CALIFORNIA BROADBAND REPORT

A Summary of Broadband Adoption in California as of June 30, 2011

BROADBANDUSA
CONNECTING AMERICA'S COMMUNITIES

September 2012

Edmund G. Brown, *Governor*

CALIFORNIA PUBLIC UTILITIES COMMISSION

PREPARED BY THE CENTER FOR ECONOMIC DEVELOPMENT, CALIFORNIA STATE UNIVERSITY, CHICO

PRINCIPAL AUTHOR: RYAN MILLER

SECONDARY AUTHORS: ALYSSA CALDWELL AND AMY LIPPUS

EDITING AND ADVISING PROVIDED BY: CATHY EMERSON AND WARREN JENSEN

Michael Morris
Supervisor
VIDEO FRANCHISING AND BROADBAND DEPLOYMENT

Rob Wullenjohn
Program Manager
BROADBAND, POLICY AND ANALYSIS

Michael Amato
Acting Director
COMMUNICATIONS DIVISION

Paul Clanon
Executive Director

DISCLAIMER

This report was prepared by staff of the California Public Utilities Commission (CPUC). It does not necessarily represent the views of the CPUC, its Commissioners, or the State of California. The CPUC, the State of California, its employees, contractors, and subcontractors make no warrant, express or implied, and assume no legal liability for the information in this report; nor does any party represent that the uses of this information will not infringe upon privately owned rights. This report has not been approved or disapproved by the CPUC, nor has the CPUC passed upon the accuracy or adequacy of the information in this report.

Table of Contents

Executive Summary **1**
1 Introduction **1**
1.1 Purpose of Report 1
1.2 Overview of Data Sources 2
2 Subscription and Provider Information **5**
2.1 Distribution of Reportable Connections 5
2.2 Number of Providers by County by Tech Type: 6
2.3 Number of Providers by Census Tract by Tech Type 8
3 Penetration and Adoption **13**
3.1 Penetration and Adoption Tables 13
3.2 Adoption Rates by Census Tract 15
3.3 Adoption in Urban Areas: Summary 20
4 Detailed Correlation Results **21**
4.1 Urbanity and Adoption 21
4.2 Statewide Correlation Results 21
4.3 Summary 28
4.4 Conclusions 28
5 Technical Notes **29**
5.1 FCC Form 477 Data 29
5.2 CPUC Broadband Availability Data 29

Executive Summary

Examination of FCC Form 477 broadband subscription data as of June 30, 2011 yields engaging information about the spatial and demographic patterns of Broadband Internet adoption rates in California. Statewide, an estimated 72.9% of all households subscribe to fixed broadband services. Out of households which have been determined to have geographic access to fixed broadband services, an estimated 74.6% subscribe.

Geographic disparities in broadband adoption become apparent when adoption rates are mapped at the census tract level in California's major metropolitan areas. Numerous urban communities including South Los Angeles, East Oakland, South Sacramento, and National City, show very low adoption rates compared to suburban and exurban locations within the same region. Adoption rates are found to be significantly correlated with household income, educational attainment, and language speaking ability, and less notably correlated with median age and population density. Continued research into the determinants of adoption rates as well as targeted outreach to low-adoption communities will be required to help bridge the "Digital Divide" in California.

1 Introduction

This report examines the state of Internet access in California by summarizing information collected by the Federal Communications Commission (FCC) regarding broadband subscriptions in conjunction with information collected by the California Public Utilities Commission (CPUC) regarding broadband availability. This report's analysis of penetration or adoption uses data only for "fixed" connections, which consist of service provided by xDSL, cable modem or fiber technologies as the FCC does not collect location-based data from mobile providers.

This report is intended to be California's counterpart to "Internet Access Services: Status as of June 30, 2011", a report published by the Wireline Competition Bureau of the FCC that examines broadband subscription data nationwide.

The FCC's report can be downloaded by visiting its website at:

http://www.fcc.gov/reports/internet-access-services-63011.

1.1 Purpose of Report

Widespread adoption and use of broadband Internet services is a primary goal of the State of California. State-financed or state-created programs exist to help close the "Digital Divide" both by increasing geographic access to broadband, such as the California Advanced Services Fund (CASF), as well as by promoting adoption and use of broadband, such as the California Emerging Technology Fund (CETF). This report aims to complement the mission of such programs, as well as to promote general knowledge and public awareness of the barriers to broadband access.

This report achieves our goal in three ways. Section 2 of the report summarizes data about overall broadband connections, and examines where broadband providers of differing technology types are located throughout the state, at the county and census tract level. Section 3 explores rates of broadband

penetration and adoption throughout the state, including a summary of adoption rates by county and detailed maps of adoption rates at the census tract level for California's major urban areas. Finally, Section 4 explores the trends that underlie geographic disparities in adoption rates by summarizing statistically significant demographic predictors of adoption rates.

Keep in mind that the broadband speeds and speed tiers relate to data from providers about their maximum advertised speeds, not the actual speeds received by customers. The FCC has monitored actual connection speeds in 10,000 homes and concluded, generally, that wireline customers actually receive speeds near the maximum advertised speeds they purchase, and sometimes faster than the advertised speeds[1] . The story may be different for mobile broadband, though. The CPUC has completed testing mobile broadband service quality throughout the state, and has just released its Initial Staff Report of the data it collected. The CPUC's experience indicates that in most areas, the speeds actually received by mobile broadband customers are often below the company's advertised speeds.

Figures and maps shown in this report focus on highlighting the "Digital Divide" that persists in California. By understanding the geographic and demographic determinants of broadband adoption, California's citizens and policymakers can use this knowledge to better focus its efforts to close this Divide.

1.2 Overview of Data Sources

This report draws from three primary data sources: the June 31, 2011 edition of the FCC Form 477, June 31, 2011 Broadband Availability Data collected by the CPUC pursuant to its Recovery Act (ARRA) State Broadband Grant initiative Grant from the National Telecommunications and Information Administration, and a compilation of publicly available demographic information from the United States Census Bureau. Each of these data sources are described in detail in this section.

FCC Form 477 (June 31, 2011)

Twice yearly, broadband Internet providers of various technology types are required by the FCC to report the number of connections they serve, both commercial and residential, at the census tract level. . The providers further break down their connections by up and down maximum advertised speed "tier" combinations. Information is collected only for connections of over 200 kilobytes per second (kbps) in either the downstream or upstream direction. This information can be used to determine rates of broadband ***penetration*** – the ratio of residential broadband subscriptions to households in a given area. It can also be used, in conjunction with broadband availability data, to derive rates of broadband ***adoption*** – the ratio of residential broadband subscriptions to households which have geographic access to broadband services in a given area.

More information about the FCC Form 477, including collection methods and reporting dates, can be found by visiting their website:

http://transition.fcc.gov/form477/

[1] See FCC's "Measuring Broadband America, July 2012" report, http://www.fcc.gov/measuring-broadband-america/2012/july

CPUC Broadband Availability Data (June 31, 2011)

The California Public Utilities Commission collects data regarding the availability of broadband services, pursuant to the State Broadband Data Initiative and Development Grant Program administered by the National Telecommunications and Information Administration (NTIA). The CPUC collects this geographic coverage data from broadband providers twice yearly, using the same time intervals as the FCC's Form 477. This allows the two datasets – availability and subscriptions -- to be compared directly.

The CPUC has contracted with the Geographical Information Center (GIC) and the Center for Economic Development (CED) at California State University, Chico to assist with data compilation, analysis, and mapping.

For more information about the State Broadband Mapping Program, visit the CPUC's website at:

http://www.cpuc.ca.gov/PUC/Telco/Information+for+providing+service/Broadband+Mapping/index.htm

To examine the most current edition of availability data without the need for specialized software, visit the flash-based California Interactive Broadband Map:

http://www.broadbandmap.ca.gov/

2010 US Census and 2006-2010 American Community Survey Estimates

The United States Census Bureau is the federal agency responsible for collecting demographic and socioeconomic data for public use. The decennial census fully surveys the population to obtain information about population, households, and race, while more in-depth demographic statistics are collected via the American Community Survey (ACS), using smaller sample rates.

This report uses household data from the 2010 US Census and demographic data from the 2006-2010 American Community Survey Estimates. ACS data at the census tract level is only available as a five-year average, and often include a high error bound due to low sample rates. However, the ACS is the definitive demographic data source of the federal government, and is still useful for examining large cross-sectional datasets despite its low sample rates.

Household information used for the purposes of calculating adoption and penetration rates for June 2011 use population projections published by the California Department of Finance at the county level.

For more information about the American Community Survey, visit:

http://www.census.gov/acs/www/

For more information about the US Census and projections made by the California Department of Finance, visit the Demographic Research Unit's page at:

http://www.dof.ca.gov/research/demographic/overview/

2 Subscription and Provider Information

2.1 Distribution of Reportable Connections

In addition to providing information regarding broadband adoption, California's Form 477 data can also be used to track overall speeds of those broadband "connections," which is the word the FCC uses for "subscriptions." While there may be some technical differences between connections and subscriptions, those differences are not significant, and we use the terms interchangeably here. This section offers some summary statistics about all reportable connections in the state.

Table 2.1 (below) reports the total number of fixed connections by speed tiers: note that only the highest speed tier reported below corresponds to advertised speeds considered fully "served" for the purposes of the California Advanced Services Fund (greater than or equal to 6 mbps down, and greater than or equal to 1.5 mbps up).

FIGURE 2.1: Distribution of Reportable Connections by Speed Tier

Speed Tier	All Connections		Residential Connections	
Downstream Speed < 3 mbps	3,104,780	**30.8%**	2,701,053	**29.2%**
3 mbps ≤ Downstream Speed < 6 mbps	1,670,084	**16.5%**	1,399,789	**15.1%**
Downstream Speed ≥ 6 mbps	5,318,315	**52.7%**	5,142,226	**55.6%**
(Total)	*10,093,179*	*100%*	*9,243,068*	*100%*
Upstream Speed < 1.5 mbps	3,753,490	**37.2%**	3,287,146	**35.6%**
768 kbps ≤ Upstream Speed < 1.5 mbps	3,257,758	**32.3%**	3,105,138	**33.6%**
Upstream Speed ≥ 768 kbps	3,081,931	**30.5%**	2,850,784	**30.8%**
(Total)	*10,093,179*	*100%*	*9,243,068*	*100%*

The overall speed tiers of California's broadband connections hold an interesting comparison to figures at the national level. Figures 2.2a and 2.2b (on the following page) display graphically the proportion of speeds at various speed tiers for both upstream reported speeds and downstream reported speeds.

FIGURE 2.2a: Distribution of Fixed Connections by Downstream Speed

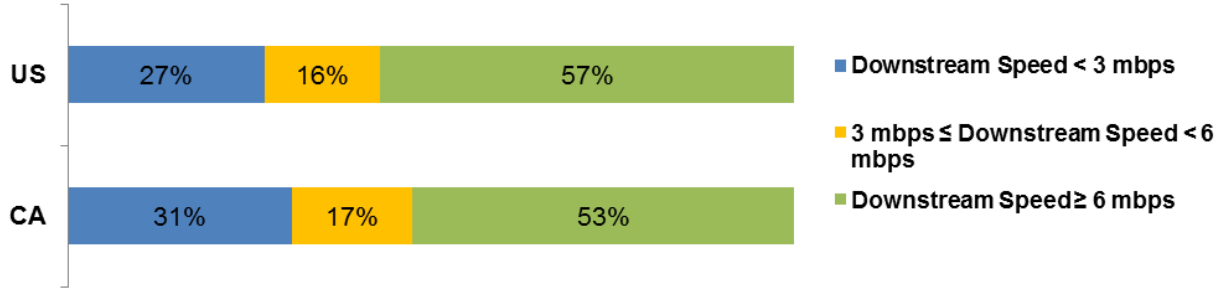
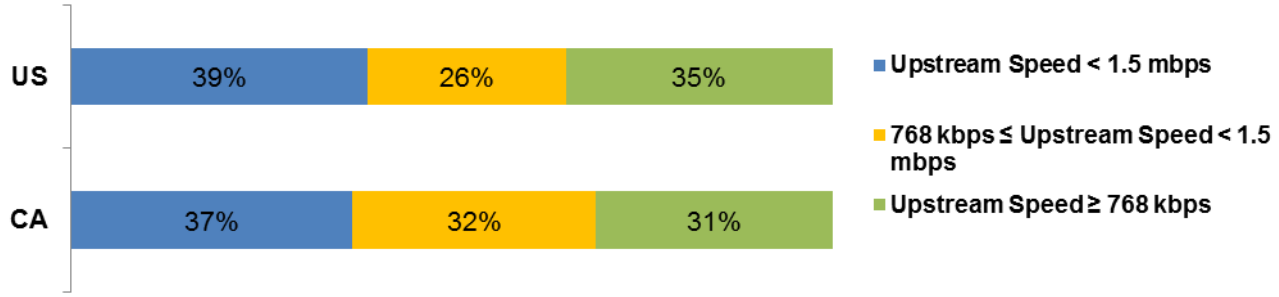


FIGURE 2.2b: Distribution of Fixed Connections by Upstream Speed



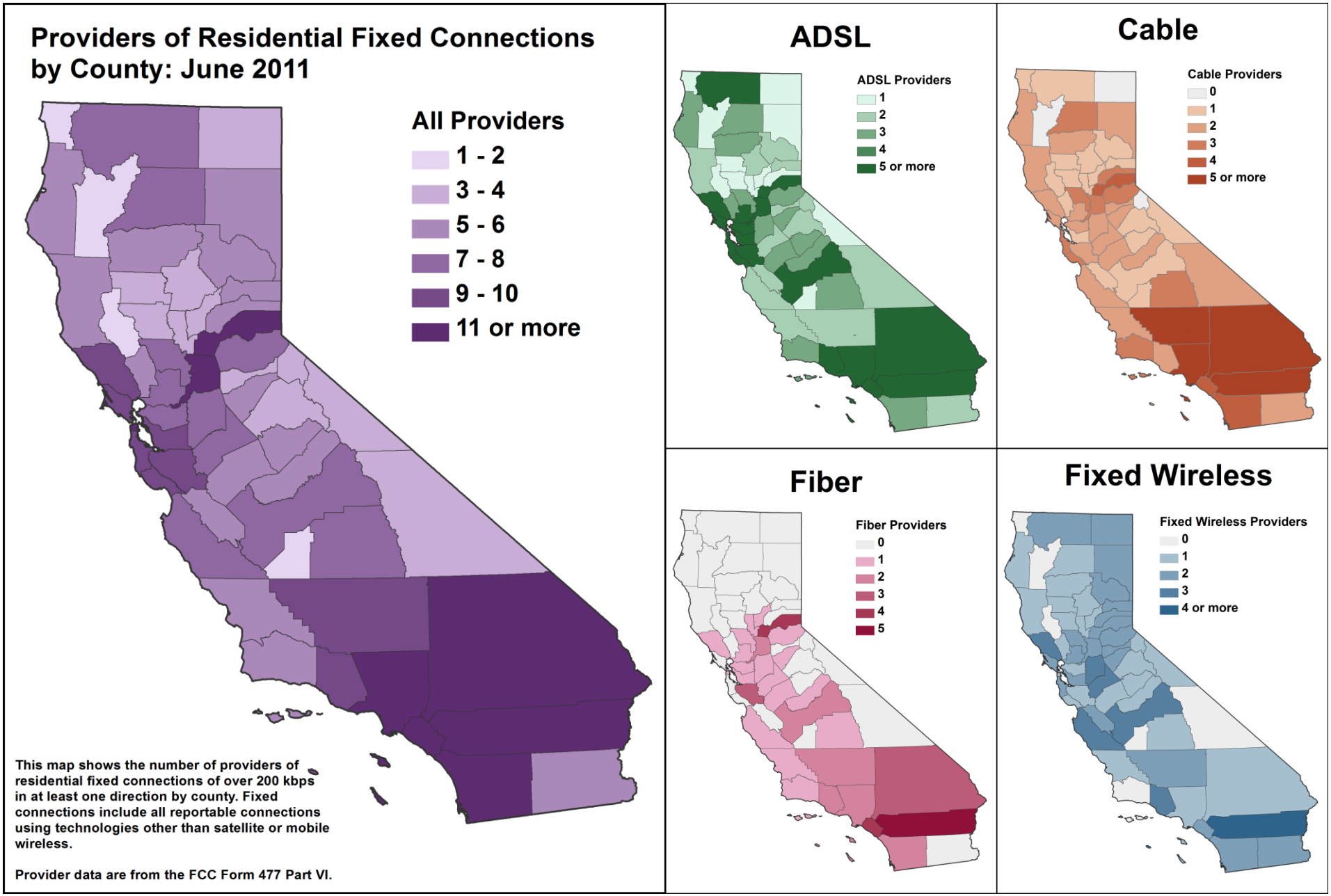
While California holds a greater share of connections with a downstream speed of less than 6 megabytes per second (mbps) compared to the national average, it also holds a greater share of connections with an upstream speed of more than 768 kbps compared to the national average.

2.2 Number of Providers by County by Tech Type:

In addition to allowing summary statistics about service speeds, Form 477 also allows a look at how many different providers offer services across different geographies in the state.

The following page displays the total number of providers reporting services in each county in the state, as well as a breakdown of providers by the four technologies most commonly used for residential connections: xDSL, Cable, Optical Fiber, and Fixed Wireless.

FIGURE 2.3: Providers of Residential Fixed Connections by County



2.3 Number of Providers by Census Tract by Tech Type

The following series of maps follows the same format as maps by County, but are presented by Census Tract for greater detail.

FIGURE 3.3: Number of Residential Fixed Providers by Census Tract

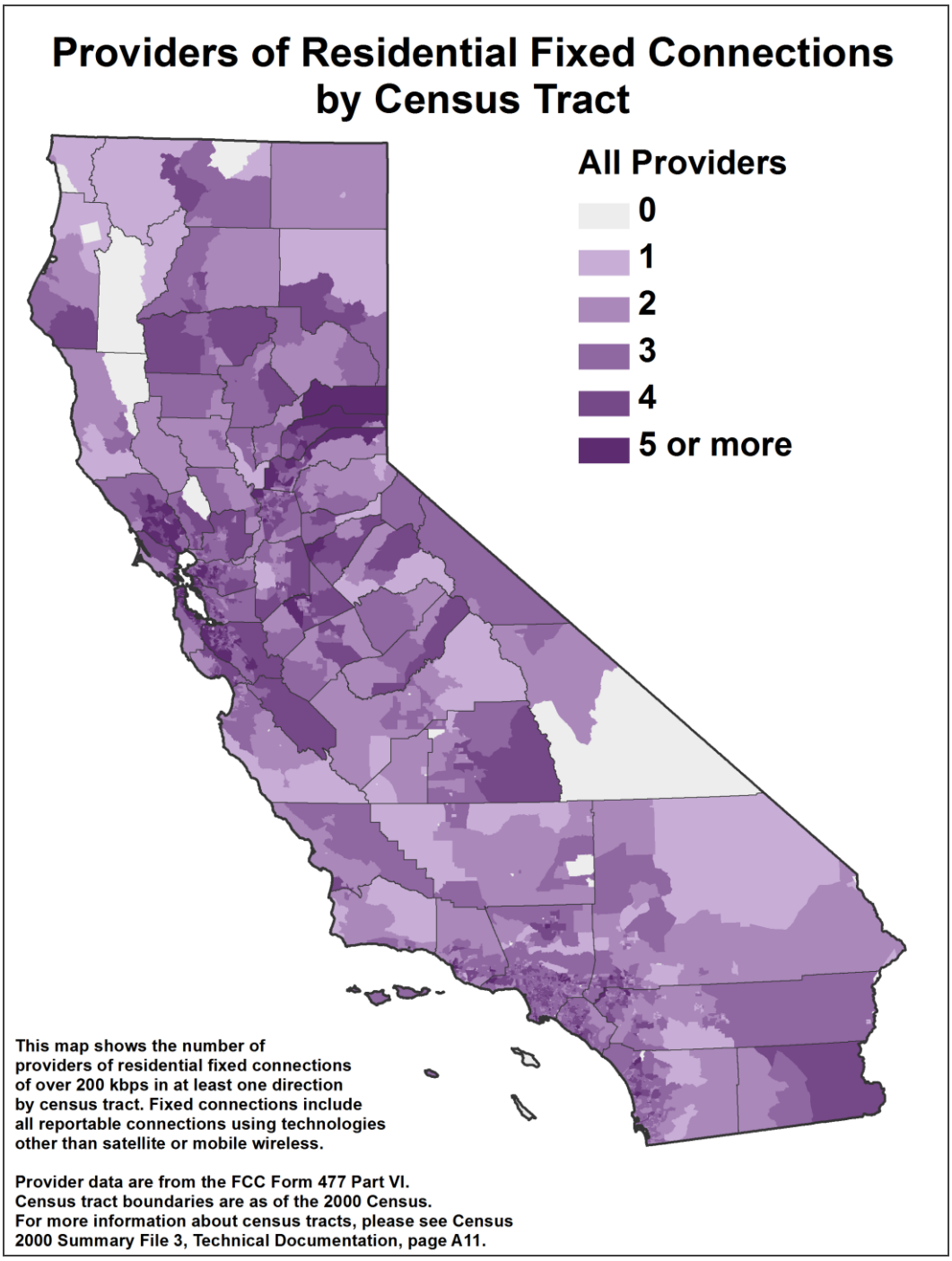


FIGURE 3.4: Number of ADSL Providers by Census Tract

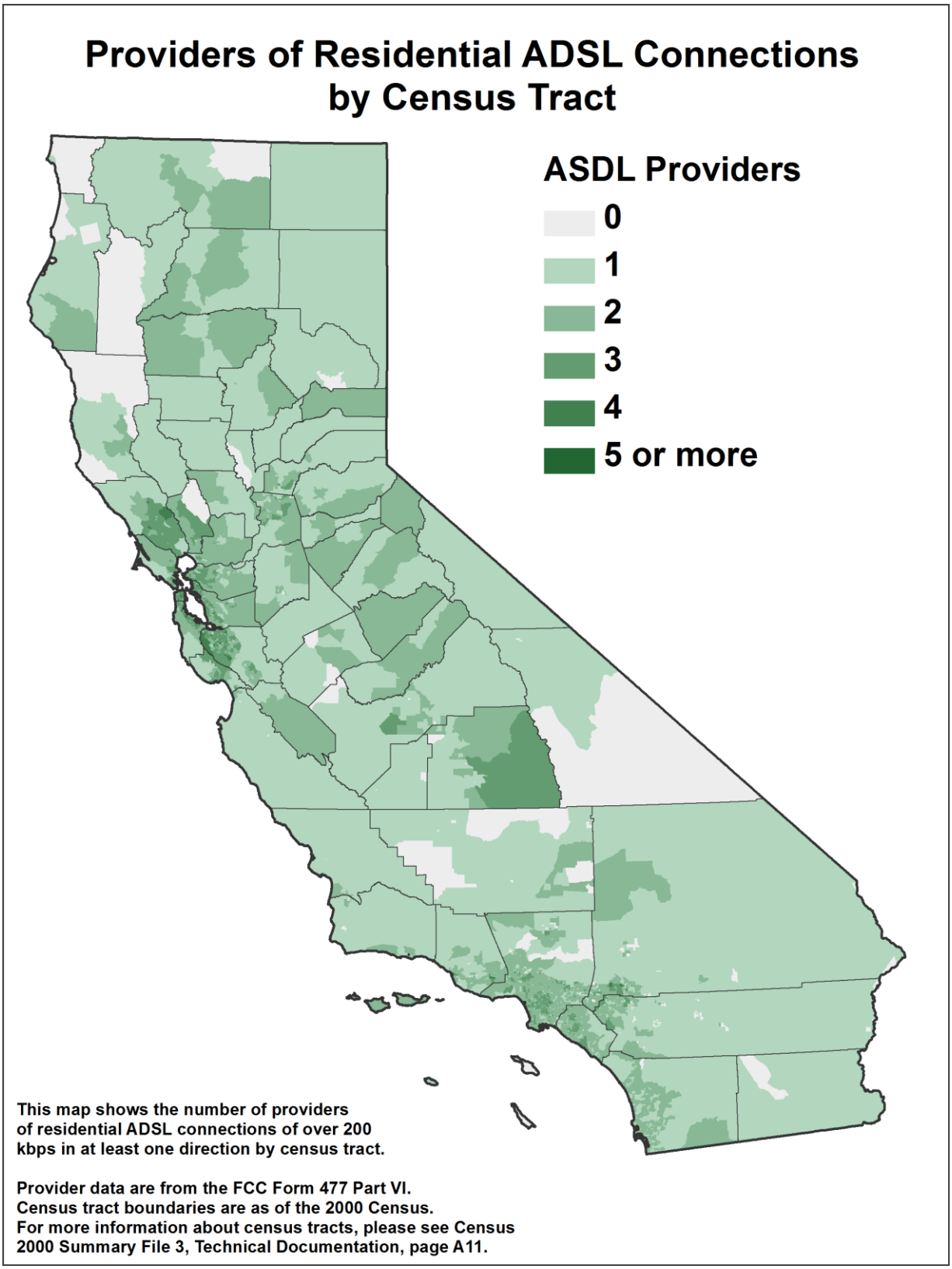


FIGURE 3.5: Number of Cable Providers by Census Tract

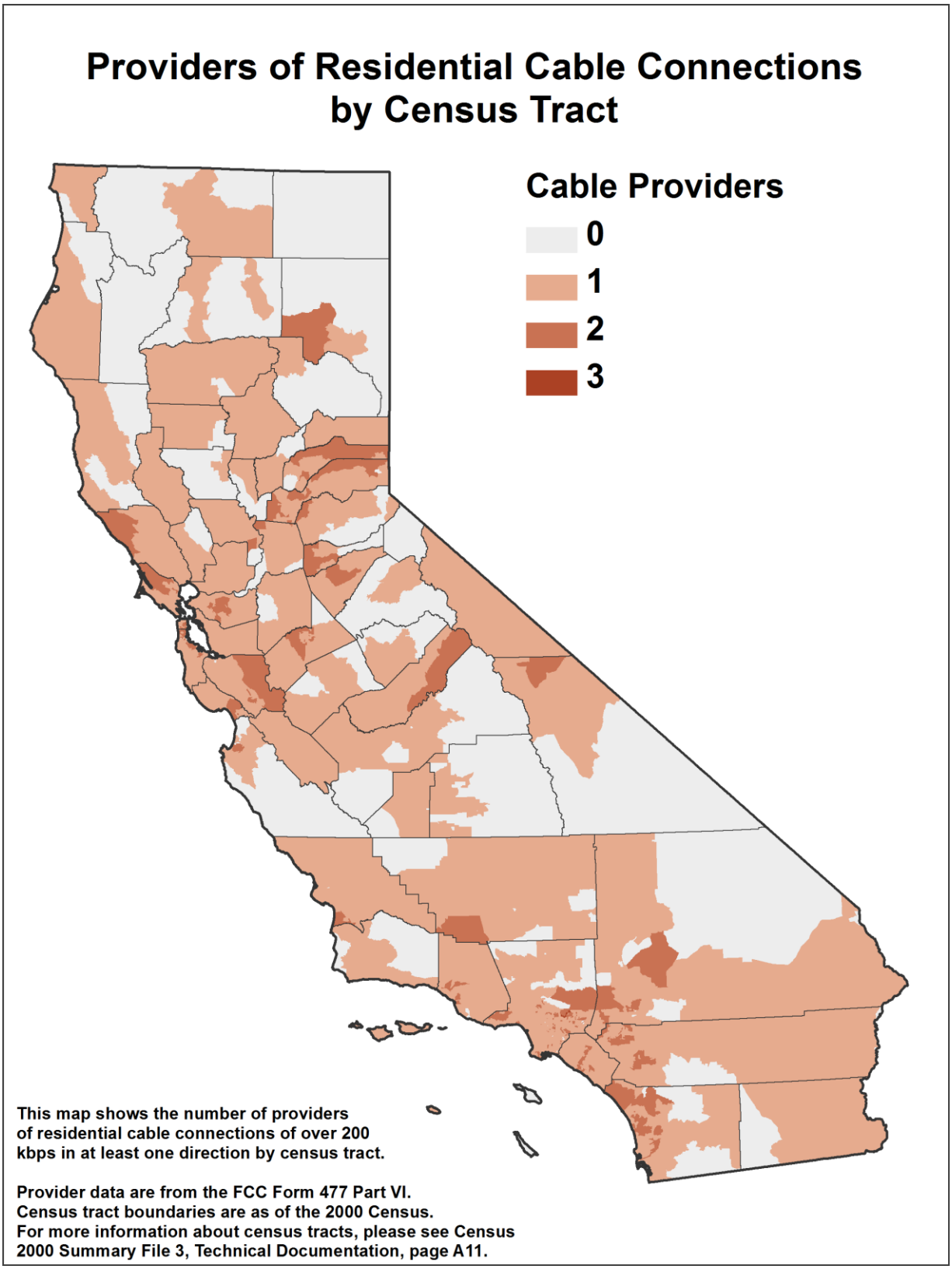


FIGURE 3.6: Number of Fiber Providers by Census Tract

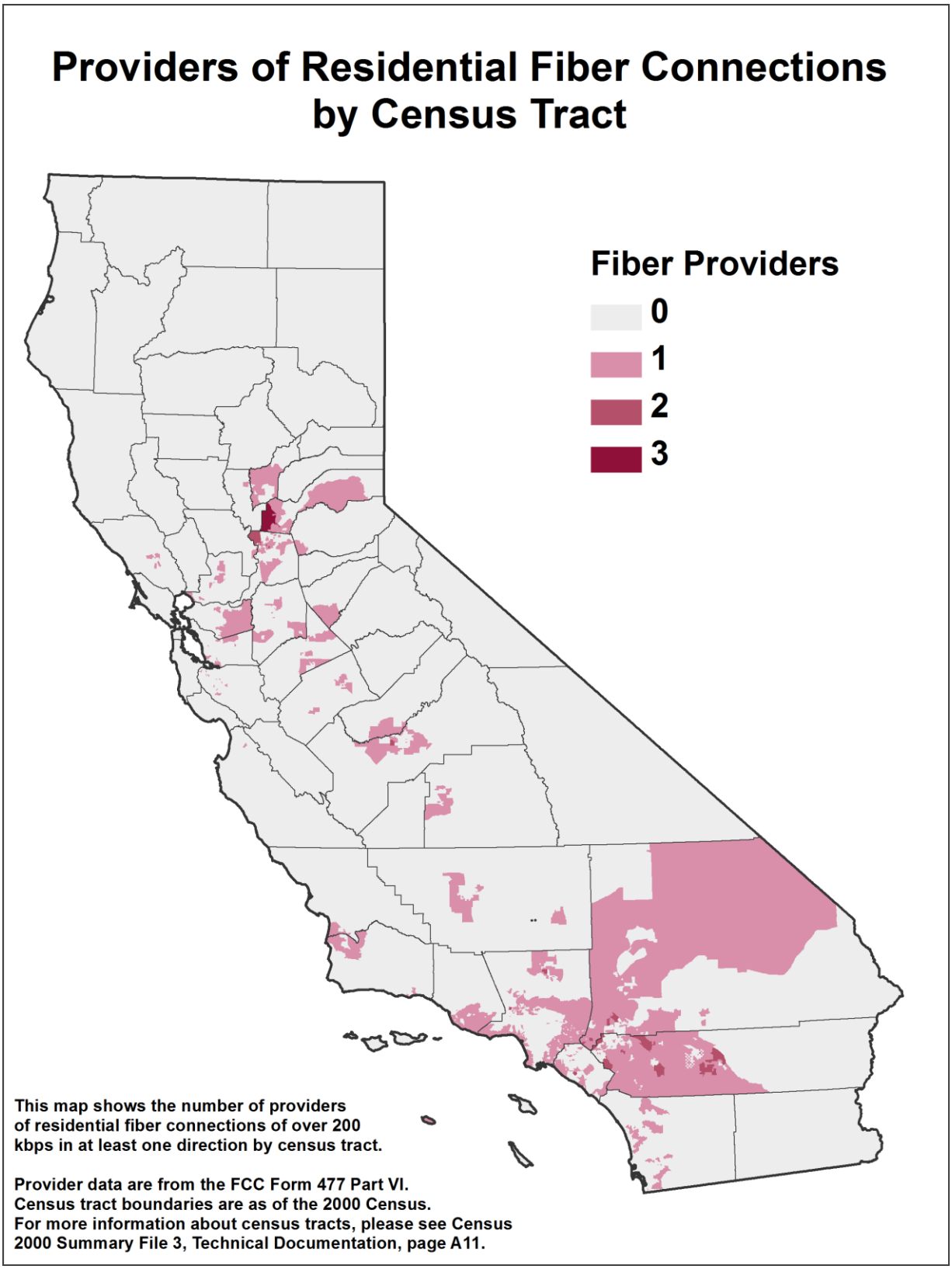
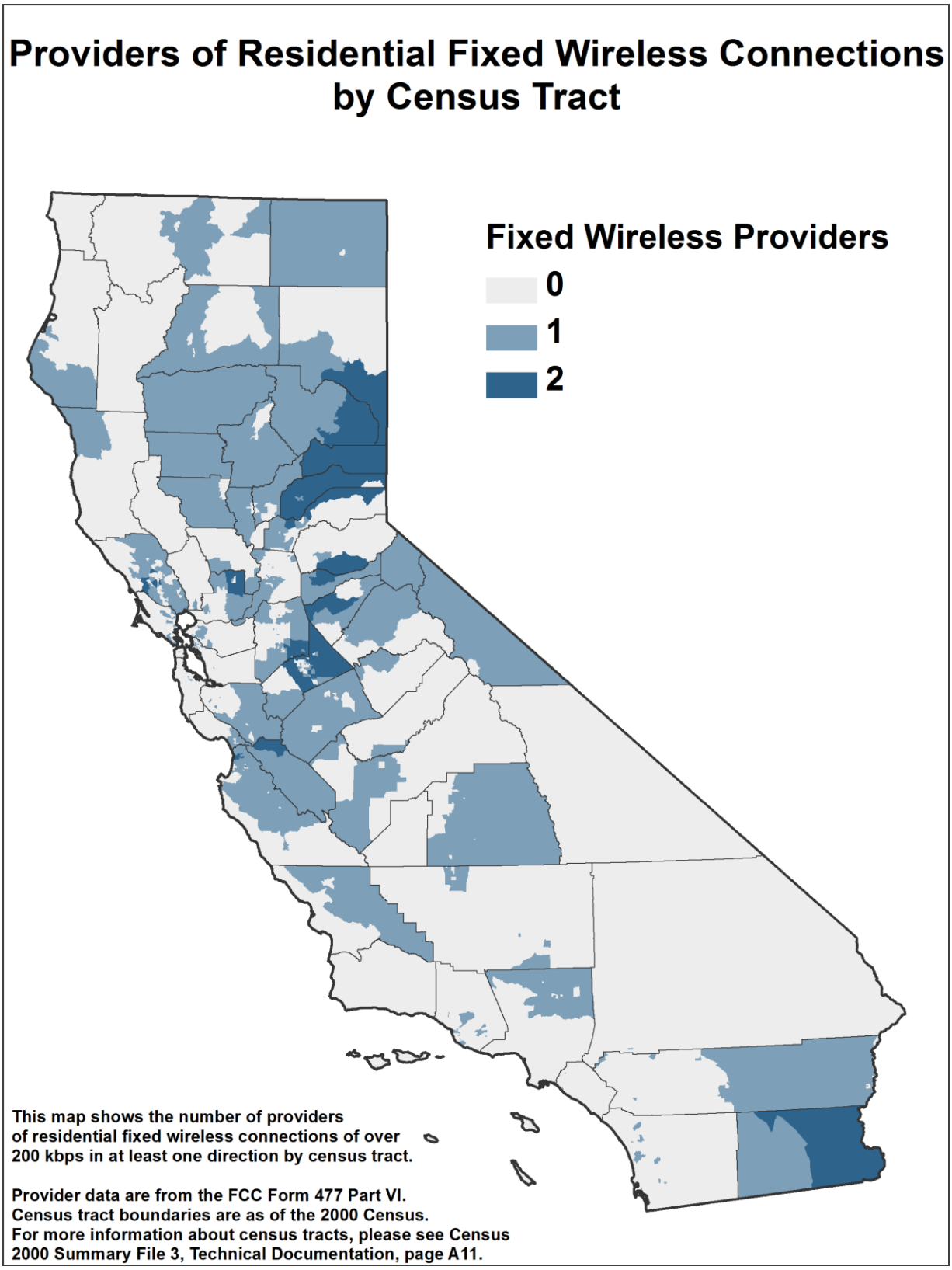


FIGURE 3.7: Number of Fixed Wireless Providers by Census Tract



3 Penetration and Adoption

3.1 Penetration and Adoption Tables

The table below summarizes rates of broadband penetration and adoption for each of California's counties as of June 31, 2011. Broadband penetration rate is defined as the ratio of residential fixed broadband subscriptions to total households in the county. Broadband adoption rate is defined as the ratio of residential fixed broadband subscriptions to households in the county which have been determined to have geographic access to broadband services using CPUC availability data.

Note: counts of residential fixed broadband subscriptions, and therefore broadband penetration and adoption rates, have been withheld for some areas. In cases where one service provider has over 80% of the area's subscriptions, or where there are fewer than three (3) total service providers in the area, subscription numbers are withheld to maintain provider confidentiality, in accordance with guidelines developed by the United States Department of Commerce.

FIGURE 3.1: Penetration and Adoption Rates by County

County	Households (June 2011)	Households with Fixed Broadband Available	Residential Fixed Broadband Subscriptions	Penetration Rate	Adoption Rate
California	***12,683,589***	***12,397,603***	***9,243,068***	***72.9%***	***74.6%***
Alameda	552,916	549,489	420,164	76.0%	76.5%
Alpine	469	73	*Data Withheld*	--	--
Amador	14,270	12,929	9,479	66.4%	73.3%
Butte	87,989	87,753	56,572	64.3%	64.5%
Calaveras	18,624	14,526	11,721	62.9%	80.7%
Colusa	7,126	6,804	*Data Withheld*	--	--
Contra Costa	377,730	371,238	306,729	81.2%	82.6%
Del Norte	9,858	8,312	*Data Withheld*	--	--
El Dorado	70,642	62,297	46,466	65.8%	74.6%
Fresno	293,030	275,840	167,553	57.2%	60.7%
Glenn	9,798	9,564	4,289	43.8%	44.8%
Humboldt	56,012	45,699	32,029	57.2%	70.1%
Imperial	49,743	45,511	27,155	54.6%	59.7%
Inyo	8,018	5,285	3,357	41.9%	63.5%
Kern	257,792	232,525	153,260	59.5%	65.9%
Kings	41,093	34,876	*Data Withheld*	--	--
Lake	26,166	26,068	*Data Withheld*	--	--
Lassen	9,936	8,837	6,631	66.7%	75.0%
Los Angeles	3,264,523	3,254,784	2,375,692	72.8%	73.0%
Madera	43,613	38,917	23,228	53.3%	59.7%
Marin	103,708	101,872	85,799	82.7%	84.2%

County	Households (June 2011)	Households with Fixed Broadband Available	Residential Fixed Broadband Subscriptions	Penetration Rate	Adoption Rate
Mariposa	9,967	4,675	4,135	41.5%	88.4%
Mendocino	34,858	25,993	13,738	39.4%	52.9%
Merced	77,478	75,141	37,015	47.8%	49.3%
Modoc	4,020	2,499	*Data Withheld*	--	--
Mono	5,838	3,475	2,785	47.7%	80.1%
Monterey	127,179	116,475	80,254	63.1%	68.9%
Napa	49,356	49,078	35,302	71.5%	71.9%
Nevada	40,996	38,787	28,884	70.5%	74.5%
Orange	1,001,335	988,025	813,155	81.2%	82.3%
Placer	134,286	130,567	102,569	76.4%	78.6%
Plumas	8,883	8,651	5,884	66.2%	68.0%
Riverside	695,292	680,423	524,748	75.5%	77.1%
Sacramento	518,536	518,143	373,652	72.1%	72.1%
San Benito	16,927	15,428	10,650	62.9%	69.0%
San Bernardino	613,452	596,740	421,042	68.6%	70.6%
San Diego	1,099,421	1,058,574	882,810	80.3%	83.4%
San Francisco	348,269	348,199	263,104	75.5%	75.6%
San Joaquin	217,422	215,262	132,450	60.9%	61.5%
San Luis Obispo	104,944	98,851	74,240	70.7%	75.1%
San Mateo	260,725	259,943	211,404	81.1%	81.3%
Santa Barbara	140,800	133,793	79,775	56.7%	59.6%
Santa Clara	612,901	612,598	489,778	79.9%	80.0%
Santa Cruz	95,333	95,157	65,951	69.2%	69.3%
Shasta	70,532	68,201	43,546	61.7%	63.8%
Sierra	1,447	1,324	787	54.4%	59.4%
Siskiyou	19,427	17,435	7,785	40.1%	44.7%
Solano	141,855	141,694	106,651	75.2%	75.3%
Sonoma	186,724	180,650	134,046	71.8%	74.2%
Stanislaus	165,145	163,759	102,776	62.2%	62.8%
Sutter	31,484	31,484	19,551	62.1%	62.1%
Tehama	23,630	23,495	10,572	44.7%	45.0%
Trinity	6,058	187	*Data Withheld*	--	--
Tulare	132,209	125,633	58,930	44.6%	46.9%
Tuolumne	19,271	12,560	*Data Withheld*	--	--
Ventura	268,943	266,028	214,088	79.6%	80.5%
Yolo	71,169	71,162	48,889	68.7%	68.7%
Yuba	24,421	24,315	*Data Withheld*	--	--

Note: Household information estimated using projections published by the California Department of Finance.

3.2 Adoption Rates by Census Tract

The following pages present maps of adoption rates by Census Tract. Reporting criteria specifies that a Tract can only be reported in cases where there are 3 or more service providers in the tract, and no one service provider holds 80% or greater of the tract's total subscriptions. Unfortunately, this prevents many non-urban census tracts from being displayed.

FIGURE 3.2: Adoption Rates: Statewide:

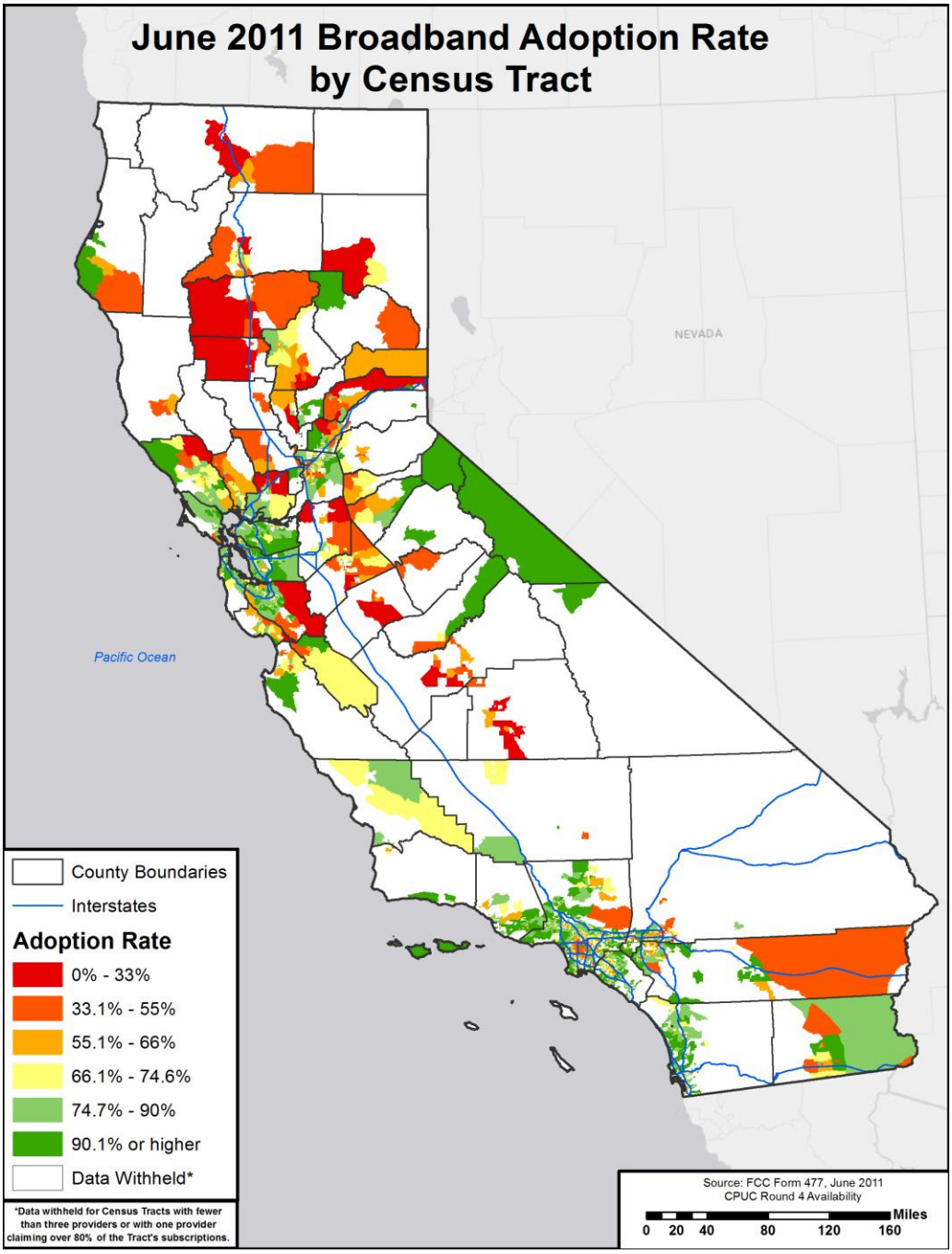


FIGURE 3.3: Adoption Rates: Greater Los Angeles

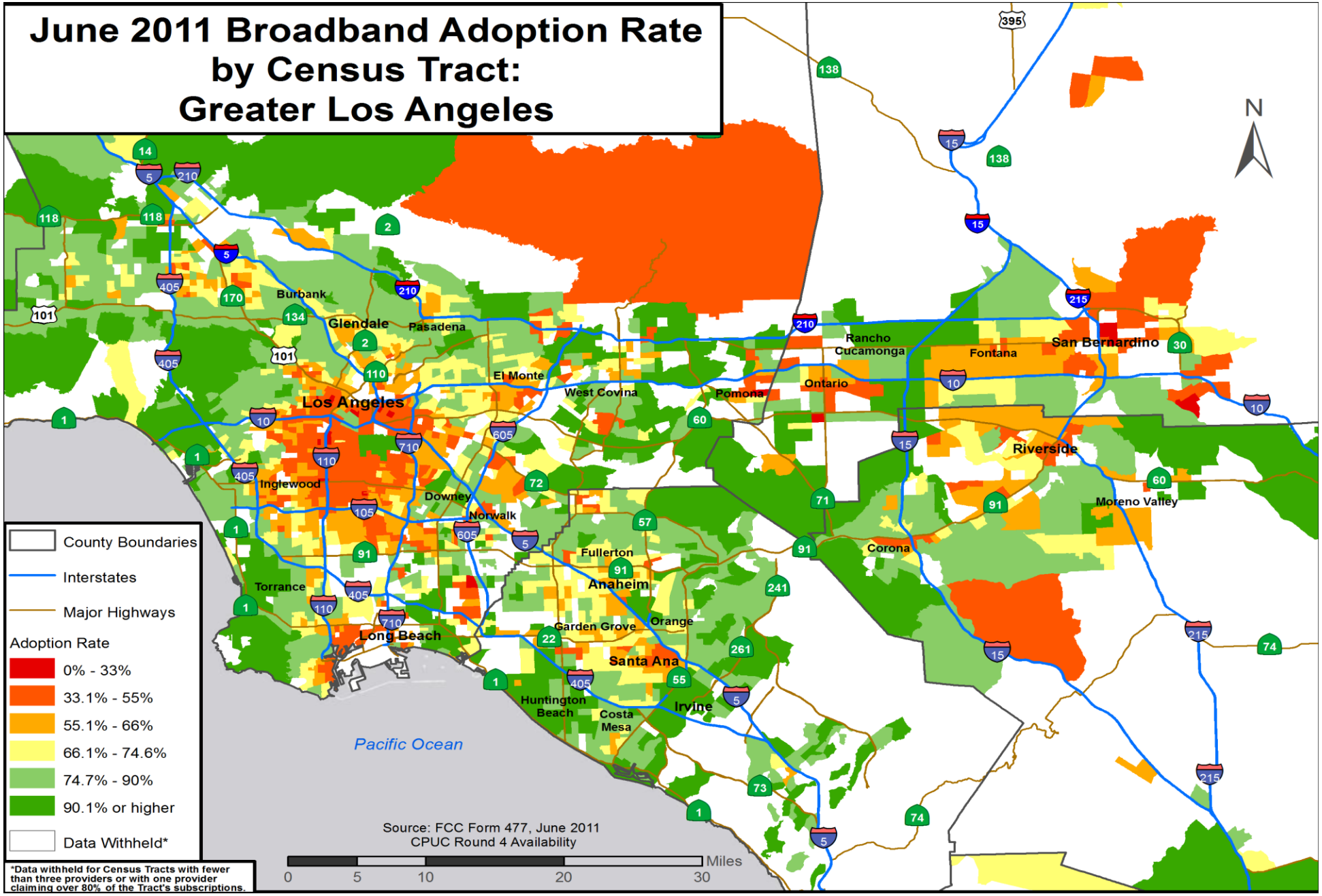


FIGURE 3.4: Adoption Rates: San Francisco Bay Area

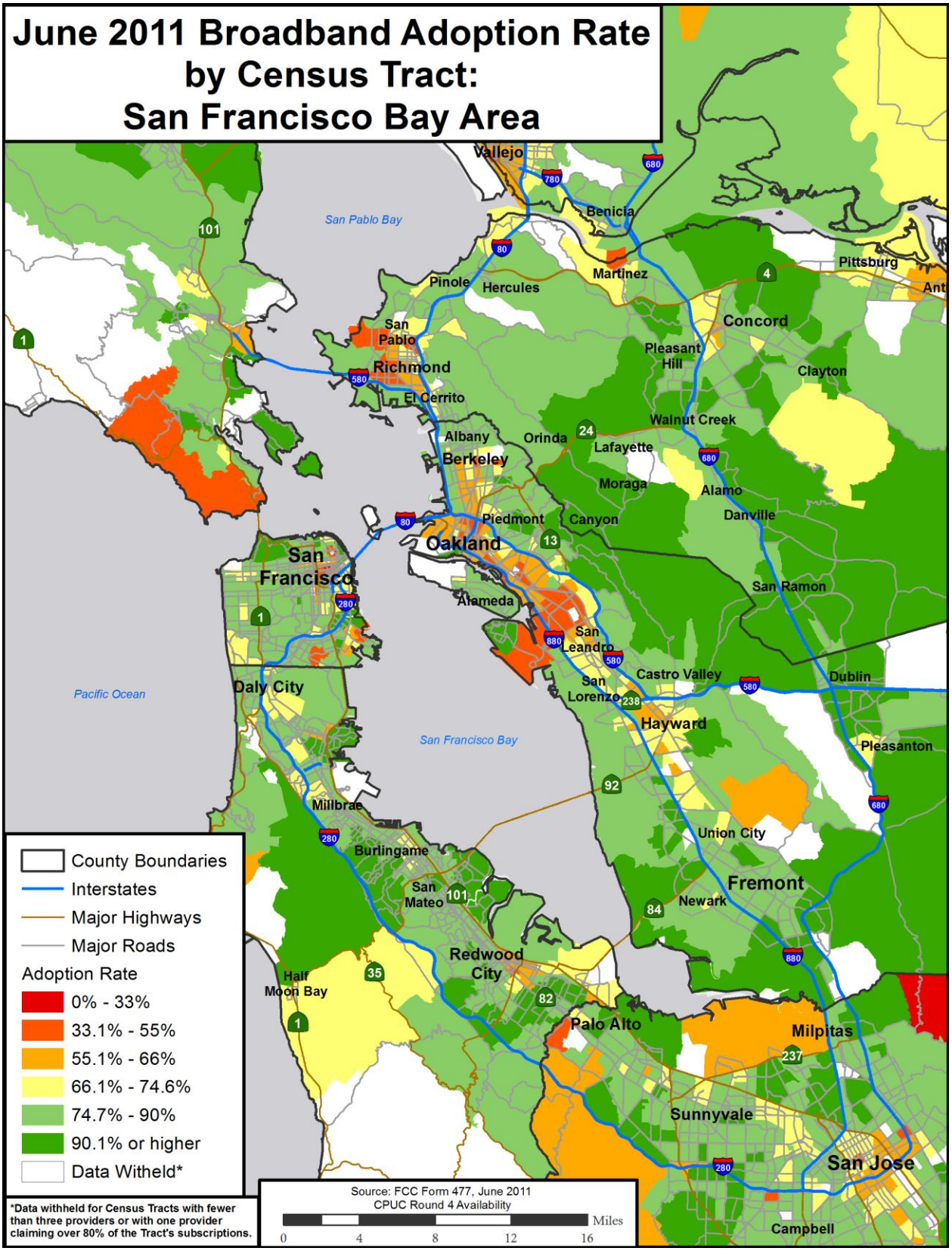


FIGURE 3.5: Adoption Rates: Greater Sacramento Area

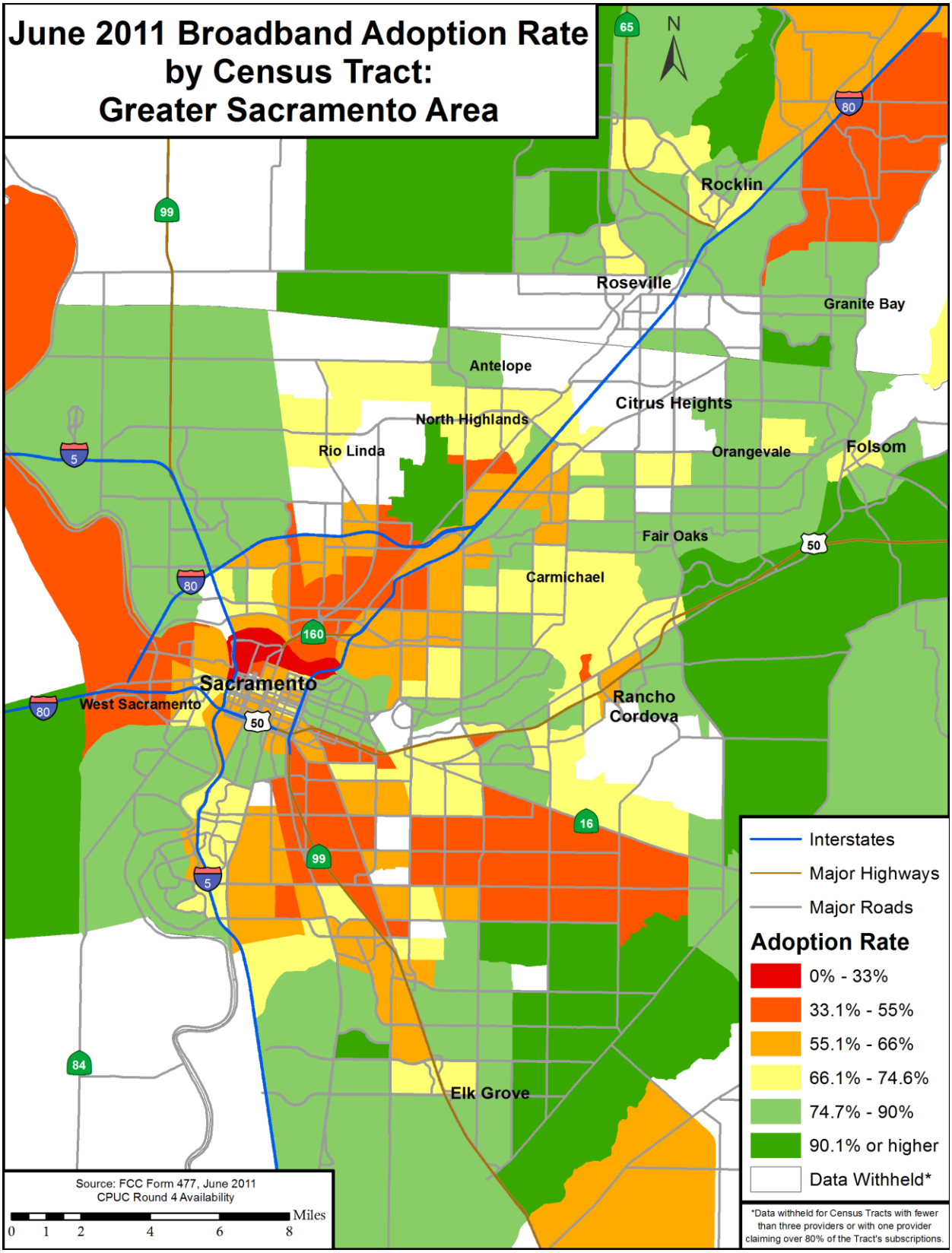
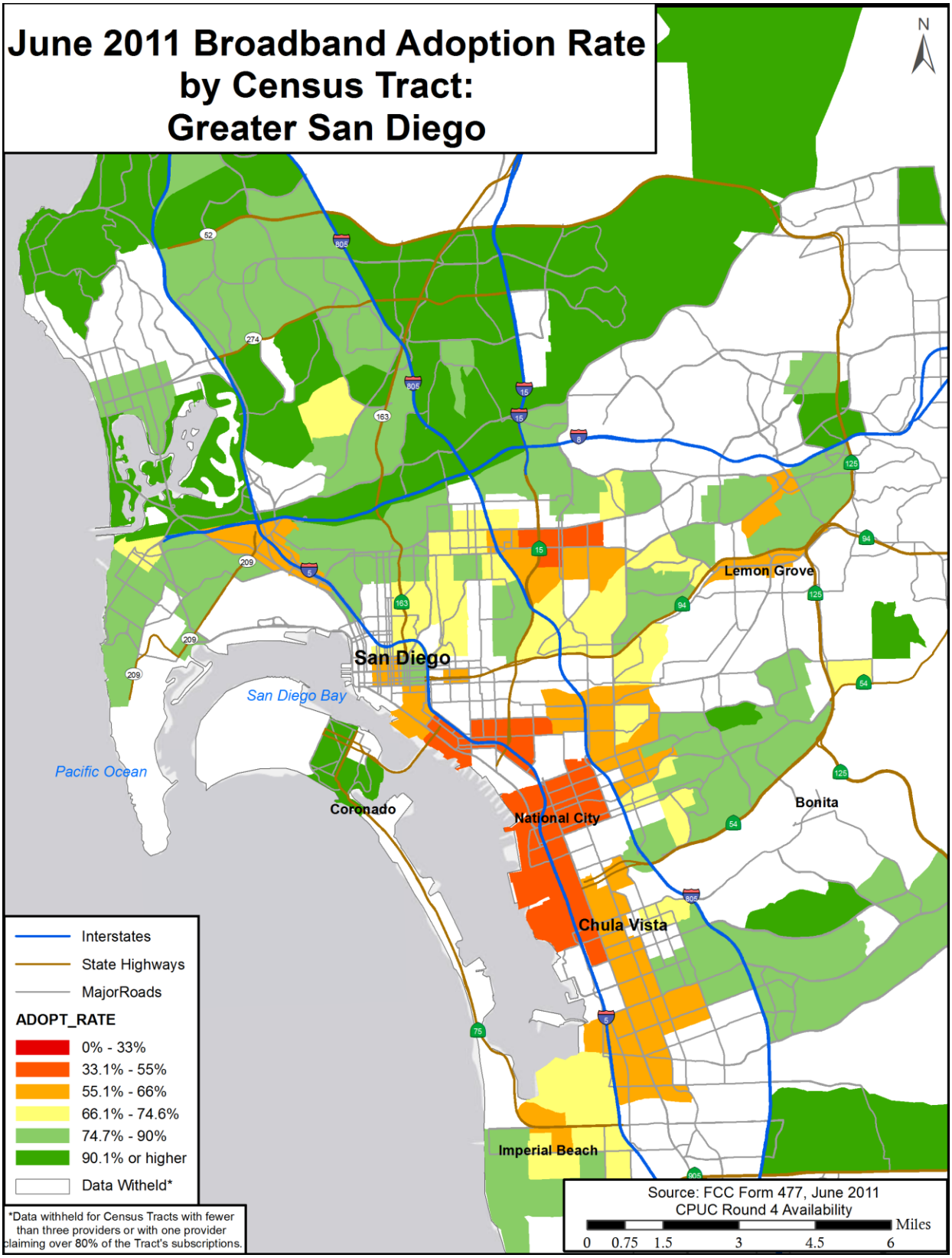


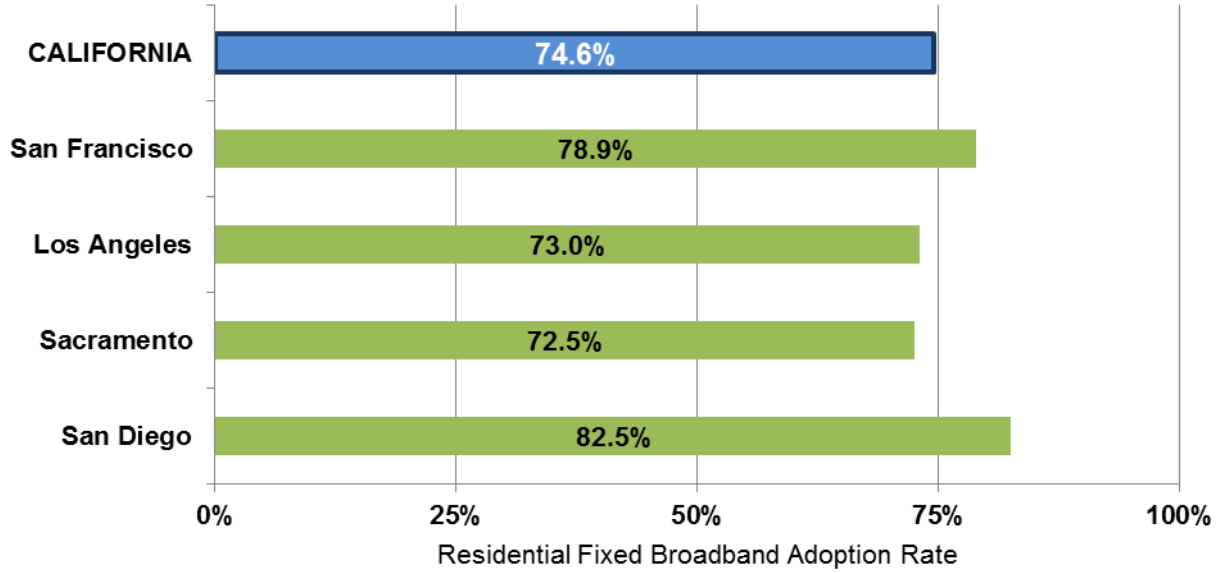
FIGURE 3.6: Adoption Rates: Greater San Diego



3.3 Adoption in Urban Areas: Summary

Figure 3.7 (below) summarizes adoption rates for the urban areas mapped previously.

FIGURE 3.7: Adoption Rates in Selected Urban Areas



Urban Area Definitions:

The urban areas summarized above are defined using Census 2000 tracts (the geography level of Form 477 data) whose center points fall within urban area boundaries defined by the 2010 Census.

San Francisco includes tracts centered within the following census-defined urbanized areas:

San Francisco – Oakland, San Jose, Concord, Vallejo, Fairfield, Antioch, Livermore

Los Angeles includes tracts centered within the following census-defined urbanized areas:

Los Angeles – Long Beach – Anaheim, Riverside – San Bernardino

Sacramento and San Diego include tracts centered within only their respective urbanized areas.

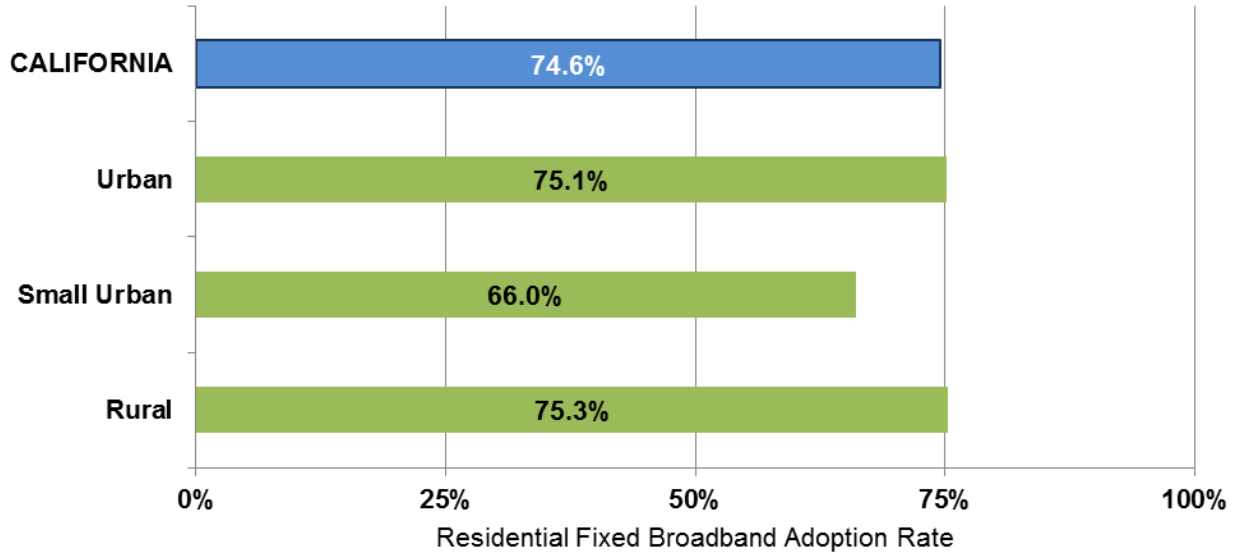
4 Detailed Correlation Results

4.1 Urbanity and Adoption

Examining statistical correlations between adoption rates and various demographic variables allows a quantitative look at the factors which most strongly predict broadband adoption across communities. The remainder of this report will visually display how the adoption rates of California's census tracts are related to demographic indicators.

Figure 4.1, below, categorizes California's census tracts according to their level of urbanity. While it might be expected that adoption rates in small urban areas are at a midpoint between urban and rural areas, adoption rates in these areas are below their rural and urban counterparts.

FIGURE 4.1: Adoption Rates by Urbanity



"Small Urban" areas are defined by the Census Bureau as continuously developed areas with a population of between 2,500 and 50,000. Census tracts with centerpoints in these areas are grouped into the "Small Urban" category, while census tracts with their centerpoints in larger urban areas are grouped into the "Urban" category, and all other tracts are assigned to the "Rural" category.

4.2 Statewide Correlation Results

The following pages show correlation patterns between adoption rates for all census tracts and selected demographic indicators. Each data point represents one Census Tract with a unique adoption rate and demographic indicator value. In general, the more clustered the data points, the stronger the correlation.

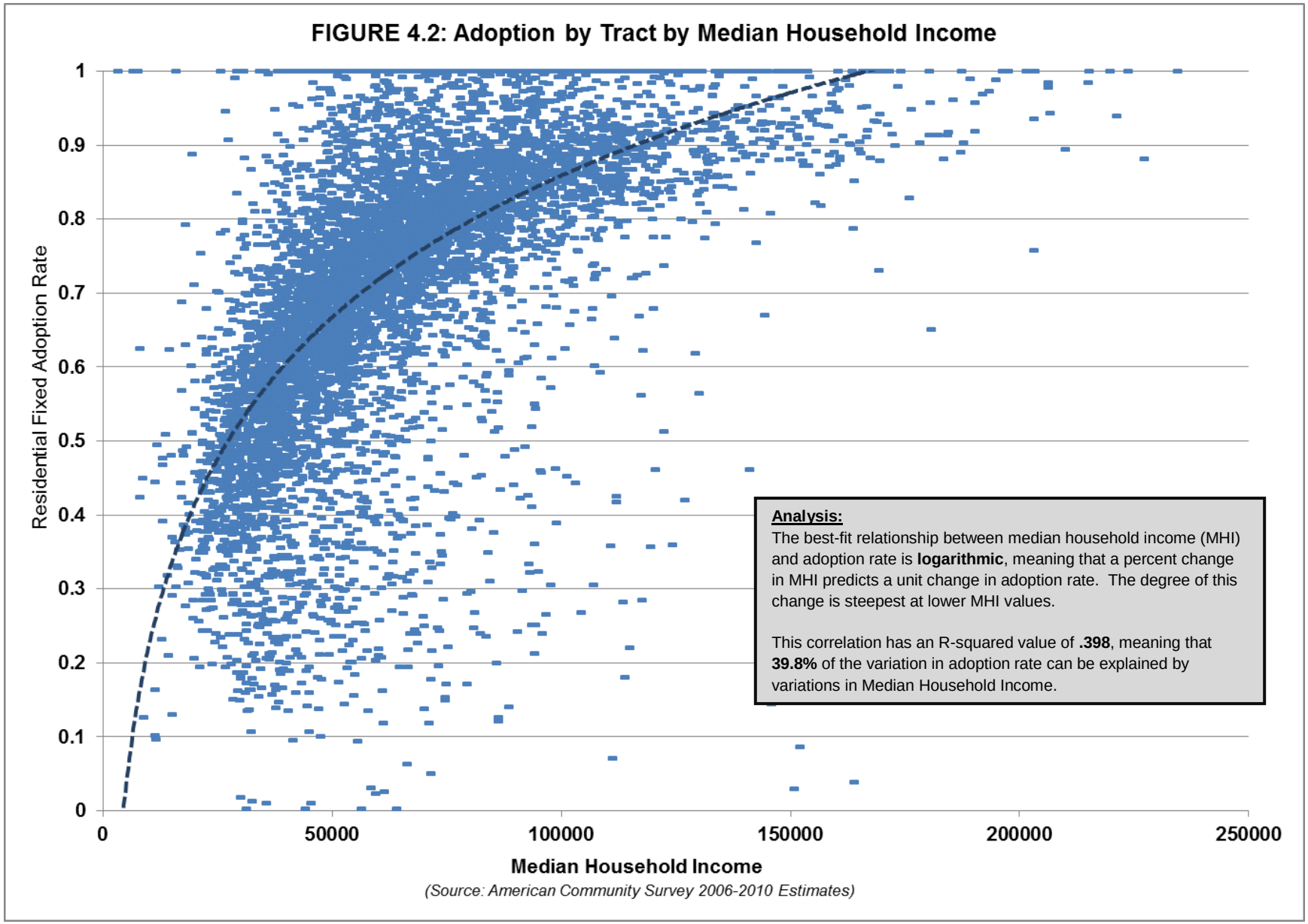


FIGURE 4.2: Adoption by Tract by Median Household Income
Residential Fixed Adoption Rate
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
50000
100000
150000
200000
250000
Median Household Income
(Source: American Community Survey 2006-2010 Estimates)
Analysis:
The best-fit relationship between median household income (MHI) and adoption rate is logarithmic, meaning that a percent change in MHI predicts a unit change in adoption rate. The degree of this change is steepest at lower MHI values.
This correlation has an R-squared value of .398, meaning that 39.8% of the variation in adoption rate can be explained by variations in Median Household Income.

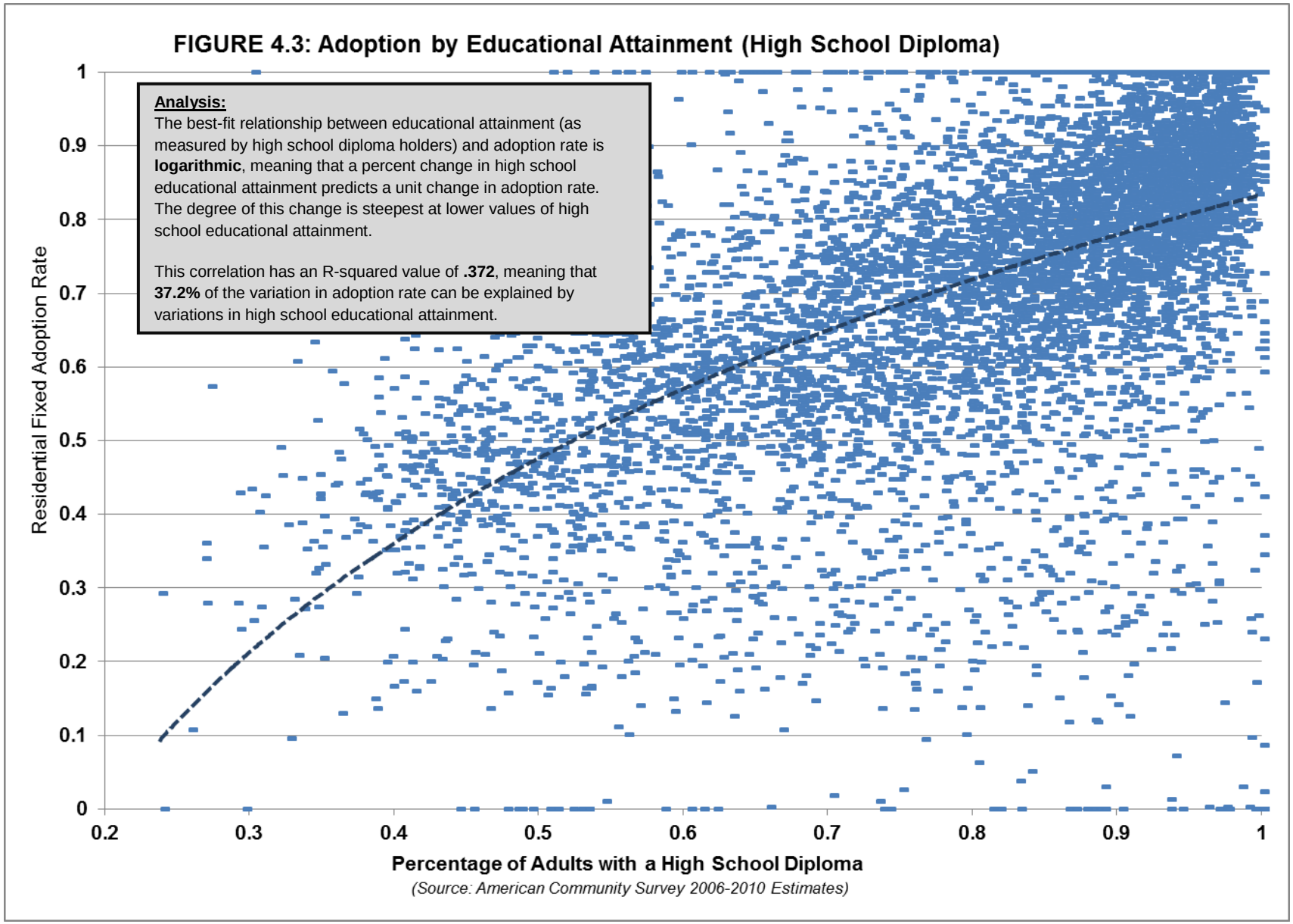


FIGURE 4.3: Adoption by Educational Attainment (High School Diploma)
Analysis:
The best-fit relationship between educational attainment (as measured by high school diploma holders) and adoption rate is logarithmic, meaning that a percent change in high school educational attainment predicts a unit change in adoption rate. The degree of this change is steepest at lower values of high school educational attainment.
This correlation has an R-squared value of .372, meaning that 37.2% of the variation in adoption rate can be explained by variations in high school educational attainment.
Residential Fixed Adoption Rate
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Percentage of Adults with a High School Diploma
(Source: American Community Survey 2006-2010 Estimates)

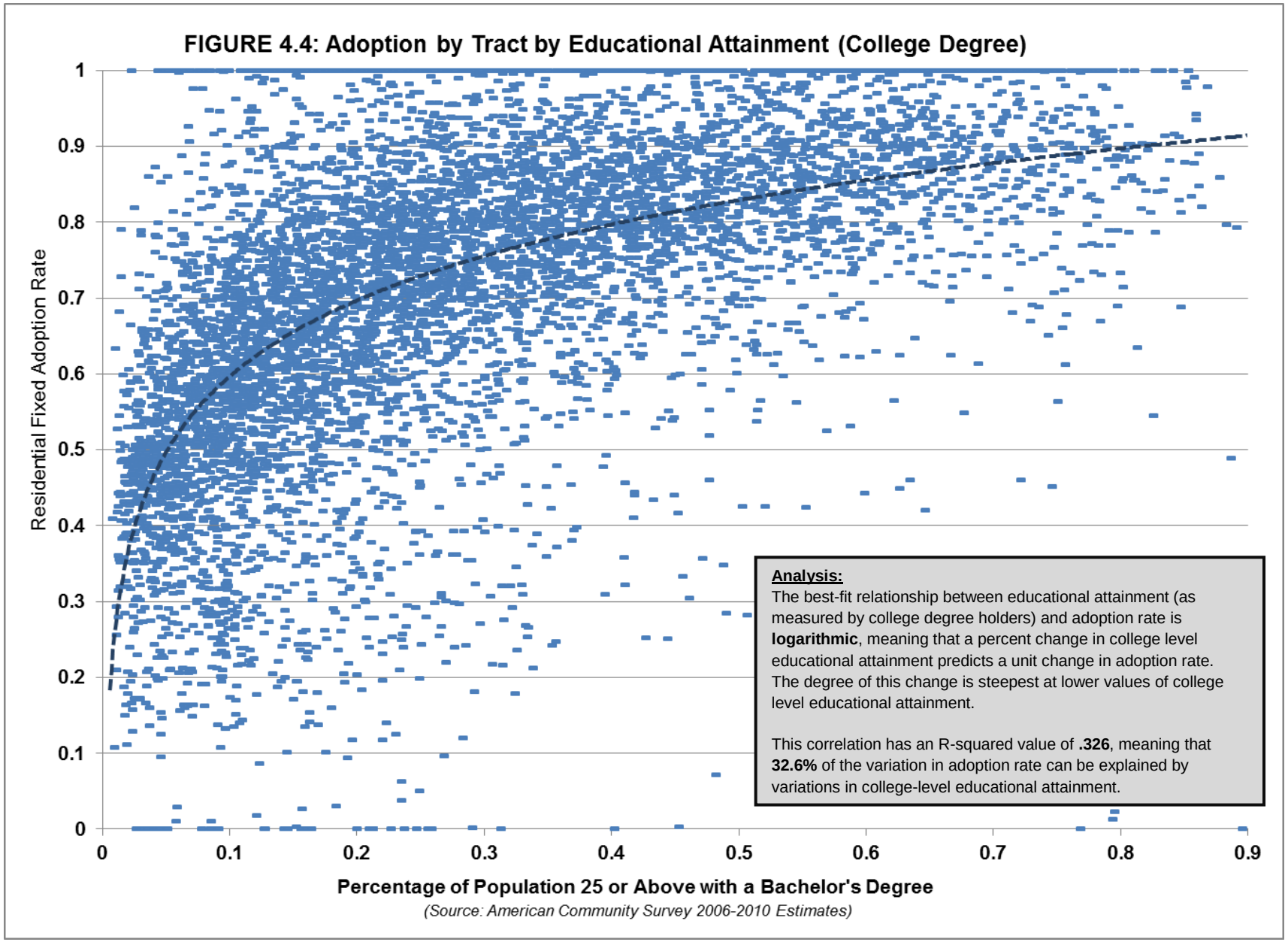


FIGURE 4.4: Adoption by Tract by Educational Attainment (College Degree)
Residential Fixed Adoption Rate
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Percentage of Population 25 or Above with a Bachelor's Degree
(Source: American Community Survey 2006-2010 Estimates)
Analysis:
The best-fit relationship between educational attainment (as measured by college degree holders) and adoption rate is logarithmic, meaning that a percent change in college level educational attainment predicts a unit change in adoption rate. The degree of this change is steepest at lower values of college level educational attainment.
This correlation has an R-squared value of .326, meaning that 32.6% of the variation in adoption rate can be explained by variations in college-level educational attainment.

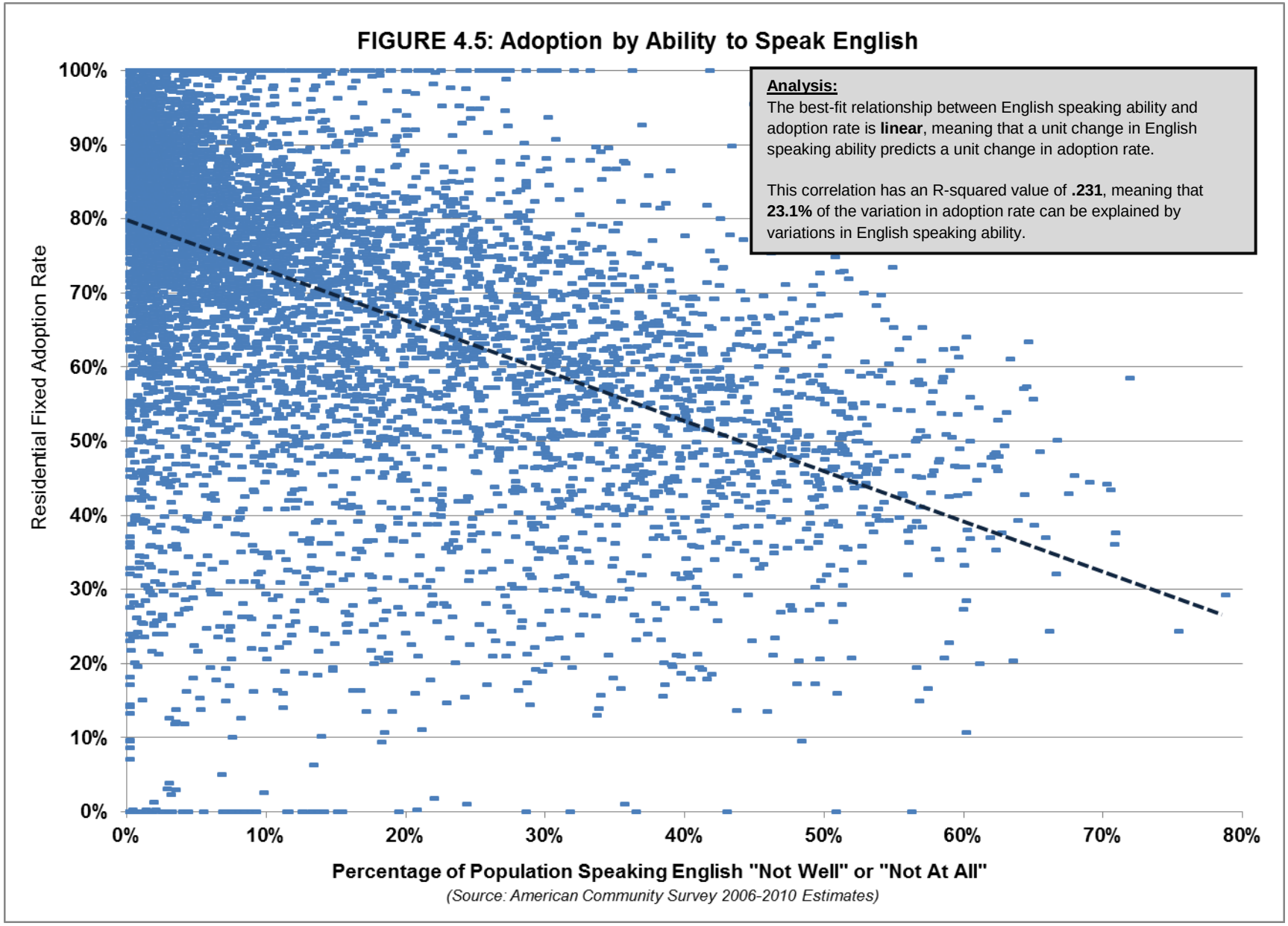


FIGURE 4.5: Adoption by Ability to Speak English
Analysis:
The best-fit relationship between English speaking ability and adoption rate is linear, meaning that a unit change in English speaking ability predicts a unit change in adoption rate.
This correlation has an R-squared value of .231, meaning that 23.1% of the variation in adoption rate can be explained by variations in English speaking ability.
Residential Fixed Adoption Rate
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0%
10%
20%
30%
40%
50%
60%
70%
80%
Percentage of Population Speaking English "Not Well" or "Not At All"
(Source: American Community Survey 2006-2010 Estimates)

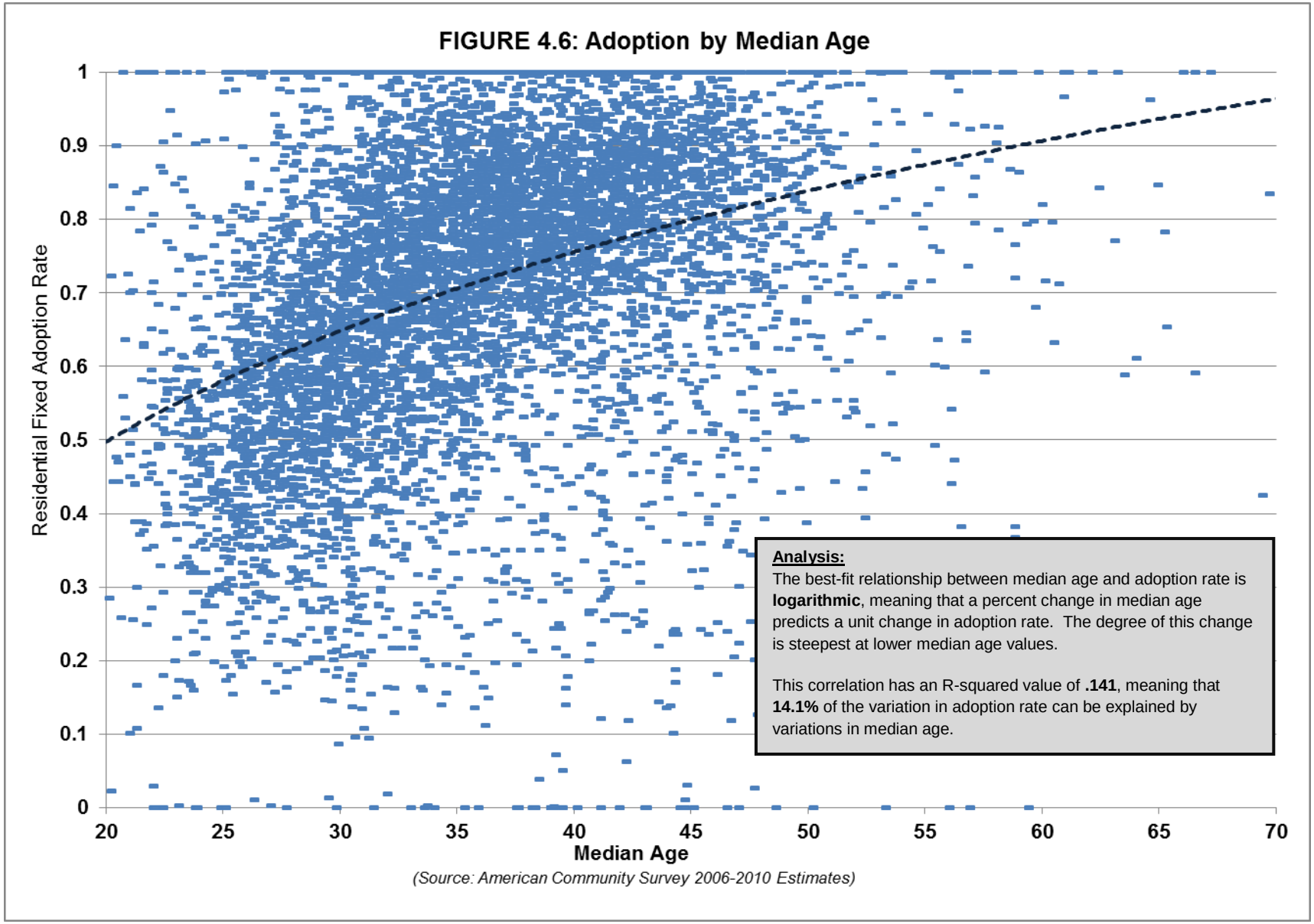


FIGURE 4.6: Adoption by Median Age
Residential Fixed Adoption Rate
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
20
25
30
35
40
45
50
55
60
65
70
Median Age
(Source: American Community Survey 2006-2010 Estimates)
Analysis:
The best-fit relationship between median age and adoption rate is logarithmic, meaning that a percent change in median age predicts a unit change in adoption rate. The degree of this change is steepest at lower median age values.
This correlation has an R-squared value of .141, meaning that 14.1% of the variation in adoption rate can be explained by variations in median age.

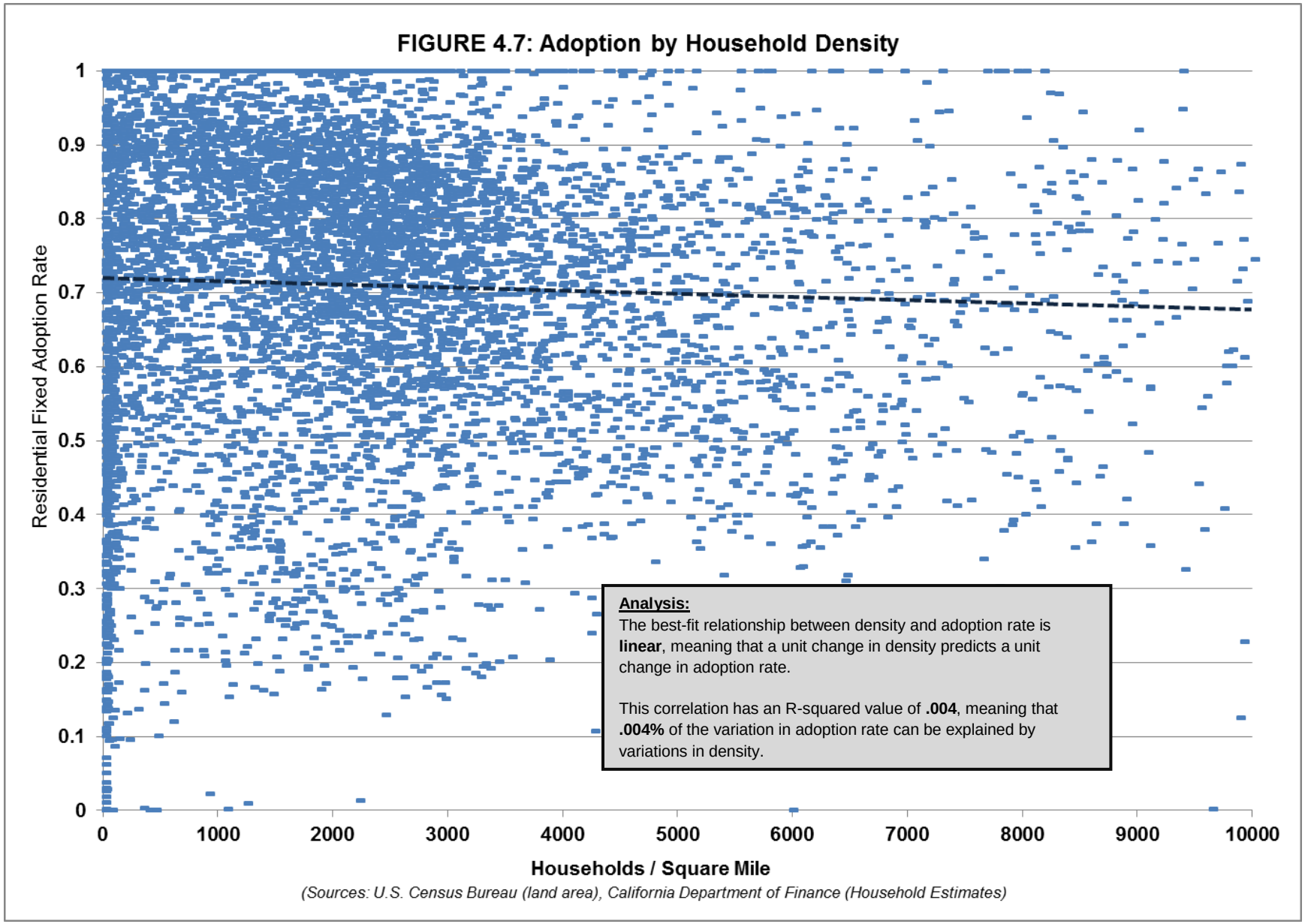


FIGURE 4.7: Adoption by Household Density
Residential Fixed Adoption Rate
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
Households / Square Mile
Analysis:
The best-fit relationship between density and adoption rate is linear, meaning that a unit change in density predicts a unit change in adoption rate.
This correlation has an R-squared value of .004, meaning that .004% of the variation in adoption rate can be explained by variations in density.
(Sources: U.S. Census Bureau (land area), California Department of Finance (Household Estimates)

4.3 Summary

Figure 4.8 summarizes relationships between the adoption rates of California census tracts and their demographic influencers. This list is not intended to be exhaustive, but rather includes variables with some of the highest explanatory power, such as median household income and educational attainment indicators, along with influencers that would be expected to hold a high degree of explanatory power, but in fact do not, such as density.

FIGURE 4.8: Statistically Significant Influencers of Adoption: Correlation Summary

Variable	Percent of Adoption Rate Explained	Direction of Relationship	Type of Relationship
Median Household Income	***39.8%***	+	Logarithmic
Percentage of Population 25 or Above with a Bachelor's Degree	***37.2%***	+	Logarithmic
Percentage of Population 18 or Above with a High School Diploma	***32.6%***	+	Logarithmic
Percentage of Population Speaking English "Not Well" or "Not At All"	***23.1%***	-	Linear
Median Age	***14.1%***	+	Logarithmic
Density	***.004%***	-	Linear

It is necessary to note that these influencers are highly correlated not only with adoption rates but also to one another. This limits the ability to accurately determine the contribution of each individual variable to overall changes in adoption rates within a statistical model that includes more than one explanatory variable. Multivariate models can improve overall explanatory power, but interpreting the results becomes increasingly complex.

4.4 Conclusions

Statistical analysis shows significant correlations between demographics and broadband adoption, and mapping of adoption rates shows how those correlations translate into reality for California's low-adoption communities.

There is need for further analysis of these correlations both on a statewide level, and on a city-by-city basis. It may be that some demographic influencers are more explanatory in particular metropolitan regions of the state, and further analysis of these relationships within more confined geographic areas could lead to greater efficacy for groups tasked with promoting broadband adoption on the ground in California's communities.

5 Technical Notes

5.1 FCC Form 477 Data

Detailed information regarding FCC Form 477 data can be found in the "Technical Notes" section of "Internet Access Services as of 6/30/11", published by the Wireline Competition Bureau of the FCC's Industry Analysis and Technology Division.

To view the report, visit the FCC's website:

http://www.fcc.gov/reports/internet-access-services-63011

To learn more about how Form 477 is collected, visit the FCC's Form 477 Resources for Filers page:

http://transition.fcc.gov/form477/

5.2 CPUC Broadband Availability Data

Broadband service is considered available to a census block if a service provider is able to provision a minimum of combined service of 768 kilobits per second downstream and 200 kilobits per second upstream within 10 business days. In most Census Blocks, this means that fixed broadband service is considered available to the block if it is already being provided to at least one other household in

the block. In Census Blocks larger than 2 square miles, fixed service availability is determined using a ratio of service line length to total roadway length: if the sum of the length of all service lines in a Census Block is equal to at least fifty percent of the sum of the length of all roadways in a Census Block, the block is considered to have broadband available.

In addition, fixed wireless and mobile wireless broadband service availability depends on whether the geographical center (centroid) of the Census Block falls within a provider's reported coverage area.