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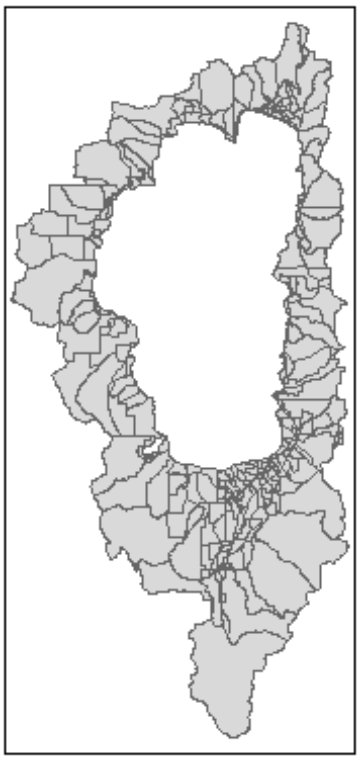
To: Tahoe Model Working Group
From: TRPA Staff
Subject: 2018 Tahoe Travel Demand Model Base Year Methodology

Introduction

This document outlines the methodology for updating elements of the Tahoe Model (model) as part of developing the 2018 base year-inputs for the 2020 Regional Transportation Plan (RTP). The core elements of the 2018 base year update include zonal input files, roadway network, and sub-model updates.

Zonal Input Methodology

Transportation Analysis Zones (TAZ)



In travel demand modeling, the existing socioeconomic and land use conditions are summarized into smaller zones referred to as Transportation Analysis Zones (TAZ). In the Tahoe model, the region is divided into 282 TAZs. The zones are smaller in more densely populated and traveled areas and larger in lightly trafficked areas. During the summer and fall of 2019, TRPA staff collected and analyzed a variety of datasets to develop the zonal input files that will be used as the basis for the Tahoe Model 2018 base year. Unless otherwise noted, all data referenced below are summarized by TAZ.

In addition to the zonal inputs, the existing TAZs themselves were analyzed and assessed to determine any potential areas for improvement. Except some minor geospatial realignments, it was determined that their existing size, quantity, and land use composition satisfied all fundamental modeling characteristics.

Employment

The model classifies employment into five types: *retail*, *recreation*, *service*, *gaming*, and *other*.

The base year employment data was sourced from official Quarterly Census of Employment and Wages (QCEW) reported data, which was purchased from the California Economic Development

Department (EDD)[1] and provided by the Nevada Department of Employment Training and Rehabilitation (DETR)[2].

For the EDD data, the average number of monthly employees at each business was aggregated for each TAZ-employment type category. The data was averaged for June, August, and September of 2018 to align with the model time period.

The Nevada data from DETR provided totals for the Nevada portions of the Lake Tahoe Region, not number of employees at each business. Therefore, TRPA used these total figures, and modeled the TAZ-level and employment-type categories based on the distribution of businesses from other TRPA sources (e.g., accounting of commercial floor area, permit data), local jurisdiction data (e.g., business licensing, tax records, Secretary of State filings) and prior analyses (e.g., 2017 RTP distribution of employees from InfoGroup for the 2014 base year). The DETR data included average employment in Nevada's Q4 2018 (April, May, June 2018) and Q1 2019 (July, August, September 2018) data, which generally aligns with the model time period.

Employment Totals

- Nevada - 11,108
- California - 17,512
- Total - 28,620

School Enrollment

Individual school enrollment was acquired from the California and Nevada departments of education for all public and private schools in the region[3] [4] [5] [6]. The individual school enrollments were aggregated by TAZ and broken down by school type (elementary, middle, and high school and the two colleges). Enrollment was averaged for the spring and fall quarters of 2018 to align with the model time period.

Total Enrollment by Category

- Elementary School - 3,119
- Middle School - 1,613
- High School - 2,045
- College - 1,890
- Total - 8,667

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[1] California Economic Development Department, 2018 Quarterly Census of Employment Wages, 2019, Quarterly Employees Per Business, Staff Request

[2] Nevada Department of Employment, Training, and Rehabilitation, 2018 Quarterly Census of Employment Wages, 2019, Total Employees, Staff Request

[3] Nevada Department of Education, Enrollment for Public Schools, 17-18 School Year, http://www.doe.nv.gov/DataCenter/Enrollment/, 2019

[4] Nevada Department of Education, Private School Directory and Status, http://www.doe.nv.gov/Private_Schools/, 2019

[5] California Department of Education, 2017-2018 Enrollment for Charter and Non-Charter Schools, https://dq.cde.ca.gov/dataquest/dqcensus/EnrCharterLevels.aspx?cds=3166944&agglevel=district&year=2017-18, 2019

[6] California Department of Education, Private School Directory 2017-2018, https://www.cde.ca.gov/ds/si/ps/, 2019

Residential Units

The total number of residential units was determined using parcel-level TRPA tracking data, enhanced by a variety of other datasets (TRPA and MOU Partner permit data, assessor's records, LIDAR, Zillow). The number of occupied and unoccupied units were determined by applying occupancy rates from the US Census American Community Survey (ACS) [7] to the total residential units. Within the ACS, occupied units are units that are occupied by people who make their primary residence in the region.

occupied units = (total residential units) X *(census occupancy rates)*

unoccupied units = (total residential units) - (occupied units)

Residential Unit Totals

- Residential Units - 47,651
- Occupied Residential Units – 21,620
- Unoccupied Residential Units – 26,031

Residential Population

The residential population was calculated by applying occupancy status, income, and household size statistics from the ACS to the TRPA residential unit dataset. The proportion of occupied units and number of persons per household were adjusted in accordance with ACS trends to ensure the total persons aligned with the most recent population ACS estimate for the region[8].

total residents = (occupied residential units) X *(average household size)*

Residential Population Total

- Total Persons – 51,631

Seasonal Units and STRs (Short-Term Rentals)

The unoccupied residential units calculated above are then categorized as seasonal resident, STR, or other unoccupied by first using the ACS estimate of the unoccupied units that are labeled as *Seasonal/Recreational/Occasional Units*. The number of STRs was provided by each jurisdiction for the summer of 2018. The number of reported STRs was subtracted from the total number of the *Seasonal/Recreational/Occasional Units* to estimate the number of seasonal or other unoccupied units.

total seasonal units = (total unoccupied units) - (STRs + other unoccupied units)

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[7] United States Census, American Community Survey (ACS), 2012-2017 Five Year Estimate, 2019

[8] United States Census, American Community Survey (ACS), 2012-2017 Five Year Estimate, Total Population, https://monitoring.laketahoeinfo.org/socioecon, 2019

Occupancy rates were determined by analyzing observed Short-Term Rental transient occupancy tax (TOT) reporting statistics from local jurisdictions[9] [10] [11] [12]. No observed occupancy rate data was available for seasonable units, so it was assumed that the STR occupancy rate was the same as the seasonal rate. The occupancy rate data consisted of an average of monthly or quarterly rates from June thru September. The number of occupied STRs and seasonal units were determined by multiplying the total number of units of each by the occupancy rate.

STR occupancy rates = (rooms occupied) / (rooms available)

Seasonal/STR Totals

- Unoccupied Residential Units - 26,031
- STRs - 6,005
- Seasonal Units - 17,121
- Other Unoccupied Units - 2,905

Overnight Lodging Units

The location and number of visitor overnight lodging units is based upon data from TRPA sources (e.g., accounting of Tourist Accommodation Units, permit data), local jurisdiction data (e.g., county assessor data, TOT reports) and prior analyses (e.g., TRPA Annual Reports, 2017 RTP). Units are aggregated by TAZ and lodging unit category (casino, resort, hotel/motel, & campground). Casino units refer to overnight accommodations that are located on properties that have casinos. A resort is typically the primary provider of the guest experience and will generally have one signature amenity or attraction such as a wellness spa, golf course, mountain/skiing or beach access[13].

The number of occupied overnight lodging units was determined by multiplying the total number of units by the reported occupancy rate. The occupancy rates were calculated using TOT reported rooms occupied divided by rooms available for the model time period. This data was collected at various levels of granularity depending on the jurisdiction. For campgrounds, occupancy rates were determined using an average of the occupancy reported by campground operators.

- Placer County - Occupancy per unit type for each of Placer County's five TOT reporting areas in Tahoe, aggregated by TAZ[14]
- City of South Lake Tahoe - Occupancy per unit type for all reporting businesses, aggregated by TAZ[15]

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[9] Washoe County Monthly Hotel Statistics FY 18-19, 2019

[10] Douglas County Monthly Room Tax Reports 18-19, 2019

[11] Placer County Statistical Data Report, Department of Revenue Services, Staff Request 2019

[12] City of South Lake Tahoe Transient Occupancy Tax Reports, https://www.cityofslt.us/588/TOT-Reports

[13] Brey, E. (2009). Resort definitions and classifications: A summary report to research participants. [PDF] University of Memphis: Center for Resort and Hospitality Business. Retrieved from http://caribbeanhotelassociation.com/source/Members/DataCenter/Research-UofMemphis.pdf

[14] Placer County Statistical Data Report, Department of Revenue Services, Staff Request 2019

[15] City of South Lake Tahoe Transient Occupancy Tax Reports, https://www.cityofslt.us/588/TOT-Reports

- El Dorado County - Business level data was not available, so the rates for CSLT were applied to the El Dorado County TAZs that contained lodging units, aggregated by TAZ
- Douglas County - Occupancy per casino and non-casino units, aggregated by TAZ [16]
- Washoe County - Occupancy for all units within the Tahoe portion of Washoe County, aggregated by TAZ [17]

lodging occupancy rates = (*rooms occupied)* / (*rooms available)*

occupied lodging units = (*total lodging units)* X (*lodging unit occupancy rates)*

Lodging Unit Totals

- Total Lodging Units - 11,107
- Occupied Lodging Units - 6,765
  - Hotel/Motel - 2,132
  - Resort - 2,214
  - Casino - 2,419
- Campground Sites - 2,104

Other Model Updates

In addition to the zonal input data updates, the 2018 base-year was enhanced with other improvements to the Tahoe Model.

Roadway Network Updates

The regional roadway network was assessed to determine whether improvements were required based upon changes that have occurred in recent years. Based upon this assessment, TRPA staff made minor refinements to the roadway network such as updated speeds, lanes, and capacity information based upon a variety of data sources. (TRPA GIS, Open Street Map (OSM), Google Street View, etc).

Transit Network Updates

The transit network (transit routes and stops) was assessed to determine whether improvements were required based upon changes that have occurred in recent years. Based upon this assessment, TRPA staff made minor refinements to the transit network based on TRPA network data, which was sourced from the Tahoe Transportation District (TTD) and Tahoe Truckee Area Regional Transit (TART).

[16] Douglas County Monthly Room Tax Reports 18-19, 2019

[17] Washoe County Monthly Hotel Statistics FY 18-19, 2019

Visitor Sub-Model

The visitor sub-model was updated using recently observed visitor travel party characteristics sourced from the 2018 TRPA Summer Travel Survey. This portion of the model update is ongoing and will be finalized as part of the model validation and calibration.

External Worker Sub-Model

The external worker sub-model was updated using new commute travel pattern data from a variety of data sources (CTPP, Streetlight). Commute travel pattern updates include the trip origin, destination and timing. This portion of the model update is ongoing and will be finalized as part of the model validation and calibration.

External Station Composition

The composition (e.g., external worker vs. day visitor vs resident) of all trips traveling through Tahoe's seven entry and exit points was updated using Streetlight Data and other data sources. This portion of the model update is ongoing and will be finalized as part of the model validation and calibration.

External Trip Characteristics

The characteristics of external trips – trips that travel to or from the Tahoe Region but which occur outside of the region – were updated using Streetlight Data. These updates improve accounting of full visitor trip lengths. This portion of the model update is ongoing and will be finalized as part of the model validation and calibration

Recreation Attractiveness

Recreation attractiveness represents the relative attractiveness of recreation locations. These values influence which locations visitors and residents travel to throughout the region but do not impact the total number of visitors in the model. The relative attractiveness of recreation sites was updated using Streetlight Data. Streetlight Data provides an index value which represents the relative activity of zones that TRPA staff characterized as having high summer recreation. This portion of the model update is ongoing and will be finalized as part of the model validation and calibration