minutes of Travel (2008)

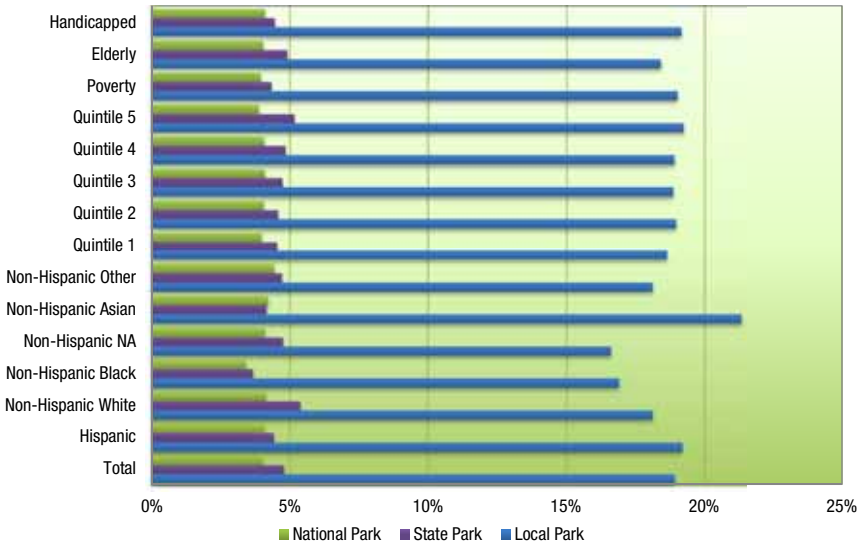


FIGURE 28 Park Accessibility by Bus within 45 Minutes of Travel (2008)

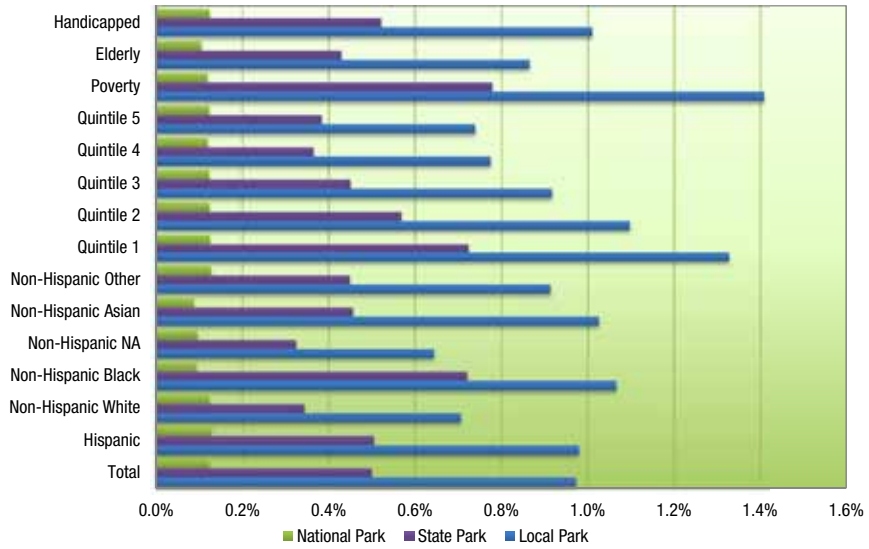


FIGURE 29 Park Accessibility by All Transit Mode within 45 Minutes of Travel (2008)

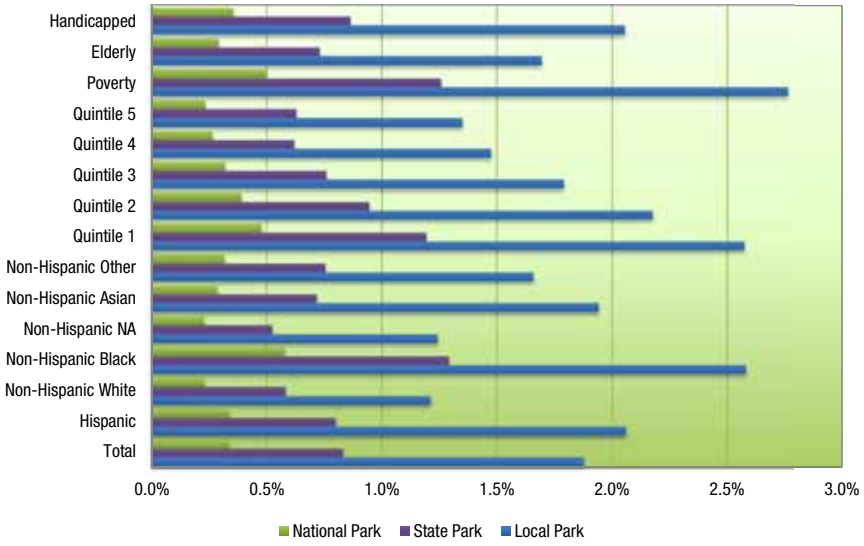


FIGURE 30 Improvements in Park Accessibility by Automobile within 45 Minutes of Travel

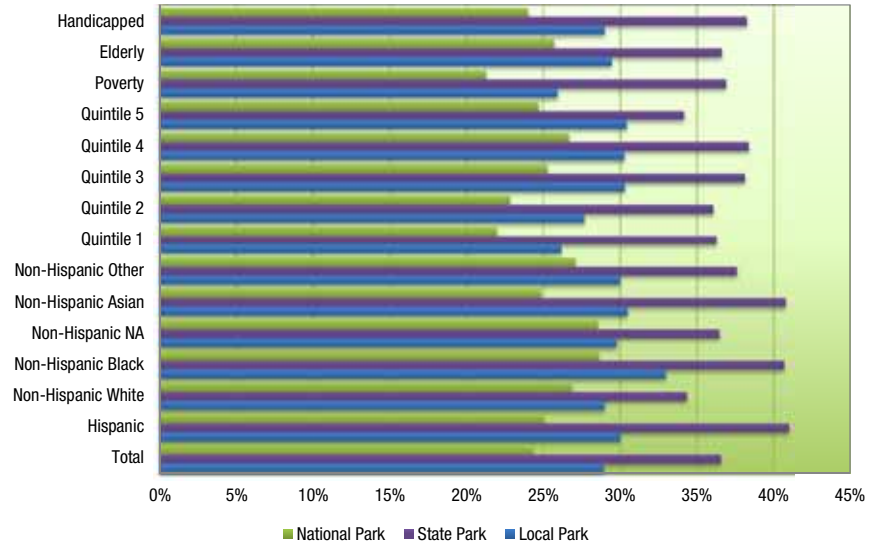


FIGURE 31 Improvements in Park Accessibility by Bus within 45 Minutes of Travel

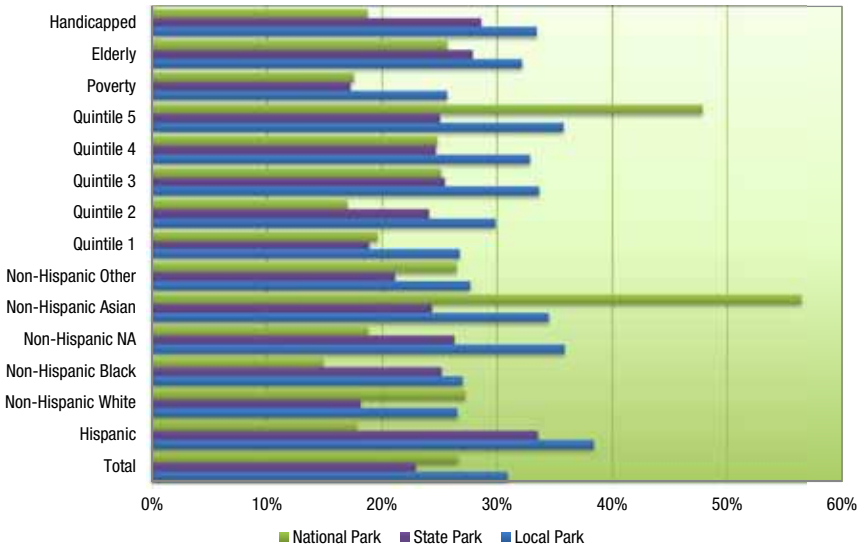


FIGURE 32 Improvements in Park Accessibility by All Transit within 45 Minutes of Travel

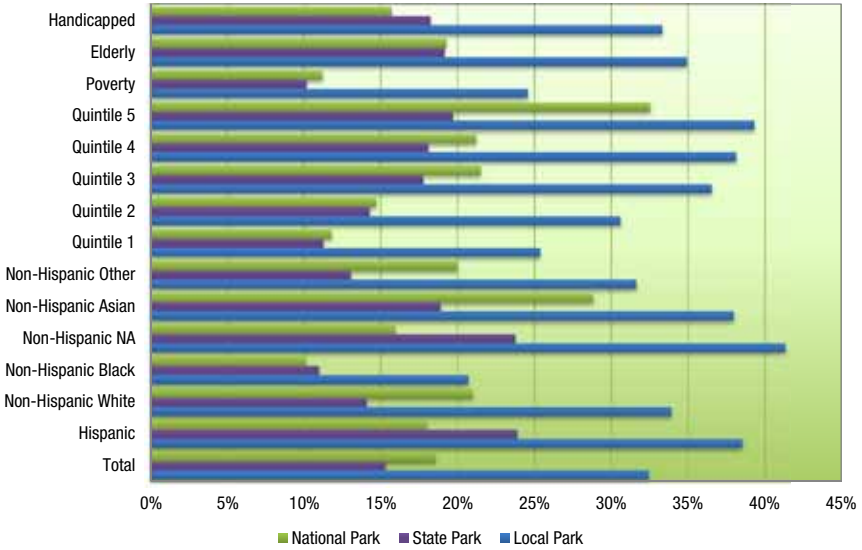


TABLE 27 2012 RTP/SCS Impacts on Park Accessibility (45 Minutes of Travel) by Ethnicity

2008	Total	Hispanic	Non-Hispanic White	Non-Hispanic Black	Non-Hispanic NA	Non-Hispanic Asian	Non-Hispanic Other
Auto Mode: 45 minutes							
Local Park	18.91%	19.17%	18.11%	16.88%	16.60%	21.31%	18.10%
State Park	4.77%	4.41%	5.37%	3.67%	4.74%	4.14%	4.72%
National Park	4.01%	4.06%	4.13%	3.40%	4.09%	4.21%	4.43%
Local Bus: 45 minutes							
Local Park	0.97%	0.98%	0.71%	1.07%	0.64%	1.02%	0.91%
State Park	0.50%	0.50%	0.34%	0.72%	0.32%	0.46%	0.45%
National Park	0.12%	0.13%	0.12%	0.09%	0.09%	0.09%	0.13%
All Transit: 45 minutes							
Local Park	1.88%	2.06%	1.21%	2.58%	1.24%	1.94%	1.66%
State Park	0.83%	0.80%	0.58%	1.29%	0.52%	0.72%	0.75%
National Park	0.34%	0.34%	0.23%	0.58%	0.23%	0.29%	0.32%
2035 Baseline	**Total**	**Hispanic**	**Non-Hispanic White**	**Non-Hispanic Black**	**Non-Hispanic NA**	**Non-Hispanic Asian**	**Non-Hispanic Other**
Auto Mode: 45 minutes							
Local Park	16.35%	16.35%	15.13%	13.98%	13.72%	18.78%	15.39%
State Park	4.16%	3.85%	4.68%	3.47%	4.16%	3.73%	4.20%
National Park	3.54%	3.52%	3.54%	3.22%	3.44%	3.75%	3.65%
Local Bus: 45 minutes							
Local Park	0.93%	0.87%	0.65%	0.88%	0.57%	0.97%	0.87%
State Park	0.47%	0.42%	0.33%	0.53%	0.30%	0.43%	0.43%
National Park	0.11%	0.11%	0.11%	0.08%	0.08%	0.09%	0.12%
All Transit: 45 minutes							
Local Park	1.80%	1.80%	1.14%	2.15%	1.12%	1.79%	1.57%
State Park	0.81%	0.72%	0.57%	0.99%	0.50%	0.69%	0.76%
National Park	0.30%	0.27%	0.20%	0.41%	0.19%	0.26%	0.28%

2035 Plan	Total	Hispanic	Non-Hispanic White	Non-Hispanic Black	Non-Hispanic NA	Non-Hispanic Asian	Non-Hispanic Other
Auto Mode: 45 minutes							
Local Park	21.08%	21.25%	19.52%	18.58%	17.81%	24.50%	20.01%
State Park	5.68%	5.43%	6.28%	4.88%	5.68%	5.25%	5.78%
National Park	4.40%	4.41%	4.49%	4.14%	4.42%	4.68%	4.64%
Local Bus: 45 minutes							
Local Park	1.22%	1.20%	0.83%	1.11%	0.78%	1.31%	1.11%
State Park	0.58%	0.56%	0.39%	0.67%	0.37%	0.54%	0.52%
National Park	0.14%	0.13%	0.14%	0.09%	0.09%	0.14%	0.15%
All Transit: 45 minutes							
Local Park	2.38%	2.49%	1.53%	2.59%	1.58%	2.47%	2.07%
State Park	0.93%	0.89%	0.65%	1.10%	0.61%	0.82%	0.86%
National Park	0.35%	0.32%	0.24%	0.46%	0.22%	0.33%	0.34%
2035 Plan - Baseline: Absolute Change	**Total**	**Hispanic**	**Non-Hispanic White**	**Non-Hispanic Black**	**Non-Hispanic NA**	**Non-Hispanic Asian**	**Non-Hispanic Other**
Auto Mode: 45 minutes							
Local Park	4.73%	4.90%	4.38%	4.61%	4.09%	5.72%	4.61%
State Park	1.52%	1.58%	1.61%	1.41%	1.52%	1.52%	1.58%
National Park	0.86%	0.88%	0.95%	0.92%	0.98%	0.93%	0.99%
Local Bus: 45 minutes							
Local Park	0.29%	0.33%	0.17%	0.24%	0.20%	0.34%	0.24%
State Park	0.11%	0.14%	0.06%	0.13%	0.08%	0.11%	0.09%
National Park	0.03%	0.02%	0.03%	0.01%	0.01%	0.05%	0.03%
All Transit: 45 minutes							
Local Park	0.58%	0.69%	0.39%	0.44%	0.46%	0.68%	0.50%
State Park	0.12%	0.17%	0.08%	0.11%	0.12%	0.13%	0.10%
National Park	0.06%	0.05%	0.04%	0.04%	0.03%	0.07%	0.06%

TABLE 27 *Continued*

2035 Plan – Baseline: % Change	Total	Hispanic	Non-Hispanic White	Non-Hispanic Black	Non-Hispanic NA	Non-Hispanic Asian	Non-Hispanic Other
Auto Mode: 45 minutes							
Local Park	28.9%	30.0%	29.0%	33.0%	29.8%	30.5%	30.0%
State Park	36.6%	41.0%	34.3%	40.7%	36.5%	40.8%	37.6%
National Park	24.3%	25.0%	26.8%	28.6%	28.5%	24.8%	27.1%
Local Bus: 45 minutes							
Local Park	30.9%	38.3%	26.5%	27.0%	35.8%	34.5%	27.6%
State Park	22.9%	33.5%	18.1%	25.2%	26.3%	24.3%	21.1%
National Park	26.6%	17.7%	27.2%	14.9%	18.8%	56.4%	26.5%
All Transit: 45 minutes							
Local Park	32.5%	38.5%	33.9%	20.7%	41.3%	38.0%	31.6%
State Park	15.3%	23.9%	14.1%	11.0%	23.7%	18.9%	13.0%
National Park	18.5%	18.0%	21.0%	10.1%	15.9%	28.8%	20.0%

TABLE 28 2012 RTP/SCS Impacts on Park Accessibility (45 Minutes of Travel) by Income Quintile

2008	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Auto Mode: 45 minutes					
Local Park	18.62%	18.96%	18.85%	18.90%	19.23%
State Park	4.54%	4.57%	4.72%	4.85%	5.16%
National Park	3.97%	4.04%	4.08%	4.07%	3.87%
Local Bus: 45 minutes					
Local Park	1.33%	1.10%	0.92%	0.77%	0.74%
State Park	0.72%	0.57%	0.45%	0.36%	0.38%
National Park	0.12%	0.12%	0.12%	0.12%	0.12%
All Transit: 45 minutes					
Local Park	2.57%	2.18%	1.79%	1.47%	1.35%
State Park	1.19%	0.94%	0.76%	0.62%	0.63%
National Park	0.48%	0.39%	0.32%	0.26%	0.23%
2035 Baseline	**Quintile 1**	**Quintile 2**	**Quintile 3**	**Quintile 4**	**Quintile 5**
Auto Mode: 45 minutes					
Local Park	16.78%	16.53%	16.06%	16.14%	16.26%
State Park	3.94%	4.05%	4.09%	4.20%	4.51%
National Park	3.55%	3.61%	3.58%	3.55%	3.44%
Local Bus: 45 minutes					
Local Park	1.37%	1.05%	0.87%	0.72%	0.66%
State Park	0.73%	0.52%	0.43%	0.34%	0.34%
National Park	0.11%	0.11%	0.11%	0.10%	0.10%
All Transit: 45 minutes					
Local Park	2.65%	2.08%	1.69%	1.36%	1.21%
State Park	1.22%	0.92%	0.75%	0.59%	0.57%
National Park	0.43%	0.34%	0.28%	0.23%	0.20%

TABLE 28 *Continued*

2035 Plan	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Auto Mode: 45 minutes					
Local Park	21.17%	21.10%	20.92%	21.03%	21.20%
State Park	5.36%	5.51%	5.65%	5.81%	6.05%
National Park	4.33%	4.43%	4.48%	4.49%	4.29%
Local Bus: 45 minutes					
Local Park	1.73%	1.36%	1.16%	0.95%	0.89%
State Park	0.86%	0.65%	0.53%	0.42%	0.43%
National Park	0.14%	0.13%	0.14%	0.13%	0.15%
All Transit: 45 minutes					
Local Park	3.32%	2.71%	2.30%	1.88%	1.69%
State Park	1.36%	1.05%	0.88%	0.70%	0.69%
National Park	0.49%	0.39%	0.34%	0.27%	0.27%
2035 Plan - Baseline: Absolute Change	**Quintile 1**	**Quintile 2**	**Quintile 3**	**Quintile 4**	**Quintile 5**
Auto Mode: 45 minutes					
Local Park	4.39%	4.57%	4.86%	4.89%	4.95%
State Park	1.43%	1.46%	1.56%	1.61%	1.54%
National Park	0.78%	0.82%	0.90%	0.95%	0.85%
Local Bus: 45 minutes					
Local Park	0.36%	0.31%	0.29%	0.24%	0.24%
State Park	0.14%	0.13%	0.11%	0.08%	0.09%
National Park	0.02%	0.02%	0.03%	0.03%	0.05%
All Transit: 45 minutes					
Local Park	0.67%	0.63%	0.62%	0.52%	0.48%
State Park	0.14%	0.13%	0.13%	0.11%	0.11%
National Park	0.05%	0.05%	0.06%	0.05%	0.07%

TABLE 28 *Continued*

2035 Plan - Baseline: % Change	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Auto Mode: 45 minutes					
Local Park	26.2%	27.7%	30.3%	30.3%	30.4%
State Park	36.3%	36.1%	38.1%	38.4%	34.2%
National Park	22.0%	22.8%	25.2%	26.7%	24.7%
Local Bus: 45 minutes					
Local Park	26.7%	29.8%	33.6%	32.8%	35.7%
State Park	18.8%	24.1%	25.4%	24.6%	25.0%
National Park	19.6%	17.0%	25.1%	24.8%	47.8%
All Transit: 45 minutes					
Local Park	25.4%	30.6%	36.5%	38.1%	39.3%
State Park	11.2%	14.2%	17.7%	18.1%	19.7%
National Park	11.8%	14.7%	21.5%	21.2%	32.5%

TABLE 29 2012 RTP/SCS Impacts on Park Accessibility (45 Minutes of Travel) by Population in Need

2008	Poverty	Elderly	Handicapped
Auto Mode: 45 minutes			
Local Park	19.01%	18.40%	19.14%
State Park	4.33%	4.90%	4.44%
National Park	3.94%	4.04%	4.10%
Local Bus: 45 minutes			
Local Park	1.41%	0.86%	1.01%
State Park	0.78%	0.43%	0.52%
National Park	0.12%	0.10%	0.12%
All Transit: 45 minutes			
Local Park	2.76%	1.69%	2.06%
State Park	1.26%	0.73%	0.86%
National Park	0.50%	0.29%	0.35%

2035 Baseline	Poverty	Elderly	Handicapped
Auto Mode: 45 minutes			
Local Park	16.80%	16.01%	16.61%
State Park	3.87%	4.16%	3.88%
National Park	3.55%	3.51%	3.59%
Local Bus: 45 minutes			
Local Park	1.39%	0.81%	0.95%
State Park	0.75%	0.39%	0.47%
National Park	0.11%	0.09%	0.11%
All Transit: 45 minutes			
Local Park	2.69%	1.60%	1.94%
State Park	1.24%	0.68%	0.82%
National Park	0.43%	0.25%	0.30%

2035 Plan	Poverty	Elderly	Handicapped
Auto Mode: 45 minutes			
Local Park	21.15%	20.72%	21.43%
State Park	5.30%	5.68%	5.36%
National Park	4.31%	4.42%	4.45%
Local Bus: 45 minutes			
Local Park	1.75%	1.08%	1.27%
State Park	0.88%	0.50%	0.60%
National Park	0.13%	0.12%	0.13%
All Transit: 45 minutes			
Local Park	3.35%	2.15%	2.59%
State Park	1.36%	0.81%	0.97%
National Park	0.48%	0.29%	0.34%

2035 Plan - Baseline: Absolute Change	Poverty	Elderly	Handicapped
Auto Mode: 45 minutes			
Local Park	4.35%	4.71%	4.81%
State Park	1.43%	1.52%	1.48%
National Park	0.75%	0.90%	0.86%
Local Bus: 45 minutes			
Local Park	0.36%	0.26%	0.32%
State Park	0.13%	0.11%	0.13%
National Park	0.02%	0.02%	0.02%
All Transit: 45 minutes			
Local Park	0.66%	0.56%	0.65%
State Park	0.13%	0.13%	0.15%
National Park	0.05%	0.05%	0.05%

2035 Plan – Baseline: % Change	Poverty	Elderly	Handicapped
Auto Mode: 45 minutes			
Local Park	25.9%	29.4%	29.0%
State Park	36.9%	36.6%	38.2%
National Park	21.3%	25.7%	24.0%
Local Bus: 45 minutes			
Local Park	25.6%	32.1%	33.4%
State Park	17.2%	27.8%	28.6%
National Park	17.5%	25.6%	18.7%
All Transit: 45 minutes			
Local Park	24.6%	34.9%	33.3%
State Park	10.2%	19.1%	18.2%
National Park	11.2%	19.2%	15.7%

(9) Gentrification and Displacement

The major land use strategy which integrates with the existing and planned transportation investments recommended in the 2012 RTP/SCS is to follow the emerging demographic trends and to collaborate with local jurisdictions to encourage future growth around high quality transit areas (HQTA). According to the 2012 RTP/SCS recommended land use scenario, the strategy calls for placing over 50 percent of future growth in households and therefore population (782,000, or 52 percent) and employment (905,000, or 53 percent) in the high quality transit areas.

While the SCAG region population is increasingly using transit and showing more interest in living in transit-rich neighborhoods, this favored trend is tempered by a growing concern about gentrification and displacement. Will current neighborhood residents, many of them low income and/or people of color, benefit from planned transit investment, stations, and many other amenities that come with transit-induced neighborhood revitalization? Or will they be displaced by more affluent and less diverse residents because of new development near transit areas is unaffordable? Planners and policymakers have to prepare to address this undesired outcome if transit investment and expansion inevitably lead to gentrification and displacement.

It is important first to understand whether gentrification and displacement are actually occurring in high quality transit areas or neighborhoods. This part of the analysis will follow the methodology and framework from the report, "Maintaining Diversity in America's Transit Rich Neighborhood-Tools for Equitable Neighborhood Change," by Stephanie Pollack, Barry Bluestone, and Chase Billingham, October 2010, a Report Prepared by the Dukakis Center for Urban and Regional Policy at Northeastern University. In this analysis, SCAG staff processed the key indicators related to changes in neighborhood characteristics from 2000 Census and from the more recent 2005–09 American Community Survey (ACS) for the HQTA and the rest of the region to test if there exists any indications or concerns for potential or actual displacement or gentrification.

This analysis will also look into the characteristics of the population in the high quality transit areas including the population by income and ethnicity and their travel behavior. We will accomplish this by using the data from the National Household Travel Survey (NHTS).

In the third part of the discussion on this particular performance area, staff has developed a statistical model/tool based primarily on the NHTS data to quantify the potential benefits from the land use strategy recommended in the 2012 RTP/SCS. The statistical model is designed to complement the regional transportation model so that it can capture land use and the so-called "D"—design, density, diversity, destination, and accessibility factors for a more refined growth allocation at the parcel level, as well as growth redirected into HQTAs which has been hard for the regional model to capture.

There have been recent concerns raised by environmental groups, the heath community, housing and air quality regulation agencies about incompatible land uses, including sensitive receptors such as hospitals, senior/day care centers, and housing near freeways and busy roadway buffer areas. The 2012 RTP/SCS land use strategy calls for redirecting future growth into HQTA. Inevitably, part of this growth will occur in areas where the HQTA overlaps with 500 feet freeway buffer areas. According to land use statistics of the 2012 RTP/SCS, 8.1 percent of the new housing units added to HQTA areas from 2008 - 2035, fall within the 500 feet freeway buffer areas. In the last part of this section, staff will provide statistics to document the recent growth and socioeconomic profile within the 500 feet freeway buffer areas.

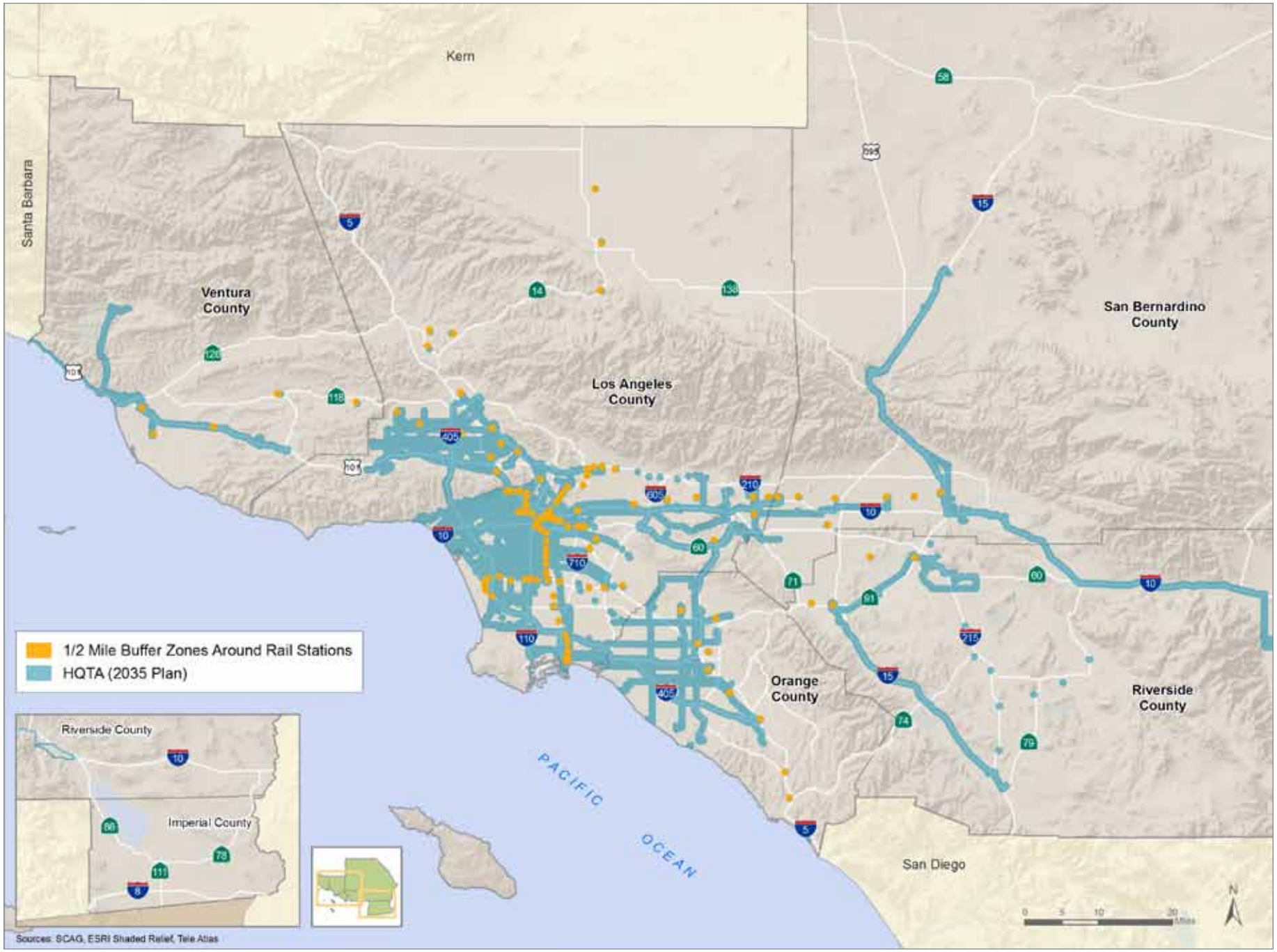
It is logical to expect an increase in local traffic and congestion as a result of the compact development pattern in HQTA. Staff observed from regional modeling about increases in local congestion from various compact land use scenarios in previous RTPs. However, an initial examination of traffic delays for principal, minor arterials and major and minor collectors shows that there are net delay increases at both the regional and county levels. Staff will investigate detailed link-based traffic outcomes from the regional 4-step transportation model to investigate local traffic conditions around the HQTA and to assess the impacts on environmental justice. This additional task may be completed before the adoption of final 2012 RTP/SCS in April 2012.

HQTA: RECENT GROWTH AND CHARACTERISTICS—EVIDENCE FROM 2000 CENSUS AND 2005–09 ACS

The following research question was examined: will transit investment change the surrounding neighborhood? While patterns of neighborhood change vary, the most predominant pattern is one in which housing becomes more expensive, neighborhood residents become wealthier and vehicle ownership becomes more common. In some of the newly transit rich neighborhoods, the research reveals how a new transit station can set in motion a cycle of unintended consequences in which core transit users—(e.g. renters and low income households)—are priced out in favor of higher-income, car-owning residents who are less likely to use public transit for commuting.

In order to assess whether HQTA are moving toward more desirable, sustainable, and livable communities and their likely impacts, staff applied block group data processed from the 2000 Census and the 2005–09 ACS, and calculated a set of performance indicators for both HQTA and the other areas for comparison. Staff demonstrated some observed trends between the two time periods to evaluate the changes in HQTA. In addition, staff designed the research to understand the impacts from different types of HQTA, specifically areas around rail stations versus other areas such as bus, or corridors. Staff also identified existing HQTA as well as those proposed in the 2012 RTP. The following performance indicators were developed for five categories: (1) Growth, (2) Economies, (3) Equity, (4) Sustainability, and (5) Transportation collected data for 125 rail stations.

EXHIBIT 19 High Quality Transit Areas (HQTA)



Performance Indicator 1: Growth

TABLE 30 Growth

	Total	Non HQTA	HQTA	TOC	Rest HQTA (HQTA-TOC)
Population from 2000 Census	16,516,006	10,118,314	6,397,692	621,842	5,775,850
Population from 2005–09 ACS	17,737,412	11,227,449	6,509,963	642,379	5,867,584
Growth	7.4%	11.0%	1.8%	3.3%	1.6%
Household					
2000 Census	5,386,491	3,303,532	2,082,959	200,865	1,882,094
2005–09 ACS	5,689,831	3,576,167	2,113,664	210,620	1,903,044
Growth	5.6%	8.3%	1.5%	4.9%	1.1%

Source: SCAG staff process 2000 Census and 2005–09 ACS data

Based on the above research, the following observations can be made:

- The growth rates of population and households in HQTA (1.8 percent) was much lower than the growth rates in the whole region and in the rest of non-HQTA.
- Within HQTA, the growth rate in rail stations was much faster than in the rest of HQTA. Comparing data between 2000 Census and 2005–09 ACS data, population growth in TOC was more than twice as fast as the growth in the rest of the HQTA (3.3 percent versus 1.6 percent) , and more than four times higher than the household growth rate registered in the TOC than recorded in the rest of the non-TOC HQTA.

Comparisons in other performance indicators in sections below will focus on TOC versus the region as a whole or non-TOC areas.

Performance Indicator 2: Economies

TABLE 31 Economies

	Total	Non HQTA	HQTA	TOC	Rest HQTA (HQTA-TOC)
Workers from 2000 Census	6,810,823	4,297,437	2,513,386	227,563	2,285,823
Workers from 2005–09 ACS	8,082,681	5,070,136	3,012,545	286,368	2,726,177
Growth	18.7%	18.0%	19.9%	25.8%	19.3%
Jobs					
2000 Census	6,661,287	3,343,874	3,317,413	1,104,873	2,212,540
2005–09 ACS	7,193,159	3,664,853	3,528,306	1,173,754	2,354,552
Growth	8.0%	9.6%	6.4%	6.2%	6.4%
Median Household Income					
2000 Census	$50,855	$57,046	$41,037	$33,024	$41,892
2005–09 ACS	$49,022	$54,462	$39,818	$33,267	$40,543
Growth	-3.60%	-4.50%	-3.00%	0.70%	-3.20%

Source: SCAG staff process 2000 Census and 2005–09 ACS data

The above table illustrates the following trends:

- Median household income in the TOC areas is less than the income in non-TOC areas, however, the median household income was almost unchanged between 2000 and 2005–09 period. In contrast, all other places experienced declines of between 3 percent to 4.5 percent in median household income.
- The statistics show higher growth in the number of workers in TOC areas, however, slower growth in jobs than those in the non-TOC areas.

Performance Indicator 3: Equity & Ethnicity

- There is no dominant difference in age distribution between TOC areas and the SCAG region, and between the two time periods.
- The share of Hispanic population is about 13 percentage points higher in the TOC areas than in the SCAG region.

TABLE 32 Equity & Ethnicity

SCAG			TOC		
% Age	2000	2005–09	% Age	2000	2005–09
<5	7.8%	7.6%	<5	8.5%	7.6%
5-15	17.8%	16.3%	5-15	17.6%	15.4%
16-64	64.4%	65.8%	16-64	65.0%	67.6%
>65	9.9%	10.4%	>65	8.9%	9.4%
All	100.0%	100.0%	All	100.0%	100.0%
% Hispanic	40.6%	44.2%	% Hispanic	54.0%	56.6%

Performance Indicator 4: Sustainability

Based on an analysis of sustainability, the following observations can be made about households without a vehicle in transit oriented communities versus the rest of the region.

- In 2000, nearly a quarter of households in the TOC areas don't own automobiles compared with about 10 percent zero-vehicle households for the region as a whole.
- The percent of zero-vehicle households declined significantly region-wide between 2000 and 2005–09 ACS. As indicated in the figure households without vehicles dropped by almost 7 percentage points compared with a 3 percentage point decline in the region. As a result, the average number of household vehicles increased by 13 percent in the TOC areas and by just 8 percent for the whole region.

TABLE 33 Sustainability

SCAG			TOC		
# of Vehicles	2000	2005–09	# of Vehicles	2000	2005–09
0	10%	7%	0	25%	18%
1	35%	32%	1	40%	40%
2	37%	37%	2	25%	29%
3+	18%	23%	3+	11%	14%
Vehicle/ Household	1.63	1.76	Vehicle/ Household	1.22	1.38

Performance Indicator 5: Transportation

Transportation indicators for the TOC areas are derived from the NHTS data. With about 6,700 households and 15,000 individual samples, the 2009 NHTA dataset provides valuable and sufficient observations to analyze both demographic and travel characteristics of the SCAG region and the TOC areas. In order to understand the demographic/travel characteristics of the TOC areas in detail, staff analyzed the NHTS household dataset with ¼, ½, and 1 mile buffer zones for the 125 rail stations around the region. The following subsection summarizes the socioeconomics of TOC areas.

1. TOC HOUSEHOLD CHARACTERISTICS

- Smaller household size in TOC areas
- Higher percentage of 1-person households and households without children
- More households with workers than in the region as a whole

TABLE 34 TOC Household Characteristics

	Household Size	% 1 person	% No Kids	% 1 Person HH, Retired	% 2 Person + HH, Retired	% HH with Workers
TOC-1/4	2.28	44.6	46.4	19.6	7.1	59%
TOC-1/2	2.60	35.6	38.3	16.3	13.6	52%
TOC-1	2.80	28.4	34.8	13.4	17.0	49%
SCAG	2.82	22.3	30.2	12.0	24.4	49%

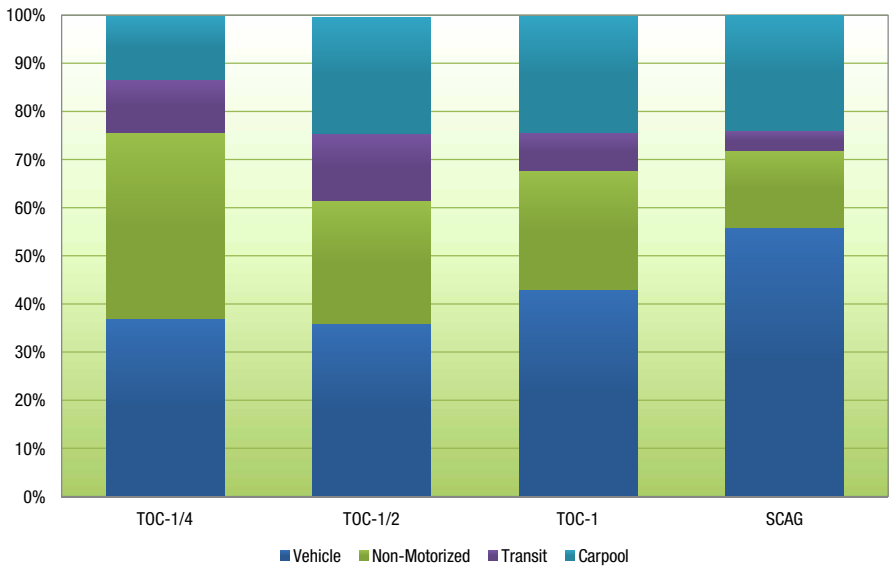
2. TOC TRAVEL CHARACTERISTICS

- Households in TOC areas show less traveled and drove than the region as a whole.
- The statistics indicate that the travel behaviors are proportionally shifts (increases) as distance of the buffer areas increase.
- People in TOC areas use more non-motorized transportation and transit, less auto as their transportation mode.

TABLE 35 TOC Travel Characteristics

	Trips	Trip Distance	# of Vehicle Trips	VMT
TOC-1/4	5.5	26.0	2.0	16.6
TOC-1/2	7.3	34.9	2.6	16.8
TOC-1	7.9	42.7	3.4	23.7
SCAG	8.5	57.5	4.7	35.9

FIGURE 33 Mode Shares: TOC vs. SCAG Region



- 3. TOC Travel Characteristics: Hispanic vs. Non-Hispanic Compared with Non-Hispanic households, Hispanic households have larger household size and lower household income
- Compared to the SCAG region, both Hispanic and Non-Hispanic in the TOC areas showed similar travel patterns: less total trips, use less autos and less VMT

TABLE 36 TOC Travel Characteristics: Hispanic vs. Non-Hispanic

	% Household		Household Size		Household Income		Trips		VMT	
	Hispanic	Non-Hispanic	Hispanic	Non-Hispanic	Hispanic	Non-Hispanic	Hispanic	Non-Hispanic	Hispanic	Non-Hispanic
TOC-1/4	54%	46%	2.75	1.73	$17,040	$36,370	5.1	5.8	10.7	23.7
TOC-1/2	58%	42%	3.07	1.95	$18,070	$35,100	6.3	8.0	14.0	20.5
TOC-1	50%	50%	3.42	2.18	$21,400	$39,630	6.9	8.8	19.2	28.2
SCAG	35%	65%	3.59	2.41	$28,880	$49,060	7.9	9.6	30.5	38.8

4. AUTO OWNERSHIP

- Compared with the SCAG region, the households in TOC areas own fewer vehicles. About 20 percent of the TOC households don't own a car, twice that of the SCAG region.

FIGURE 34 Transportation - Auto Ownership - Average Household Vehicles

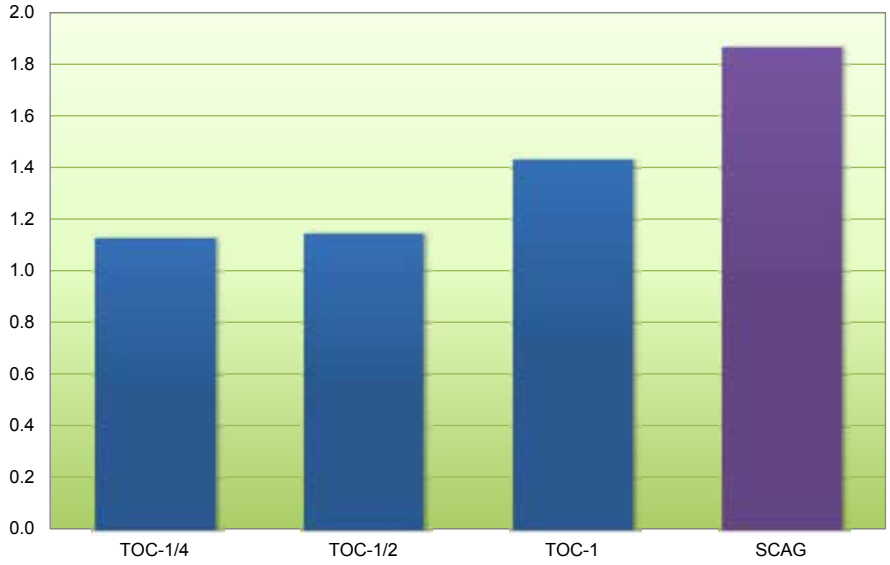
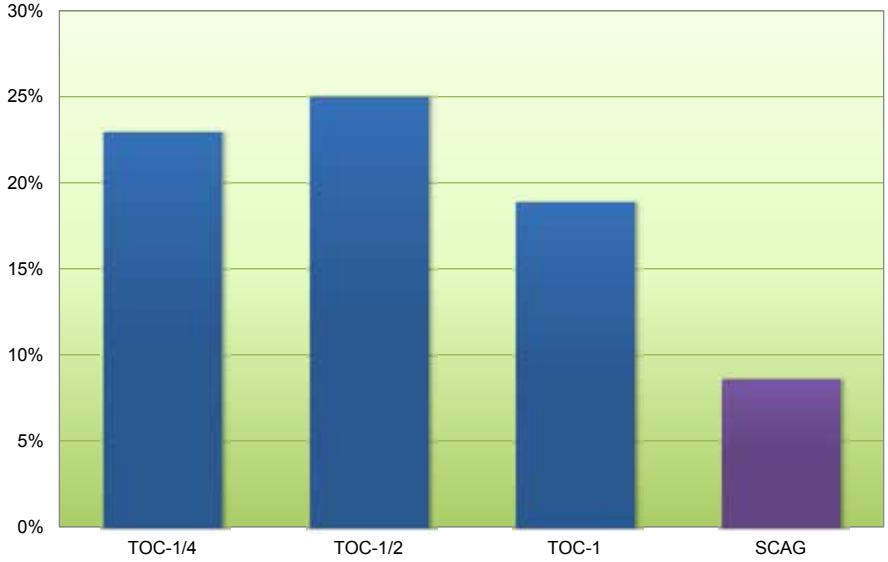


FIGURE 35 Transportation - Auto Ownership - Percent of Households without a Car



5. COMMUTING DISTANCE BY VEHICLE

The analysis of commuting distance by vehicle shows the following:

- Total commuting distance is much shorter for workers in TOC areas than for workers in the rest of the region
- Regionwide, 86 percent of total commuting distance is completed by automobile, compared with just 30 percent of total commuting distance for workers in TOC areas by autos.

TABLE 37 Transportation - Commuting Distance by Vehicle

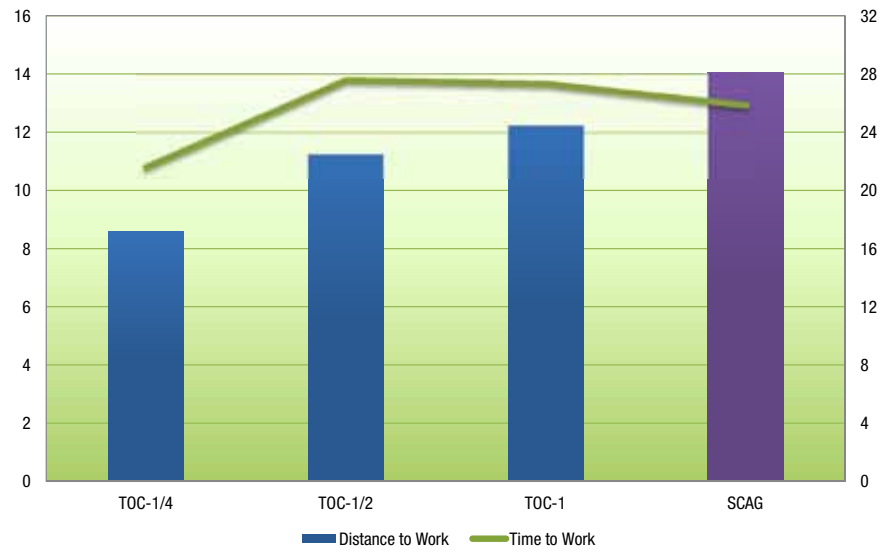
	Vehicles	Total	VMT/Total Distance
TOC-1/4	4.1	13.6	30%
TOC-1/2	9.7	19.2	51%
TOC-1	16.5	21.5	77%
SCAG	19.2	22.4	86%

6. COMMUTING DISTANCE AND TIME

The following observations can be made about commuting distance and time:

- Workers in TOC areas commute a much shorter distance but spend about the same time in commuting.

FIGURE 36 Transportation – Commuting Distance and Time



EVIDENCE OF GENTRIFICATION/DISPLACEMENT IN HQTA/TOC AREAS

Based on the literature review, seven indicators (see table below) were selected to assess early signs of likely effects of displacement or gentrification through growth in the HQTA or TOC areas. These indicators include:

- Percent of minority population
- Poverty rate
- Share of 65+ population
- Percent of households without car
- Percent of non-English speaking
- Population without a high school diploma
- Percent of renters

As indicated in the table, directional and magnitude changes in several indicators are troublesome. For example,

- Poverty rates declines more in the HQTA/TOC areas than in the rest of the region. This may be the result of low income people moving out of these areas (gentrification/displacements) or higher income people moving in.
- Households without car declined significantly and more in HQTA/TOC areas than in the rest of the region. This could be due to either low income people moving out, or more affluent people moving in or the combination of the two.
- The Non-English speaking population is normally associated with immigrants, low income households, or transit dependent peoples. Similarly, the percent of the adult population without a high school diploma is also overlapping with the demographic and transportation characteristics observed from the population in HQTA or TOC areas. Thus, the declines in the shares of non-English speaking households and/or people without high school diplomas are signals either of the disappearance of that population or a significant increase in the more affluent population.

TABLE 38 Gentrification/Displacement Related Indicators

2000 Census	Total	Non HQTA	Whole HQTA	TOC	Rest HQTA (HQTA-TOC)	p-value
Minorities	61.3%	53.0%	74.5%	77.2%	74.2%	***
Poverty	13.1%	9.8%	18.2%	22.7%	17.8%	***
Seniors (+65)	9.9%	10.5%	9.0%	8.9%	9.0%	***1
Households w/o car	10.1%	6.5%	15.7%	24.6%	14.7%	***
Non-English speaker	4.5%	2.9%	6.9%	8.5%	6.7%	***
Below High School	27.1%	21.7%	36.0%	41.2%	35.5%	***
Rented	42.6%	32.3%	59.3%	65.8%	58.6%	***

p-value is for ANOVA tests among Non-TPP, TOC, and Rest TPP *P-value: * p<0.05; ** p<0.01; *** p<0.001* *1: No difference between TOC and Rest TPP*

2005–09 ACS	Total	Non HQTA	Whole HQTA	TOC	Rest HQTA (HQTA-TOC)	p-value
Minorities	64.8%	58.7%	75.4%	77.6%	75.2%	***
Poverty	12.1%	9.6%	16.4%	20.5%	15.9%	***
Seniors (+65)	10.4%	10.9%	9.5%	9.4%	9.5%	***
Households w/o car	7.4%	4.7%	11.9%	17.9%	11.3%	***
Non-English speaker	4.7%	3.2%	7.3%	8.0%	7.2%	***
Below High School	22.4%	18.5%	29.2%	32.2%	28.9%	***
Rented	40.8%	31.0%	57.7%	64.0%	57.0%	***

p-value is for ANOVA tests among Non-TPP, TOC, and Rest TPP *P-value: * p<0.05; ** p<0.01; *** p<0.001* *1: No difference between TOC and Rest TPP*

Absolute Changes	Total	Non HQTA	Whole HQTA	TOC	Rest HQTA (HQTA-TOC)	p-value
Minorities	3.5%	5.7%	0.9%	0.4%	1.0%	***1
Poverty	-1.0%	-0.2%	-1.9%	-2.2%	-1.9%	***1
Seniors (+65)	0.4%	0.4%	0.5%	0.4%	0.5%	*2
Households w/o car	-2.7%	-1.8%	-3.8%	-6.7%	-3.5%	***
Non-English speaker	0.3%	0.3%	0.4%	-0.5%	0.5%	***1
Below High School	-4.7%	-3.2%	-6.8%	-9.0%	-6.6%	***1
Rented	-1.8%	-1.2%	-1.5%	-1.8%	-1.5%	***2

p-value is for ANOVA tests among Non-TPP, TOC, and Rest TPP *P-value: * p<0.05; ** p<0.01; *** p<0.001* *1: No difference between TOC and Rest TPP* *2: No difference between Non-TOC and Rest TPP*

SCAG recognizes the risk that transit investment could catalyze undesirable neighborhood change is substantial enough that it needs to be managed whenever transit investments or improvements are being planned. Thus, we will continue use the methodology and framework in this report to monitor the growth trends of those indicators in the HQTA and TOC areas. The 2012 RTP/SCS Environmental Justice report also presents a toolkit of policy tools for shaping equitable neighborhood change in HQTA and TOC areas. These are tools that are increasingly available and in use across the country.

DEVELOP AN ENHANCED SCAG LOCAL SUSTAINABILITY PLANNING TOOL[5]

Based on the "4D" principles (density, destination, accessibility, diversity, etc.), SCAG has developed the Local Sustainability Planning Tool (LSPT) which was used for extensive outreach process to help local jurisdictions to explore land use benefits. As part of enhancement to the LSPT, SCAG recently developed a module from National Household Travel Survey (NHTS) data to analyze land use strategies and capture additional VMT reduction benefits for the 2012 RTP/SCS. The enhanced module provides key input to the SCAG Local Sustainability Planning Tool such as the VMT and GHG impacts of land use variations. The enhanced LSPT with the NHTS Module also complements the Regional Travel Demand Model so that it can capture land use and the so-called "4Ds" factors for a more refined growth allocation at the parcel level, as well as growth redirected into High Quality Transit Areas (HQTAs) which are not designed for the regional transportation model to capture. Lastly, this supplemental tool can help monitor socioeconomic data and travel behavior at the parcel level, addressing some environmental justice concerns.

(10) Environmental Impact Analyses (Air, Health, Noise)

HISTORICAL AIR QUALITY AND HEALTH IMPACTS

Exposure to air pollutants is an environmental justice issue due to the disproportionate share of minority and low-income populations living in close proximity to heavily traveled corridors, particularly near port and logistics activity. This exposure to unhealthy air results in 5,000 premature deaths and 140,000 children with asthma and respiratory symptoms. More than half of Americans exposed to $PM_{2.5}$ pollution exceeding the national standard reside in the SCAG region.[6]

New to the Title VI and Environmental Justice analysis for the 2012 RTP/SCS, SCAG has mapped exposure to ozone, concentration of particulate matter emissions, cancer risks, and respiratory hazard risks. In order to assess the impact of emissions on various demographic groups throughout the region, emissions information was summarized to the Environmental Justice communities.

Air pollution comes from many different sources and can be classified into two types: ozone pollution and particulate matter. Ozone pollution takes a gaseous form and is generated as vapor emitted from fuel commonly used in vehicles, industrial processes, etc. Ozone is formed by the reaction between volatile organic compounds (VOC) and oxides of nitrogen (NO_X) in the presence of sunlight. Ozone negatively impacts the respiratory system. Particulate matter (PM_{10} and $PM_{2.5}$) are very fine particles made up of materials such as soot, ash, chemicals, metals, and fuel exhaust that are released into the atmosphere. Particulate pollution has been linked to significant health problems, including aggravated asthma, increases in adverse respiratory problems, chronic bronchitis, decreased lung function, and premature death.

EXHIBIT 20 shows the average daily ozone exposure that is in excess of the national 8 hour standard (0.075 parts per million [ppm]) in the SCAG Region for years 2004–06. Although the region as a whole largely experiences average daily ozone exposure exceeding the federal standard, the highest concentration of ozone exposure can be seen mostly in southwest San Bernardino and northwest Riverside counties, and also in north Los Angeles County. **EXHIBIT 21** shows the same emissions factor for years 2007–09. In comparing these figures, it can be seen that average daily ozone exposure has decreased in most areas across the region between these two study periods. Indeed, the regional average declined from 0.18 ppm to 0.14 ppm (22 percent) during this time. The geographic distribution of ozone exposure, however, largely remained the same with the highest concentrations still prevalent in north Los Angeles County and western San Bernardino and Riverside counties.

[5] For a detailed description and technical report on the development of the NHTS Module, please see the Performance Measure Appendix and its sub-appendix, which includes the full technical report.

[6] California Air Resources Board, South Coast Air Quality Management District, and Southern California Association of Governments. Powering the Future. August 2011.

EXHIBIT 22 displays the number of days that exceeded the federal 8 hour standard of ozone exposure in the SCAG region for the period of 2004–06. The areas with the lowest number of days are in south Los Angeles County, south Ventura County, east San Bernardino County, and east Imperial County. The areas that have the highest number of days that exceed the federal ozone exposure standard are north Ventura County, west San Bernardino County (including the high and low desert areas), west Riverside County (including parts of the Coachella Valley), and west Imperial County. **EXHIBIT 23** shows the same data element for years 2007–09. When these maps are compared side-by-side, it can be seen that the intensification of this factor has decreased over time, but the geographic distribution has remained quite similar.

Along with information on ozone emissions, SCAG was able to obtain data from the California Air Resources Board (ARB) showing particulate matter pollution throughout the region for years 2004–06 and 2007–09. **EXHIBIT 24** shows the average annual exposure to particulate matter smaller than 2.5 micrometers ($PM_{2.5}$) for years 2004–06. South Los Angeles County, northeast Orange County, southwest San Bernardino County, and northwest Riverside County experienced the highest average annual exposure to $PM_{2.5}$, with average rates ranging from 14.6 to 21.4 micrograms of $PM_{2.5}$ per cubic meter of air (ug/m3). Other high exposure areas include north Los Angeles County, east Ventura County (along the US 101 corridor), central Orange County, central Riverside County (Coachella Valley), and central Imperial County (Imperial Valley basin). Also included in this group are the areas in San Bernardino and Riverside County that are directly outside of the highest intensity areas identified previously that fall between the SR 74, I-15, and I-215 corridors. **EXHIBIT 25** shows this same data element for years 2007–09. As is seen in this figure, the average annual concentration of $PM_{2.5}$ decreased in both numbers and geographic intensity from 2004–06 to 2007–09. The communities with the highest intensity of average annual $PM_{2.5}$ are shown to be somewhat constrained within the areas between I-210 and SR-91 in the north and the south and the I-405 and I-215 in the east and the west, whereas before the highest intensity areas went far beyond these markers. Indeed, average annual $PM_{2.5}$ emissions decreased during this period from 14.76 ug/m3 in 2004–06 to 12.91 ug/m3 in 2007–09.

The impact of ozone and particulate emissions on health can often be seen in the instances of cancer or poor respiratory health in a designated geographic area. The rate of cancer risk per one million people as a result of emissions in the SCAG region is displayed in **EXHIBIT 26**. As is seen in this figure, the highest instance of cancer risk is exhibited in the area in and around Downtown Los Angeles, along the I-10 and SR-60 highways in San Bernardino County, at the SR-91/I-15, SR91/I-215 intersections in Riverside County, and at the SR-57/SR-22 intersection in Orange County. Generally speaking, the other areas that have high instances of cancer risk in the SCAG Region are south Ventura County, south and central Los Angeles County, southwest San Bernardino County, northwest Riverside County, and all of Orange County. In addition to cancer risk, respiratory risk is also an indicator of emissions impact on public health. **EXHIBIT 27** shows respiratory risk for the year 2005 in the SCAG Region. The highest areas of respiratory risk are the segments that closely follow major freeways in the most urbanized portions of the region, with the areas surrounding Downtown Los Angeles showing the highest geographic concentration of respiratory risk in the region. Respiratory risk is also present in the urbanized portions of south Ventura County, south and central Los Angeles County, southeast San Bernardino County, northwest Riverside County, Orange County, and central Imperial County.

Emissions Impact on Environmental Justice Populations at the Regional Level

In order to assess the impact of emissions on various demographic groups throughout the region, emissions information was summarized to the Environmental Justice Communities that were determined previously. **TABLE 39** and **FIGURES 37–41** show the results of this analysis. For years 2004–06, the average days exceeding federal ozone standards are shown. Most demographic groups fall below the regional average, except for the elderly population which exceeds the regional total at 18.09. This trend holds true for average daily ozone exposure as well, where the elderly population had average daily ozone exposure identical to the regional average. The opposite, however, is true for average annual $PM_{2.5}$ exposure. All groups except for the elderly population are in excess of the regional average, with minority populations having the highest average annual $PM_{2.5}$ exposure at 16.19 ug/m3. This pattern also appears with cancer risk and respiratory risk. All groups except for the elderly population exceed the regional average, with the Foreign Born population having the highest cancer risk at 635.23 per million people and Non-English Speakers having the highest respiratory risk at 5.77. For the years 2007–09, there are reductions across the board for ozone and particulate emissions at both the regional level and for each demographic group. In terms of ozone emissions, all demographic groups are at or below the regional average for both average day exceeding federal ozone standards and average daily ozone exposure in excess of national standards. This, however, cannot be said for $PM_{2.5}$ emissions, where each demographic group except he elderly population is in excess of the regional average for average annual $PM_{2.5}$ exposure, with Foreign Born and Non-English Speakers each having 13.74 ug/m3. This trend again appears for cancer risk and respiratory risk, with each group exceeding the regional average except for the elderly population. Non-English Speakers have both the highest cancer and respiratory risk, with cancer risk at 612.15 per million people and 5.62 for respiratory risk.

EXHIBIT 20 Average Daily Ozone Exposure in Excess of the National 8 Hour Standard (0.75 ppm) (2004–06)

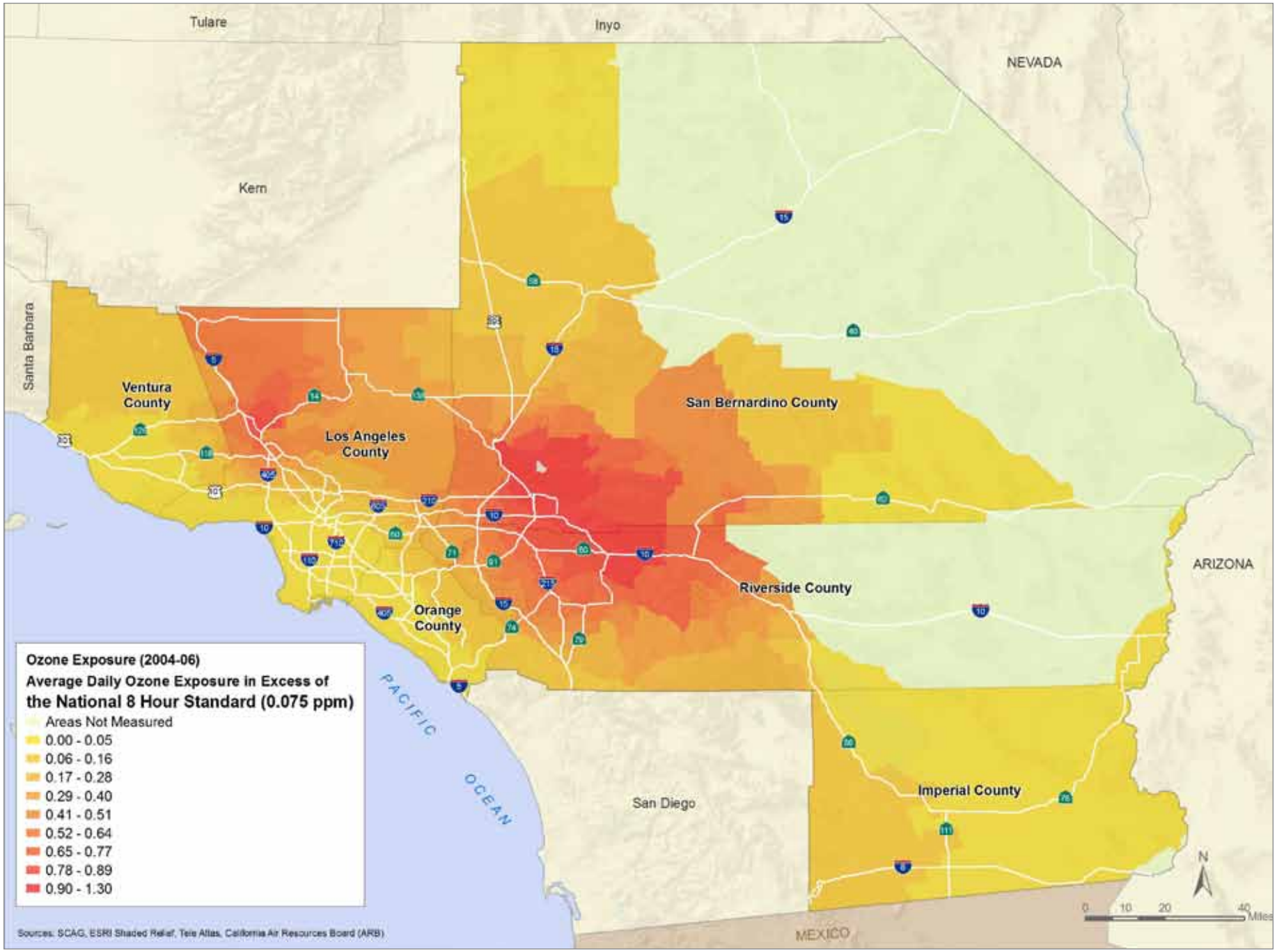


EXHIBIT 21 Average Daily Ozone Exposure in Excess of the National 8 Hour Standard (0.75 ppm) (2007–09)

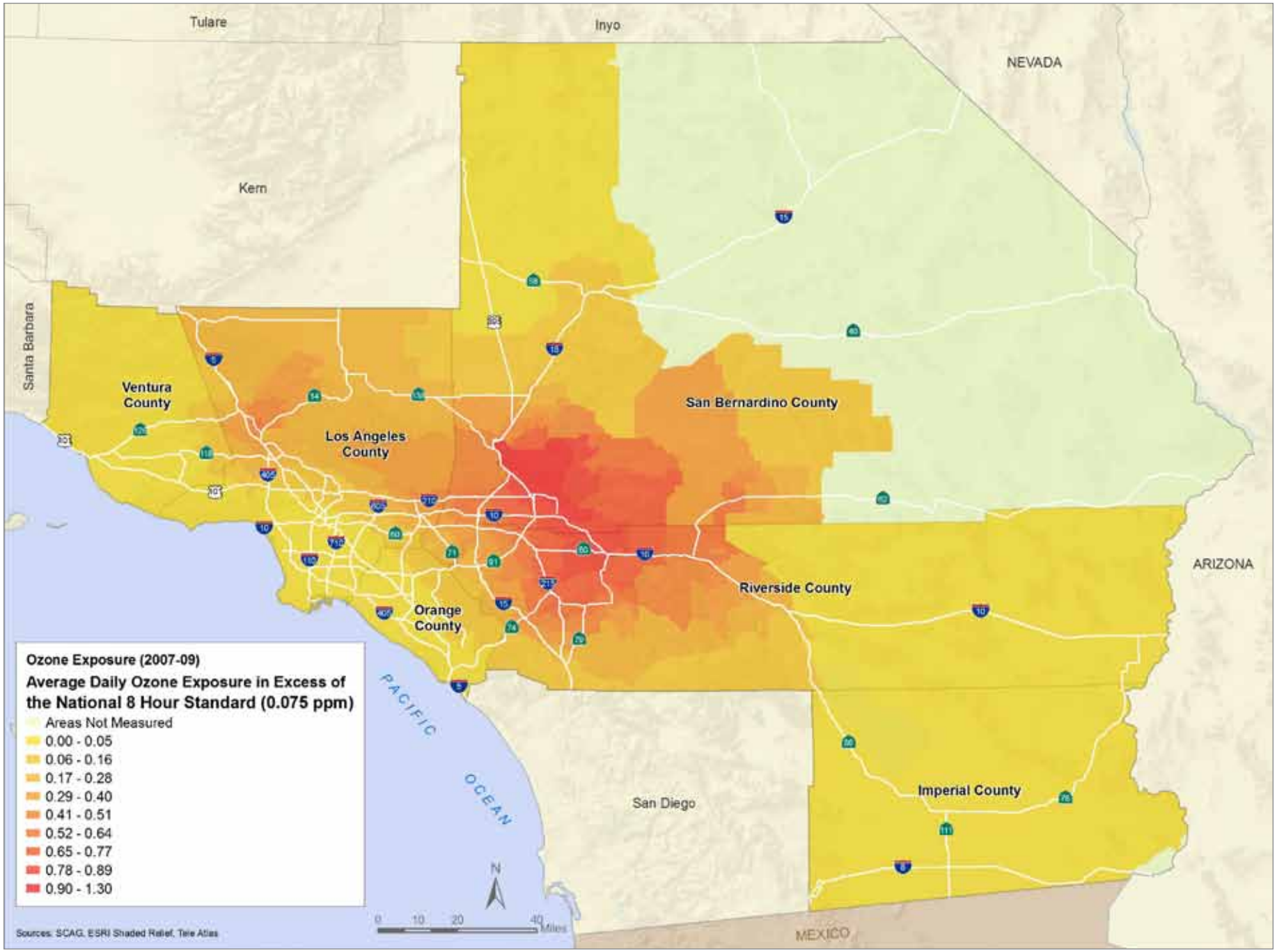


EXHIBIT 22 Number of Days Exceeding the Federal 8 Hour Standard of 0.075 ppm (2004–06)

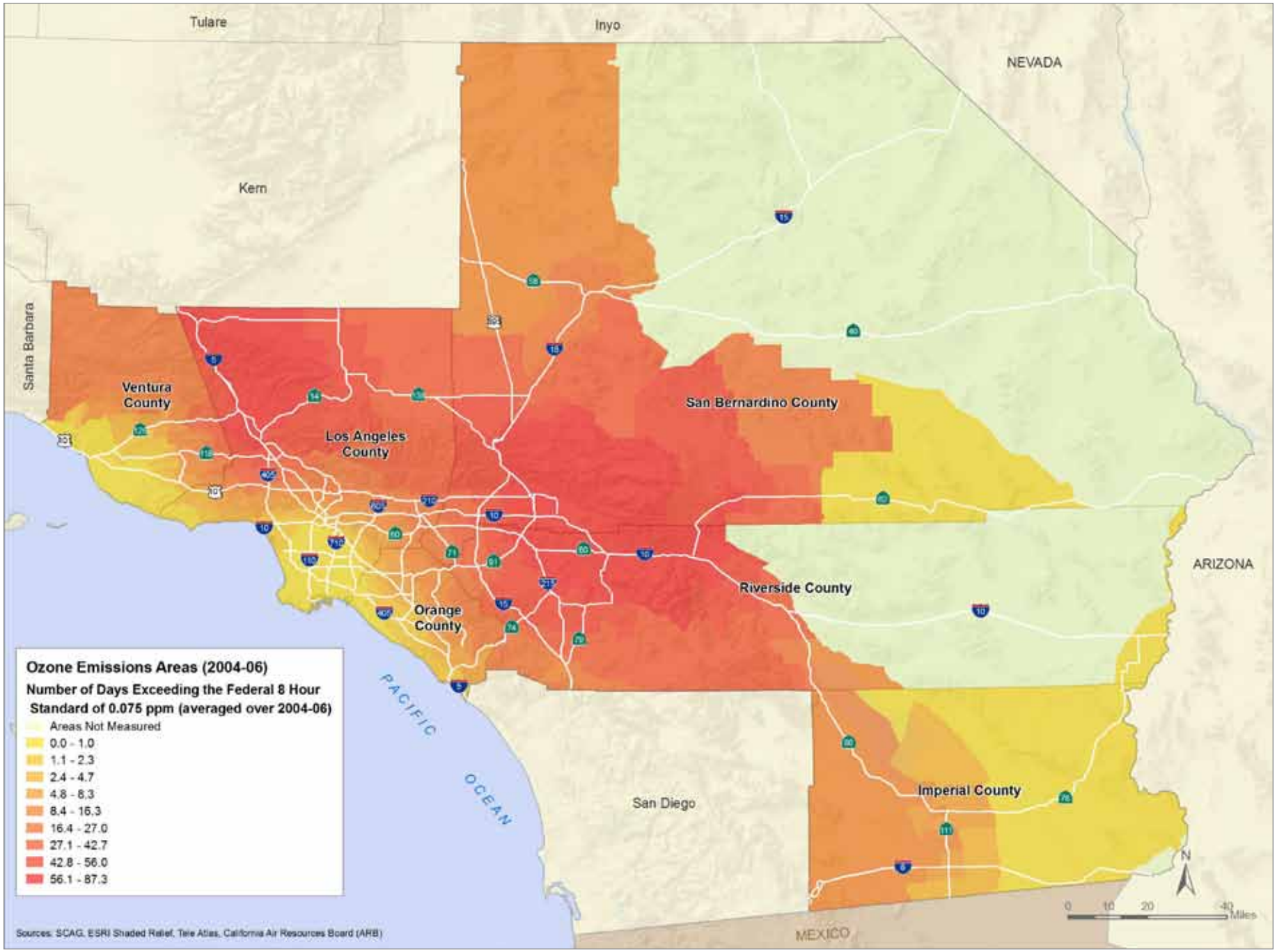


EXHIBIT 23 Number of Days Exceeding the Federal 8 Hour Standard of 0.075 ppm (2007–09)

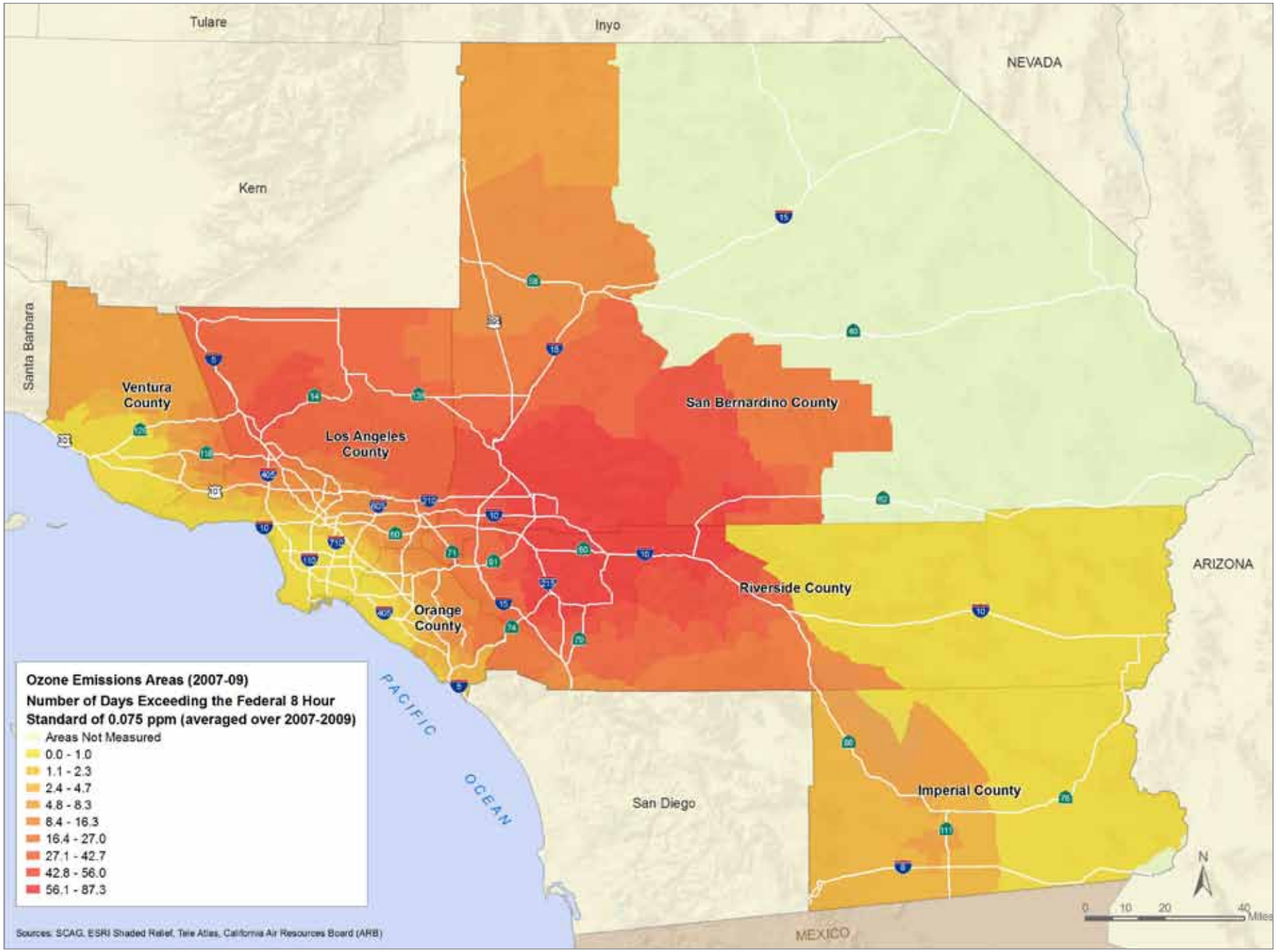


EXHIBIT 24 Annual Average Concentration of $PM_{2.5}$ (2004–06)

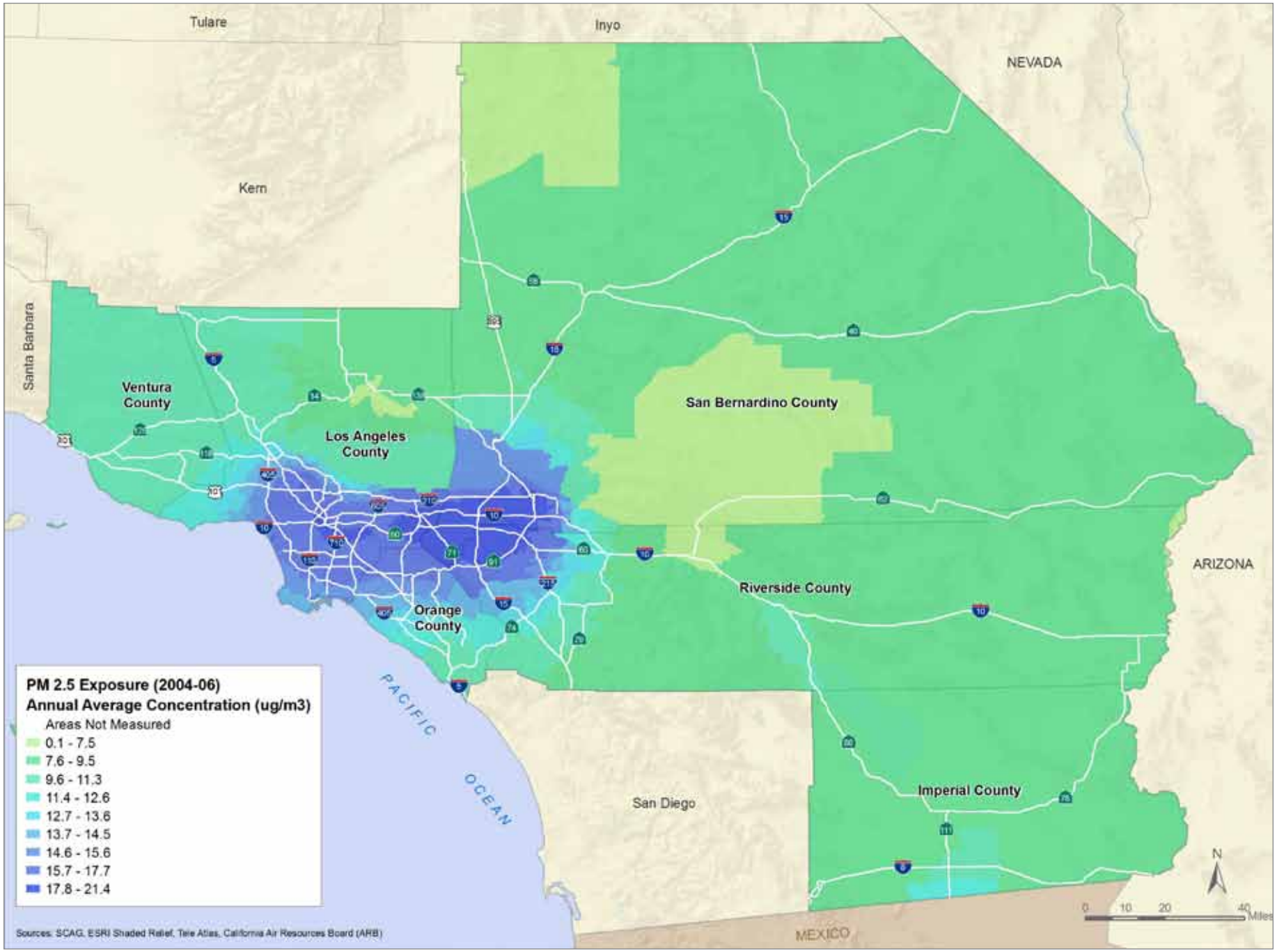


EXHIBIT 25 Annual Average Concentration of $PM_{2.5}$ (2007–09)

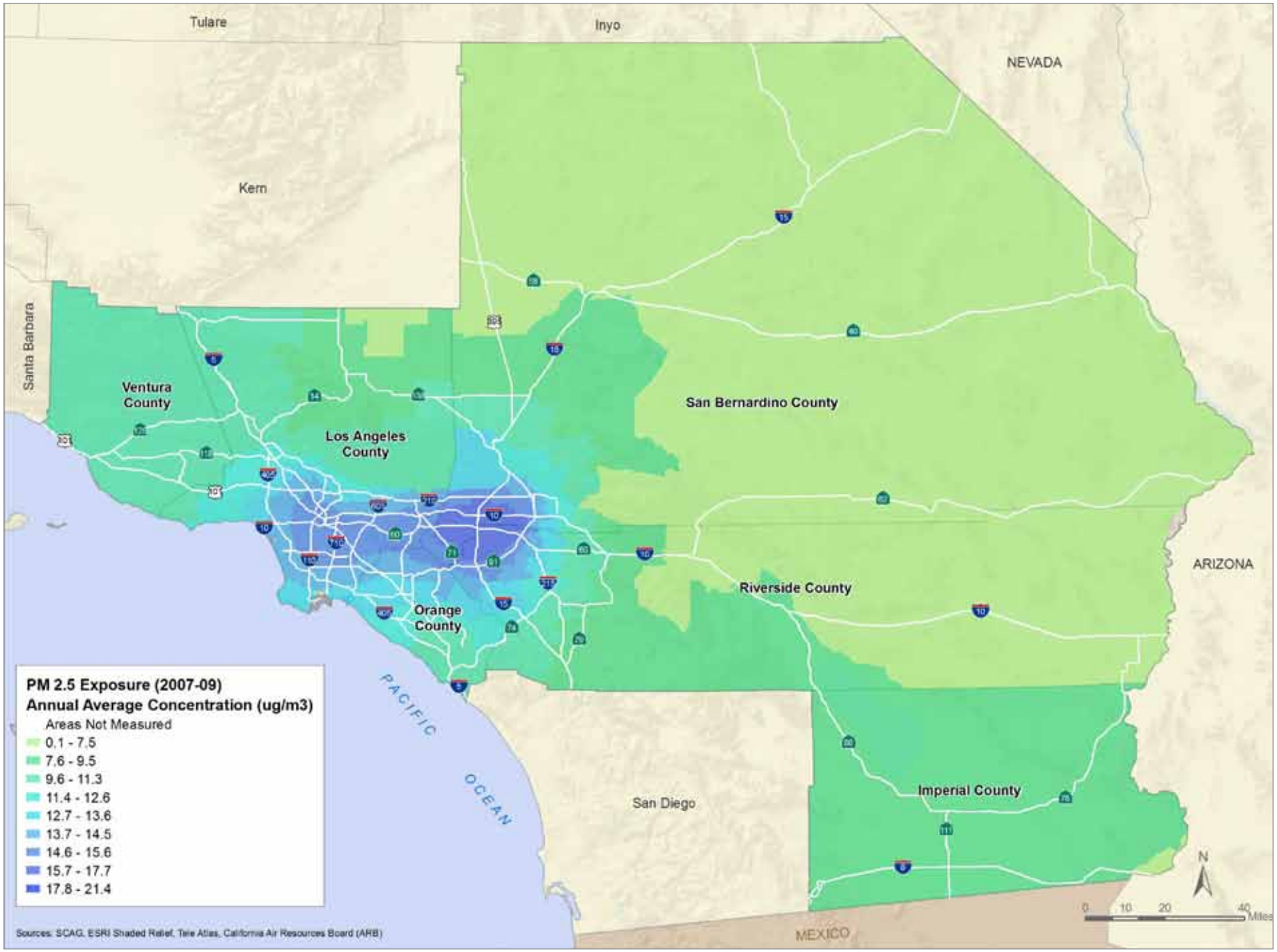


EXHIBIT 26 Cancer Risk Over Lifetime Per Million Persons (2005)

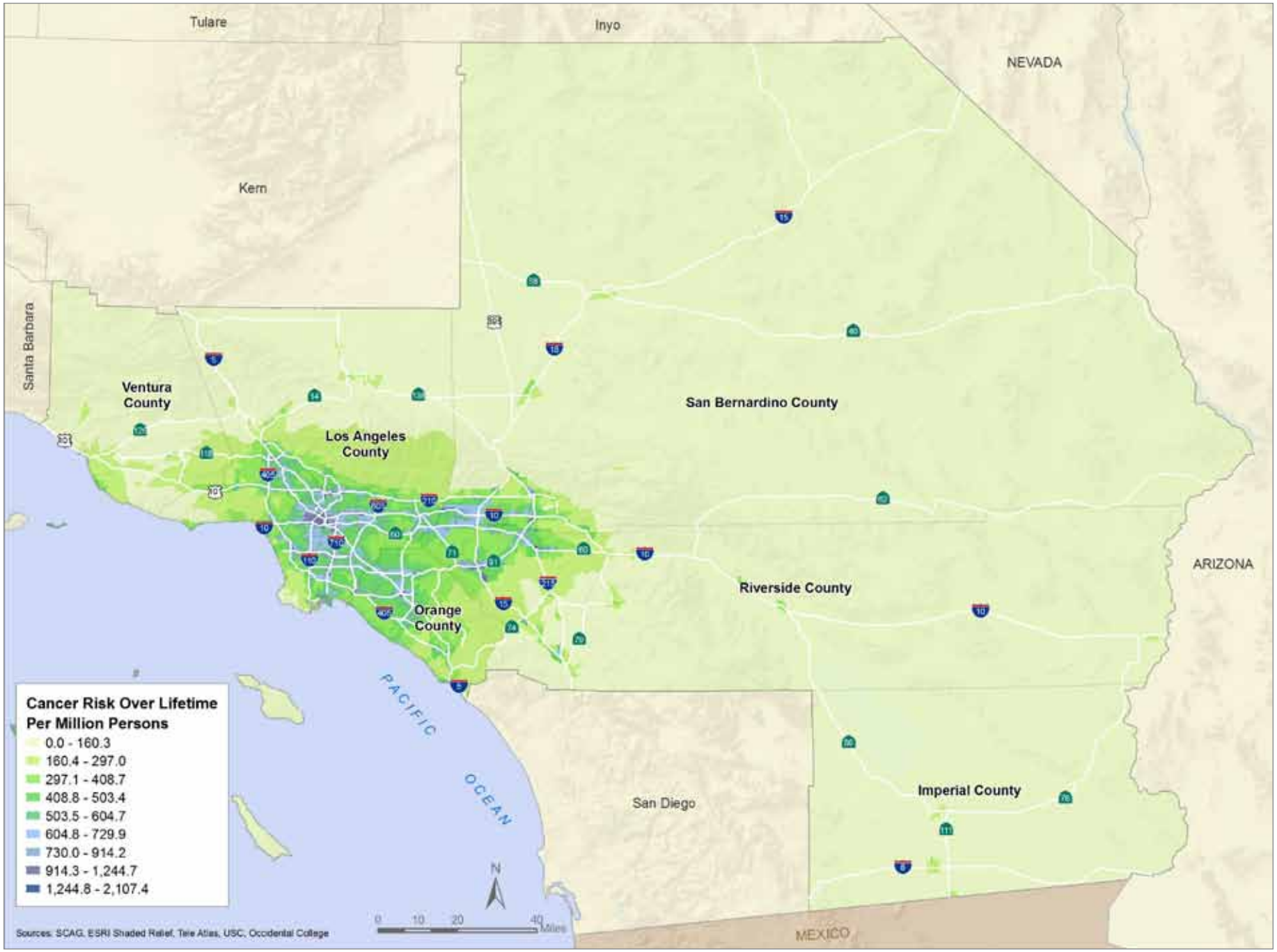


EXHIBIT 27 Respiratory Hazard Risk Per Individual (2005)

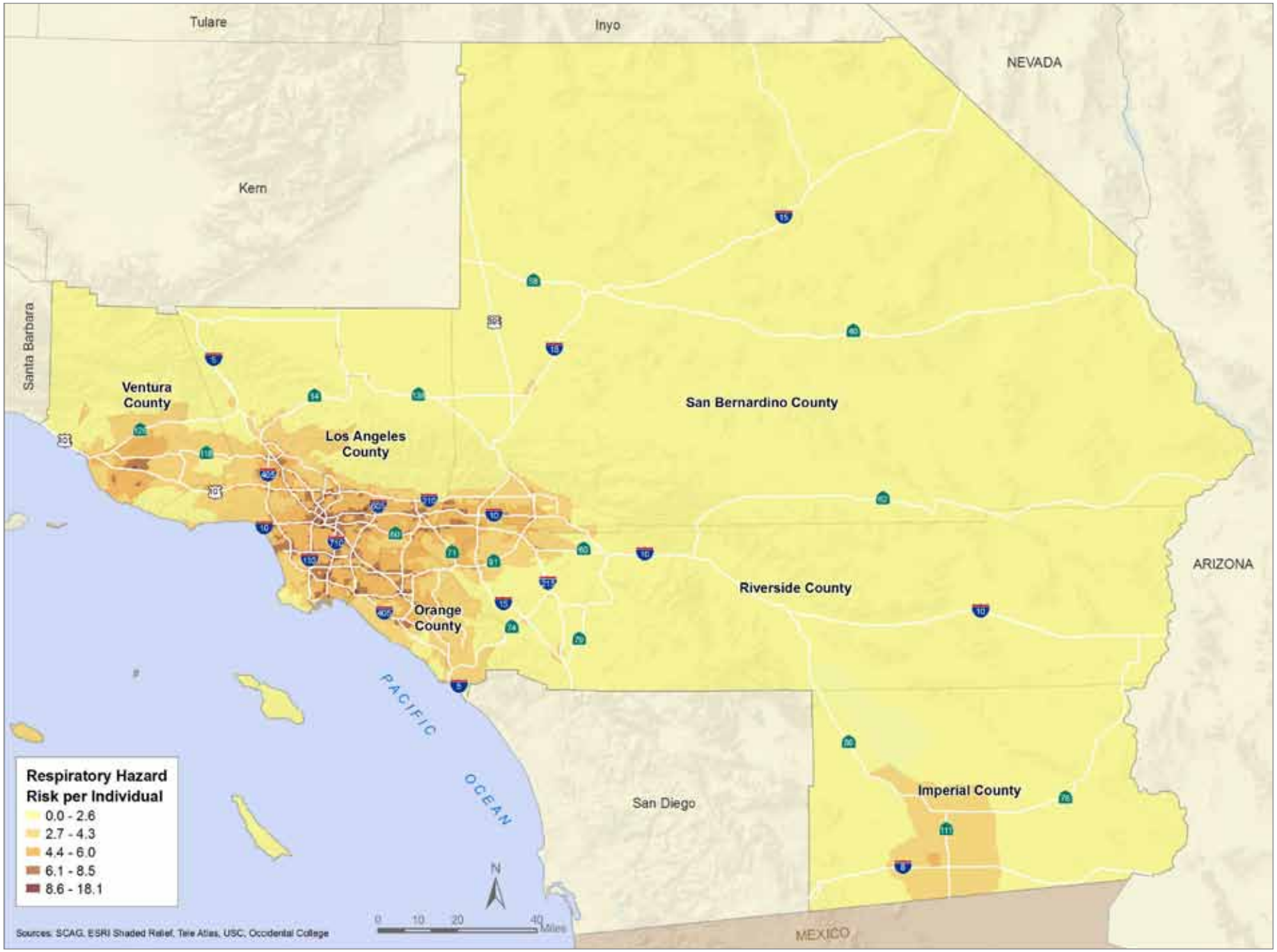


TABLE 39 Summary of Emissions and Health Risks by Environmental Justice Population Group

Environmental Justice Demographic Groups	2004–06						2007–09					
	Population	Average Days Exceeding Ozone Standards	Average Daily Ozone Exposure in Excess of National Standards	Average Annual $PM_{2.5}$ Exposure	Cancer Risk Per Million	Respiratory Risk	Population	Average Days Exceeding Ozone Standards	Average Daily Ozone Exposure in Excess of National Standards	Average Annual $PM_{2.5}$ Exposure	Cancer Risk Per Million	Respiratory Risk
Elderly Population	995,023	18.09	0.18	14.20	402.57	4.62	1,234,527	14.18	0.13	12.66	418.36	4.39
Below Poverty	1,802,317	15.51	0.16	15.75	582.94	5.33	1,647,407	14.40	0.14	13.29	562.03	5.17
Minority	7,321,095	13.05	0.14	16.19	588.13	5.54	8,283,746	12.37	0.12	13.65	574.46	5.42
Foreign Born	3,481,079	10.51	0.10	16.06	607.29	5.69	3,638,816	9.36	0.09	13.74	596.85	5.60
Non-English Speakers	509,760	10.93	0.11	16.16	635.23	5.77	619,622	10.59	0.10	13.74	612.15	5.62
Households Without Vehicles	366,398	12.83	0.13	15.92	604.53	5.46	307,565	11.36	0.11	13.51	576.63	5.28
Education Below High School	2,029,516	14.95	0.16	15.75	571.02	5.35	1,897,248	14.11	0.14	13.40	565.48	5.30
Region Total	16,516,006	17.77	0.18	14.76	467.13	4.62	17,737,412	15.03	0.14	12.91	467.13	4.62

**Population and Household data is representative of the 2000 Decennial Census and the 2005–09 American Community Survey.*
**Emissions data shows averages based upon two data sets, one representing averages from 2004–06 and the other showing averages from 2007–09*
**Cancer risk data represents a single data point from 2005*

Sources: SCAG, 2000 Census, 2005–09 American Community Survey (ACS), California Air Resources Board (ARB), University of Southern California (USC)

FIGURE 37 Average Days Exceeding Federal Ozone Standards (2004–06 and 2007–09)

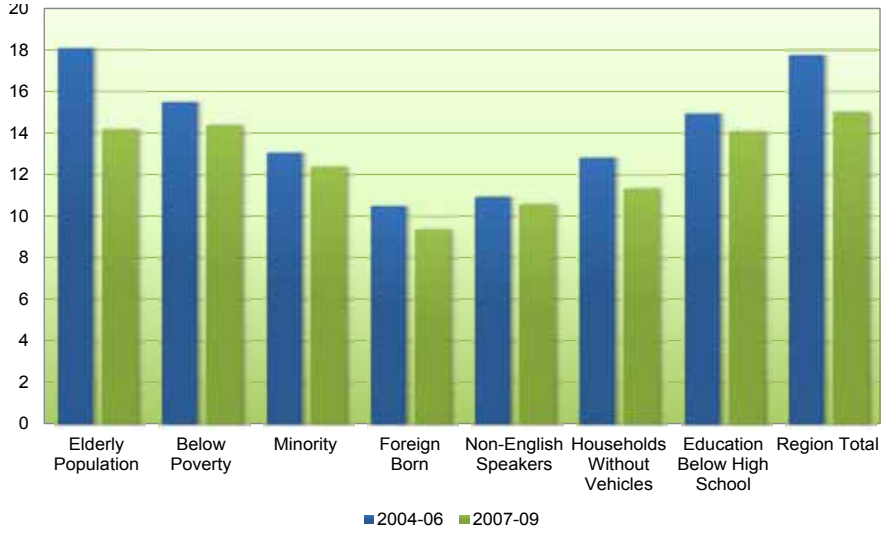


FIGURE 38 Average Annual $PM_{2.5}$ Exposure (2004–06 and 2007–09)

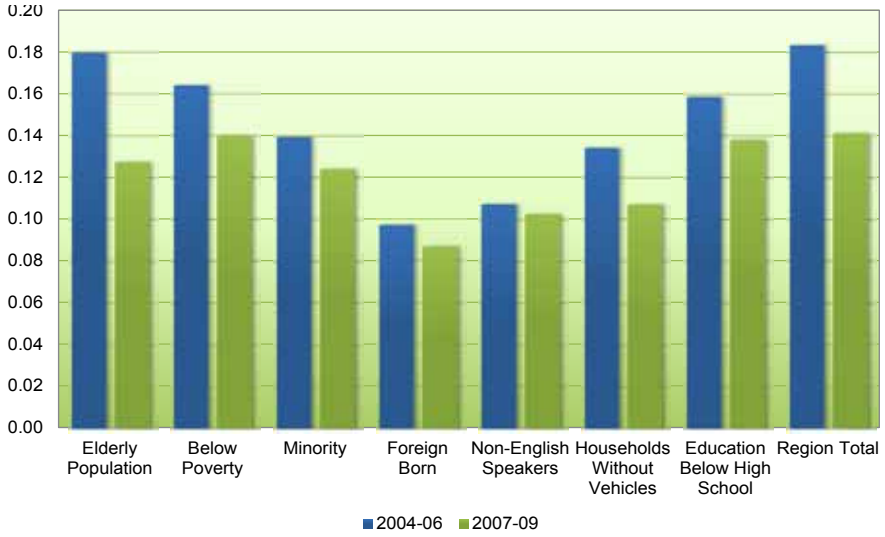


FIGURE 39 Average Daily Ozone Exposure in Excess of Federal Standards (2004–06 and 2007–09)

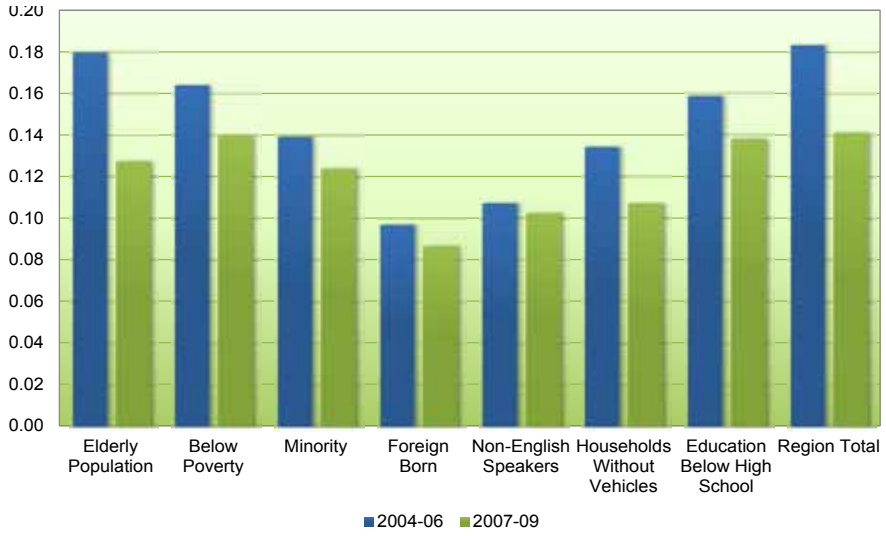


FIGURE 40 Lifetime Cancer Risk per Million Persons (2005)

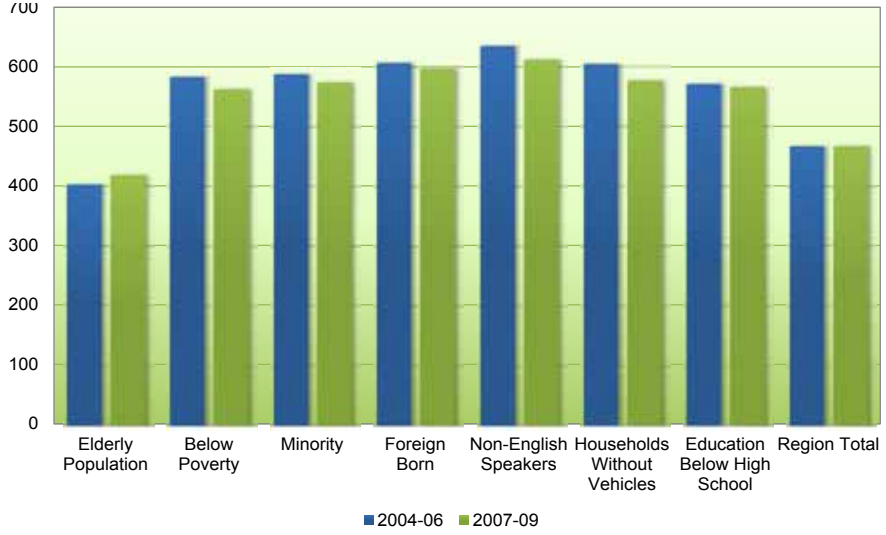
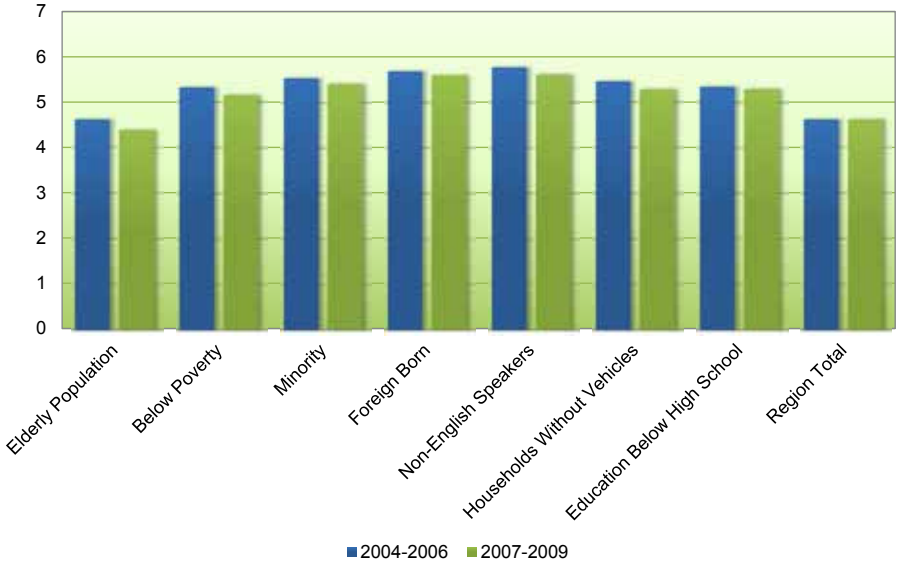


FIGURE 41 Respiratory Hazard Risk Per Individual (2005)



In addition to historical information on regional demographics, it is also important to note the intensity and location of sensitive receptors in the SCAG Region. A sensitive receptor is a person in the population who is particularly susceptible to health effects due to exposure to an air contaminant. The following are land uses (sensitive sites) where sensitive receptors are typically located:[7]

- Schools, playgrounds and childcare centers
- Long-term health care facilities
- Rehabilitation centers
- Convalescent centers
- Hospitals
- Retirement homes
- Residences

EXHIBIT 28 shows fire stations, police stations, k-12 schools, summer camps, hospitals, nursing facilities, urgent care centers, child care centers, and senior care centers in the SCAG region. The concentration of sensitive receptors is highest in south Los Angeles County, north Orange County, southwest San Bernardino County, and northwest Riverside County. The distribution of these facilities highly correlates with $PM_{2.5}$ emissions in the SCAG Region, which suggests that there may be health impacts to these sensitive populations.

Air Quality Impacts along Freeways and Highly Traveled Corridors

METHODOLOGY

The concentration of air pollutants along heavily traveled corridors, particularly PM_{10} and $PM_{2.5}$, is a major concern in Southern California. SCAG identified major corridors defined as urban roads with 100,000 average daily trips and rural roads with 50,000 daily trips. Next, SCAG overlaid the income, race and ethnic composition of those households within 500 feet of the corridor. This analysis allows SCAG to better understand the impacted populations and allow for greater outreach to those communities of concern.

RESULTS

The following table illustrates the population and household growth within the areas adjacent to heavily traveled corridors compared to the entire region. The table is further refined by county and 2000 census and 2005/09 ACS data. The table shows that the total number of residents and households within 500 feet of a heavily traveled corridor increased from approximately 1 million people in 2000 to 1.1 million people in 2005–09, an increase of 5.7 percent. Within the SCAG region as a whole, the population increased at a higher rate of 7.4 percent.

[7] South Coast Air Quality Management District. Guidance Document for Addressing Air Quality Issues in General Plans and Local Planning, 2005.

EXHIBIT 28 Sensitive Receptors in 2008

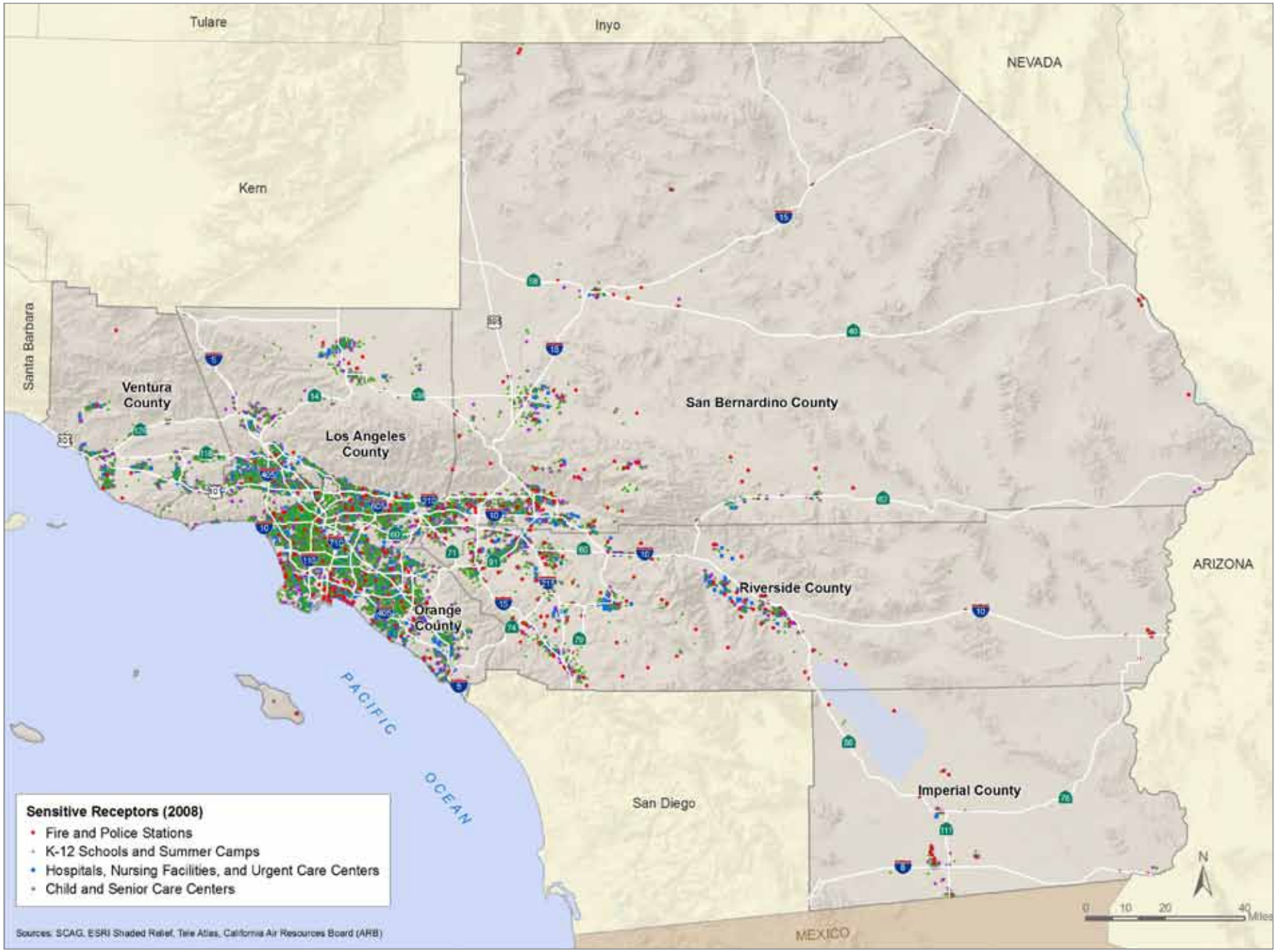


TABLE 40 Environmental Impacts along Freeways and Highly Traveled Corridors

Freeway Buffer	2000		2005–09		2000 – 2005–09	
County	Population	Households	Population	Households	Pop %	HH %
Imperial	2,663	793	2,899	895	8.9%	12.9%
Los Angeles	673,278	211,736	690,688	216,760	2.6%	2.4%
Orange	193,860	63,628	204,734	66,862	5.6%	5.1%
Riverside	74,415	26,089	94,625	32,341	27.2%	24.0%
San Bernardino	92,315	27,986	104,014	30,505	12.7%	9.0%
Ventura	40,678	14,426	42,129	14,917	3.6%	3.4%
SCAG Region	1,077,209	344,658	1,139,089	362,280	5.7%	5.1%
SCAG Region	**2000**		**2005–09**		**2000 – 2005–09**	
County	**Population**	**Households**	**Population**	**Households**	**Pop %**	**HH %**
Imperial	142,361	39,384	160,034	46,405	12.4%	17.8%
Los Angeles	9,519,338	3,133,774	9,785,295	3,178,266	2.8%	1.4%
Orange	2,846,289	935,287	2,976,831	974,001	4.6%	4.1%
Riverside	1,545,387	506,218	2,036,304	645,185	31.8%	27.5%
San Bernardino	1,709,434	528,594	1,986,635	588,796	16.2%	11.4%
Ventura	753,197	243,234	792,313	257,178	5.2%	5.7%
SCAG Region	16,516,006	5,386,491	17,737,412	5,689,831	7.4%	5.6%

The following table, **TABLE 41**, shows that 263,323 acres of the SCAG region are within 500 feet of a heavily traveled corridor. This acreage represents 1 percent of the total area within the SCAG region.

TABLE 41 Acreage Within 500 Feet of a Heavily Traveled Corridor by County

County	Total acres	Acres within 500 feet of a heavily traveled corridor	Percent
Imperial	2,867,801	14,062	0.5%
Los Angeles	2,616,307	74,953	2.9%
Orange	511,120	26,279	5.1%
Riverside	4,672,082	42,421	0.9%
San Bernardino	12,861,065	66,175	0.5%
Ventura	1,188,842	12,433	1.0%
SCAG REGION	**24,717,217**	**236,323**	**1.0%**

The following table, **TABLE 42**, shows the distribution of Environmental Justice Communities residing within 500 feet of a heavily traveled corridor. Low-income groups comprise 7 percent of the population living within 500 feet of a heavily traveled corridor, while 7.1 percent of minorities reside in these areas. This is higher than the regional level, which shows that 5.7 percent of the region's population lives within 500 feet of a heavily traveled corridor.

TABLE 42 Distribution of Environmental Justice Demographic Group Within 500-Foot Freeway Buffer

Year 2000							
County	Seniors (65+)	Poverty	Minorities	Foreign-Born	Non-English Speaker	Households Without Car	Education Below High School
Imperial	1.7%	0.8%	1.7%	1.6%	0.9%	1.0%	1.1%
Los Angeles	6.8%	7.6%	7.7%	7.7%	8.3%	7.4%	8.0%
Orange	6.7%	7.6%	7.4%	7.3%	6.8%	7.7%	7.3%
Riverside	5.3%	4.8%	4.6%	4.6%	4.3%	5.1%	4.5%
San Bernardino	4.7%	5.8%	6.1%	5.9%	6.0%	5.8%	5.6%
Ventura	5.6%	5.4%	4.8%	4.9%	3.9%	7.6%	5.0%
SCAG Region	6.3%	7.0%	7.1%	7.2%	7.4%	7.1%	7.2%
Year 2005–09							
County	Seniors (65+)	Poverty	Minorities	Foreign-Born	Non-English Speaker	Households Without Car	Education Below High School
Imperial	1.6%	1.3%	1.7%	1.6%	1.1%	1.3%	1.1%
Los Angeles	6.9%	7.6%	7.6%	7.6%	8.0%	7.3%	8.1%
Orange	6.6%	7.5%	7.4%	7.3%	7.4%	7.4%	7.5%
Riverside	5.7%	4.4%	4.3%	4.5%	4.5%	4.9%	4.4%
San Bernardino	4.6%	5.1%	5.8%	5.5%	5.0%	5.7%	5.2%
Ventura	5.3%	5.6%	5.0%	5.0%	4.1%	6.5%	4.8%
SCAG Region	6.3%	6.8%	6.9%	7.0%	7.1%	6.9%	7.1%

FIGURE 42 Percentage of Environmental Justice Communities residing within 500 Feet of a Heavily-Traveled Corridor by County (2000 Census)

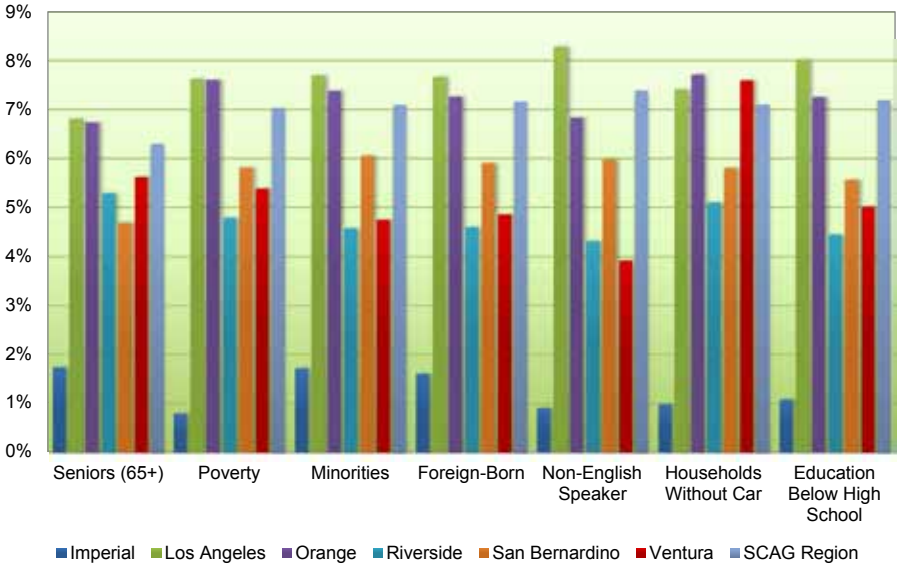
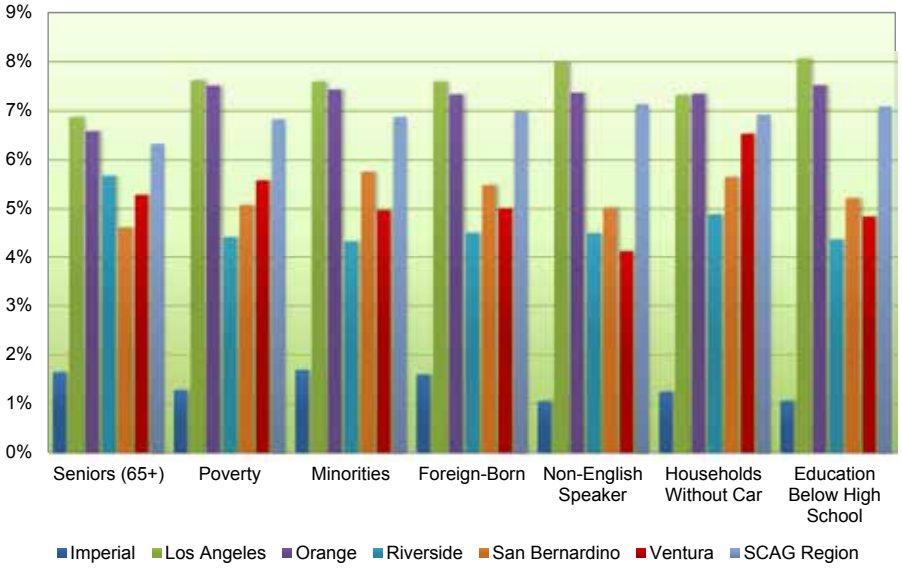


FIGURE 43 Percentage of Environmental Justice Communities residing within 500 Feet of a Heavily-Traveled Corridor by County (2005–09 ACS)



Environmental Impacts of Plans and Baseline Scenarios

Transportation projects can have both a positive or negative impact on the environment. On the one hand, investments can cause travelers to shift to less polluting modes (e.g. bus, train, carpooling, or commuter rail). On the other hand, investments that increase traffic on a particular facility usually degrade air quality in the immediate vicinity of that facility[8]. In order to evaluate the environmental impacts of the 2012 RTP/SCS, the environmental justice analysis addressed air pollutant emissions and noise generated from aviation, highway, and freight rail activities.

Minorities and low-income groups may be particularly vulnerable to the effects of air pollution. SCAG's air pollutant emissions analysis was based on emission estimates for pollutants that have localized health effects: carbon monoxide (CO) and particulate matter (PM). Analysis was also conducted for PM exhaust emissions from heavy-duty vehicles: an indicator for diesel toxic air contaminants. The results were computed based on the average emissions at the TAZ level and weighted according to the population of each ethnic or income group in that TAZ. This analysis focuses on air emissions and noise impacts generating from aviation, highways, and rail corridors.

Transportation is a major source of noise. Some typical principal noise generators within the SCAG region are associated with airports, freeways, railroads, and arterial roadways. Intrusive noise can cause stress and degrade the quality of life for people in affected areas. In extreme cases, intrusive noise can pose a threat to hearing. New transportation facilities or other system changes that increase traffic levels will generally increase noise levels near the facility. Investments in sound walls or new pavement can help to mitigate vehicle noise.[9]

Sound is measured on a non-linear scale in units of decibels. An adjusted scale, using A-weighted decibels [dB (A)], emphasizes those sound frequencies that are audible to humans. On this scale, a 10 dB (A) increase is perceived as a doubling of sound. Sound above 65 dB (A) is considered annoying and sound above 125 dB (A) is painful. Noise generated from the transportation system generally falls above the annoyance level, but below that which is painful.[10]

SCAG's analysis of noise for the 2012 RTP/SCS considers three sources: aviation noise (from aircraft at the region's airports), railroad noise, and highway noise. While insufficient data was available to analyze noise from freight and passenger trains, this analysis will attempt to identify rail segments based on train activities and other indicators that may post more significant noise and air pollution impacts than other places. Because of the differences in the data sources, and varying standards used to regulate the different sources, SCAG's analysis takes a different approach for aviation noise than for highway noise and train noise. Given the metrics used for the noise analyses, it is not appropriate to combine the data to estimate aggregate noise impacts of the Plan.[11]

METHODOLOGY

Minorities and low-income groups may be particularly vulnerable to the effects of air pollution. SCAG's analysis is based on emissions estimates for pollutants that have localized health effects: carbon monoxide (CO) and particulate matter (PM). Analysis was also conducted for PM exhaust emissions from heavy-duty vehicles, an indicator for diesel toxic air contaminants. The results were computed based on the average emissions at the TAZ level and weighted according to the population of each ethnic or income group in that TAZ. This analysis focuses on air emissions and noise impacts generated from aviation and highway activity.

Since ambient pollutant concentration levels that are directly linked to localized emissions could not be easily estimated, the geographic emissions distribution analysis presented here focuses on pollutants that tend to have localized effects which are generally proportionate to emissions—carbon monoxide (CO)and fine particulate matter (PM_{10} and $PM_{2.5}$). The analysis does not cover pollutants that do not have localized effects proportionate to emissions, but are regionally distributed as a result of chemical interactions, photochemical reactions and meteorology (VOC, NO_X, and SO_X).

In addition, this methodology assumes that all residents in a given TAZ are equally exposed. Generally, both CO and $PM_{10/2.5}$ tend to impact those located closest to the source of emissions. Thus, in a TAZ containing a roadway, those closest to the roadway would experience greater emissions and potential health impacts than those located further away. This differential as it might exist within TAZs is not addressed by this analysis; only differences between the aggregate demographic totals of different TAZs are

8 Caltrans. Desktop Guide: Environmental Justice in Transportation Planning Investments. January 2003.

9 Ibid.

10 Ibid

11 Ibid

addressed. Notwithstanding these assumptions, the methodology presents a reasonable gross measure of air quality impacts of mobile sources in the region.

RESULTS

It is important to note that total emissions of all pollutants in the region will decrease compared to existing conditions with or without the Plan, due to the combination of measures being taken to meet air quality standards. Since the Plan must demonstrate conformity with regional air quality management plans that call for reductions in emissions of air pollutants, the Plan itself will likewise result in reductions of pollutant emissions. This is primarily because the Plan investments will alleviate roadway congestion and provide a greater range of transportation alternatives. The following analysis, however, is based on a comparison of Plan to Baseline conditions, rather than a comparison of Plan to current conditions.

Overall, the region as a whole will experience an improvement in air quality via reductions in transportation-related emissions. However, emissions of CO and PM_{10} in some TAZ's will increase under the Plan compared to the Baseline conditions. For PM_{10}, region-wide about 23 percent of total population will experience an increase in PM_{10} exposure, 76 percent of the population will benefit from reductions in PM_{10}, while about 2 percent of the population will have no changes in PM_{10} exposure. For CO, 29 percent of the total population will experience worse CO emissions while the rest (71 percent) of the population will benefit from reductions in CO emissions. To examine equity impacts in these areas, the following two charts and associated maps present the distribution of Environmental Justice populations for both PM and CO emissions impacted areas (both worse areas and improved areas).

As indicated in **EXHIBITS 29** and **30**, the localized emissions such as PM and CO are closely associated with TAZs aligned with roadways.

EXHIBIT 29 CO Emission Change (2035 Baseline to Plan)

EXHIBIT 30 PM Emission Change (2035 Baseline to Plan)

There are disproportionately higher concentrations of Environmental Justice Communities along the heavily traveled corridors. The TAZs with higher concentrations of CO and PM also have a higher share of minorities and low income residents than the regional average. Those TAZs that will experience a reduction in CO and PM emissions from the proposed plan have a lower share of minorities and low income residents than the regional average.

FIGURE 44 Environmental Justice for Particulate Matter Impacted Areas

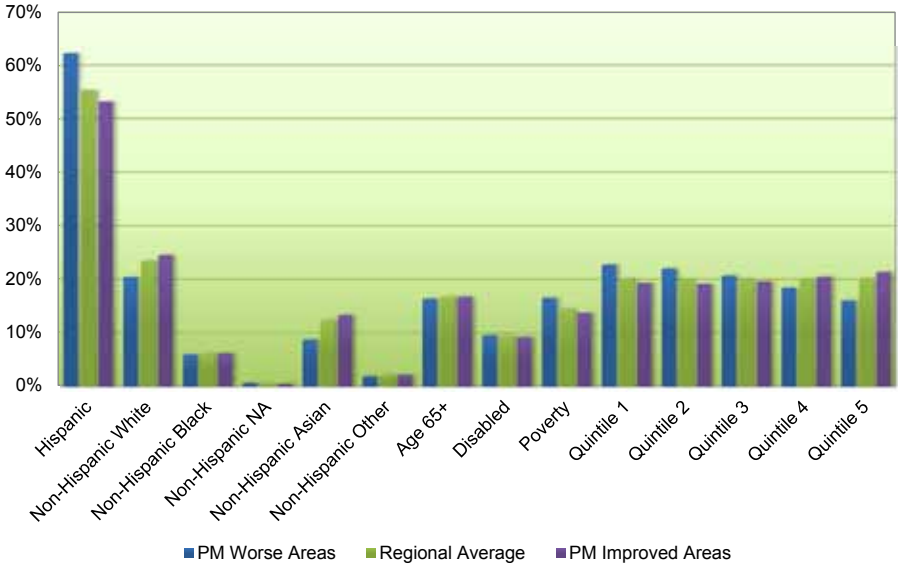
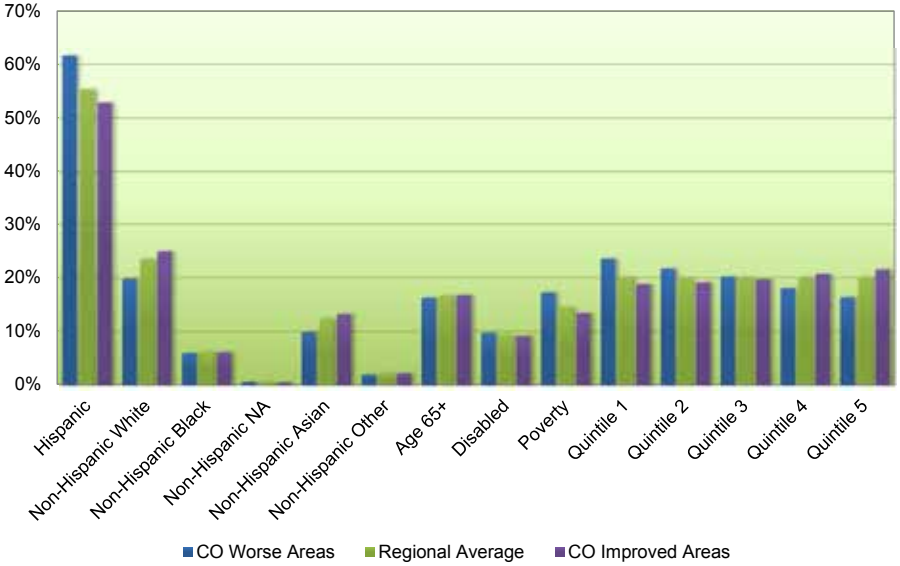


FIGURE 45 Environmental Justice for CO Impacted Areas



GROWTH AND SOCIOECONOMIC CHARACTERISTICS IN AREAS ADJACENT TO FREEWAYS

As discussed earlier, recently there have been concerns raised by environmental groups, the health community, housing groups and air quality regulation agencies about incompatible land uses, including sensitive receptors such as hospitals, senior/day care centers, and housing near freeway and busy roadways. The 2012 RTP/SCS land use strategy calls for redirecting future growth into HQTA. As a result, part of this growth will occur in areas where HQTA is overlapping within 500 feet freeway buffer areas. The table below provides statistics of growth allocation among geographic areas of high quality transit areas (HQTA), Freeway 500 feet buffer areas (here called freeway adjacent areas), and overlapping areas of HQTA & FWYB for the 2012 RTP/SCS

EXHIBIT 31 High Quality Transit Areas (HQTA) and 500 Feet Freeway Buffer

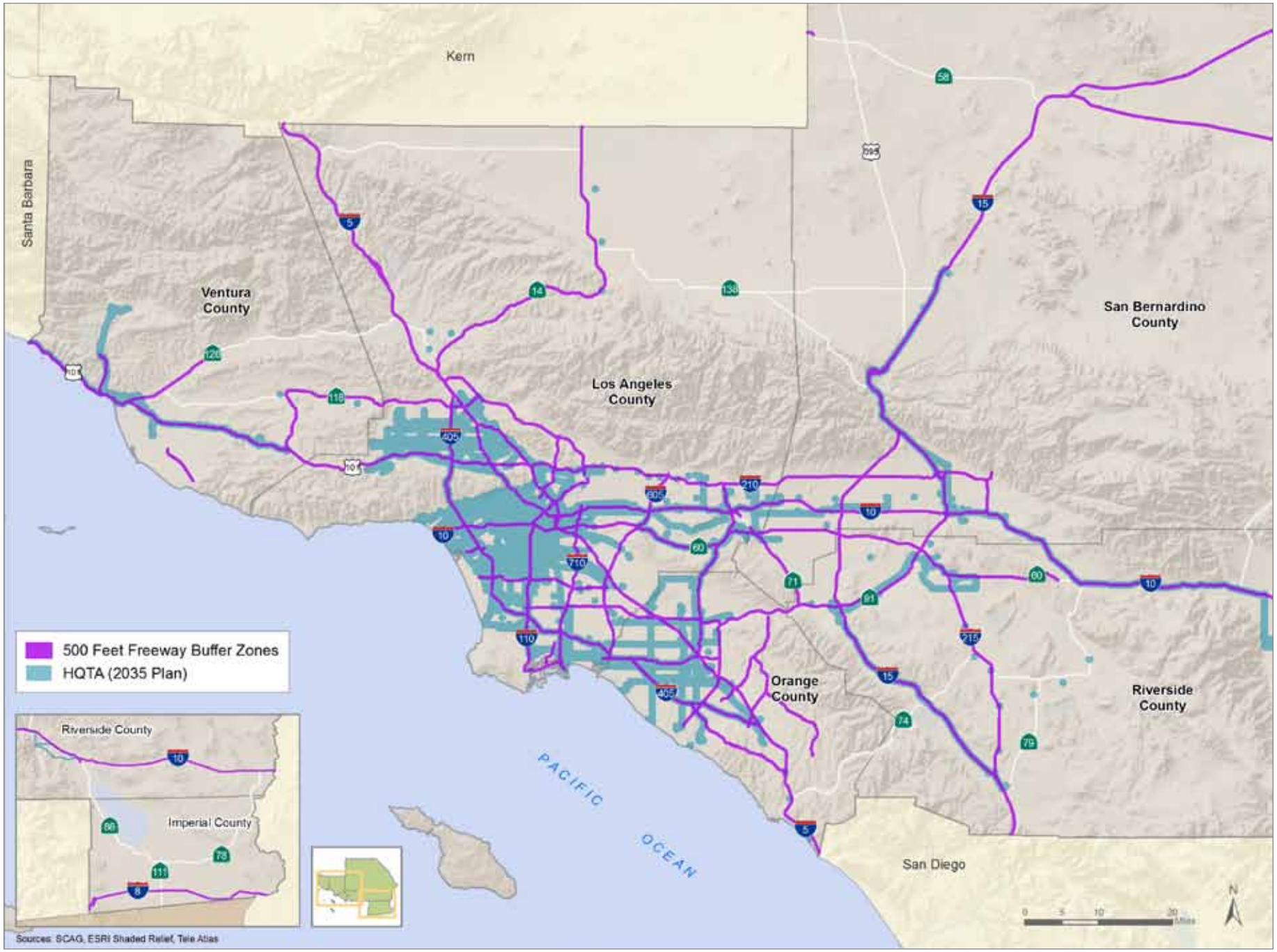


TABLE 43 Summary Statistics of 2012 RTP/SCS Land Use Scenario Allocation by HQTA and 500 Feet Freeway Buffer

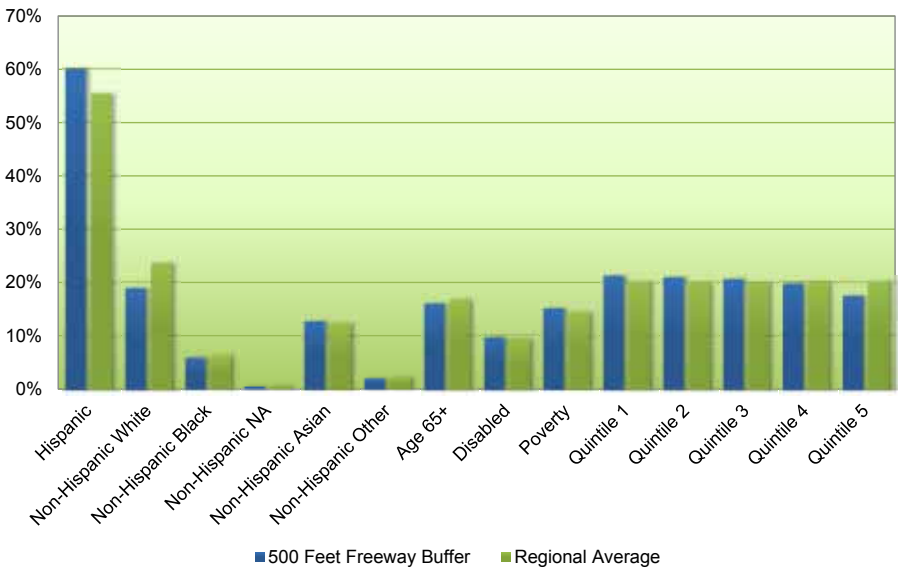
2008 Existing Total			IN HQTA (2008 Network)						IN 500 Feet Freeway Buffer						IN the Overlapped Area of HQTA & 500 Feet Freeway Buffer					
Acres	HH	EMP	Acres	% of Total	HH	% of Total	EMP	% of Total	Acres	% of Total	HH	% of Total	EMP	% of Total	Acres	% of HQTA Added	HH	% of HQTA	EMP	% of HQTA
24,722,909	5,811,979	7,733,570	444,722	1.8%	2,317,636	39.9%	3,786,261	49.0%	236,468	1.0%	336,971	5.8%	747,029	9.7%	47,013	10.6%	160,990	6.9%	383,978	10.1%
2008 Existing Total			**IN HQTA Added Since 2008***						**No 500 Feet Freeway Buffer Added Since 2008**						**IN the Overlapped Area of HQTA Added Since 2008 & 500 Feet Freeway Buffer**					
24,722,909	5,811,979	7,733,570	363,810	1.5%	649,147	11.2%	1,234,702	16.0%							36,783	10.1%	57,465	8.9%	138,291	11.2%
2008-35 Increment Total			**IN HQTA (2035 Plan Network)**						**IN 500 Feet Freeway Buffer**						**IN the Overlapped Area of HQTA & 500 Feet Freeway Buffer**					
24,722,909	1,508,694	1,697,882	701,303	2.8%	782,287	51.9%	904,854	53.3%	236,468	1.0%	81,857	5.4%	148,844	8.8%	83,718	11.9%	63,343	8.1%	96,808	10.7%
2035 Preferred Total			**IN HQTA (2035 Plan Network)**						**IN 500 Feet Freeway Buffer**						**IN the Overlapped Area of HQTA & 500 Feet Freeway Buffer**					
24,722,909	7,320,673	9,431,452	701,303	2.8%	3,737,264	51.1%	5,826,072	61.8%	236,468	1.0%	418,828	5.7%	895,872	9.5%	83,718	11.9%	281,775	7.5%	618,976	10.6%

Socioeconomic Profile in the 500 Feet Freeway Adjacent Areas

As indicated in the table, freeway adjacent areas account for just 1 percent of the SCAG land area but accommodate 5.8 percent of regional households and less than 10 percent of total SCAG region jobs. There are disproportionately higher concentrations of Environmental Justice Communities in the freeway adjacent areas both currently and in our 2035 projection. The following figure presents a comparison of the Environmental Justice Communities' distribution in the freeway adjacent areas with those in the SCAG region.

All Environmental Justice Communities are present in a higher concentration in the freeway adjacent areas than the regional average, except for the following: percent of Non-Hispanic Black, Non-Hispanic Others, Native Americans, and elderly age 65 and above. On the other hand, there is a disproportionately low Non-Hispanic White population and the highest income quintile household presence in the freeway adjacent areas.

FIGURE 46 Environmental Justice Population in the 500 Feet Buffer Area



Environmental Impacts in the Freeway Adjacent Areas

Exposure levels to PM and CO are often higher in freeway adjacent areas than is seen elsewhere in the region. As indicated in the table below, while freeway adjacent areas account for just 1 percent of the regional land area, 5.8 percent of households and population and 9.7 percent of jobs, the area captures over 12 percent of PM emissions and more than 11 percent of CO emissions. The average exposures of the population, workers, and other sensitive receptors located in the freeway adjacent areas become much higher than other places in the region if measured by some kind of concentration index (for example, emissions divided by land area).

Similar to the results of the regional emission analysis, while the 2012 RTP/SCS will reduce both CO and PM for most places along the freeway adjacent areas, there are between 25 percent to 27 percent of population within the freeway adjacent areas who are projected to see increases in their emission exposures to CO and PM. Finally, there are further concerns about environmental justice issues with respect to Environmental Justice Communities distribution in areas where CO and PM emissions increase between plan and baseline.

Thus efforts and mitigation measures should be considered to address various environmental issues with existing population and business in the freeway adjacent areas and most importantly, about future growth redirected in the freeway adjacent areas.

TABLE 44 Air Quality Impact – PM

	SCAG	500 Feet Freeway Buffer	Buffer/ SCAG
2035 Baseline	27,767	3,327	12.0%
2035 Plan	25,522	3,102	12.2%
Plan - Baseline	-2,246	-225	
% Reduction	-8.1%	-6.8%	

Source: SCAG 2012 RTP/SCS Regional Transportation Modeling and Emission Analysis

TABLE 45 Air Quality Impact – CO

	SCAG	500 Feet Freeway Buffer	Buffer/ SCAG
2035 Baseline	651,447	72,540	11.1%
2035 Plan	610,015	68,785	11.3%
Plan - Baseline	-41,432	-3,755	
% Reduction	-6.4%	-5.2%	

Source: SCAG 2012 RTP/SCS Regional Transportation Modeling and Emission Analysis

FIGURE 47 Environmental Justice Population in the 500 Feet Buffer Area Impacted by CO Changes

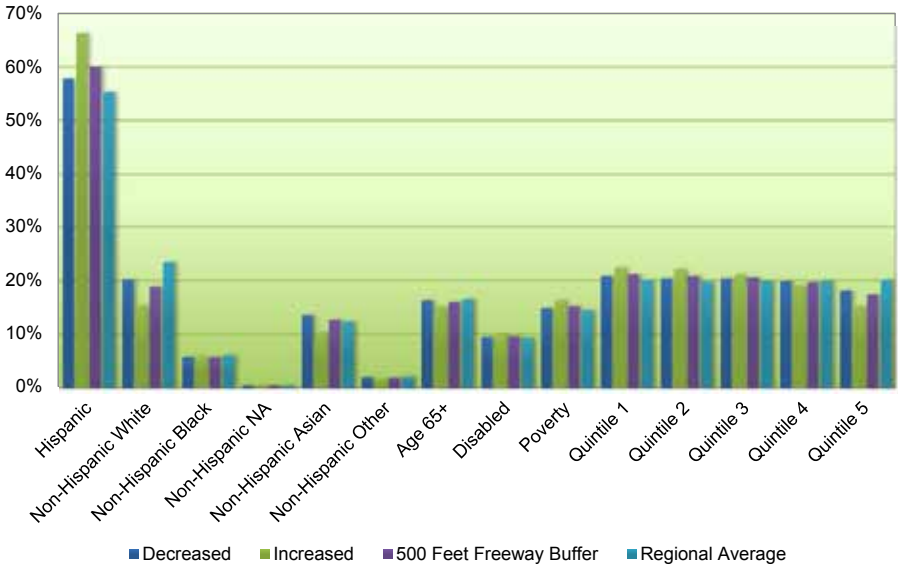
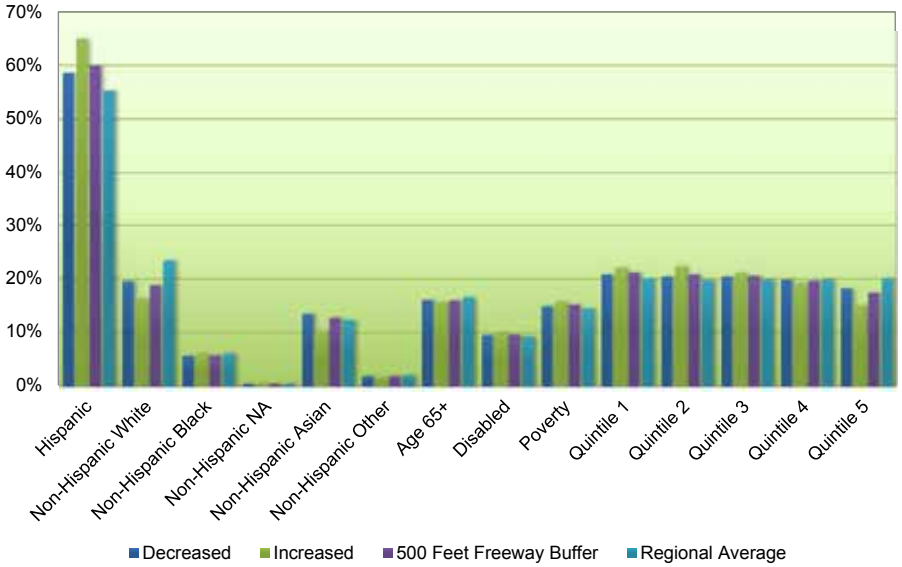


FIGURE 48 Environmental Justice Population in the 500 Feet Buffer Area Impacted by PM Changes



NOISE IMPACTS

Roadway Noise Impacts

The SCAG region has an extensive roadway system with nearly 21,000 centerline miles and 65,000 lane miles. It includes one of the country's most extensive High-Occupancy Vehicle lane systems and a growing network of toll lanes, as well as High Occupancy Toll (HOT) lanes. The region also has a vast network of arterials and other minor roadways. Roadway facilities noise may cause significant environmental concerns.

Noise associated with highway traffic depends on a number of factors that include traffic volumes, vehicle speed, vehicle fleet mix (cars, trucks), as well as the location of the highway with respect to sensitive receptors (i.e., schools, daycare facilities, parks, etc.). According to Federal Highway Administration (FHWA) guidance, noise impacts occur when noise levels increase substantially when compared to existing noise levels. For the purposes of this analysis (consistent with FHWA guidance), noise increases of 3 dB along highways where noise levels are currently, or would be in the future, above 66 dB are considered to be significant, regardless of adjacent land use.

Highways that would be expected to have an increase of 3 dB or more include those where any of the following would occur: (1) the total traffic volumes increase by 100 percent compared to existing conditions; (2) the medium/heavy truck traffic volumes increase by 130 percent compared to existing conditions; or (3) the medium/heavy truck traffic volumes increase by 100 percent and there is an increase in other traffic volumes by 50 percent. These highway segments were identified using the results of SCAG's regional transportation model.

On some highways, there is no potential for noise levels to reach 66 dB. To eliminate these from the analysis, the following criteria were applied: (1) arterials where the FHWA's Traffic Noise Model (TNM) indicated that the motor vehicle volume (and the percentage of medium/heavy trucks) would result in traffic noise levels less than 66 dB; (2) arterials where the calculated motor vehicle speed was less than 17 mph; or (3) freeways where the average volume-to-capacity ratio was equal to or greater than 1.0, which would result in vehicle speeds of less than 30 mph. If a highway met any one of these criteria, it was eliminated from further consideration.

For each highway segment where a significant increase in noise would occur, a 150-foot impact zone was determined on either side. Using GIS, the percentage of each affected TAZs land area that fell within this zone was identified, and this percentage was applied to the demographic data forecast for this TAZ. This methodology was utilized in both the 2008 and 2004 RTP.). Maps were created for 2035 Baseline and 2035 Plan alternatives from the 2008 base year (see maps). They show significant noise clusters in the South Bay region near the ports and the Inland Empire, in the vicinity of Ontario, Rancho Cucamonga, and San Bernardino. Other areas of noise significance include the Antelope Valley and Apple Valley. For both scenarios, truck traffic volumes 130 percent or greater (from existing conditions) had the largest impact, as depicted by the green color in the maps.

EXHIBIT 32 SCAG Region Roadway Noise (2035 Baseline from Existing Conditions)

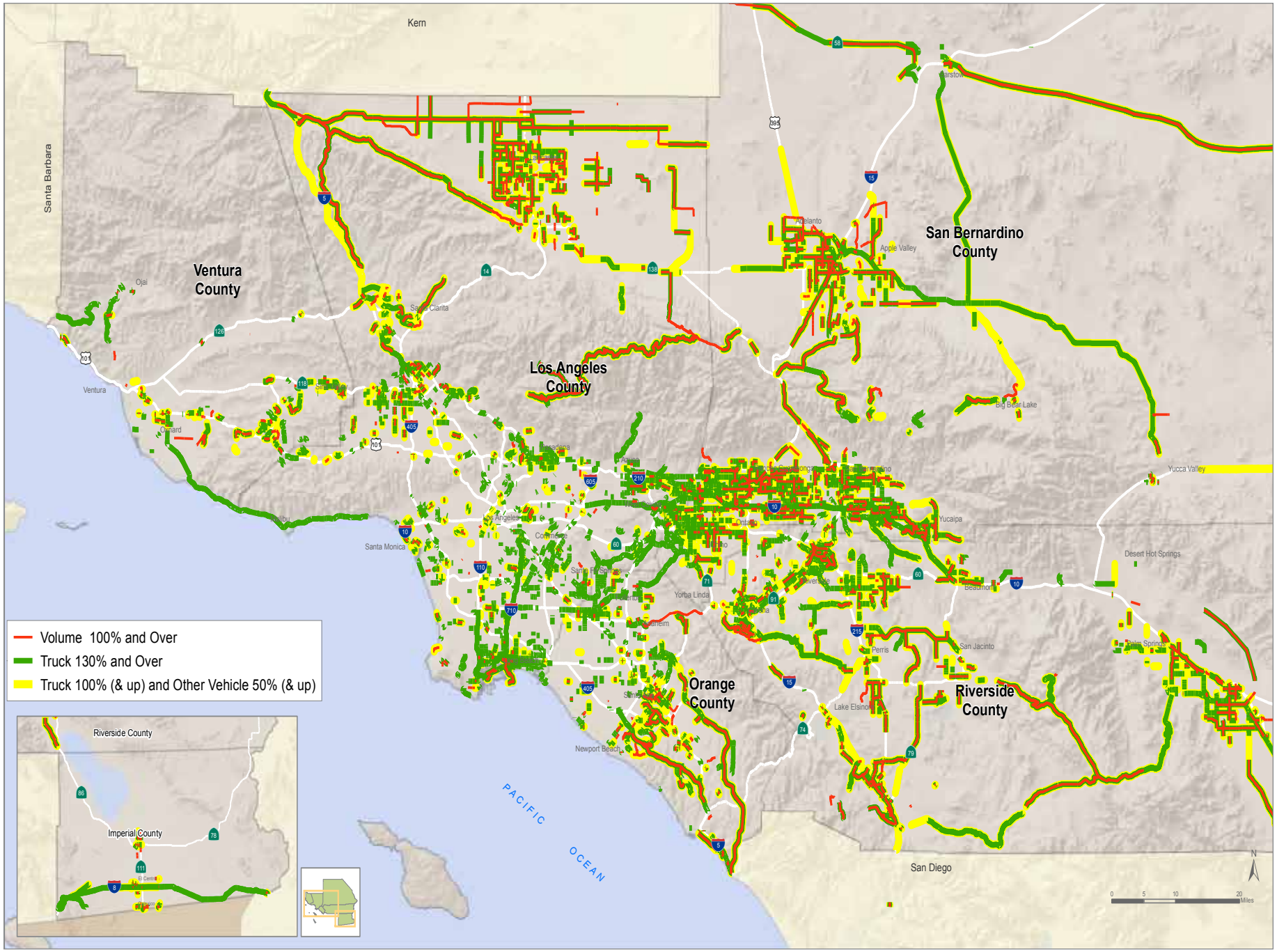
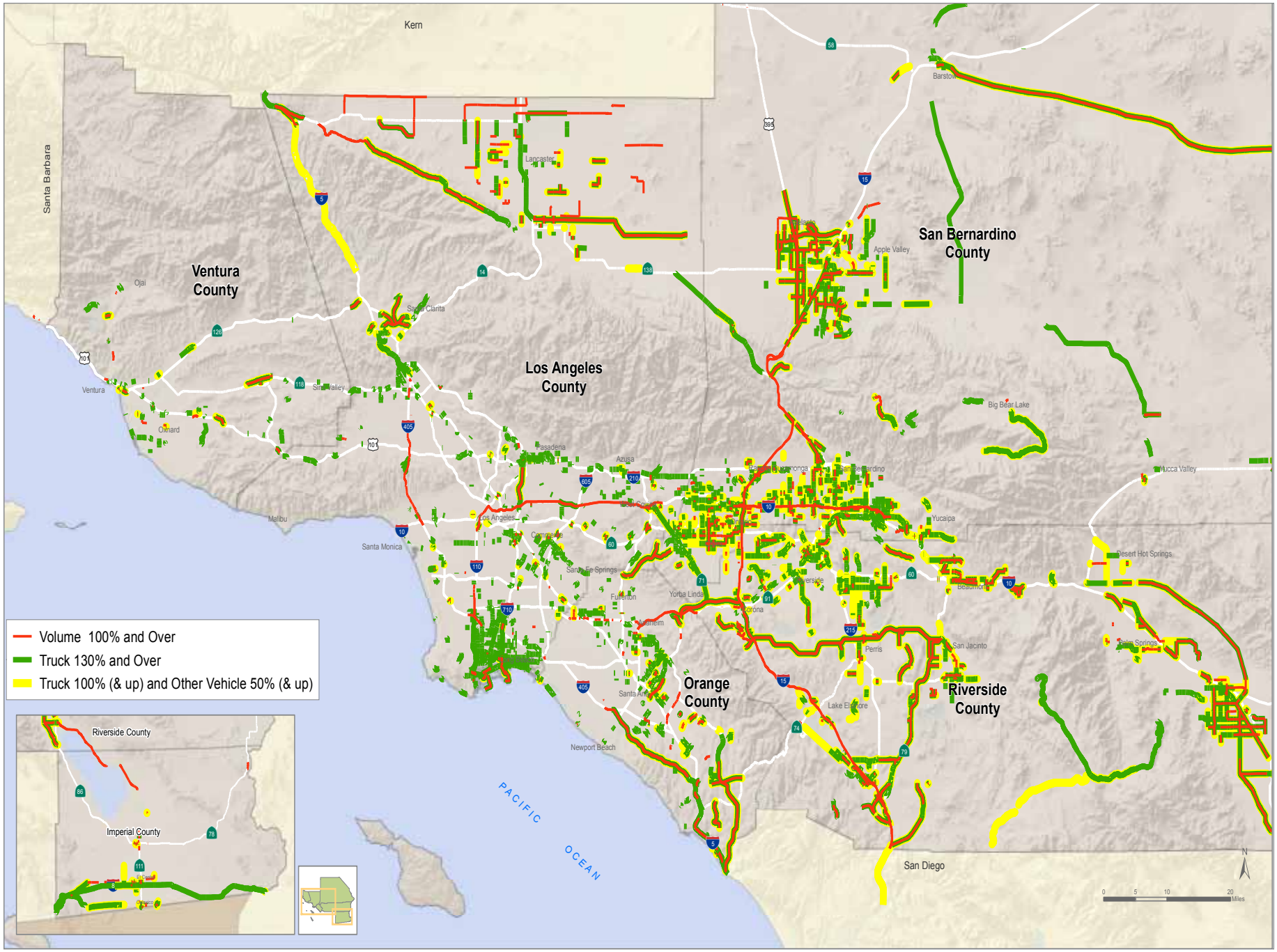


EXHIBIT 33 SCAG Region Roadway Noise (2035 Plan from Existing Conditions)



The demographic characteristics of each impacted TAZ were aggregated and compared with the regional demographics to determine if there would be any disproportionate impacts to any of the demographic groups identified in Section I of this Appendix.

FIGURE 49 compares the share of people within an Environmental Justice Community of interest with the rest of the region residing within roadway noise areas. The lowest income group (Quintile 1) will account for 22 percent of the affected population in 2035. In contrast, the highest income group in the region (Quintile 5) will account for 17 percent of the population in Highway Noise Areas. **FIGURE 49** also illustrates that there is a marginal disproportionate impact on households below the poverty line. Within the region as a whole 14 percent of households are below the poverty line. Within the Highway Noise Areas, this percentage rises to 16 percent.

In addition, the distribution of the disabled established that there is no significant concentration of that Environmental Justice population in these areas. Similarly, distribution of age 65+ revealed that the elderly were not disproportionately impacted by the large changes in dB associated with Highway Noise Areas. Within the region, this group represents 17 percent of all households. In contrast, households age 65 and over only represented 15 percent of the households in Highway Noise Areas.

The 2012 RTP also found that minority populations were primarily affected by highway noise impacts. As indicated by the distribution of households in Highway Noise Areas by Ethnic/Racial Category, minority populations, specifically Hispanics, would be disproportionately impacted by highway noise. Approximately, 60 percent of Hispanics would be residing in highway noise areas by 2035.

The identification of these disparate highway noise impacts at the regional level can be attributed to a the issue of incompatible land use, where high polluting transportation projects, such as freeway construction, airport expansions, or rail extension projects, are located in minority populated neighborhoods. The Mitigation Toolbox provided below includes potential mitigation measures to address noise impacts including corridor-level analyses for proposed projects in areas where impacts are concentrated. In addition, the 2012 RTP further proposes mitigating these impacts to the extent possible, for example, by requiring new sound walls where freeway expansions are proposed. Furthermore, the RTP also proposes grade crossings, new technologies, and other clean technologies for goods movement corridors.

FIGURE 49 Environmental Justice Population Impacted Along Roadway Noise Areas (2035)

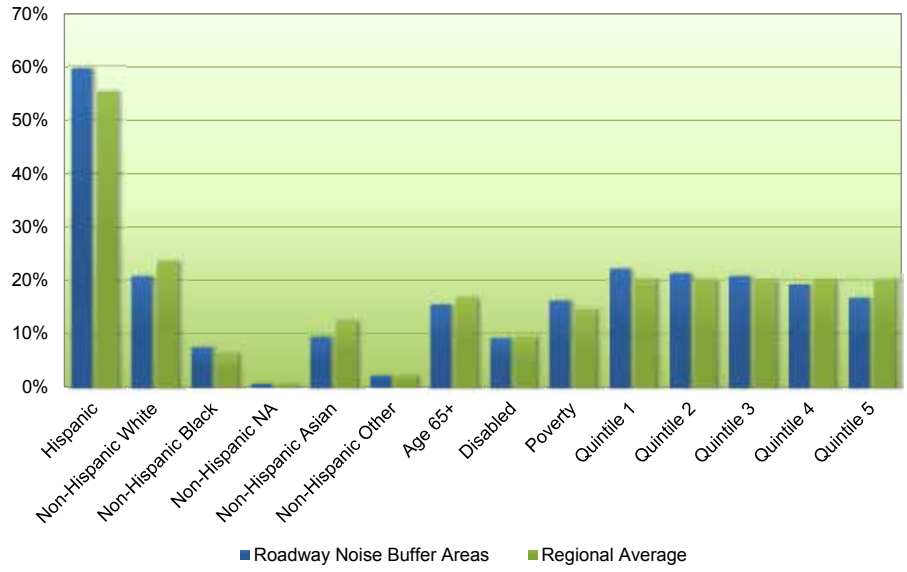


FIGURE 50 Environmental Justice Population Impacted Along Roadway Noise Areas (2035)

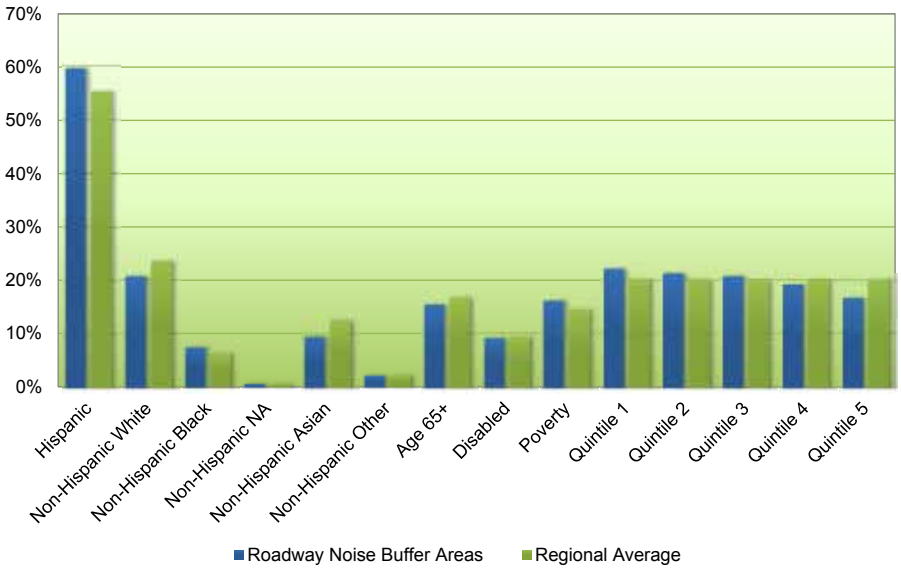
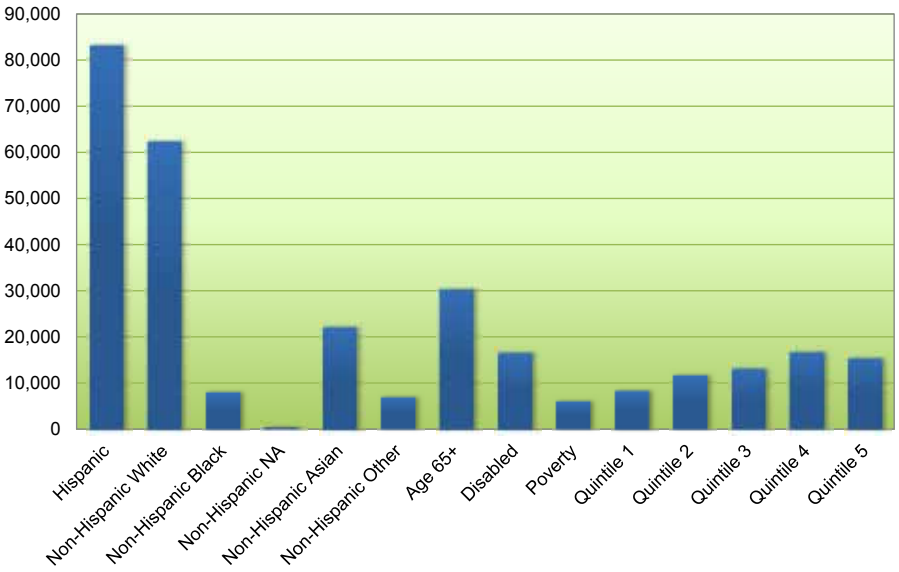


FIGURE 51 Environmental Justice Population Impacted (Reduced) by Roadway Noise Improvement between Baseline and Plan (2035)

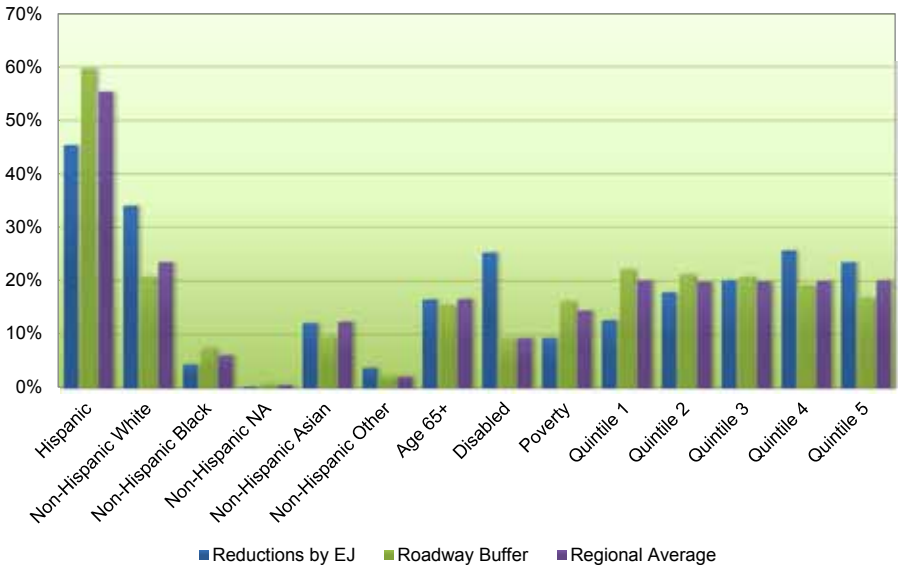


Staff further investigated the impacts on areas and the number of people affected by improvement of roadway noise from the proposed 2012 RTP/SCS as it compared with the baseline condition. As illustrated in the roadway segment maps where noise impacts are identified for both baseline and for proposed plan, areas or number of segments under proposed plan are much smaller/less than those under the baseline condition. Thus it is projected that will be 183,000 fewer people (13.9 percent reduction) and 63,000 less households (15.3 percent reduction) affected by roadway noise than those under baseline condition (1,321,600 people/426,700 households).

FIGURE 51 provides allocation by Environmental justice Communities for those affected population and household where their roadway noise conditions are improved from proposed 2012 RTP/SCS.

While the proposed 2012 RTP/SCS improves the roadway noise conditions by reducing the areas, roadway segments, and the number of people affected by roadway noise, the benefits are not proportionally shared by each Environmental Justice category as observed in the roadway noise impacted areas or in the region as whole. SCAG's analysis found that the roadway noise reductions will disproportionately benefit Non-Hispanic Whites and the two highest income quintile groups. Several other Environmental Justice Communities also receive greater benefits from roadway noise improvements including Non-Hispanic Asian, Non-Hispanic others, elderly, and disabled (See **FIGURE 52**).

FIGURE 52 Environmental Justice Population Distribution of Roadway Noise Improvement between Baseline and Plan (2035)



Airport Noise Impacts

The SCAG Region supports the nation's largest regional airport system in terms of number of airports and aircraft operations. It operates in a very complex airspace environment. The system has six established air carrier airports including Los Angeles International (LAX), Bob Hope (formerly Burbank), John Wayne, Long Beach, Ontario and Palm Springs. There are also four emerging air carrier airports in the Inland Empire and North Los Angeles County. These include San Bernardino International Airport (formerly Norton AFB), March Inland Port (joint use with March Air Reserve Base), Southern California Logistics Airport (formerly George AFB) and Palmdale Airport (joint use with Air Force Plant 42). The regional system also includes 45 general aviation airports and two commuter airports, for a total of 57 public use airports. Although the projected demand for airport capacity has decreased compared to the 2008 RTP, there is still moderate growth planned for the future. The challenge is striking a balance between the aviation capacity needs of Southern California with the local quality of life for the affected populations.

Projected noise impacts from aircraft operations at the region's airports in 2035 were modeled for inclusion in the Programmatic Environmental Impact Report for the RTP. For each airport, modeling produced a contour or isoline for the 65 dB Community Noise Equivalent Level (CNEL), a measure of noise that takes into account both the number and the timing of flights, as well as the mix of aircraft types. The Federal Aviation Administration (FAA) considers residences to be an "incompatible land use" with noise at or above 65dB. To identify potentially impacted populations, the anticipated population within the 65 dB CNEL contour was calculated using the following steps:

1. Calculate the percentage of TAZs that would lie within a 65 dB CNEL contour.
2. Assign the SCAG projected population to the TAZ.
3. Apply the demographic breakdown of the TAZ as a whole to the population within the 65 dB CNEL contour.

It should be noted that after 9-11 and "Great Recession" experienced since 2008, the global aviation industry remains in a depressed state. SCAG region air passenger demand and cargo forecasts have been revised downward repeatedly in 2004 RTP and 2008 RTP from the aviation scenario and forecasts adopted in the 2001 RTP. Currently for the 2012 RTP, projections of aviation demand and air cargo remained significantly less than those projected and adopted in 2001 RTP. Thus the downward revisions in projected demand at airports resulted in the reduction of Airport Noise Areas and the corresponding communities that will be studied.

For the purposes of this study, Aviation Noise Areas are defined as areas that are adversely affected by aircraft and airport noise. As part of the Environmental Justice Analysis, special attention will be paid to income, disability, age, and race/ethnicity of affected populations.

FIGURE 53 presents distribution of all environmental justice variables within the aviation noise impacted areas, and their comparisons with regional average. The analysis indicates that the 2012 RTP/SCS results in a disproportionate aviation noise impact to low income and minority populations. Under the 2012 RTP, the lowest income group (Quintile 1) will represent 27 percent of the households impacted by noise above the 65 dB CNEL,

while the highest income group (Quintile 5) will only represent 13 percent of the households impacted by noise above the 65 dB CNEL.

Similarly as indicated in the figure, a disproportionate number of households below the poverty threshold will be affected by airport noise levels above the 65 dB CNEL. While 14 percent of the SCAG region households are projected to be living below the poverty level, 19 percent of those that live within the Noise Contour Areas will be below the poverty line.

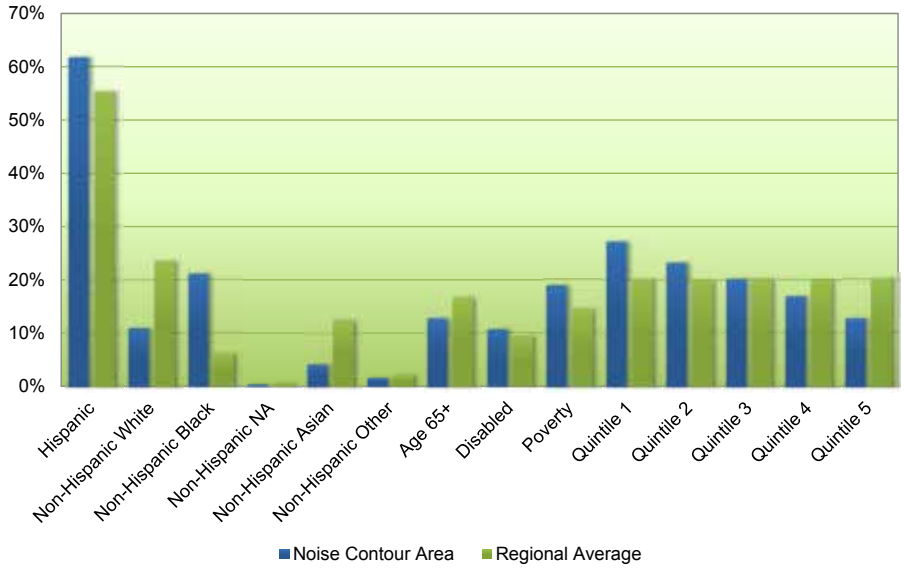
In terms of race/ethnicity, the aviation plan of the 2012 RTP/SCS is projected to have a disproportionate aviation noise impact on minority groups who make up 89 percent of population within the noise contours compared with a regional average of 76 percent of minority population in 2035. Specifically, Hispanic and African-American populations are disproportionately affected. These two groups will make up 55 percent and 6 percent of the regional population in 2035 respectively, but represent 62 percent and 21 percent of those that will live within the impacted Noise Contour Area.

Distribution of the disabled in aviation noise areas shows that there will be a slightly higher concentration of disabled people compared to the region. It is projected that 11 percent of the households in aviation noise areas will be disabled, while the average is 9 percent for the region. On the other hand, elderly households age 65 and above are less concentrated in aviation noise areas in 2035 (13 percent), than the regional average of 17 percent.

SCAG has adopted the Aviation Decentralization Strategy, which calls for relieving the pressure at LAX and Ontario airports. Coupled with the ground access strategy which would relieve surface congestion in the surrounding areas, some of the negative effects of airports could be addressed. The Aviation Decentralization Strategy explores available airport capacity in the Inland Empire and North Los Angeles County. However, as a result of the Great Recession, projected demand for all airports in the region is down. This new reality has had the effect of reducing the number of communities that fall within Aviation Noise Areas, though the problem will still exist. A decentralized airport system will relieve pressure on constrained airports, minimize environmental impacts such as noise, traffic, and encroachment on adjacent neighborhoods, and reduce stress on the region's surface transportation infrastructure. The challenges facing the Aviation Decentralization Strategy, relate to the fact that the core of aviation demand will continue to reside in the urban areas of Los Angeles and Orange counties.

The environmental justice analysis results demonstrate that lower income, minority and disabled residents bear a disproportionate burden from aviation noise pollution with the 2012 RTP. It is therefore critical to continue addressing this issue. SCAG has included potential mitigation measures in the Environmental Justice Mitigation Toolbox at the end of this Appendix.

FIGURE 53 Environmental Justice Population Within the Aviation Noise Impacted Area (2035)



(11) Rail-Related Impacts

METHODOLOGY

Environmental pollution from locomotives, rail yards and other rail facilities is a major public health concern at the national, regional and community level. The movement of goods by rail involves diesel-powered locomotives and equipment, resulting in significant emissions of particulate matter (PM), nitrogen oxides (NO_X), hydrocarbons, and other air toxins throughout the process. In response to input from our federal partners, SCAG developed this summary analysis to address potential environmental justice impacts in areas adjacent to railroads and rail facilities, although further discussion and analysis is recommended. This section includes an analysis of Environmental Justice Communities adjacent to railroads and rail facilities, a comparison of cancer risk areas adjacent to railroads, rail impacts to sensitive receptors, and a summary examination of potential environmental justice concerns adjacent to grade separation projects.

SHARE OF KEY ENVIRONMENTAL JUSTICE POPULATION IN AREAS ADJACENT TO RAILROADS: FROM 2000 CENSUS AND 2005–09 ACS

The following figures present the socioeconomic indicators from 2000 Census and 2005–09 American Community Survey in areas within ¼-mile, ½-mile and 1-mile distance from railroads, by key Environmental Justice Communities including the elderly population (age 65 and over), population below poverty, minority, foreign born population, non-English speaking population, households without a vehicle and population without a high school diploma. As shown in figures below, the share of most Environmental Justice Communities residing in close proximity to railroads is higher than regional average both in 2000 and in 2005–09. The only exception is elderly population. These observations suggest that rail-related environmental burdens, such as air pollution and noise from locomotives, rail yard and other rail facility, are relatively higher to low-income and minority communities than regional average. However, SCAG recommends further analysis with our partner agencies to verify this observation.

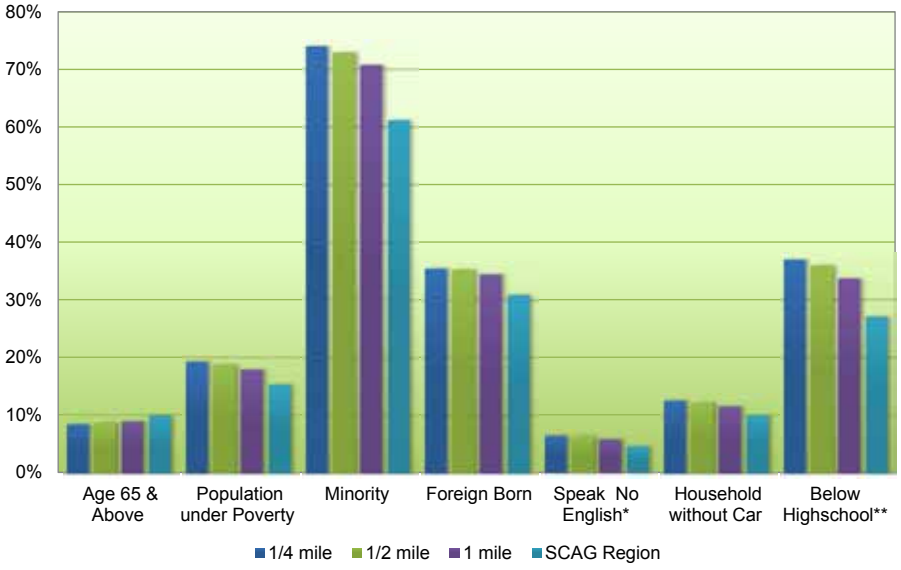
TABLE 46 Distribution of Environmental Justice Demographic Groups in Areas Adjacent to Railroads

Key Environmental Justice Population Groups in the Areas Adjacent to Railroads [2000 Census]							
Distance from Railroads	Age 65 & Above	Population under Poverty	Non-Hispanic White	Foreign Born	Speak No English	Household Without Car	Below High School
1/4 mile	219,115	499,191	669,692	918,567	149,558	97,334	554,085
1/2 mile	425,161	926,704	1,327,191	1,743,738	277,934	181,226	1,033,615
1 mile	784,745	1,571,570	2,557,459	3,027,074	460,213	313,469	1,747,788
Key Environmental Justice Population Groups in the Areas Adjacent to Railroads [2000 Census (Percent)]							
Distance from Railroads	Age 65 & Above	Population under Poverty	Minority	Foreign Born	Speak No English*	Household Without Car	Below High School**
1/4 mile	8.5%	19.3%	74.1%	35.5%	6.3%	12.6%	37.0%
1/2 mile	8.6%	18.8%	73.1%	35.4%	6.2%	12.2%	36.0%
1 mile	8.9%	17.9%	70.9%	34.5%	5.7%	11.6%	33.7%
SCAG Region	9.9%	15.4%	61.3%	31.0%	4.5%	10.1%	27.1%
Key Environmental Justice Population Groups in the Areas Adjacent to Railroads [2005–09 American Community Survey]							
Distance from Railroads	Age 65 & Above	Population under Poverty	Non-Hispanic White	Foreign Born	Speak No English	Household Without Car	Below High School
1/4 mile	237,909	451,743	611,297	936,230	162,487	71,763	496,597
1/2 mile	464,028	842,274	1,214,840	1,783,632	305,410	134,682	927,689
1 mile	862,374	1,436,849	2,355,294	3,133,716	515,315	234,947	1,575,776
Key Environmental Justice Population Groups in the Areas Adjacent to Railroads [2005–09 American Community Survey (Percent)]							
Distance from Railroads	Age 65 & Above	Population under Poverty	Minority	Foreign Born	Speak No English*	Household Without Car	Below High School**
1/4 mile	8.9%	16.9%	77.2%	35.0%	6.6%	9.0%	30.7%
1/2 mile	9.1%	16.5%	76.3%	34.9%	6.5%	8.8%	29.9%
1 mile	9.4%	15.7%	74.3%	34.2%	6.1%	8.4%	28.1%
SCAG Region	10.4%	13.5%	64.8%	30.8%	4.8%	7.4%	22.4%

** Share of Population 5 & Over* *** Share of Population 25 & Over*

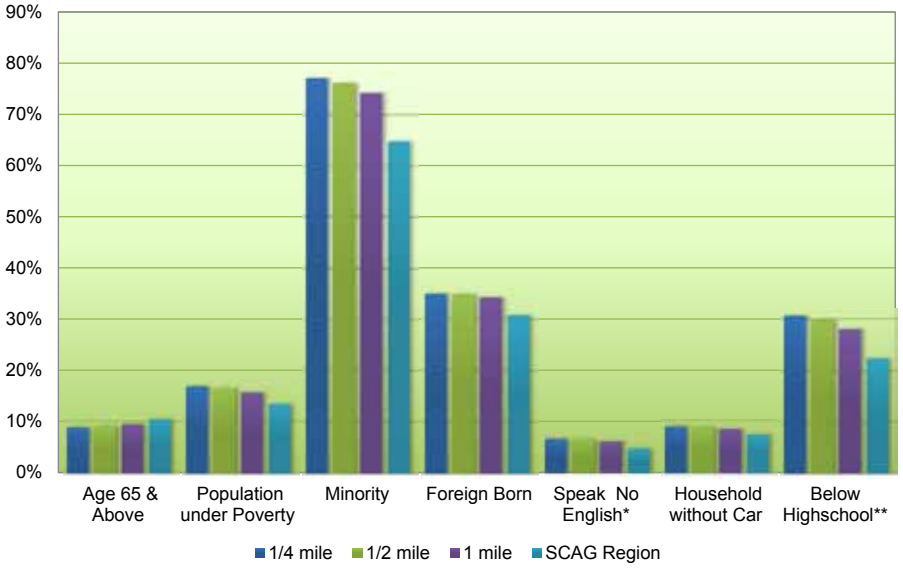
Source: 2000 Census and 2005–09 ACS, processed by SCAG Research, Analysis, and Information Service staff

FIGURE 54 Key Environmental Justice Population Groups in the Areas Adjacent to Railroads (2000 Census)



** Share of Population 5 & Over* *** Share of Population 25 & Over*

FIGURE 55 Key Environmental Justice Population Groups in the Areas Adjacent to Railroads (2005–09 American Community Survey)



** Share of Population 5 & Over* *** Share of Population 25 & Over*

SHARE OF KEY ENVIRONMENTAL JUSTICE POPULATION IN AREAS ADJACENT TO RAILROADS: FROM 2008 AND 2035 PROJECTIONS

The following figures present the projected socioeconomic indicators in 2008 and 2035 in areas within ¼-mile, ½-mile and 1-mile distance from the railroads. As shown in figures below, the share of disabled, minority, population under poverty and households with lower income is higher than regional average both in 2008 and in 2035. These observations suggest that, as in the past, low-income and minority communities could be burdened by higher risks of rail-related environmental impacts than other demographic groups. Again, SCAG would recommend future research, with our partner agencies, to verify this observation.

TABLE 47 Projected Environmental Justice Variables and Demographic Changes in the Areas Adjacent to Railroads

Distance from Railroads :	1/4 mile				1/2 mile				1 mile				SCAG Region	
	2008	2035	2008	2035	2035	2035	2008	2035	2035	2035	2008	2035	2008	2035
Population	**2,508,920**	**3,098,859**			**5,041,957**	**6,213,170**			**9,239,617**	**11,348,604**				
Male	1,256,919	1,552,071	50.1%	50.1%	2,517,402	3,101,926	49.9%	49.9%	4,599,265	5,648,919	49.8%	49.8%	49.9%	49.9%
Female	1,252,002	1,546,789	49.9%	49.9%	2,524,555	3,111,244	50.1%	50.1%	4,640,352	5,699,685	50.2%	50.2%	50.1%	50.1%
Age 65 & over	223,212	458,097	8.9%	14.8%	457,689	932,993	9.1%	15.0%	872,443	1,758,960	9.4%	15.5%	10.4%	16.7%
Disabled	233,195	311,694	9.3%	10.1%	469,820	626,740	9.3%	10.1%	854,401	1,137,904	9.2%	10.0%	8.6%	9.3%
Hispanic	1,462,152	2,093,732	58.3%	67.6%	2,878,265	4,132,225	57.1%	66.5%	4,978,015	7,232,396	53.9%	63.7%	44.8%	55.4%
Non-Hispanic White	571,903	461,446	22.8%	14.9%	1,189,856	956,845	23.6%	15.4%	2,380,302	1,920,683	25.8%	16.9%	34.4%	23.5%
Non-Hispanic Black	184,897	183,118	7.4%	5.9%	369,481	369,411	7.3%	5.9%	705,504	712,682	7.6%	6.3%	6.9%	6.1%
Non-Hispanic NA	11,024	14,871	0.4%	0.5%	21,519	29,088	0.4%	0.5%	38,922	53,081	0.4%	0.5%	0.4%	0.5%
Non-Hispanic Asian	240,357	295,582	9.6%	9.5%	502,960	622,328	10.0%	10.0%	984,461	1,229,896	10.7%	10.8%	11.6%	12.3%
Non-Hispanic Other	38,588	50,111	1.5%	1.6%	79,877	103,272	1.6%	1.7%	152,413	199,867	1.6%	1.8%	1.9%	2.1%
Poverty 1*	128,457	164,743	17.0%	17.3%	254,163	326,557	16.6%	17.0%	449,225	580,044	15.7%	16.3%	13.8%	14.5%
Poverty 2*	80,374	102,908	10.6%	10.8%	159,415	204,376	10.4%	10.6%	281,378	362,251	9.9%	10.2%	8.7%	9.0%
Poverty 3*	73,722	92,926	9.7%	9.8%	147,982	186,421	9.7%	9.7%	265,369	334,921	9.3%	9.4%	8.3%	8.5%
Household	**756,711**	**950,975**			**1,533,242**	**1,922,122**			**2,854,880**	**3,567,371**				
Quintile 1	177,088	227,073	23.4%	23.9%	354,056	451,211	23.1%	23.5%	636,188	803,261	22.3%	22.5%	21%	20%
Hispanic	74,996	148,748	9.9%	15.6%	145,337	289,081	9.5%	15.0%	240,236	489,551	8.4%	13.7%	6.4%	10.8%
Non-Hispanic White	60,475	30,761	8.0%	3.2%	124,258	63,370	8.1%	3.3%	238,230	123,607	8.3%	3.5%	9.4%	4.2%
Non-Hispanic Black	24,512	20,137	3.2%	2.1%	48,547	40,747	3.2%	2.1%	90,499	77,979	3.2%	2.2%	2.4%	1.8%
Non-Hispanic NA	893	1,355	0.1%	0.1%	1,794	2,730	0.1%	0.1%	3,057	4,788	0.1%	0.1%	0.1%	0.1%
Non-Hispanic Asian	12,525	20,127	1.7%	2.1%	26,465	42,931	1.7%	2.2%	49,717	83,348	1.7%	2.3%	1.7%	2.4%
Non-Hispanic Other	3,687	5,945	0.5%	0.6%	7,653	12,352	0.5%	0.6%	14,448	23,989	0.5%	0.7%	0.5%	0.7%
Quintile 2	177,864	220,063	23.5%	23.1%	355,144	439,930	23.2%	22.9%	635,225	790,318	22.3%	22.2%	20%	20%
Hispanic	98,882	151,607	13.1%	15.9%	192,639	297,519	12.6%	15.5%	323,946	513,667	11.3%	14.4%	8.5%	11.5%
Non-Hispanic White	45,768	31,147	6.0%	3.3%	94,616	64,605	6.2%	3.4%	183,631	126,633	6.4%	3.5%	7.3%	4.3%
Non-Hispanic Black	15,247	13,141	2.0%	1.4%	30,502	26,889	2.0%	1.4%	57,287	51,790	2.0%	1.5%	1.6%	1.3%
Non-Hispanic NA	902	1,330	0.1%	0.1%	1,674	2,503	0.1%	0.1%	2,888	4,231	0.1%	0.1%	0.1%	0.1%

Distance from Railroads :	1/4 mile				1/2 mile				1 mile				SCAG Region	
	2008	2035	2008	2035	2035	2035	2008	2035	2035	2035	2008	2035	2008	2035
Non-Hispanic Asian	12,488	16,685	1.7%	1.8%	26,089	35,220	1.7%	1.8%	49,002	67,887	1.7%	1.9%	1.7%	1.9%
Non-Hispanic Other	4,577	6,153	0.6%	0.6%	9,624	13,193	0.6%	0.7%	18,472	26,109	0.6%	0.7%	0.6%	0.8%
Quintile 3	160,132	198,230	21.2%	20.8%	324,711	400,967	21.2%	20.9%	599,772	740,586	21.0%	20.8%	20%	20%
Hispanic	80,957	126,723	10.7%	13.3%	159,278	251,178	10.4%	13.1%	274,111	443,392	9.6%	12.4%	7.4%	10.4%
Non-Hispanic White	49,273	35,474	6.5%	3.7%	102,759	73,863	6.7%	3.8%	203,549	146,520	7.1%	4.1%	8.4%	5.1%
Non-Hispanic Black	11,858	10,721	1.6%	1.1%	24,630	22,617	1.6%	1.2%	48,205	45,268	1.7%	1.3%	1.4%	1.2%
Non-Hispanic NA	662	987	0.1%	0.1%	1,321	1,966	0.1%	0.1%	2,512	3,844	0.1%	0.1%	0.1%	0.1%
Non-Hispanic Asian	13,478	18,681	1.8%	2.0%	28,503	39,470	1.9%	2.1%	55,476	78,404	1.9%	2.2%	1.9%	2.3%
Non-Hispanic Other	3,903	5,645	0.5%	0.6%	8,221	11,873	0.5%	0.6%	15,920	23,159	0.6%	0.6%	0.6%	0.7%
Quintile 4	138,502	172,551	18.3%	18.1%	283,967	353,682	18.5%	18.4%	544,800	677,753	19.1%	19.0%	20%	20%
Hispanic	58,828	97,120	7.8%	10.2%	116,812	194,658	7.6%	10.1%	206,233	353,643	7.2%	9.9%	5.8%	8.8%
Non-Hispanic White	51,017	38,345	6.7%	4.0%	107,538	80,870	7.0%	4.2%	220,688	166,341	7.7%	4.7%	9.9%	6.4%
Non-Hispanic Black	9,631	9,496	1.3%	1.0%	20,115	20,141	1.3%	1.0%	40,280	40,921	1.4%	1.1%	1.3%	1.2%
Non-Hispanic NA	499	794	0.1%	0.1%	989	1,616	0.1%	0.1%	2,077	3,468	0.1%	0.1%	0.1%	0.1%
Non-Hispanic Asian	15,378	22,242	2.0%	2.3%	31,996	46,821	2.1%	2.4%	63,073	94,705	2.2%	2.7%	2.3%	2.9%
Non-Hispanic Other	3,149	4,554	0.4%	0.5%	6,517	9,576	0.4%	0.5%	12,450	18,675	0.4%	0.5%	0.5%	0.6%
Quintile 5	103,126	133,057	13.6%	14.0%	215,364	276,332	14.0%	14.4%	438,894	555,452	15.4%	15.6%	20%	20%
Hispanic	31,889	62,330	4.2%	6.6%	64,811	128,006	4.2%	6.7%	120,533	244,721	4.2%	6.9%	3.9%	7.1%
Non-Hispanic White	47,212	36,350	6.2%	3.8%	101,099	77,799	6.6%	4.0%	219,014	167,661	7.7%	4.7%	12.1%	7.9%
Non-Hispanic Black	6,864	7,889	0.9%	0.8%	14,083	16,154	0.9%	0.8%	27,985	32,348	1.0%	0.9%	1.0%	1.0%
Non-Hispanic NA	568	1,125	0.1%	0.1%	1,106	2,213	0.1%	0.1%	1,953	3,997	0.1%	0.1%	0.1%	0.1%
Non-Hispanic Asian	13,868	20,714	1.8%	2.2%	28,914	43,091	1.9%	2.2%	59,299	89,547	2.1%	2.5%	2.5%	3.4%
Non-Hispanic Other	2,725	4,649	0.4%	0.5%	5,351	9,068	0.3%	0.5%	10,110	17,178	0.4%	0.5%	0.4%	0.6%

** Poverty 1 = # of household below poverty; Poverty 2 = # of household between poverty and 1.5xP); Poverty 3 = # of household between 1.5xP and 2.0xP*
Source: Based on 2000 Census and 2005–09 ACS, processed and projected by SCAG Research, Analysis, and Information Service staff

RAIL-RELATED HEALTH RISK IMPACTS

EXHIBIT 34 illustrates areas adjacent to railroads overlaid with areas of high cancer risk. As shown in the maps below, a large portion of areas adjacent to railroads similar to areas of high cancer risk. These observations suggest that emissions from locomotives, rail yard and other rail facilities could result in an increased cancer risk in the neighboring low-income and minority communities. Further in-depth study is needed in order to examine the correlation of rail-related emission with cancer risk in areas adjacent to railroads.

RAIL-RELATED IMPACTS ON SENSITIVE RECEPTORS

EXHIBIT 35 depicts areas adjacent to railroads overlaid with sensitive receptor areas. Sensitive receptors include, but are not limited to, hospitals, schools, daycare facilities, elderly housing facilities where there are populations susceptible to greater impacts from air pollution and toxic chemicals. As shown in the map below, a significant number of sensitive receptors are located in close proximity to railroads. Further analysis is needed to better understand rail-related pollutants and contaminants in areas adjacent to railroads.

EXHIBIT 34 Rail-Related Health Risk Impacts

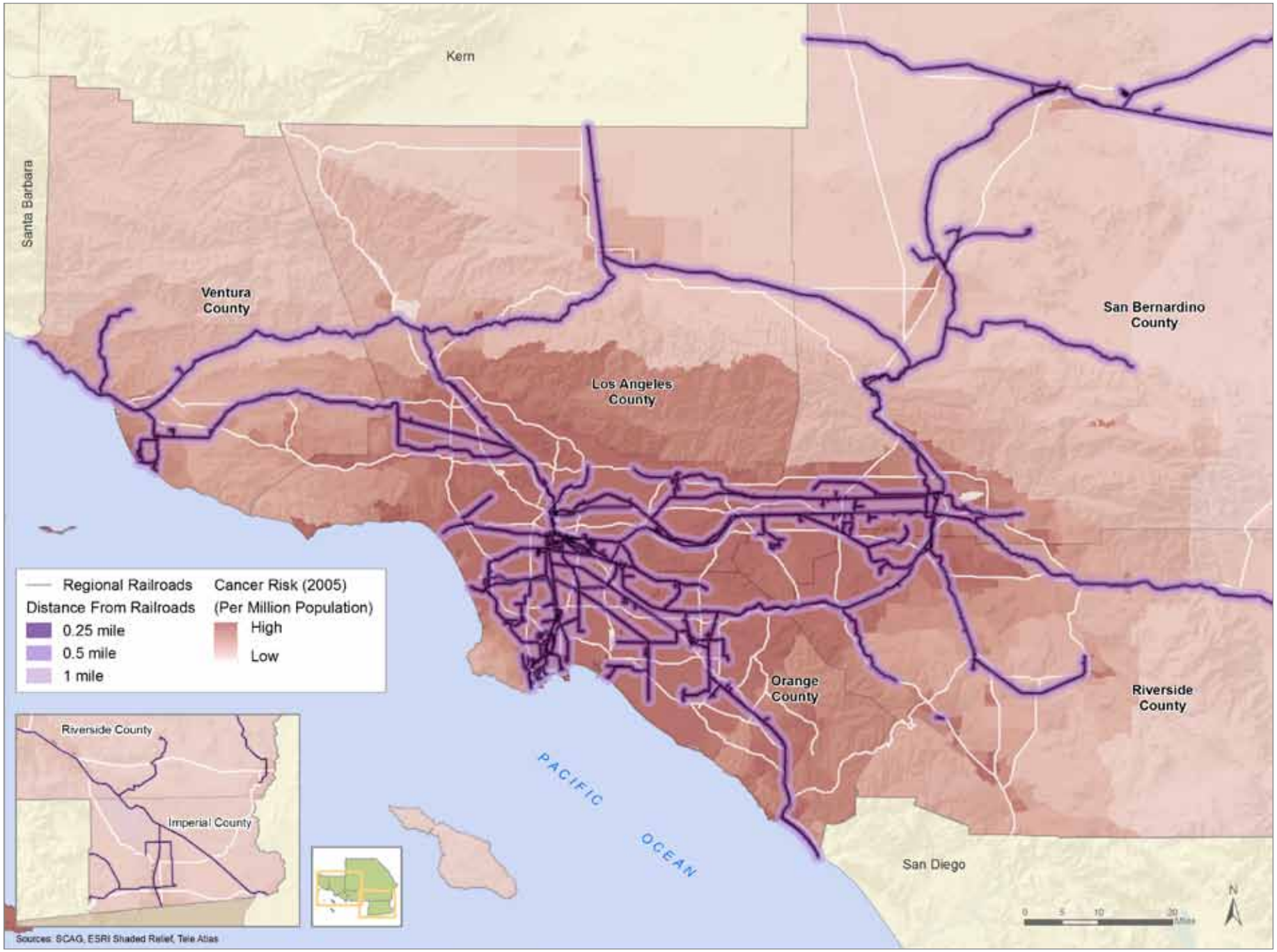
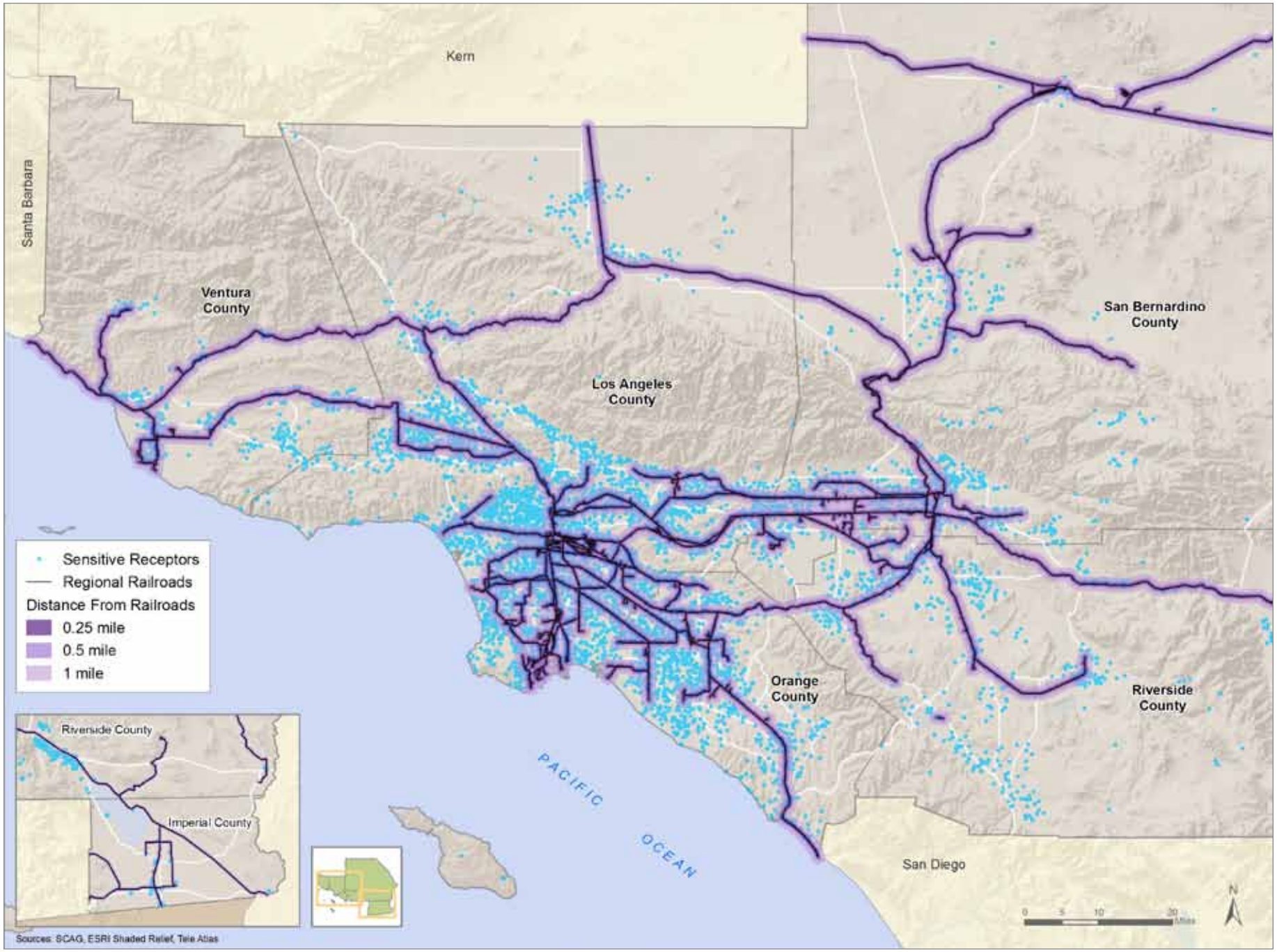


EXHIBIT 35 Rail-Related Impacts on Sensitive Receptors



SHARE OF KEY ENVIRONMENTAL JUSTICE POPULATION IN AREAS ADJACENT TO GRADE SEPARATION PROJECTS: FROM 2000 CENSUS AND 2005–09 ACS

The following figures present the socioeconomic indicators from 2000 Census and 2005–09 American Community Survey in areas within a ½-mile, 1-mile and 2-mile distance from grade separation projects, by key Environmental Justice population groups—elderly population (age 65 and over), population below poverty, minority, foreign born population, non-English speaking population, households without a vehicle and population without a high school diploma. As shown in the figures below, the share of most key Environmental Justice Communities reside close to railroads is higher than regional average both in 2000 and in 2005–09. The exceptions are the elderly population and households without a vehicle. These observations suggest that many Environmental Justice Communities are more likely to be affected by impacts from grade crossings, such as traffic delays, idling emissions and grade-crossing related accidents than other demographic groups.

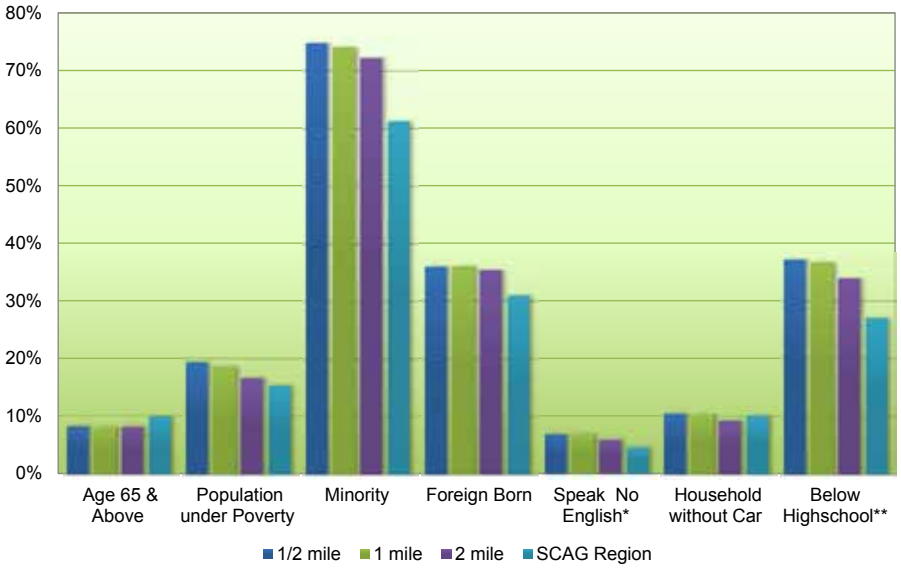
TABLE 48 Share of Key Environmental Justice Population in Areas Adjacent to Grade Separation Projects: From 2000 Census and 2005–09 American Community Survey

Key Environmental Justice Population Groups in the Areas Adjacent to Grade Separation Projects [2000 Census]							
Distance from Railroads	Age 65 & Above	Population under Poverty	Non-Hispanic White	Foreign Born	Speak No English	Household Without Car	Below High School
1/2 mile	16,530	38,664	50,186	71,886	12,316	6,034	42,697
1 mile	56,732	130,719	181,357	253,134	43,313	20,609	147,472
2 mile	171,371	348,322	578,490	738,508	111,952	55,850	410,660
Key Environmental Justice Population Groups in the Areas Adjacent to Grade Separation Projects [2000 Census (Percent)]							
Distance from Railroads	Age 65 & Above	Population under Poverty	Minority	Foreign Born	Speak No English*	Household Without Car	Below High School**
1/2 mile	8.3%	19.4%	74.9%	36.0%	6.8%	10.5%	37.2%
1 mile	8.1%	18.6%	74.2%	36.1%	6.8%	10.3%	36.8%
2 mile	8.2%	16.7%	72.3%	35.4%	5.9%	9.3%	34.0%
SCAG Region	9.9%	15.4%	61.3%	31.0%	4.5%	10.1%	27.1%
Key Environmental Justice Population Groups in the Areas Adjacent to Grade Separation Projects [2005–09 American Community Survey]							
Distance from Railroads	Age 65 & Above	Population under Poverty	Non-Hispanic White	Foreign Born	Speak No English	Household Without Car	Below High School
1/2 mile	18,680	33,708	42,765	76,860	12,815	3,976	38,911
1 mile	63,811	113,833	154,195	269,194	46,967	13,861	136,463
2 mile	196,164	304,852	500,737	787,933	128,707	38,930	382,858
Key Environmental Justice Population Groups in the Areas Adjacent to Grade Separation Projects [2005–09 American Community Survey (Percent)]							
Distance from Railroads	Age 65 & Above	Population under Poverty	Minority	Foreign Born	Speak No English*	Household Without Car	Below High School**
1/2 mile	9.0%	16.2%	79.4%	37.0%	6.7%	6.7%	31.2%
1 mile	8.7%	15.5%	79.0%	36.7%	7.0%	6.7%	31.2%
2 mile	8.9%	13.9%	77.2%	35.9%	6.4%	6.2%	28.9%
SCAG Region	10.4%	13.5%	64.8%	30.8%	4.8%	7.4%	22.4%

** Share of Population 5 & Over* *** Share of Population 25 & Over*

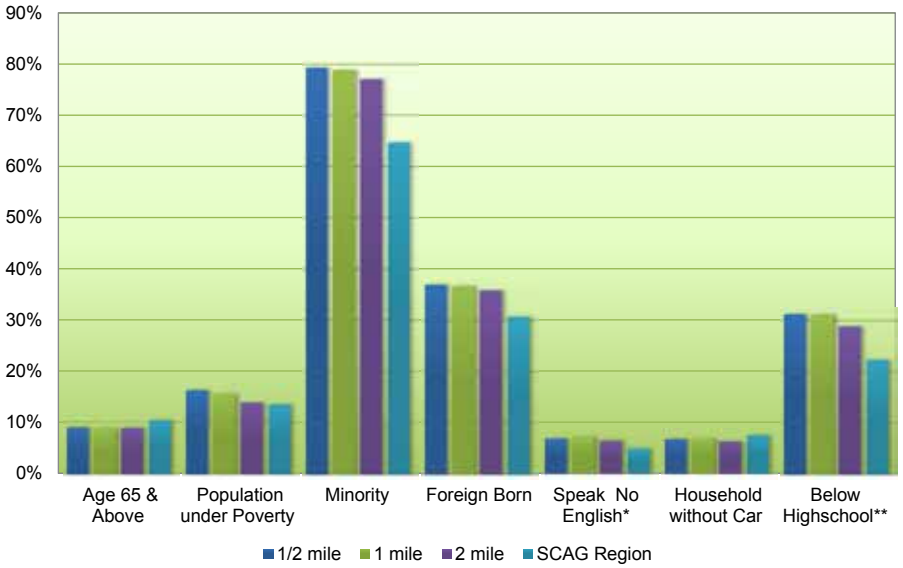
Source: 2000 Census and 2005–09 ACS, processed by SCAG Research, Analysis, and Information Service staff

FIGURE 56 Key Environmental Justice Population Groups in the Areas Adjacent to Grade Separation Projects (2000 Census)



** Share of Population 5 & Over* *** Share of Population 25 & Over*
Source: 2000 Census and 2005–09 ACS, processed by SCAG Research, Analysis, and Information Service staff

FIGURE 57 Key Environmental Justice Population Groups in the Areas Adjacent to Grade Separation Projects (2005–09 ACS)



** Share of Population 5 & Over* *** Share of Population 25 & Over*
Source: 2000 Census and 2005–09 ACS, processed by SCAG Research, Analysis, and Information Service staff

SHARE OF KEY ENVIRONMENTAL JUSTICE POPULATION IN AREAS ADJACENT TO GRADE SEPARATION PROJECTS: FROM 2008 AND 2035 PROJECTIONS

The following figures present the projected socioeconomic indicators in 2008 and 2035 in areas within a ½-mile, 1-mile and 2-mile distance from the grade separation projects. As shown in the figures below, the share of disabled, minority, population below poverty and households with lower income is projected to be higher than the regional average in 2008 and in 2035. These observations suggest that, as in the past, low-income and minority communities are more likely to be affected by impacts from grade crossings, such as traffic delays, idling emissions and grade-crossing related accidents than other demographic groups.

TABLE 49 Projected Environmental Justice Variables and Demographic Changes in the Areas Adjacent to Grade Separation Projects

Distance from the Projects:	1/2 mile				1 mile				2 miles				SCAG Region	
	2008	2035	2008	2035	2008	2035	2008	2035	2008	2035	2008	2035	2008	2035
Population	**198,052**	**270,405**			**719,686**	**959,669**			**2,189,256**	**2,856,556**				
Male	99,672	136,346	50.3%	50.4%	360,892	481,528	50.1%	50.2%	1,095,958	1,427,471	50.1%	50.0%	49.9%	49.9%
Female	98,380	134,059	49.7%	49.6%	358,794	478,141	49.9%	49.8%	1,093,299	1,429,085	49.9%	50.0%	50.1%	50.1%
Age 65 & over	16,744	38,612	8.5%	14.3%	60,866	136,329	8.5%	14.2%	192,480	420,519	8.8%	14.7%	10.4%	16.7%
Disabled	18,110	26,610	9.1%	9.8%	65,843	94,735	9.1%	9.9%	195,943	277,398	9.0%	9.7%	8.6%	9.3%
Hispanic	116,603	180,856	58.9%	66.9%	416,520	633,470	57.9%	66.0%	1,200,649	1,822,219	54.8%	63.8%	44.8%	55.4%
Non-Hispanic White	43,707	40,028	22.1%	14.8%	162,843	142,680	22.6%	14.9%	526,955	443,658	24.1%	15.5%	34.4%	23.5%
Non-Hispanic Black	9,700	14,318	4.9%	5.3%	35,939	51,396	5.0%	5.4%	112,117	153,422	5.1%	5.4%	6.9%	6.1%
Non-Hispanic NA	1,016	1,426	0.5%	0.5%	3,398	4,817	0.5%	0.5%	9,504	13,163	0.4%	0.5%	0.4%	0.5%
Non-Hispanic Asian	24,076	29,269	12.2%	10.8%	90,012	111,458	12.5%	11.6%	305,254	376,203	13.9%	13.2%	11.6%	12.3%
Non-Hispanic Other	2,950	4,509	1.5%	1.7%	10,973	15,848	1.5%	1.7%	34,777	47,891	1.6%	1.7%	1.9%	2.1%
Poverty 1*	8,882	12,122	15.7%	15.8%	32,353	43,764	15.7%	15.9%	89,737	122,244	14.1%	14.6%	13.8%	14.5%
Poverty 2*	6,354	8,608	11.3%	11.2%	22,074	29,771	10.7%	10.8%	61,778	83,445	9.7%	10.0%	8.7%	9.0%
Poverty 3*	6,141	8,122	10.9%	10.6%	21,317	28,076	10.4%	10.2%	59,963	79,190	9.4%	9.4%	8.3%	8.5%
Household	**56,443**	**76,815**			**205,859**	**274,905**			**634,602**	**838,430**				
Quintile 1	12,085	16,750	21.4%	21.8%	44,296	59,844	21.5%	21.8%	124,417	169,370	19.6%	20.2%	21%	20%
Hispanic	5,892	11,224	10.4%	14.6%	19,781	38,435	9.6%	14.0%	50,263	103,320	7.9%	12.3%	6.4%	10.8%
Non-Hispanic White	3,994	2,354	7.1%	3.1%	15,609	8,042	7.6%	2.9%	46,551	23,746	7.3%	2.8%	9.4%	4.2%
Non-Hispanic Black	874	1,230	1.5%	1.6%	3,512	5,069	1.7%	1.8%	9,663	14,691	1.5%	1.8%	2.4%	1.8%
Non-Hispanic NA	74	107	0.1%	0.1%	294	462	0.1%	0.2%	639	1,010	0.1%	0.1%	0.1%	0.1%
Non-Hispanic Asian	1,075	1,553	1.9%	2.0%	4,355	6,729	2.1%	2.4%	14,800	22,814	2.3%	2.7%	1.7%	2.4%
Non-Hispanic Other	176	282	0.3%	0.4%	746	1,108	0.4%	0.4%	2,501	3,789	0.4%	0.5%	0.5%	0.7%
Quintile 2	14,345	19,141	25.4%	24.9%	50,051	65,773	24.3%	23.9%	143,272	187,502	22.6%	22.4%	20%	20%
Hispanic	8,123	12,814	14.4%	16.7%	27,833	43,662	13.5%	15.9%	75,365	121,025	11.9%	14.4%	8.5%	11.5%
Non-Hispanic White	3,693	2,966	6.5%	3.9%	13,202	9,869	6.4%	3.6%	40,604	29,511	6.4%	3.5%	7.3%	4.3%
Non-Hispanic Black	802	1,159	1.4%	1.5%	2,827	4,146	1.4%	1.5%	8,023	11,563	1.3%	1.4%	1.6%	1.3%

Distance from the Projects:	1/2 mile				1 mile				2 miles				SCAG Region	
	2008	2035	2008	2035	2008	2035	2008	2035	2008	2035	2008	2035	2008	2035
Non-Hispanic NA	92	151	0.2%	0.2%	260	421	0.1%	0.2%	677	986	0.1%	0.1%	0.1%	0.1%
Non-Hispanic Asian	1,332	1,667	2.4%	2.2%	4,812	6,156	2.3%	2.2%	15,046	19,373	2.4%	2.3%	1.7%	1.9%
Non-Hispanic Other	303	384	0.5%	0.5%	1,117	1,519	0.5%	0.6%	3,557	5,045	0.6%	0.6%	0.6%	0.8%
Quintile 3	12,494	16,876	22.1%	22.0%	44,747	59,134	21.7%	21.5%	139,248	181,965	21.9%	21.7%	20%	20%
Hispanic	6,454	10,492	11.4%	13.7%	22,481	36,275	10.9%	13.2%	66,806	109,608	10.5%	13.1%	7.4%	10.4%
Non-Hispanic White	3,736	3,208	6.6%	4.2%	13,378	10,766	6.5%	3.9%	44,049	33,663	6.9%	4.0%	8.4%	5.1%
Non-Hispanic Black	556	892	1.0%	1.2%	2,210	3,321	1.1%	1.2%	7,203	10,487	1.1%	1.3%	1.4%	1.2%
Non-Hispanic NA	47	72	0.1%	0.1%	216	320	0.1%	0.1%	632	955	0.1%	0.1%	0.1%	0.1%
Non-Hispanic Asian	1,431	1,779	2.5%	2.3%	5,392	6,864	2.6%	2.5%	17,225	22,281	2.7%	2.7%	1.9%	2.3%
Non-Hispanic Other	269	432	0.5%	0.6%	1,070	1,589	0.5%	0.6%	3,333	4,972	0.5%	0.6%	0.6%	0.7%
Quintile 4	10,531	14,392	18.7%	18.7%	39,759	53,039	19.3%	19.3%	131,333	171,295	20.7%	20.4%	20%	20%
Hispanic	4,580	7,885	8.1%	10.3%	16,887	28,771	8.2%	10.5%	52,776	90,369	8.3%	10.8%	5.8%	8.8%
Non-Hispanic White	3,724	3,342	6.6%	4.4%	14,435	12,043	7.0%	4.4%	49,224	39,240	7.8%	4.7%	9.9%	6.4%
Non-Hispanic Black	438	742	0.8%	1.0%	1,734	2,811	0.8%	1.0%	6,393	9,552	1.0%	1.1%	1.3%	1.2%
Non-Hispanic NA	52	89	0.1%	0.1%	179	321	0.1%	0.1%	584	972	0.1%	0.1%	0.1%	0.1%
Non-Hispanic Asian	1,520	2,000	2.7%	2.6%	5,698	7,818	2.8%	2.8%	19,744	27,235	3.1%	3.2%	2.3%	2.9%
Non-Hispanic Other	216	334	0.4%	0.4%	826	1,274	0.4%	0.5%	2,613	3,926	0.4%	0.5%	0.5%	0.6%
Quintile 5	6,988	9,656	12.4%	12.6%	27,007	37,116	13.1%	13.5%	96,331	128,298	15.2%	15.3%	20%	20%
Hispanic	2,203	4,411	3.9%	5.7%	8,572	17,236	4.2%	6.3%	27,955	57,206	4.4%	6.8%	3.9%	7.1%
Non-Hispanic White	2,884	2,596	5.1%	3.4%	11,528	9,946	5.6%	3.6%	43,144	35,032	6.8%	4.2%	12.1%	7.9%
Non-Hispanic Black	413	609	0.7%	0.8%	1,446	2,224	0.7%	0.8%	4,954	7,254	0.8%	0.9%	1.0%	1.0%
Non-Hispanic NA	47	97	0.1%	0.1%	132	300	0.1%	0.1%	355	891	0.1%	0.1%	0.1%	0.1%
Non-Hispanic Asian	1,251	1,617	2.2%	2.1%	4,696	6,275	2.3%	2.3%	17,744	24,243	2.8%	2.9%	2.5%	3.4%
Non-Hispanic Other	190	326	0.3%	0.4%	631	1,135	0.3%	0.4%	2,179	3,672	0.3%	0.4%	0.4%	0.6%

** Poverty 1 = # of household below poverty; Poverty 2 = # of household between poverty and 1.5xP); Poverty 3 = # of household between 1.5xP and 2.0xP)*
Source: Based on 2000 Census and 2005–09 ACS, processed and projected by SCAG Research, Analysis, and Information Service staff

BENEFITS FROM GRADE SEPARATION PROJECTS

The following figure presents the existing and projected impacts from grade crossings where the grade separation projects are planned to be constructed in the future. It shows grade crossings-related impacts, such as traffic delay, idling emission and relevant accidents in 2010 and 2035. For 2035 projections, the statistics are projected based on the assumption of no grade separation project construction. For example, without the grade separation projects, the daily total vehicle hours of delay will increase from 1,253 vehicle-hours per day to 5,133 vehicle-hours per day, and the daily NO_X, $PM_{2.5}$, CO_2 emissions from 2,196 kg per day to 9,170 kg per day. However, with the grade separation projects constructed, traffic delay at crossing, idling emissions and grade-crossing related accidents could be eliminated by redirecting vehicles and pedestrians above or below railroad tracks.

TABLE 50 Existing and Projected Impacts on Grade Separation Project Areas (2035 Projections Based on the Assumption of No Grade Separation Projects)

	Average Daily Traffic (vehicles/day)	Average Daily Train Volume (trains/day)	Daily Total Gate Down Time (minutes/day)	Daily Total Vehicle Hours of Delay (veh-hrs/day)	PM Peak Average Delay per Vehicle (seconds/vehicle)
2010	765,560	2,717	5,202	1,253	370
2035*	988,730	5,988	13,010	5,133	1,211
% Change	29%	120%	150%	310%	227%
	Daily NO_X Emissions** (g/day)	Daily $PM_{2.5}$ Emissions** (g/day)	Daily CO_2 Emissions** (g/day)	Daily NO_X, $PM_{2.5}$, and CO_2 Emissions** (g/day)	Daily Emissions Related Damages*** ($/year)
2010	10,510	289	2,185,239	2,196,039	98,748
2035*	47,407	657	9,121,986	9,170,050	276,091
% Change	351%	127%	317%	318%	180%
	5-Year Average Number of Crashes Per Year	5-Year Average Number Killed Per Year	5-Year Average Number Injured Per Year	5-Year Average Damage Per Year ($)	
2006–2010	6.4	1.0	2.4	37,440	

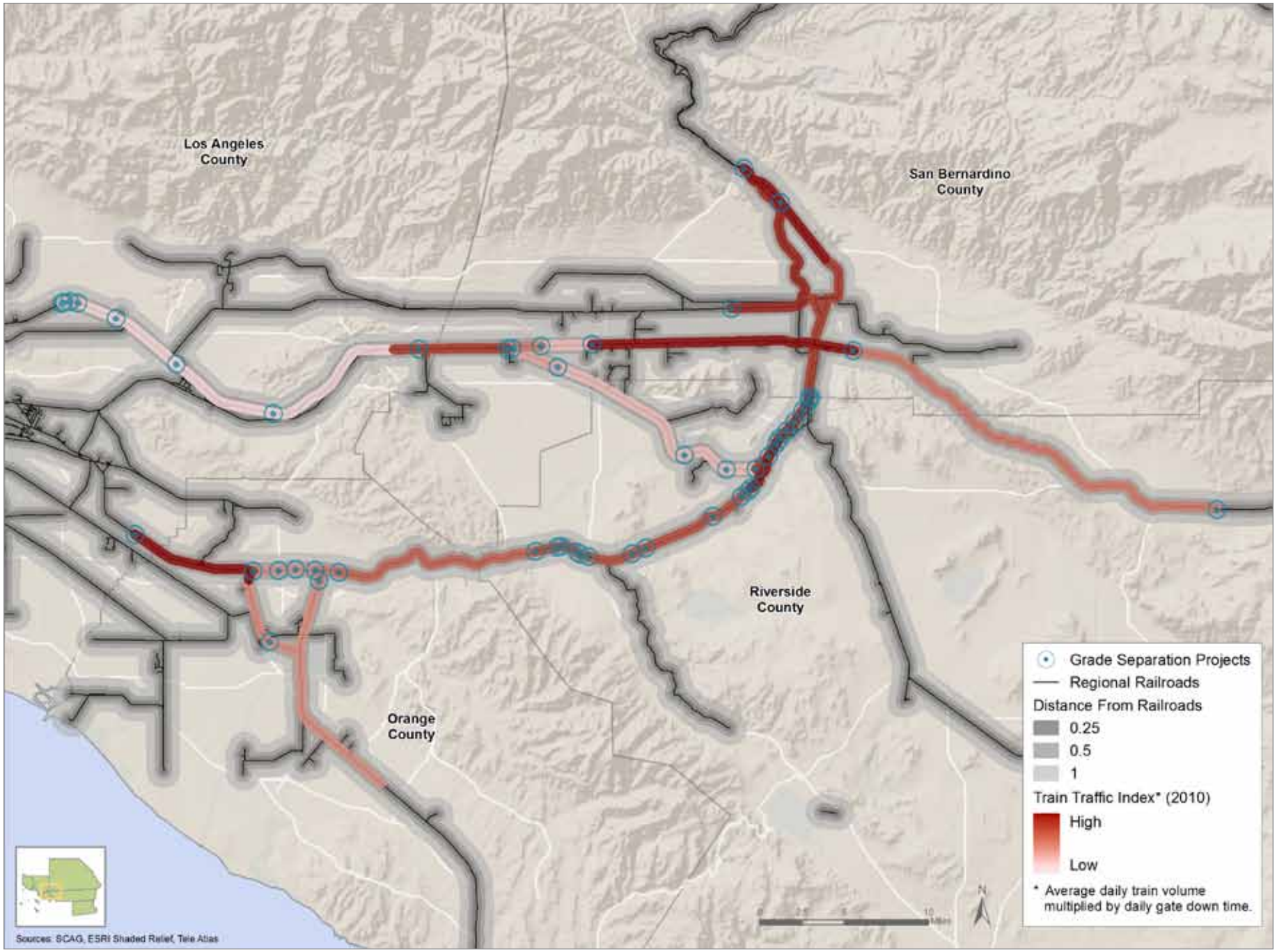
** Assuming no grade separation projects.*
*** Emissions isolates idling emissions (autos and trucks) at the crossing.*
**** Damage Costs derived as follows: (veh-hrs of delay per day) x (grams/hr) x (1/tons per gram) x (tons per short tons) x (dollars per short ton) x 365 days per year = dollars per year for all vehicles*

Source: SCAG, 2011

TRAIN TRAFFIC INDEX

Train traffic index is one measure that SCAG analyzed to determine the usage of railroad segments and, as a result, to estimate the degree of environmental impacts on areas adjacent to railroads and grade separation projects. The train traffic index of each railroad segment is calculated by using average daily train volume multiplied by daily total gate down time of two grade crossings located at both ends of the segment. The following map illustrates the train traffic index of railroad segments adjacent to the grade separation projects. As show in the map below, San Bernardino County and Riverside County have higher train traffic index values than other counties. As railroad emissions and noise are greater where there is a large amount of train traffic volume, these observations suggest that the rail-related environmental impacts could be greater in San Bernardino County and Riverside County than other counties. And, based upon the analysis of Environmental Justice categories above, the low-income and minority communities adjacent to railroads and grade-crossings in San Bernardino County and Riverside County can be more affected by rail-related impacts, such as emissions, noise, accidents, traffic delay, etc. than other population groups. Additionally, the 2012 RTP proposes railroad electrification, which would significantly reduce rail-related emissions throughout the region, and especially for in low-income and minority communities adjacent to railroads. Further study and demonstrations are needed to broadly deploy near zero and zero emission rail technologies that would significantly reduce environmental impacts from locomotives and rail-related facilities. Please refer to the Goods Movement Technical Appendix to review the 2012 RTP Goods Movement Environmental Strategy and Action Plan for Technology Advancement.

EXHIBIT 36 Train Traffic Index



Additional SCAG Strategies: Environmental Justice Mitigation Toolbox

New to the 2012 RTP/SCS, SCAG has developed a toolbox of potential mitigation measures to address potential impacts to Environmental Justice Communities. These measures were identified through a review of the literature, the PEIR and recent planning activities.[12]

Recommended Mitigation for Noise Impacts

Project sponsors can and should, to the extent feasible and practicable, and where their jurisdictional authority permits:

- As part of the appropriate environmental review of each project, conduct a project specific noise evaluation and identify and implement appropriate mitigation.
- Employ land use planning measures, such as zoning, restrictions on development, site design, and use of buffers to ensure that future development is compatible with adjacent transportation facilities.
- Maximize the distance between noise-sensitive land uses and new roadway lanes, roadways, rail lines, transit centers, park-and-ride lots, and other new noise-generating facilities.
- Construct sound reducing barriers between noise sources and noise-sensitive land uses. Sound barriers can be in the form of earth-berms or soundwalls. Constructing roadways so as appropriate and feasible that they are depressed below-grade of the existing sensitive land uses also creates an effective barrier between the roadway and sensitive receptors.
- Improve the acoustical insulation of dwelling units where setbacks and sound barriers do not sufficiently reduce noise.
- Implement speed limits and limits on hours of operation of rail and transit systems, where such limits may reduce noise impacts.
- Maximize distance of new route alignments from Environmental Justice Communities. For example, if a transit project were constructed along the center of a freeway (as opposed to a new route or along side the freeway), operational noise impacts would be reduced by the increase in distance to the noise sensitive sites and the masking effects of the freeway traffic noise.
- As a last resort, eliminate noise-sensitive receptors by acquiring freeway and rail rights-of-way. This would ensure the effective operation of all transportation modes.

Recommended Mitigation for Air Quality Impacts Along Freeways and Heavily Traveled Corridors

Local air districts, local jurisdictions and project sponsors can and should implement measures adopted by ARB designed to attain federal air quality standards for PM2.5 and 8-hour ozone. ARB's strategy includes the following elements:

- Set technology forcing new engine standards;
- Reduce emissions from the in-use fleet;
- Require clean fuels, and reduce petroleum dependency;
- Work with US EPA to reduce emissions from federal and state sources; and
- Pursue long-term advanced technology measures.
- Consider proposed new on-road transportation-related SIP measures include :
    - Improvements and Enhancements to California's Smog Check Program
    - Expanded Passenger Vehicle Retirement
    - Modifications to Reformulated Gasoline Program
    - Cleaner In-Use Heavy-Duty Trucks
    - Ship Auxiliary Engine Cold Ironing and Other Clean Technology
    - Cleaner Ship Main Engines and Fuel
    - Port Truck Modernization
    - Accelerated Introduction of Cleaner Line-Haul Locomotives
    - Clean Up Existing Commercial Harbor Craft

Conduct corridor-level analysis for proposed projects in areas where roadway air quality impacts may be concentrated among Environmental Justice Communities.

[12] The Environmental Justice Mitigation Toolbox draws from, among other sources, mitigation measures included in the 2012 RTP/SCS Program Environmental Impact Report (PEIR), particularly for air quality and noise impacts. As captured here, Environmental Justice mitigation is geared toward reducing impacts for Environmental Justice communities as defined in this appendix, whereas PEIR measures are more broadly geared to sensitive receptors as defined in the PEIR. Mitigation activities cited here (e.g. performing corridor specific analysis) are consistent between this toolbox and the PEIR.

Recommended Mitigation for Rail Related Impacts

- Accelerated Introduction of Cleaner Line-Haul Locomotives
- Construct sound reducing barriers between noise sources and noise-sensitive land uses
- Improve the acoustical insulation of dwelling units where setbacks and sound barriers do not sufficiently reduce noise
- Implement, to the extent feasible and practicable, speed limits and limits on hours of operation of rail system, where such limits may reduce noise impacts

Recommended Mitigation for Road Pricing Mechanisms

- Transit, vanpools, or other options as alternatives in locations not served by transit
- Upper limits on road pricing
- Exemptions or discounts for persons who are disadvantaged people such as those whose earnings are below a certain income level and people with disabilities
- Limits on the number of priced crossings in a period for cordon charges
- Allowances for unlimited use of priced facilities in certain periods, typically off-peak hours and holidays[13]
- Develop detailed program design including billing and collection technology, rate structure, enforcement, spillover guards, revenues and gas tax replacement strategy, and mitigation for perceived geographic inequity before communicating with public[14]
- Develop explicit benefit plan for increased revenues dovetailing with goals and mitigation concerns (e.g., enhanced transit, spillover protections and better enforcement)[15]
- Include environmental justice mitigation actions as part of the NEPA review[16]

[13] Department of Transportation, Federal Highway Administration. Environmental Justice Emerging Trends and Best Practices Guidebook, Document Number: FHWA-HEP-11-024. August 2011.

[14] National Cooperative Highway Research Program Report 686. Road Pricing: Public Perceptions and Program Development (2011).

[15] Ibid.

[16] Ibid.

Areas of Future Research

Given the anticipated growth and dynamic nature of the SCAG region, there are many policy areas that may present future challenges and are of interest for further research:

- Currently there is no racial/ethnic majority in SCAG, but the sum of all minority groups comprises over 50 percent of the total population in the region. Around 2025, the Hispanic population is projected to obtain a population majority in SCAG
- Gentrification and displacement will likely continue to be an issue in the region. Future research is necessary to monitor and analyze population trends related to gentrification. As such, the development of new indicators and data are needed at increasingly refined geographic levels
- Additional research is needed to evaluate the implications of general job wages-/worker earnings mismatch and jobs-housing imbalance at the regional, county, and community levels
- Continued work is necessary to increase understanding of the linkages and interactions between emissions, air quality, and health outcomes, and their overall relationship with the region's socioeconomic cohorts related to income, education, race/ethnicity, among many other groups
- Further research is needed to understand the residential choices, surrounding communities, and the built environment for Native Americans, and population that identifies as Non-Hispanic Other
- The implications of VMT-based transportation fees on population growth and distribution will also require additional attention in the coming years
- Additional data and analysis is needed to understand the future environmental justice impacts of rail related freight traffic in the region
- Continual engagement and outreach with regional stakeholders is needed to address future environmental justice concerns

REGIONAL TRANSPORTATION PLAN
2012–2035
SUSTAINABLE COMMUNITIES STRATEGY
Towards a Sustainable Future

RTP

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