

## Introduction

As part of the 2020 TRPA Regional Transportation Plan (RTP), TRPA prepared regional development and transportation forecasts for the years 2035 and 2045. The regional development forecast includes changes in development, population, demographics, and visitation. The transportation forecast includes the RTP project list, as well as the transportation strategies. The regional development forecast and the transportation forecast are implemented in the Tahoe travel demand model and the Trip Reduction Impact Analysis (TRIA) tool to allow planners to assess the efficacy of policies and projects that promote the goals of the Regional Plan and the RTP.

## Development Forecast Summary

The 2035 and 2045 forecast years build upon the 2018 model base year, which was developed during the fall of 2019. More information about the 2018 base year can be found on the [Tahoe model website](#). The forecasts include a variety of projections related to land use and the characteristics of the Regions' traveling population in the forecast years; this population includes residents, visitors, and commuters. The forecast years of 2035 and 2045 were selected to meet specific regulatory requirements of the California Sustainable Communities Strategy (SCS) and Federal RTP requirements.

*Residents*– The forecast projects Lake Tahoe's full-time residential population to increase slightly. The forecasted increase is a deviation from the declines in the Region's population observed over the last 20 years and is influenced by a suite of factors. First, the number of regional housing units will increase as residential allocations are distributed and workforce

housing/affordable housing programs are implemented using residential bonus units (which restrict units from being used as second homes or vacation rentals). Similarly, the residential occupancy rate – the proportion of homes occupied by residents – is expected to increase due to the increase in housing supply available for residents from implementation of workforce and affordable housing initiatives as local and regional efforts to increase the housing supply for local residents take effect. The downward trend in regional population in the last 20 years was likely influenced by the declines in gaming and associated job loss. The precipitous declines in gaming revenues observed in the early part of the century following the opening of casinos in northern California have not continued into the second decade as revenues appear to have stabilized. The income distribution of the residential population will remain steady as increased provision of workforce and affordable housing counteract recent upward trends in household income. School enrollment will increase slightly because of overall population growth. Employment will also increase slightly as additional Commercial Floor Area (CFA) and Tourist Accommodation Units (TAU) are constructed throughout the Region.

*Visitation* – The forecast projects both day and overnight visitation to the Lake Tahoe Region to increase during the forecast years. This forecasted increase is based upon the projected population growth in the mega-region (Bay Area/Sacramento/Reno), forecasted increases in traffic counts in adjacent areas, and the increasing popularity of the outdoor recreation experience. This increase in visitation will result in an increase in the number of occupied

overnight lodging units, short-term rentals, and seasonal homes.

• **Table 1: 2045 Forecast Data Summary**

Forecast Data Summary				
	Base Year 2018	Forecast 2045	change (#)	change (%)
<b>Residential Units and Population</b>				
Residential Population	51,624	58,041	+ 6,417	12.4 %
Occupied Units	21,624	24,315	+ 2,691	12.4 %
Unoccupied Units	26,031	28,056	+ 2,025	7.8 %
<b>Total Residential Units</b>	<b>47,655</b>	<b>52,252</b>	<b>+ 4,597</b>	<b>9.6 %</b>
<b>Income of Occupied Residential Units</b>				
Low Income Units	10,463	11,886	+ 1,423	13.6 %
Medium Income Units	4,891	5,437	+ 546	11.2 %
High Income Units	6,254	6,843	+ 589	9.4 %
<b>Total Overnight Visitor Units</b>				
Short Term Rentals	6,005	5,931	-74	-1.2 %
Seasonal Units	17,129	18,544	+ 1,415	8.3 %
Campground Spots	2,120	2,120	0	0 %
<b>Total Lodging Units</b>	<b>11,107</b>	<b>12,052</b>	<b>+ 945</b>	<b>8.5 %</b>
<b>Occupied Overnight Visitor Units</b>				
Occupied Short Term Rentals	2,227	2,240	+ 13	0.6 %
Occupied Seasonal Units	6,396	6,911	+ 515	8.1 %
Occupied Camping Spots	1,278	1,278	0	0 %
Occupied Lodging Units	6,190	7,086	+ 896	14.5 %
<b>Other Key Data Points</b>				
Commercial Floor Area	6,327,319	6,533,869	+ 206,550	3.3 %
Employment	28,604	29,462	+ 858	3 %
School Enrollment	8,887	9,992	+ 1,105	12.4 %

### Forecast Methodology

The overall approach to forecast development was to apply the best available information and data. The development rate forecast was informed by a review of historical development

rates, and an assessment of the performance of past forecasts. The forecast differs from past forecasts in at least two ways:

1. More rational development rates – Prior forecasts have generally assumed that

full build out of the Region would occur by 2035 but historic development rates have not kept pace with those forecasts. This forecast refines past methodologies by placing greater weight on observed development rates.

2. Recent overhaul of development rights system - This is the first forecast since significant changes were made to the development rights system to accelerate attainment of threshold standards and Regional Plan goals and policies. The changes enable easier conversion between types and facilitates the attainment of State housing mandates.

The forecasts contained in this document represent a conservative yet realistic view of the continued build out of the Lake Tahoe Regional Plan. Prior forecasts by TRPA had projected significantly faster growth and a faster consumption of the remaining development rights. The annual rate of consumption for commercial floor area and tourist accommodation units were adjusted to align with observed trends more accurately since the adoption of the 2012 Regional Plan update. Additionally, the forecast assumes that not all the remaining development potential for commercial floor area and tourist accommodation units will be constructed by 2045.

Staff anticipates that by 2045 the unknown but likely time-limited economic impacts from the COVID pandemic will be replaced by more normal economic forces.<sup>12</sup>

### *Residential Units*

The number of housing units in the Region is influenced by market conditions as well as TRPA's development rights system, which caps the total development potential for the Region. The residential occupancy rate of the housing stock is influenced by economic factors, the number of residents, second home ownership, and visitors that frequent the Region.

There are currently 47,655 residential units in the Region (based on TRPA records); according to the occupancy rates published by the U.S. Census Bureau 2018 American Community Survey (ACS), an estimated 21,624 residential units (45%) are occupied by full-time residents and 26,031 units (55%) are not occupied by full-time residents (ACS 2018). Currently, approximately 20% of existing residential units in the Region are multi-family units (approximately 9,530 units) and 80% of existing units (38,125) are single family units. By 2045, an additional 4,597 units are expected to be constructed, bringing the total number of residential units in the Region to 52,252, a 9% increase. This includes the construction of 1,823 additional single-family residential units (40% of additional units) and 2,774 additional multi-family residential units (60% of additional units). Forecasts of residential projects in the three California jurisdictions are sufficient to accommodate the Regional Housing Needs Assessment (RHNA) Cycle 5 (2013-2021) and Cycle 6 (2022-2029). The forecast includes a continuation of the RHNA requirements beyond 2029. These requirements were linearly extrapolated to 2045 based on requirements

---

<sup>12</sup> Additional detail on the considerations related to COVID-19 are included in an addendum at the end of this document.

established to date and are accommodated in the forecasts.

All remaining residential allocations (2,234) are allocated and constructed in the forecast. This includes the award and construction of all residential bonus units (1,609), and all currently banked residential units (204) by 2045. The forecast also includes the conversion of 100,000 square feet of CFA and 130 TAUs to residential units, which will generate an additional 290 multi-family and 260 single-family units. The projected conversions are consistent with conversion trends since the adoption of the conversion programs and observed development rights utilization rates. The observed trends indicate a net conversion from CFA and TAUs and towards Residential.

Several key assumptions informed the spatial distribution of residential development in the forecast. First, new residential units were allocated to projects known to be in the pipeline, including multi-family and affordable-/moderate-income projects on public lands. This included 580 units expected to be built on California Tahoe Conservancy (CTC) asset lands<sup>13</sup>, redevelopment successor agency parcels<sup>14</sup> and other publicly owned parcels where large multi-family and affordable/moderate-income housing projects are likely to be constructed<sup>15</sup>. For multi-family development on private properties, where the exact number of units to be constructed was not fully known, a computer-generated random selections to distribute units to vacant buildable multi-family and existing underbuilt residential

parcels throughout the Region. For these parcels, the number of units allocated was 60% of the maximum allowable buildout based on current zoning, coverage constraints, and density restrictions. This assumption is consistent with observed buildout patterns, and conservative in that it distributes new residential development throughout the Region (rather than modeling the most compact possible pattern). Multi-family units were only assigned to parcels that are currently zoned for multi-family residential, meet density requirements, and that have remaining coverage available to support additional units. Finally, the remaining private residential units were constructed as single-family units through random assignment to vacant buildable properties throughout the Region.

#### *Residential Occupancy rate*

The U.S. Census American Community Survey (ACS) estimates that, since 2010, the proportion of occupied housing units in the Tahoe Region has dropped from 46% to 42% in 2018 (U.S. Census Bureau 2020). The remaining 58% of the regional housing supply not occupied by full time residents is classified by the ACS as vacant (ACS classifies houses as “vacant” if they are permanently unoccupied, periodically occupied by seasonal residents, used as a second homes, or rented by visitors, including short-term rentals). In recent years, the total number of seasonal or short-term housing units increased by 24%, from 21,000 in 2010 to 26,000 units in 2018.

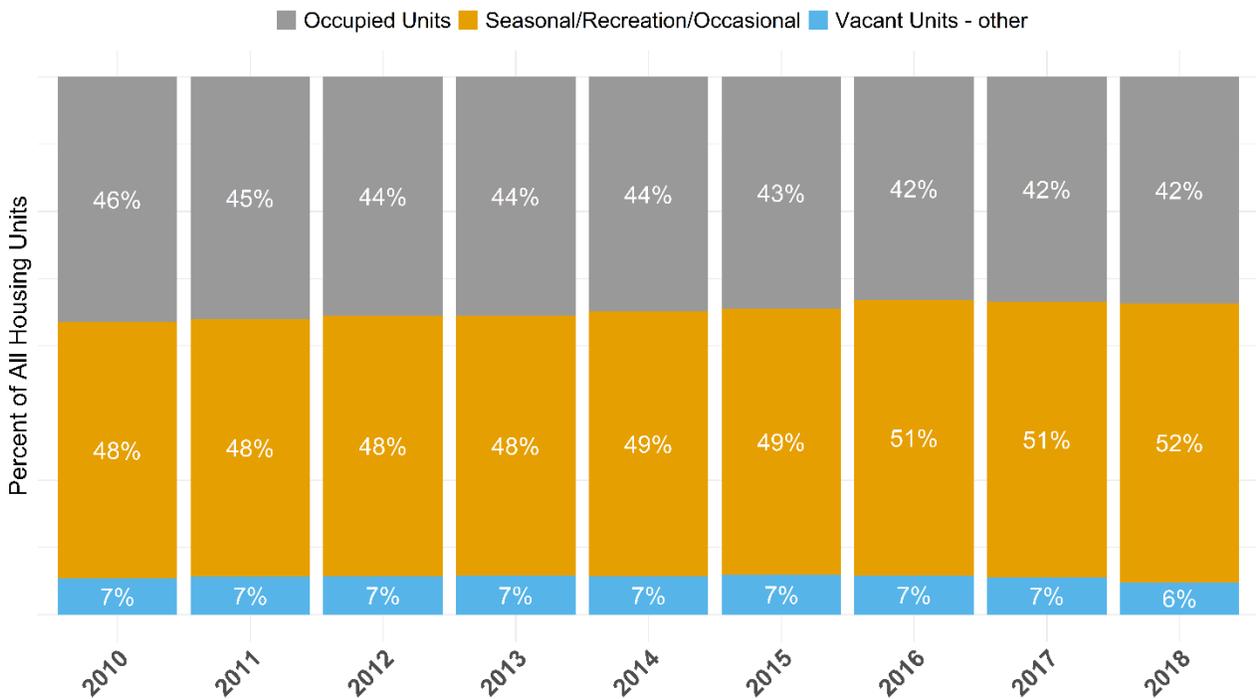
---

<sup>13</sup> See <https://tahoe.ca.gov/programs/tahoe-livable-communities/asset-land-sales/> for more details about potential housing development opportunities that have been identified by the California Tahoe Conservancy.

<sup>14</sup> See <https://www.placer.ca.gov/3396/Housing> for information about potential housing development project opportunities in Placer County.

<sup>15</sup> Includes housing commitments made by the Tahoe Transportation District as part of the Highway 50 Community Revitalization Project, see <https://www.tahoetransportation.org/us50>.

• **Figure 1: Housing Occupancy (2010-2018)**



Source: American Community Survey (ACS)

Despite these trends over the past several years, the forecast includes an increase in the proportion of residential units occupied by full-time residents (owner-occupied and renter-occupied). Three factors are expected to contribute to the shift: 1) Housing Initiatives to promote construction of new workforce, achievable, and affordable housing in the Region, 2) Housing initiatives to promote the

transition of the existing stock of residential units from second homes and short term rentals to resident-occupied units, and 3) Measure T in the City of South Lake Tahoe. Additional detail on each factor is provided below.

1. *Housing initiatives to promote new workforce and income-restricted housing:* The development forecast

includes construction of all the remaining 1,609 residential units from the TRPA residential bonus unit pool. Residential Bonus Units are awarded as transfer incentives for relocating remote development into town centers, and for the construction of affordable/moderate/achievable housing. New housing constructed with Residential Bonus Units is required by TRPA Code to be deed-restricted to prohibit these housing units from being used for second homes or vacation rentals.

2. *Housing initiatives to transition existing housing stock:* There are several initiatives underway to transition second homes, vacation rentals, and vacant house into residential units for full time residents. The forecast includes significant level of success for these initiatives (and other initiatives unknown at this time) that results in 700 additional units (~1.5% of the 2018 housing stock) occupied by residents in 2035 and 2045. The increase is independent of the forecasted increases described in and 1 and 3.
3. *Measure T in the City of South Lake Tahoe:* Voters passed Measure T in the City of South Lake Tahoe in November 2018 (see <https://www.cityofslt.us/453/Vacation-Home-Rentals>). The measure includes broad restrictions on short term rentals (STRs) outside select areas in the city. The restrictions go into effect on December 31, 2021. As a result of the measure, approximately 1,372 currently permitted VHRs will not be renewed. The market value of the existing VHR stock

skews higher than median values in the Region, so a conservative, but optimistic forecast is that 15% of the units will be transitioned to be occupied by residents (rented or owned); other units are expected to become part of the second home market. A recent study on the economic impact of VHRs in South Lake Tahoe suggested that 10% of existing VHR owners would likely rent to full time if they could no longer use the property as VHR (MBI 2017).

#### *Commercial Floor Area (CFA)*

There are currently 556,796 square feet of unused commercial floor area in TRPA and local jurisdiction community/area plan pools. Since 2013, a total of 41,928 square feet of CFA has been allocated to projects: an average rate of 6,988 square feet of CFA per year. The forecast includes the construction of an additional of 130,067 square feet of CFA by 2035 and 206,550 square feet by 2045. The forecasted rate of development - 7,650 square feet - is just higher than the observed rate since the 2012 Regional Plan, but lower than rates used in prior regional forecasts. For the forecasts, CFA was allocated to known projects that have been permitted or are in the planning phase, but not constructed; remaining CFA was allocated to town centers and area plans using the observed proportions from recent allocations.

The forecast includes the conversion of 100,000 square feet of CFA to residential units, consistent with conversion trends since the adoption of the conversion program; recent trends indicate the net conversion from CFA and TAUs towards Residential. The converted CFA is forecasted to result in the construction of 400 additional residential units --200 multifamily units, and 200 single family units. At the end of the forecast

period, 250,246 square feet of CFA remains unallocated and thus unconstructed.

#### *Tourist Accommodation Units (TAU)*

The forecast includes the construction of an additional 629 TAUs by 2035 and 945 TAUs by 2045. The forecast includes the completed construction of all currently permitted projects using 807 banked TAUs and the use of all 138 awarded TAU bonus units. Not all TAUs allowed in the Regional Plan are forecast to be constructed by 2045; an estimated 230 TAUs will remain undeveloped through 2045 (74 TAU bonus units and 156 banked TAUs). The TAU development rights pool is not exhausted within the forecast horizon, because of the slow rate of TAU right utilization and construction over the past 30 years. No TAUs have been allocated to projects and constructed since adoption of the 2012 Regional Plan, and only 58 TAUs have been allocated since the adoption of the 1987 Regional Plan. TAUs were allocated to projects that are permitted but not yet constructed (Homewood, Boulder Bay, Edgewood Casitas, Tahoe City Lodge, and Chateau/Project 3), and the forecast includes the removal and banking of some existing units. Bonus TAUs were assigned to permitted projects (Homewood, Boulder Bay, Tahoe City Lodge) and no additional allocations other than existing permits were included.

The forecast also includes the conversion of 130 TAUs to residential units, consistent with recent conversion trends since the adoption of the conversion programs; observed trends indicate the net conversion from CFA and TAUs and towards Residential.

#### *Development Rights Forecast Summary*

Total development in the Tahoe Region is capped by the Regional Plan. The type and rate of that development is further controlled by a complex system governing development rights in

the Region. Development rights are land use units someone must acquire before a property is developed. Development rights include tourist accommodation units (TAUs), single and multi-family residential units of use (RUUs), and commercial floor area (CFA).

Residential units of use (RUUs) are formed by combining a potential residential unit of use (PRU) and a residential allocation. The forecast differentiates between when a development right is allocated from TRPA or another jurisdiction's pool and the final use of that development right. Development rights can be utilized in one of two ways; they can be used to construct a project (e.g. a house) or converted to a different type of development right. The forecast is grounded in projections about the utilization, transfer, conversion, and construction of development rights. Tables 2-4 summarize the fate of development rights in the forecast period.

- Table 2 summarizes new construction which influences land use in the future scenarios. Tables 3 and 4 provide background detail on the underlying accounting that enabled the development.
- Table 3 summarizes the expected utilization of development rights in their current type.
- Table 4 summarizes the expected conversion of development rights between types.

The forecast includes the annual construction of 172 residential units, 7,650 square feet of commercial floor area and 35 tourist accommodation units (Table 2).

**Table 2: Construction Forecast Summary**

<i>Development Right Construction</i>	<b>Annual Construction Rate</b>	<b>2035 Net Change</b>	<b>2045 Net Change</b>
<i>Residential Units</i>			
<b>Total Development of Residential Units</b>	<b>+172</b>	<b>+2,924</b>	<b>+4,597</b>
<i>Commercial Floor Area (in Square Feet)</i>			
<b>Total Utilization of CFA</b>	<b>+7,650</b>	<b>+130,067</b>	<b>+206,550</b>
<i>Tourist Accommodation Units</i>			
<b>Total Development of TAUs</b>	<b>+35</b>	<b>+629</b>	<b>+945</b>

The forecast includes the utilization of allocation pools held by TRPA and local jurisdictions in the area plan, community plan, or plan area

statement pools, as well as the use of bonus and incentive pools, special projects pools, and banked development rights (Table 3).

**Table 3: Development Rights Utilization Forecast Summary**

<i>Development Right Utilization</i>	<b>Annual Utilization Rate</b>	<b>2035 Net Change</b>	<b>2045 Net Change</b>
<i>Residential Units</i>			
<i>Residential Allocations</i>	+83	+1,411	+2,234
<i>Residential Bonus Units</i>	+60	+1,020	+1,609
<i>Banked Residential Development</i>	+8	+136	+204
<b>Total Development of Residential Units</b>	<b>+151</b>	<b>+2,567</b>	<b>+4,047</b>

<b>Commercial Floor Area (in Square Feet)</b>			
<i>Commercial Floor Area Allocations</i>	+6,413	+109,021	+173,142
<i>Commercial Floor Area Allocations (TRPA special projects pool)</i>	+2,963	+50,371	+80,000
<i>Banked Commercial Development</i>	+1,979	+33,643	+53,408
<b>Total Utilization of CFA</b>	<b>+11,355</b>	<b>+130,067</b>	<b>+306,550</b>
<b>Tourist Accommodation Units</b>			
<i>TAU Allocations</i>	+5	+85	+130
<i>TAU Bonus Allocations</i>	+6	+102	+138
<i>Banked TAU Development</i>	+31	+527	+807
<b>Total Development of TAUs</b>	<b>+42</b>	<b>+714</b>	<b>+1075</b>

The forecast includes the conversion of development rights between the various types of development (Table 4). TRPA approved a comprehensive update to Tahoe’s development rights system in 2018. This allows conversions between different types of development rights using environmentally neutral exchange rates and makes development rights simpler to transfer around the Basin, keeping limits on Tahoe’s total development potential. The changes make it easier for the private sector to

invest in redevelopment projects that benefit Tahoe’s environment and communities and provide needed workforce housing. The projected conversions are consistent with conversion trends since the adoption of the conversion programs and observed development rights utilization rates. The observed trends indicate a net conversion that reduces CFA by 3,700 square feet and 5 TAUs and creates an additional 21 residential units each year.

**Table 4: Development Rights Conversion Summary**

<b>Development Right Conversion</b>	<b>Annual Change as a Result of Conversion</b>	<b>2035 Net Change</b>	<b>2045 Net Change</b>
-------------------------------------	--	------------------------	------------------------

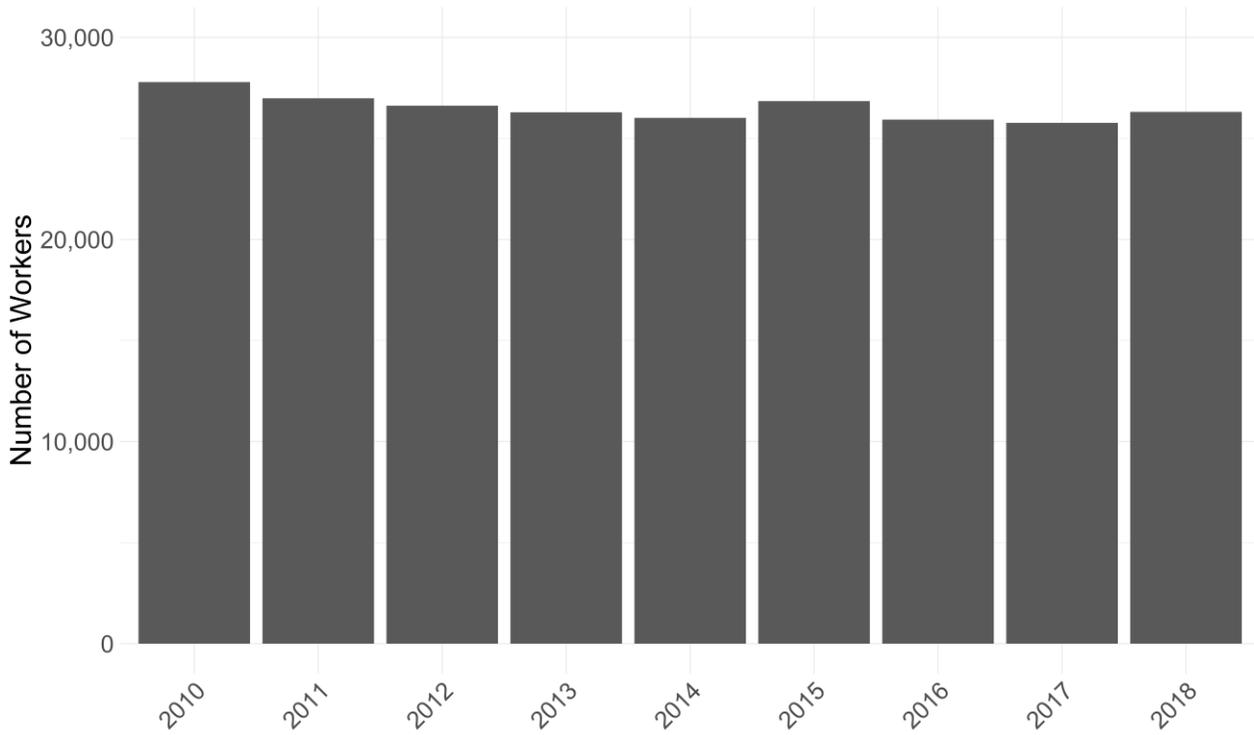
	<b>Residential Units</b>		
<i>Net Development Right Conversions to Residential</i>	+21	+357	+550
	<b>Commercial Floor Area (in Square Feet)</b>		
<i>Net Development Right Conversions from CFA to RUU</i>	-3,704	-62,968	-100,000
	<b>Tourist Accommodation Units</b>		
<i>Net Development Right Conversions from TAUs to RUU</i>	-5	-85	-130

*Employment*

The most recent region-wide data estimates that summer-time work opportunities in the Tahoe Region increased by 5% between 2014 and 2018, from 26,637 to 28,053 jobs. While employment increased, the number of workers estimated to

be living in the Region decreased by 6%, from 27,785 in 2010 to 26,314 in 2018 (ACS, 2018). This indicates that an increasing number of workers may be commuting into the Region for employment.

• **Figure 2: Number of Workers (2010-2018)**



Source: American Community Survey (ACS)

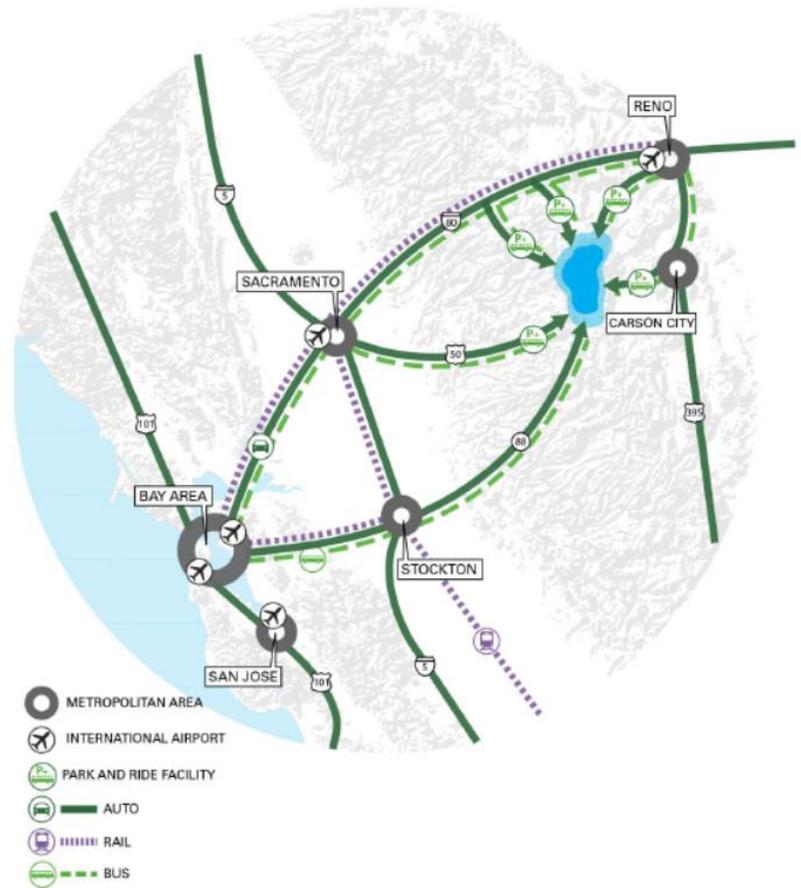
The forecast projects a small increase in employment in the Region as a result of increased visitation, construction of new CFA and TAUs, and population growth. In the 2018 model base year there are an estimated 28,604 workers in the Tahoe Region (some residents hold jobs outside the Region). The forecast projects continued growth of jobs in the Region, with 572

(+2%) and 858 (+3%) new jobs in the Region by 2035 and 2045, respectively. The number of external workers (those commuting into the Region for work) is not expected to grow because more workers are expected to find housing locally as a result of the regional housing initiatives.

*Visitation*

**Figure 3: Tahoe Mega-Region**

The forecast includes an increase in visitation which is influenced by several factors. The Tahoe Region is located near and draws visitors from several regions that are projected to experience between 20% and 40% growth in the coming decades (Figure 3, Table 5). The Sacramento Council of Governments (SACOG), predicts that population in the greater Sacramento region<sup>16</sup> will grow 26% by 2045. SACOG models traffic volumes on Interstate-80 and US Highway-50 leading into the Tahoe Region, and forecasts between 18% and 22% increases in volume in the next two decades (SACOG 2019). Farther west, but still within the Tahoe Mega-Region, the Association of Bay Area Governments (ABAG)<sup>17</sup> forecasts 27% population increase by 2040 (MTC & ABAG 2017). To the north and east of Tahoe, RTC-Washoe predicts a 27% growth in population in the Reno/Sparks Metropolitan area<sup>18</sup> by 2040 and the Carson Area MPO<sup>19</sup> predicts a 28% growth in population (CAMPO 2016; RTC-Washoe 2018).



Population growth in the mega-region is likely to create increased demand for the recreation opportunities and the unique experience that Tahoe provides.

**Table 5: Mega-Region Growth Forecasts**

Location	Metric	Growth	Forecast Year	Source
----------	--------	--------	---------------	--------

<sup>16</sup> The Sacramento Area Council of Governments (SACOG) includes the counties of El Dorado, Placer, Sacramento, Sutter, Yolo, Yuba and the 22 cities within this six-county region.

<sup>17</sup> The Association of Bay Area Governments (ABAG) region encompasses Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma counties

<sup>18</sup> Regional Transportation Commission (RTC) of Washoe County, Nevada serves the Reno and Sparks areas along with unincorporated areas of Washoe County.

<sup>19</sup> The Carson Area Metropolitan Planning Organization (CAMPO) covers the Carson City urbanized area, which consists of Carson City, northern Douglas County, and western Lyon County.

<i>Sacramento Region</i>	Population	+26%	2045	SACOG 2020 MTP/SCS
<i>Sacramento Region</i>	Employment	+25%	2045	SACOG 2020 MTP/SCS
<i>Interstate-80</i>	Traffic Volumes	+22%	2040	SACOG 2020 MTP/SCS
<i>US Highway-50</i>	Traffic Volumes	+18%	2040	SACOG 2020 MTP/SCS
<i>Reno/Sparks Metro</i>	Population	+27%	2040	RTC-Washoe 2040 RTP, 2018
<i>Reno/Sparks Metro</i>	Employment	+37%	2040	RTC-Washoe 2040 RTP, 2018
<i>Carson City Region</i>	Population	+28%	2040	CAMPO 2040 RTP, 2018
<i>San Francisco Region</i>	Population	+27%	2040	ABAG 2040 RTP, 2017

**Table 6: Sacramento and Reno Population Growth**

<i>Location</i>	<i>Metric</i>	<i>Growth</i>	<i>Between</i>	<i>Source</i>
<i>Sacramento Region</i>	Population	+32% (+1.4% per year)	2000-2020	SACOG

<i>Reno–Sparks Metro</i>	Population	+36% (1.7% per year)	2000-2018	Nevada Regional Economic Analysis Project
------------------------------	------------	----------------------	-----------	---

Population growth outside the Region over the last 20 years has not translated to a linear increase in visitation to the Region. Over the past 20 years (Table 6), the population in the SACOG region surrounding Sacramento has increased by 32% overall, or 1.4% per year compounded. The population of the Reno-Sparks Metropolitan region increased by 36%, or 1.7% per year compounded. Therefore, the forecast does not project increases in visitation in proportion to the projected growth in the mega-region. The mega-region is forecast to add another two million people over the next 20 years. The primary challenge in forecasting future visitation is in establishing the relationship between future population growth in the mega-region and visitation to the Tahoe Region. Looking at how historic growth in the mega-region has influenced travel into the Region through, we find that since 1990, the mega-region populations on the California side have grown by 32%, while AADT at the California entry stations has grown by 15%. Put another way, the populations of San Francisco, Sacramento, and San Jose have grown by over two million people, which translated into 5,500 more trips through the entry or exits on the California side. The mega-region is forecast to add another two million people over the next 20 years. The challenge is further complicated by the impact of macro-economic conditions that affect visitation.

Despite the population growth outside the Region, the number of rooms rented in the Region is lower today than it was at the turn of

the century. The recent observed trends in overnight lodging occupancy show generally flat or increasing occupancy in recent years, depending on location. Between 2013 and 2018, the number of hotel/motel rooms rented in the city of South Lake Tahoe increased by 37%. On the other hand, Douglas county casino occupancy (South Shore) has declined over the last two decades (Douglas County Room Tax Reports, 18-19); total rooms sold in the 2018-2019 fiscal year was 80% of the number sold in 2001-2002. The majority of the decline in Casino occupancy occurred between 2000-2010, and more recently occupancy has been relatively stable. Occupancy in Washoe county has varied between years over the last 20 years but overall is generally flat.

It is uncertain why past population growth has not translated in a linear fashion to increased visitation, but working theories include the decline in popularity of the local casinos as the gaming experience has become more widely available, limited tourist accommodation capacity, the limited roadway capacity into the Region and associated willingness to travel to the Region given the longer travel times.

The visitation forecast is comprised of related but independent projections regarding the expected characteristics of both the number and occupancy of overnight lodging accommodations types, and day visitation. The visitation forecast can be broken down into overnight visitors (staying in Hotels/Motels/Casinos/STRs/Private

homes) and day visitors. The number of occupied overnight visitor units is forecast to grow by 9% by 2045.

*Overnight Visitors in Hotels/Motels/Casinos* – In the 2018 model base year, 6,190 of the Region’s 11,107 TAUs are occupied (56%) during the modeled day. The forecast includes the construction of an additional 945 TAUs by 2045, an 8.5% increase in tourist accommodation units. Forecasted occupancy of TAUs was increased slightly to account for the impact of Measure T in the City of South Lake Tahoe, which is expected to affect where visitors to the city can stay but not the overall demand (MBI 2017). The forecast estimates that 50% of the visitor parties that may have previously stayed overnight in STRs within the City of South Lake Tahoe would now stay in TAUs, because of the expected lower supply of STRs in the City. As a result, the regional overnight lodging occupancy rate (in TAUs) increases from 56% to 59% in the forecast years. As a result of both additional unit availability from new TAU construction and the higher occupancy rate, the actual number of occupied Hotel/Motel/Casino units increases by 14.5% in 2045.

*Overnight Visitors in STRs* – In 2018, TRPA estimated that there were 6,005 permitted STRs in the Tahoe Region, which comprised approximately 13% of all existing residential units and 23% of the vacant housing units. On the model day, 37% of the units (2,227) are occupied. The forecast projects that both the total number and occupancy of STRs is relatively flat in the forecast years. This projection is highly influenced by the City of South Lake Tahoe’s Measure T, which eliminates STRs within most of the City’s jurisdiction. Measure T will reduce the number of available STRs in the City of South Lake Tahoe but is unlikely to reduce the overall regional demand for the home-based stay

experience in Tahoe. As a result, the forecast includes the displacement of STRs from the city to other jurisdictions in the Region. The result will be more STRs (in absolute and proportional terms) in other jurisdictions in the Region and in areas of the City where STRs are still allowed. As a result of Measure T, approximately 1,372 STRs within the City of South Lake Tahoe but located outside of the Tourist Core area will not have their licenses renewed. During the model analysis period (model day), 508 of those 1,372 STRs were occupied. The forecast assumes that all 508 visitor parties will still visit the Region and find overnight accommodations elsewhere. Of the visitor parties that would have been staying at one of the STRs impacted by Measure T, half are forecasted to find accommodations in STRs in the Tourist Core areas within the City of South Lake Tahoe, where STRs remain allowed, or in STRs in other jurisdictions, and half of visitor parties are forecast to shift to accommodations in the casinos, hotels, motels, and resorts in the Region.

*Overnight Visitors in Seasonal Units* – Seasonal units are residences within the model that are not claimed as the primary residence for the owner. Within the model they could be occupied by the owner, friends of the owner, time-shares, informally rented, but are not accounted for included in the total of STRs. These units comprise approximately 36% of the total housing market in the Region, of which 37% were estimated to be occupied on modeled day in the 2018 base year. The forecast maintains these percentages into the forecast years. The proportion of seasonal units in the Region has grown in the last 10 years. The proportion of seasonal units is not forecast to continue to increase in the forecast, due to three factors: 1) the construction of additional workforce housing units which cannot be used for second homes, and 2) initiatives focused on making the existing

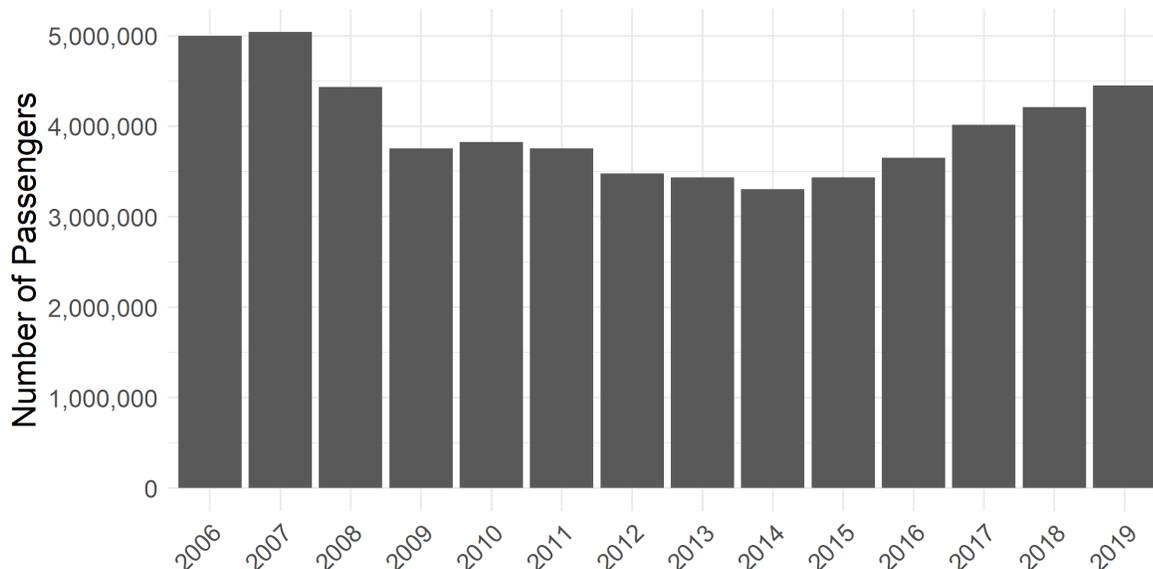
stocking more affordable for workers and residents, and 3) the conversion of some existing vacation rentals in the City of South Lake Tahoe to resident housing because of the Measure T requirements. The forecast projects the occupancy rate of second units will remain the same, maintaining the 37% occupancy of the base year in 2035 and 2045. As a result of the increase in the total number of homes in the Region the number of seasonal units increases by 8% in 2045.

*Day Visitors* – Day visitation is forecast to increase as a result of population growth in the mega-region, at a similar rate as overnight visitation. Day visitors are one of the more challenging travel parties to forecast. The model assumes the factors that drive overnight

visitation are positively correlated with factors driving day visitation. The relationship between these two types of visitors was established as part of the calibration and validation for the 2018 base year and is not expected to change in the forecast years.

*Passenger Traffic at Reno Tahoe International Airport* - TRPA staff also analyzed the total passenger data from the Reno Tahoe International Airport (Figure 4), which shows that passenger traffic has increased in each of the past 5 years, but remains below the passenger volumes in the mid-2000s. Between 2014 and 2019, annual growth in passengers ranged from +4% to +10%, with the average annual growth from 2014 to 2019 of +6%.

**Figure 4: Reno-Tahoe International Airport: Total Passengers 2006-2019**



Source: The Reno-Tahoe Airport Authority, Reno-Tahoe International Airport: Passengers and Cargo Statistics Reports 2008 through 2019, Retrieved May 25, 2020 from <https://www.renoairport.com/airport-authority/facts-figures/statistics>.

*Sensitivity of Visitation Forecasts*

In meetings with the TRPA Governing Board, Tahoe Model Working Group and other

stakeholders, TRPA staff were asked to test and report on the sensitivity and impact of higher or lower than expected changes in visitation and different scenarios that might change the

forecast assumptions. In response, staff assessed the sensitivity of VMT forecasts to a range of visitation assumptions. performed additional validation and testing for changes in visitation and the resultant effect on VMT.

All visitors in the base year model (including day, overnight, second homeowners, and thru-travelers) average 7.9 in-region VMT a day. So, for every 100 additional (or fewer) visitors, Regional VMT would change by 790 VMT. At a high level, Visitors make up 47.3% of the VMT in the model, so if total visitation increased by 10%, regional VMT would increase by approximately 4.7% increase in regional VMT.

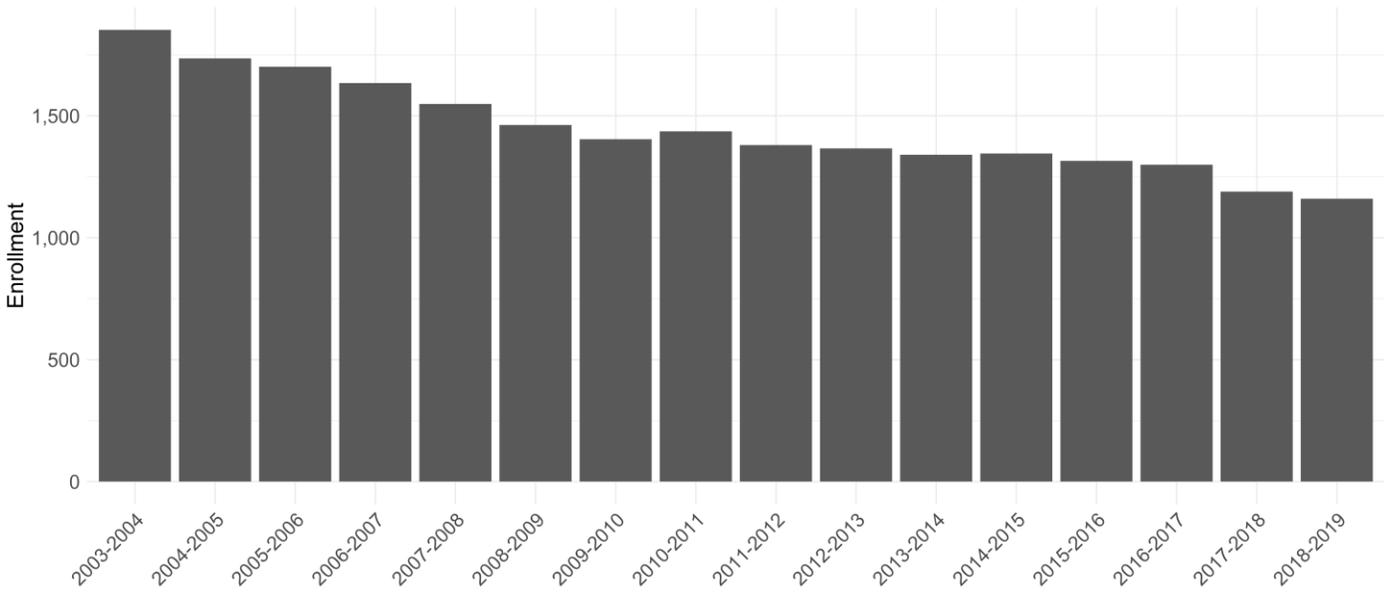
If each of these visitor types were adjusted independently, the results would be as follows:

- A 10% increase in the number of day visitors would result in a 1.8% increase in regional VMT
- A 10% increase in overnight visitors would result in a 1.8% increase in regional VMT
- A 10% increase in second homeowners would result in a 0.9% increase in regional VMT

#### *School Enrollment*

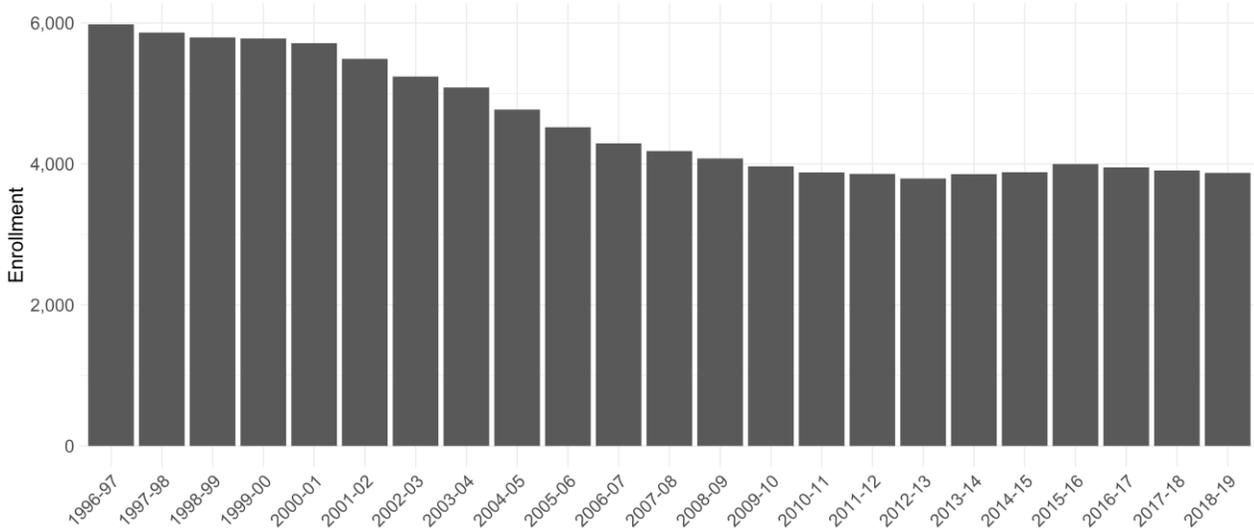
Like the overall population, school enrollment in the Region has decreased in the last two decades, but in most recent years has been relatively steady. Between 1996 and 2018, enrollment in the Lake Tahoe Unified School district in South Lake Tahoe, California decreased by 35%, while enrollment on the Nevada side decreased by 37%, from 1,852 in 2003 to 1,160 in 2019. The forecast projects that school enrollment will increase by 12.4% as new employment (858 additional jobs) and residents (6,417 additional full-time residents) are added to the Region.

**Figure 5: Tahoe - Nevada School Enrollment (2003-2019)**



Source: <http://nevadareportcard.nv.gov/di/main/demoprof>

**Figure 6: Lake Tahoe Unified School District Enrollment (1996-2018)**

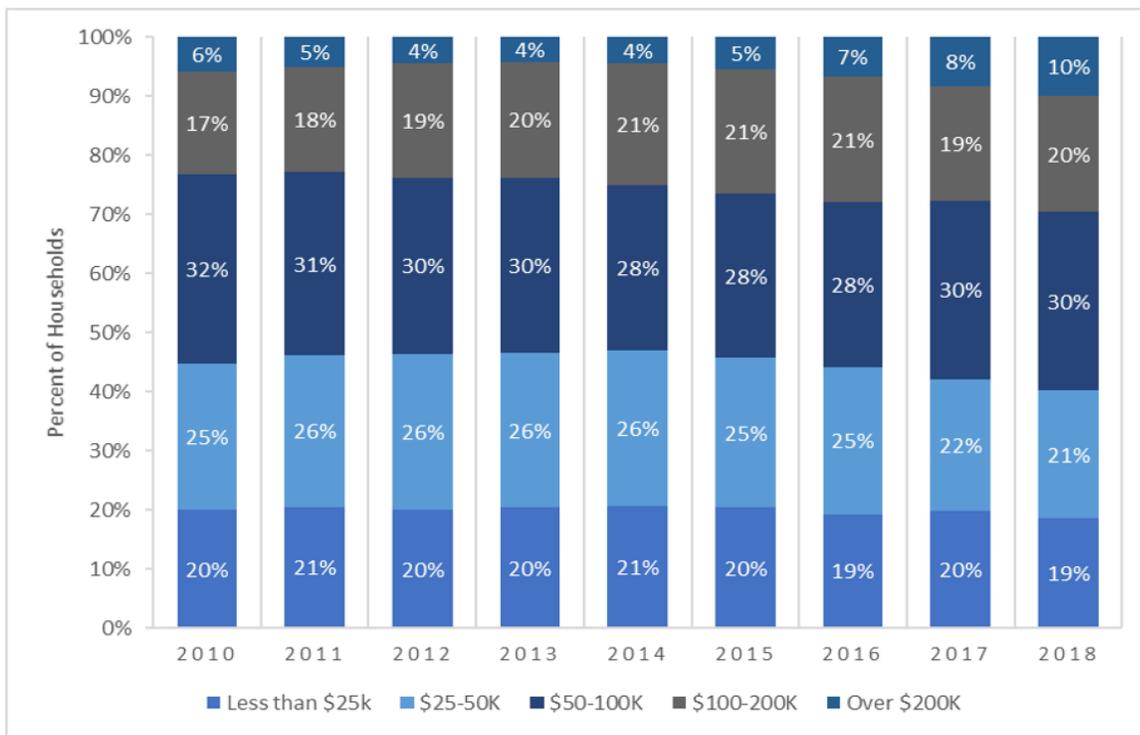


Source: dq.cde.ca.gov

### Household Income

Household income is a key characteristic of the residential population, which influences travel behavior. Census data over the last nine years

show that household income in the Region is trending upwards towards higher incomes (ACS 2010-2018). Annual median income for



Source: American Community Survey (ACS)

households nationally rose to \$61,937 in 2018, within California it is \$75,277, and in Nevada it is \$58,646 (Guzman 2019). Median income in the Tahoe Region has grown over the last five years as the Region emerged from the Recession and is now close the national average. However, the proportion of households earning less than \$25,000/year annually has remained at relatively stable, at about 20% of households. Between 2010 and 2018 the number of households earning over \$200,000/year grew by 67% and those earning between \$100,000 and \$200,000 increased by 11%. Despite these gains,

households earning less than \$100,000/year outnumber households earning more than \$100,000/year by two to one. Some have suggested the decline in lower-income households has been driven by workers leaving the Region in search of more affordable housing. The forecast projects that the relative distribution of household incomes will be maintained at the current level. Initiatives to provide workforce and affordable housing are expected to increase the regional housing availability at the lower end of income distribution.

**Figure 7: Household Income Categories (% of Households 2010-2018)**

## Addendum

### COVID-19

The research and majority of the forecasts for the 2020 Regional Transportation Plan were developed prior to the impact of COVID-19 on our community and the world. The immediate impact of COVID-19 on our community has been severe. Both states issued stay-at-home orders and the casinos, ski resorts and many other businesses closed in March 2020, furloughing or laying off thousands of employees. The Lakeside Inn and Casino announced that it would not reopen. The hotels, motels, restaurants, bars, and many of the recreation areas, beaches and parks that are the lifeblood of our tourism-based economy were closed for weeks. The impacts on transportation were apparent in the traffic volumes around the Region. In early May, VMT in the counties that make up the Tahoe Region was estimated to be down 30-50% from levels observed in the same period in prior years.

The long-term impacts of COVID-19 on the Region are uncertain. Some believe that the job losses, business closures, and economic hardship will continue. Others think that urban flight will result in a mass movement from cities to rural areas, as remote work continues and people seek to escape crowded cities for open spaces, resulting in massive population shifts and increased housing needs in the Region.

Given this uncertainty, staff recommends maintaining the above assumptions for the forecast scenarios even considering the COVID - 19 pandemic and associated economic downturn. The Harvard Business Review (HBR) recommends that in “moments of unprecedented uncertainty”, one must “know when not to make a forecast” (Saffo, 2007). HBR suggests that “even in periods of dramatic, rapid transformation, there are vastly more elements that do not change than new things that emerge” (Saffo,2007).

## *Transportation Projects & Strategies Forecast Summary*

### *Transportation Projects & Strategies*

The second element of the RTP/SCS forecast was the transportation forecast. The transportation projects and strategies were forecasted using both the Tahoe travel demand model and the Trip Reduction Analysis Tool (TRIA). All fixed-route transit projects were directly incorporated into the travel demand model; the route locations, fares, and headways were directly forecasted within the model network. In terms of roadway capacity, the plan does not include many changes. As a result, the Highway 50 Revitalization project was the only roadway project directly represented in the travel demand model. The rest of projects and strategies were incorporated in the forecast using TRIA; these include microtransit, bike/ped projects, ITS, TDM, parking, and others.

### *TRIA 2.0*

The Tahoe Regional Planning Agency developed and maintains a Trip Reduction Impact Analysis (TRIA) spreadsheet tool to evaluate the trip and VMT reduction impacts of various transportation policies and programs under consideration as part of the Sustainable Communities Strategy (SCS) effort. The TRIA spreadsheet tool captures the strategies that can have a significant effect on travel demand such as parking policies, traveler information systems, new transit operations, or construction of new bike trails and sidewalks but which cannot be accurately captured in the TRPA travel demand model. The purpose of the TRIA is to provide planning-level, order-of-magnitude, comparative estimates of the quantitative vehicle trip reductions in the travel demand modeling process to inform expected total trips, vehicle miles traveled (VMT), and greenhouse gas (GHG) emissions based on the combined impact of the capital

improvement projects, operational enhancements, policies, and programs considered in the TRPA 2045 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS).

As noted above, the TRIA 2.0 tool provides a way to make comparisons between different policy alternatives and their ultimate effect on vehicle trips, VMT, and GHG emissions. The tool is integrated as a step in the travel demand modeling process in order to allow TRPA to understand the impact of policies, programs, and other investments tailored to the Tahoe area that will help the Region meet the GHG emissions reduction targets set by the California Air Resources Board under California's Senate Bill 375, the VMT reduction targets under California's Senate Bill 743, and trip reduction goals.

As much as possible, the TRIA 2.0 used estimates based on current conditions in the Tahoe Basin, or existing trip reduction estimates developed locally, particularly in the case of new transit services and new active transportation facilities such as bike trails and sidewalks. For policies or projects for which there are no local studies, the trip reduction impacts were estimated based on a review of the current (2020) literature and studies of locations where similar policies, programs, or investments have been implemented. Where research shows that a policy might vary in effectiveness a more conservative approach will be chosen, so as not to overstate the trip and VMT reduction potential.

The TRIA 2.0 is built around the main modes of transportation and analysis of how the land use plan and transportation strategies and policies proposed in the RTP will impact these modes.

The main categories previously considered in the model are:

- Active transportation (bicycling and walking)
- Public transit service
- Intelligent Transportation System (ITS) technologies
- Transportation demand management (TDM) measures
- Parking policy changes

As well as updating the existing categories in TRIA, the update also includes the addition of the following categories:

- Shared Micromobility services (i.e., E-scooters)
- Microtransit Services

The model is structured in such a way as to estimate the potential growth for each mode, where relevant (e.g. the potential for new transit riders who were previously vehicle riders), and estimate a vehicle trip reduction as a result of the strategy. See Table for an overview of the strategies analyzed and their individual estimated trip reduction potential in the 2035 and 2045 RTP/SCS scenarios.

#### Analysis by Mode

The approach taken in TRIA 2.0 for the strategies considered are summarized below. The table that follows lays out the full details on trip reduction by strategy, sources used and overall reduction.

#### Active Transportation

The following describes the three active transportation-related trip reduction strategies.

#### Bike and Pedestrian Facilities

The vehicle trip reductions for bicycle and pedestrian trips were developed using the bicycle and pedestrian monitoring data collected by TRPA for the past three years (the data used for this analysis and ongoing monitoring data is available at

<http://www.trpa.org/transportation/monitoring/>).

The monitoring data was used to develop an understanding of how walking and biking trips vary by different facility types (e.g., sidewalk, bike lanes, and shared-use paths) in different contexts (e.g., town centers, recreation corridors, campgrounds, etc.) to establish a relative classification of usage. New bicycle and pedestrian improvements were then classified into one of the facility and context types to estimate the number of walking and biking trips expected based on the new facility. These usage estimates are then used to estimate a vehicle trip reduction associated with the new walking and biking facilities. The TRIA assumes that the implementation of the bicycle and pedestrian network will happen at a uniform rate across the timeframe of the plan, therefore by 2035 only a portion of the network will have been completed, and therefore the VMT reduction is not as great in 2035 (1.12%) as in 2045, at 1.19%. This trip reduction is applied to all trips in the Region.

#### Electric Bicycles

The prevalence of electric bicycles, or “e-bikes”, was introduced in the 2020 TRIA update to calculate trip reductions associated with programs and policies to encourage the safe use of e-bikes. E-bikes are gaining prevalence in many locations around the world through individual ownership, rental programs, and bikeshare services. A literature review was conducted to determine how e-bikes affect travel behavior and patterns. The primary finding

of the literature was people are willing to travel nearly twice as far using an e-bike than a regular bicycle. To account for this impact, the TRIA tool estimates increases in the bicycle mode share based on the potential for longer bike trips using e-bikes. The reduction in vehicle trips based on the adoption of e-bikes (0.79%) was applied to all trips in the Tahoe Basin based on an expected bicycle mode share by trip length for both the 2035 and 2045 scenario.

#### Shared Micromobility

Trip reductions associated with shared micromobility services were included in the TRIA 2.0 update. Shared micromobility services include shared e-scooters and e-bikes, that are accessed and paid for via applications and allow trips within a defined service area. Overall trips reduction factors associated with shared mobility services were calculated using 2018 and 2019 trip data and survey data from South Lake Tahoe’s implementation of the Lime e-scooter program which showed that 48% of e-scooter trips replaced an automobile trip. The trip reduction is calculated using trips in the areas expected to provide shared micromobility service in the future: Tahoe City, Kings Beach, and South Lake Tahoe areas. The regional trip reduction percentage (0.53%) is calculated by dividing the total trips reduced in micromobility areas by regional trips. The resulting trip

#### Year 2035:

- TTD 20 and 19x (long)- Stateline TC to Carson (interlined)
- TTD 21x - Stateline TC to Carson via Spooner
- TART 89 (long) - Tahoe City TC to Truckee Depot
- TART 267 (long) - Stateline to Truckee Depot

reduction factor was corroborated through review of e-scooter trip research from Portland and Chicago and is applied to all trips in the Region.

#### Transit Services and Facilities

The following four strategies describe the trip reductions calculated in TRIA associated with new or improved transit services not captured by the TRPA travel demand model.

#### Transit Service and Capital Projects

The transit portion of the trip and VMT reductions are based on ridership projections for new or improved transit routes included in the RTP’s constrained project list for 2035 and 2045. The model currently accounts for transit ridership for all transit trips internal to the TRPA’s travel demand model network (e.g., the Tahoe Basin). Therefore, the transit portion of the trip reductions in TRIA is only based on trips that either originate or end external to the Tahoe Basin. Additionally, trip reductions associated with circulator, ferry taxi, and other non-route-based services that cannot be represented in the travel demand model are also estimated in the TRIA 2.0 transit service calculations. The name and description of the new or improved transit routes included in the trip reduction calculations are listed below:

- Event Center Circulator - Tourist Core to Round Hill
- South Shore Ferry Taxi - Round Hill Pines to Camp Richardson
- STS - STS Medical Transportation

#### Year 2045:

- TTD 20 and 19x (long) - Stateline TC to Carson (interlined)

- TTD 21x - Stateline TC to Carson via Spooner
- TART 89 (peak) - Tahoe City TC to Truckee Depot
- TART 89 (off-peak) - Tahoe City TC to Truckee Depot
- TART 267 - Stateline to Truckee Depot
- TART 3 - Incline Village to Reno
- Trans Sierra 1 - Meyers to Stockton
- Trans Sierra 2 - Meyers to Sacramento
- Event Center Circulator - Tourist Core to Round Hill
- South Shore Ferry Taxi - Round Hill Pines to Camp Richardson
- North Shore Ferry Taxi - Sand Harbor to Tahoma
- STS - STS Medical Transportation

Trip reduction calculations associated with these additional transit services results in trip reductions of 0.51% and 1.61% in 2035 and 2045, respectively. This trip reduction is applied to regional trips (including external trips).

#### Intercept Lots

Additionally, a strategy implementing intercept parking lots to allow visitors or residents to park in designated lots and transfer to transit services was also evaluated in the updated TRIA calculations. The strategy targets reducing visitor vehicle trips into the Tahoe Basin and the impact was estimated based on a study by the Alameda County Transportation Commission estimating

drive-to-transit mode shares. The estimated impact of the intercept lots was adjusted down from 8% to 4% to conservatively estimate the number of visitors that would be willing to use the intercept lots. Based on the percentage of external traffic generated by visitors (70%), the calculated trip reduction for was 2.8%. This trip reduction factor is only applied to external trips entering or leaving the Region.

#### Microtransit Service Areas

Trip reductions associated with microtransit services were also included as a new strategy in the TRIA update. Microtransit services are on-demand transit services that typically provide flexible routes within a defined service area using lower-capacity transit vehicles.

Microtransit services can be funded by public agencies, private agencies, or through public-private partnerships. Overall trip reduction factors associated with microtransit were calculated using 2019 and 2020 trip data from the Squaw Valley and Alpine Meadows' Mountaineer microtransit service. User survey data from Aspen's Downtowner microtransit service was used to calculate the percentage of microtransit trips that replace vehicle trips.

Vehicle trip reductions associated with microtransit service areas are calculated based on the total number of trips in areas where microtransit services are planned as part of the RTP/SCS: Tahoe City, Kings Beach, and South Lake Tahoe. The reduced vehicle trips are then used to calculate regional trip reduction factors of 0.28% and 0.45% in 2035 and 2045, respectively. The trip reduction factor is then applied to all trips in the Region.

#### Intelligent Transportation System (ITS) Technologies

Several strategies to increase the functionality and usability of transit based on ITS technology

improvements were included in the TRIA 2.0. These included:

- Improved transit coordination between local and regional providers, through simplified trip planning (e.g. Google Transit). This strategy is associated with trip reduction percentages of 0.68% and 0.66% of trips to or from Town Centers in 2035 and 2045, respectively. For external trips, this strategy is associated with trips reductions of 0.43% and 0.42% in 2035 and 2045, respectively.
- Improved transit coordination between local and regional providers, through the elimination or shortened wait time of transfers, as well as improvements to ticketing structure and agency cooperation to eliminate "transfer anxiety". This strategy is associate with trip reduction percentages of 0.08% and 0.10% of trips to or from Town Centers in 2035 and 2045, respectively.
- Real-time arrival information at transit stops, online, and/or via web-enabled mobile devices. The trip reduction factor for this strategy is 0.04% and is applied to trips to or from Town Centers.
- Dynamic ridesharing for inter-regional trips. This strategy introduces services and/or subsidies to encourage commuters to rideshare. Examples include through carpool matching services and vanpools. The TRIA tool calculates the expected reduction in trips with the introduction of these services as 1.00% and is this reduction is applied to internal-external and external-internal trips only.

Transportation Demand Management (TDM) Measures

The TRIA 2.0 TDM calculations were updated with current employer data. The businesses are categorized by size with 19 small (less than 100 employees), three medium (between 100 and 200 employees) and four large employers (more than 200 employees) included in the data set. TRIA 2.0 compares the effect of improving the participation rate of the existing Employer Trip Reduction ordinance through improved enforcement and/or updating policies and programs. Target participation rates for small, medium, and large employers were established and compared to an assumed 50% existing participation rate. The change in participation is then used to calculate reduced trips based on expected TDM policies impacts based on the current literature and average local employer size data. The TDM measures trip reduction is calculated for new development (1.86%) and existing development (0.82%). New development is estimated to be 3% of all new trips in the Region and is used to weight the potential trip reduction of TDM measures. The TDM measures trip reductions are only applied to trips going to or from a Town Center.

#### Parking Management

TRIA 2.0 evaluates the expected reduction in vehicle trips associated with parking pricing and parking management strategies in select parking management zones in the Tahoe Basin. This includes demand-responsive pricing in commercial areas with residential permits to prevent parking spillover into residential areas, changes to parking standards, shared parking arrangements, etc. This trip reduction percentage is calculated relative to regionwide trips based on the trips reduced in areas implementing parking strategies. The trip reduction calculation methodology was updated to simplify the overall calculation method and account for a wider range of parking strategies in

an inclusive calculation based on an updated literature review on the latest research into parking impacts on vehicle trip reductions. A parking management trip reduction percentage from the current literature (2.7%) was halved to 1.35% to reflect the lower potential impact of parking management policies based on the high recreational travel demand for the Region. This trip reduction was applied to trips in areas across the Region that were expected to implement parking management strategies to calculate the total number of vehicle trips reduced. These trip reductions were then recalculated as a trip reduction factor that is applied to all regional trips (1.2%).

#### *Trip Reductions Summary*

Table presents a summary of the trip reductions by individual strategy described above. The summary table provides a brief description of the vehicle trip reduction strategy, the primary source of reduced vehicle trips, the type of vehicle trips impacted, employer type, and the individual 2035 and 2045 percent reductions.

Trip reductions are classified into one of three vehicle trip type groupings:

- **Regional Trips:** This grouping applies the vehicle trip reduction to all trips in the Region.
- **Town Center Trips:** This grouping only applies the vehicle trip reduction to trips that are going to or from a designated Town Center.
- **External Trips:** This grouping only applies the vehicle trip reduction to trips that are entering or exiting the Region.

For the TDM strategy, reductions are calculated for new and existing employers. Given some employers are already participating in employer trip reduction programs, the impact on existing

employers is lower than for new employers. This is the only strategy for which the employer type is considered.

**Table 7: Trip Reduction Impact Analysis (TRIA) Estimates – 2045 RTP/SCS**

<i>Vehicle Trip Reduction Strategy</i>	<i>Primary Source of Reduced Vehicle Trips</i>	<i>Vehicle Trip Types Impacted</i>	<i>Employer Type</i>	<i>2035 Percent Reductions in Vehicle Trips</i>	<i>2045 Percent Reductions in Vehicle Trips</i>
<b>Active Transportation</b>					
<i>Complete regional network of bike and pedestrian facilities (includes expanded bike parking)</i>	Increased bike and pedestrian mode share for trips in the corridor/district served by the project, partially drawn from former vehicle trips of 3 miles or less.	Regional Trips	--	1.12%	1.19%
<i>Shared micromobility service areas</i>	Reduced vehicle trips due to use of shared micromobility devices (e.g., e-scooters or shared e-bikes)	Regional Trips	--	0.53%	0.53%
<i>Promotion of electric bicycle use</i>	Reduced vehicle trips due to the widespread use of electric bicycles	Regional Trips	--	0.79%	0.79%
<b>Public Transit Service</b>					
<i>Intra-regional transit capital projects within the Tahoe Basin; currently this only includes south shore water taxi service)</i>	Increased transit mode share, partially drawn from former vehicle trips.	Regional Trips	--	0.51%	1.64%
<i>Inter-regional transit service that extends outside the Tahoe Basin.</i>	Reduced commuter and recreational trips.	External Trips	--	0.51%	1.64%
<i>Intercept lots at entrances to the Tahoe Basin providing frequent shuttle service into the Region.</i>	Reduced visitor trips.	External Trips	--	2.80%	2.80%
<i>Microtransit service areas</i>	Reduced trips for all types served by Microtransit service areas.	Regional Trips	--	0.28%	0.45%
<b>ITS Technologies</b>					
<i>Improved transit coordination between local and regional providers, through simplified trip planning (for example Google Transit).</i>	Increased transit mode share for trips in the corridor/district served by the project, partially drawn from former vehicle trips.	Town Center Trips	--	0.68%	0.68%
<i>Improved transit coordination between local and regional providers, through the elimination or shortened wait time of transfers, improvements to ticketing structure and agency cooperation to eliminate "transfer anxiety".</i>	Increased transit mode share for trips in the corridor/district served by the project, partially drawn from former vehicle trips.	Town Center Trips	--	0.08%	0.10%
<i>Real-time arrival information at transit stops, online, and/or via web-enabled mobile devices.</i>	Increased transit mode share for trips in the corridor/district served by the project, partially drawn from former vehicle trips.	Town Center Trips	--	0.04%	0.04%

<i>Enhanced transit trip planning (for example Google Transit).</i>	Increased transit mode share for trips in the corridor/district served by the project, partially drawn from former vehicle trips.	External Trips	--	0.43%	0.42%
<i>Regionally implemented dynamic ridesharing (conservative implementation).</i>	Reduced commuter and recreational trips.	External Trips	--	1.00%	1.00%
<b>TDM Measures</b>					
<i>Improve existing employer vehicle trip reduction program (carpool and vanpool matching programs, employee shuttles, on-site secure bicycle storage and shower facilities, flexible work hours, parking, and transit use incentives.)</i>	Reduced peak-hour commuter trips.	Town Center Trips	New Employers	1.86%	1.86%
		Town Center Trips	Existing Employers	0.82%	0.82%
<b>Parking Management</b>					
<i>Parking pricing and parking management strategies including demand-responsive pricing in commercial areas with residential permits to prevent parking spillover into residential areas, changes to parking standards, shared parking arrangements, etc.</i>	Reduced trip generation from managed on- and off-street parking spaces for trips to and from managed areas. Reduced demand due to reduced parking spaces as a result of shared parking requirements or changes to parking standards for new development.	Town Center Trips	--	1.22%	1.22%

Source: TRPA, Kittelson & Associates, Inc., 2020.

## Cumulative Effect

While the effect of each policy or project type is analyzed individually, the cumulative effect of these strategies was estimated to apply to the TRPA travel demand model. The cumulative effect of each individual strategy is not simply the sum of the individual strategy effects. The impact of some strategies depends on the origin and destination trip type – for example whether they affect trips that start in Tahoe but end outside the Region, or if the entire trip takes place within the Tahoe Basin.

Where there are several reduction measures that are not mutually exclusive, the total cumulative reduction does not equal Measure A + Measure B. Once Measure A has been applied, Measure B will be applied to a base that has already been reduced by Measure A. For example, if two trip reduction measures would each give a 10% trip reduction, the total cumulative reduction is not 20%. Rather, it would be equal to  $100\% - (90\% * 90\%) = 19\%$ . This

process continues for each additional strategy considered for a grouping.

Table summarizes the cumulative impact by trip area type impacted. These cumulative impacts for each of the three trip area types (Town Center, Non-Town Center, and Internal-External) are calculated using the method described above. The strategies applied to trip each area type are combinations of the vehicle trip types noted for each individual strategy in Table . These combinations are summarized below:

- **Town Centers:** all “Regional Trips” and “Town Center Trips” strategies are combined in this trip area type.
- **Non-Town Centers:** only “Regional Trips” strategies are combined for these trip types.
- **Internal-External:** only “External Trips” strategies are combined for this trip area type.

Table 8. Cumulative Impact by Trip Area Type Impacted

<i>Trip Area Type</i>	<i>Employer Type</i>	<b>2035 Percent Reduction in Vehicle Trips</b>	<b>2045 Percent Reduction in Vehicle Trips</b>
<i>Town Centers</i>	Existing employers	5.92%	7.21%
	New employers	6.91%	8.18%
	Overall	5.95%	7.28%
<i>Non-Town Centers</i>	--	3.20%	4.53%
<i>Internal-External</i>	--	4.67%	5.75%

Source: TRPA, Kittelson & Associates, Inc., 2020.

For Town Centers, the TDM measures strategy distinguishes between new and existing employers. As a result, a vehicle trip reduction percentage is calculated for each scenario and employer type. These are then combined into overall trip reductions by year using a weighted average based on the assumption that new employer trips represent 3% of all travel consistent with the 2017 RTP/SCS assumptions. The cumulative impacts by trip area type are then applied to the TRPA travel demand model as described below.

#### Travel Demand Model Integration

An additional component of the 2020 TRIA 2.0 update was to integrate the overall trip reductions directly into the TRPA travel demand modeling process rather than relying on off-model reductions using the TRIA tool to post-process vehicle trips. As part of this integration, the TRIA trip reduction factors for each traffic analysis zone (TAZ) in the travel demand model is calculated based on the strategies that are applicable to a trip starting or ending in that

zone using the trip area types described above. The trip reduction factors vary based on whether trips are within the Tahoe Basin, travel to a Town Center, or start or end external to the Tahoe Basin. The TRIA 2.0 trip adjustment factor model script is run for each RTP/SCS scenario and the travel demand model’s trip table is adjusted to account for the reduction in vehicle trips for each origin-destination pair (e.g., Kings Beach to Tahoe City, or South Lake Tahoe to Carson City). These reduced trips are then reassigned to the travel demand model network to obtain an estimate of trips and vehicle miles traveled for the entire model roadway network. The resulting trip and VMT data can then be used to calculate RTP/SCS performance metrics and impacts based on the expected number of trips after considering the strategies included in the TRIA.

Table 9: Total Proportion of Vehicle Trip Reductions

Parking	TDM	Transit	Rideshare	Ped/Bike	Micromobility
9.8%	22.1 %	32.9 %	4.3%	24.0 %	6.8%

*References*

CAMPO. 2016. 2040 Regional Transportation Plan. Carson Area Metropolitan Planning Organization. Available from <http://carson.org/home/showdocument?id=51018>.

Guzman GG. 2019. Household Income: 2018: American Community Survey Briefs. American Community Survey Briefs. U.S. Census Bureau.

MBI. 2017. Socioeconomic Impacts of Vacation Home Rentals in South Lake Tahoe. Michael Baker International for The City of South Lake Tahoe, Rancho Cordova, CA.

MTC, ABAG. 2017. Plan Bay Area 2040: Final Travel Modeling Report. Metropolitan Transportation Commission (MTC), Association of Bay Area Governments (ABAG), San Francisco, CA. Available from [http://2040.planbayarea.org/sites/default/files/2017-07/Travel\\_Modeling\\_PBA2040\\_Supplemental%20Report\\_7-2017\\_0.pdf](http://2040.planbayarea.org/sites/default/files/2017-07/Travel_Modeling_PBA2040_Supplemental%20Report_7-2017_0.pdf).

RTC-Washoe. 2018. 2040 Regional Transportation Plan. Regional Transportation Commission (RTC) of Washoe County. Available from <https://www.rtcwashoe.com/mpo-projects/rtp/>.

SACOG. 2019. 2020 Metropolitan Transportation Plan/Sustainable Communities Strategy. Sacramento Area Council of Governments. Available from <https://www.sacog.org/post/adopted-2020-mtpsc>.

Saffo P. 2007. Six rules for accurate effective forecasting. Harvard Business Review. 2007 Jul-Aug;85(7-8):122-31, 193.

U.S. Census Bureau. 2020. American Community Survey. U.S. Census Bureau, Washington, D.C. Available from Data.census.gov.

