MASTER PLAN

Chapter 2 Aviation Forecasts

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CHAPTER 2

Aviation Forecasts

1. OVERVIEW

The forecasts contained in this chapter establish the potential need for and approximate timing of demand-driven airport facilities such as hangars, apron, and vehicle parking. Likewise, the forecasts also form the basis for estimating and assessing changes to aircraft-community noise exposure. This chapter, which presents aviation activity over a 13-year period through 2025, is organized as follows:

- Review of Previous Aviation Forecasts
- Regional Analysis
- Airport Role
- Airport Service Area
- Recent Activity and Trends
- Demand Influences
- Aviation Forecasts
- Peaking Characteristics
- Forecast Summary

2. REVIEW OF PREVIOUS AVIATION FORECASTS

A review of previous forecasts can provide important information about the underlying assumptions used in their development for comparison with changed conditions and current outlook. A summary of previously published forecasts follows.

2.1 FAA Aerospace Forecasts: Fiscal Years 2013 – 2033

The Federal Aviation Administration (FAA) Aerospace Forecasts provide a macro-level analysis of U.S. aviation activity. The forecasts are published annually and detail the underlying drivers of aviation demand. These forecasts correlate total aviation activity with economic activity. They also project changes to aircraft fleet mix, hours of operation by category of aircraft, and the number of active pilots. The information contained in the forecasts will apply primarily to changes to the based aircraft fleet and operating mix recommendations of this master plan. Major conclusions of the forecasts are summarized below. **Table 2-1** projects annual growth by aircraft category and hours flown. **Table 2-2** projects changes to the entire U.S. general aviation fleet as a percentage of the total general aviation fleet. The following points summarize the major trends identified by the FAA.

- **Aviation activity models correlate aviation activity with disposable personal income (DPI), which is income after taxes.**
- **The high/low forecast ranges of this forecast are heavily influenced by assumptions related to government (U.S. and foreign) actions (i.e., reduce debt, reduce spending, increase revenue, increase employment, etc.). The selected model assumes slow economic recovery and growth, improving housing market and employment outlook, low-stable inflation (1.4 – 2.0% per year), DPI 2-3% per year through 2016 then constant 2.4% through 2033, and oil prices declining to $81/barrel by 2015, then increasing slowly to $125/barrel by 2033.**
- **Turbo-jet activity, which was significantly affected by the downturn, is expected to return to robust growth. The increase is driven by increasing corporate profits and continued concerns about safety, security, and delays associated with commercial flight. The general aviation jet fleet is forecast to grow 3.5% per year while the number of operations flown per year is expected to grow 4.3%. As a percentage of the total general aviation fleet, jets will increase from 5.4% in 2012 to 10.0% in 2033.**
- **Single-engine piston airplanes are projected to decline approximately 0.2% per year while multi-engine piston airplanes will decline at an annual rate of 0.6%. Although single-engine deliveries have been increasing, new deliveries are not projected to overtake retirements until 2028. The piston engine forecasts include growth of a new sub-classification: light sport. Single-engine pistons certified as light sport are expected to increase at an annual rate of 2%. Operations by pistons are also projected to decline 0.2% per year.**
- **Different utilization rates between the different categories of airplanes is revealed by comparing the fleet mix with hours flown. For example, turbo-jets account for 5-8% of the general aviation fleet, but account for 15-24% of the hours flown. It should be noted that the majority of these hours are spent aloft and the forecasts do not include operations (i.e., landings and takeoffs).**
- **The number of active general aviation pilots is projected to increase 0.4% per year.**

Light sport airplanes have certification requirements that make them easy-to-fly and have maximum 2-person occupancy. In addition to single-engine pistons, light sport aircraft include: glider, lighter-than-air (airship or balloon), gyroplanes, powered parachute, and weight-shift control (Trikes).

Table 2-1 Average Annual Growth Rates through 2025			
Active GA Fleet	**2012-2015**	**2012-2020**	**2012-2025**
Airplane, Single Engine Piston	-0.54%	-0.46%	-0.38%
Airplane, Multi-Engine Piston	-0.05%	0.11%	-0.20%
Airplane, Turbo-Jet	3.22%	3.24%	3.29%
Airplane, Turbo-Prop	1.63%	1.64%	1.68%
Rotor, Piston	2.67%	2.52%	2.35%
Rotor, Turbine	3.41%	3.27%	3.10%
Other*	1.41%	1.23%	1.18%
General Aviation Fleet	0.23%	0.28%	0.33%
Hours Flown	**2012-2015**	**2012-2020**	**2012-2025**
Airplane, Single Engine Piston	-2.91%	-1.96%	-1.28%
Airplane, Multi-Engine Piston	-0.97%	-1.03%	-0.91%
Airplane, Turbo-Jet	5.42%	4.96%	4.49%
Airplane, Turbo-Prop	3.18%	2.88%	2.44%
Rotor, Piston	2.91%	2.76%	2.58%
Rotor, Turbine	2.41%	2.76%	2.75%
Other*	4.98%	3.70%	2.95%
General Aviation Fleet	0.50%	0.95%	1.16%

Source: FAA Aerospace Forecast 2013-2033
*- Other aircraft include experimental, sport aircraft, airships, balloons, and gliders.

Table 2-2 Fleet Mix as a Percentage of Total General Aviation			
By Aircraft Type	**2012**	**2020**	**2025**
Airplane, Single Engine Piston	61.60%	57.60%	55.34%
Airplane, Multi-Engine Piston	7.07%	6.64%	6.25%
Airplane, Turbo-Jet	5.39%	6.81%	7.87%
Airplane, Turbo-Prop	4.38%	4.89%	5.22%
Rotor, Piston	1.71%	2.04%	2.21%
Rotor, Turbine	3.13%	3.96%	4.45%
Other*	16.72%	18.06%	18.66%
By Hours Flown	**2012**	**2020**	**2025**
Airplane, Single Engine Piston	47.34%	37.45%	34.47%
Airplane, Multi-Engine Piston	7.14%	6.08%	5.46%
Airplane, Turbo-Jet	15.27%	20.85%	23.28%
Airplane, Turbo-Prop	9.58%	11.15%	11.30%
Rotor, Piston	3.28%	3.79%	3.94%
Rotor, Turbine	10.30%	11.88%	12.63%
Other*	7.09%	8.80%	8.92%

Source: FAA Aerospace Forecast 2013-2033
*- Other aircraft include experimental, sport aircraft, airships, balloons, and gliders.

The Aerospace forecasts also include projections for two emerging sectors: commercial space transportation and unmanned aircraft systems (UAS). This master plan does not identify any future operational role at Truckee Tahoe Airport (TRK) related to commercial space vehicle launch and/or recovery although it is conceivable that temporary flight restrictions could occur nearby as a result of such activity. Currently, only eight commercial spaceports have FAA launch operator licenses. In contrast, UAS activity is much more likely to occur at or near TRK by 2025.

UAS involve flight by aircraft with no onboard pilot/operator. UAS was developed initially as a military application (e.g., drone aircraft) but have great potential to cross into commercial and civilian markets. Among other roles, UAS is expected to be viable for search and rescue operations. The FAA is currently developing a plan to accelerate the integration of UAS into the National Airspace System, which involves the development of standards, airworthiness criteria, certification, and procedures for sense and avoid systems, and command control and communication system requirements. Although it is unclear when these standards and policies will ultimately be approved, the forecasts project near-term growth in small unmanned systems will include about 7,500 aircraft that would be operating within 5 years of authorization.

2.2 FAA Terminal Area Forecast: Fiscal Years 2012 – 2040

The FAA has established the Terminal Area Forecast (TAF) system for active airports included in its National Plan of Integrated Airport Systems (NPIAS). These forecasts are prepared to meet the budget and planning needs of the FAA and provide information for use by state and local authorities, the aviation industry, and the public. As such, the TAF represents the FAA's policy benchmark for federal review and approval of airport master plan forecasts. TAF projections are updated annually using federal fiscal year activity values, not calendar year.

An **operation** is defined as either the landing or the takeoff of an aircraft.

For non-towered airports such as TRK, the TAF projections are typically based on historic activity provided by the airport operator. The historic data included in the TAF indicates a decline in based aircraft from 164 in 1990 to 76 in 2011. Total aircraft operations also indicate a decline over the same period, from 58,300 to 35,000. Air taxi operations were estimated at 1,000 annually over the entire historic and forecast period. The split between itinerant and local operations remained relatively constant: 43.4%:56.6% (itinerant : local) in 1990 versus 40%:60% in 2011. The projections indicate no change in activity through 2040: 76 based aircraft, 1,000 air taxi operations, 35,000 total operations split 40:60 between itinerant and local. A summary of the current TAF is contained in **Table 2-3**

Table 2-3 2012 TAF TRK Forecasts

Year	Aircraft Operations				Based Aircraft
	Itn. Air Taxi	Itn. GA and Military	Local GA	Total	
2012	1,000	13,000	21,000	35,000	76
2020	1,000	13,000	21,000	35,000	76
2025	1,000	13,000	21,000	35,000	76
CAGR	0%	0%	0%	0%	0%

Source: FAA Terminal Area Forecasts (TRK FY 2012 – 2040)

Based on more accurate activity counts that the TTAD has obtained in recent years, it is generally believed that the historic activity estimates included in the TAF are overstated and that the method for counting based aircraft was inconsistent over the period. Total operations have likely remained comparatively flat with a slight growth trend while there has been a recent decline in based aircraft. The operations forecast value of 35,000 may be reasonable

for master plan use, although it would more accurately reflect an increase of 10,000 annual operations from the present day. The based aircraft forecast of 76 is also held constant by the TAF and represents motorized aircraft only (i.e., not including sailplanes). There is a growing waiting list for executive hangar space at TRK and demand for T-hangar space has been declining.

2.3 1998 Airport Master Plan

The previous Airport Master Plan for TRK was completed in 1998. The 1998 plan included forecasts of aviation activity through 2020. The forecast methodologies used will be assessed and updated as part of the development of this plan. Several of the forecast trends identified in 1998 occurred, in particular, the based and operating mix of aircraft. Similar to the historic record included in the TAF, the historic operations (or estimates of operations) used by the 1998 master plan effort may have been overstated. The average number of aircraft operations per year did not increase and likely decreased between 1998 and 2012. It should be noted that the forecasts were prepared during a positive economic cycle as opposed to the current cycle of recovery. The 1998 based aircraft forecasts are presented in **Table 2-4** and forecasts for total operations in **Table 2-5.**

Table 2-4 1998 AMP Based Aircraft Mix Summary

Year	Piston, Airplane				Turbine, Airplane				Rotor		Other		Total
	Single		Multi		Prop		Jet						
	Permanent	Seasonal	Permanent	Seasonal	Permanent	Seasonal	Permanent	Seasonal	Permanent	Seasonal	Permanent	Seasonal	
1997	107	74	19	13	4	3	1	1	0	0	4	3	229
2000	109	75	19	13	4	3	1	1	1	0	4	3	233
2005	127	86	21	14	6	4	2	1	1	1	4	3	270
2010	140	94	23	16	8	5	3	2	2	1	4	3	301
2015	157	104	26	17	10	7	4	2	3	2	4	3	339
2020	167	109	30	19	12	8	6	4	5	3	4	3	370

Source: TRK 1998 AMP

Table 2-5 1998 AMP Operations Forecast Summary

Year	Aircraft Operations		
	Itinerant	Local	Total Operations
1996[1]	12,200	20,700	32,900
2000	13,800	20,700	34,500
2005	17,200	23,800	41,000
2010[2]	20,600	26,300	46,900
2012[3]	14,902	11,568	26,470
2015	24,800	29,200	54,000
2020	29,600	32,000	61,600

Source: TRK 1998 AMP

Notes:

1. Based aircraft include seasonal and permanent tenants.
2. Operation data from 2007 and after use the Airport's four-camera video system to record operations. Operation data after 2007 is believed to be more accurate than previous years.
3. 2012 estimated operations. Source: TTAD.

3. REGIONAL ANALYSIS

Activity at TRK is strongly influenced by a variety of local and regional factors. This section assesses the primary characteristics that are unique to the north side of Lake Tahoe. Combined with the physical facilities and services available at the airport, these regional factors include: visitor travel profile, area population, employment/income trends, educational profile, area property values, and other factors such as non-residential development.

3.1 Visitor Travel Profile

The Lake Tahoe region receives approximately 3 million visitors per year. The area is popular for its world-class ski resorts, outdoor recreation (i.e., fishing, biking, nature walks, etc.), gaming casinos, dining, spas, shopping, and history.

Visitor profile data for the region is usually found for the entire Lake Tahoe region. The last study available for the greater Truckee area was *North Lake Tahoe: Tourism and Community Investment Plan*, completed in 2004. This Plan stated that about 50% of visitors originate from California, 40% (20% of all visitors) of which are from the Bay Area. Most travelers arrive via personal vehicle although air travelers (using Reno Tahoe International Airport) have been increasing from Southern California and other states. The 2007 Reno-Tahoe Visitor Profile Study reports 48% of visitors to the region were from California, and 19% (of all visitors) were from the Bay Area. A more recent north Lake Tahoe Visitor Survey from 2012 also shows 52% of visitors are from California, of which, 38% are from Santa Clara, Alameda, Contra Costa, San Francisco, San Mateo, and Sonoma counties.

The greater Lake Tahoe region includes a high percentage of both transient residents and visitors. This pattern is expected to continue, but with an increasing percentage of visitors (and seasonal residents) originating from Southern California and other states. The increase in average travel distance will result in an increase air travel demand to the region. Although primary air travel demand will be accommodated by commercial airline service via Reno and Sacramento, demand for direct access through Truckee Tahoe Airport using chartered or private airplane should be expected to increase for the same underlying reasons.

Visitor lodging in the Truckee/Donner area includes about 2,240 rooms (Truckee Donner Chamber Visitor Guide); the Town of Truckee General Plan (GP) predicts the construction of 1,392 new rooms by 2025.

3.2 Area Population

In this section, the Town's GP is used as a source for population projections. This plan is believed to provide a barometer for the Truckee Tahoe Airport District (TTAD or District) area at large, since it includes data for a large planning area encompassing the Town limits. This includes high-end housing developments located south of TRK that is outside the Town of Truckee limits.

In 2010, the Town of Truckee comprised over 63% of the TTAD's population, which is presently estimated to be 29,000. According to the housing element of the Town's GP, Truckee experienced rapid growth in the 1990's (36% between 1990 and 2000). The population increased an additional 16.3% between 2000 and 2009. The 2010 census records the population of 18,451. The Truckee GP projects a 2025 population of 25,280 (37% higher than 2010). The housing element indicates that the Town will be approaching full build out shortly after the 2025 planning horizon. That said, the total population of the land area which comprises the TTAD increased less than 4% between 2000 and 2010. Population reductions have occurred in some areas as a result of the housing market collapse and the Great Recession.

Population data from Placer County was also considered since a large portion of the TTAD and the Airport's influence area is located in Placer County. Placer County experienced 31.2% total growth in population between 2002 and 2012. Projects indicate Placer County will increase in population by 10.3% from 2012 to 2017 and 20.6% from 2012 to 2022 (Placer County Economic and Demographic Profile, 2013).

This master plan assumes an outlook of recovery and moderate growth through 2025. While population growth will likely not be uniform throughout the TTAD, this plan assumes that the total district population will grow at about the same rate projected for the Town of Truckee, 2% annually.

3.3 Employment and Income Trends

Table 2-6 summarizes key employment data for select locations within the TTAD. With its mountain environment, recreational opportunities, and proximity to major transportation facilities, the North Lake is undoubtedly a desirable place to live and work. Although mining, construction, and government sector employment are prevalent sectors for the area, employment has historically been intertwined with seasonal recreation and tourism cycles: busy summers and winters; slow falls and springs. The cyclical trends pose a significant challenge to operating and staffing a year-round business and maintaining an employment base that can afford to live in the area. Many local government and business initiatives are predicated on stabilizing the cyclical patterns by attracting non-tourist higher pay/skilled businesses to the area, enhancing the local capture of visitor spending, and increasing off-season tourism.

Table 2-6 Median Household Income and Unemployment

Community	Year		Change	Unemployment (2012)
	2000	2009		
Truckee	$58,848	$67,398	14.53%	8.9%
Lake Tahoe	48,583	59,588	22.63%	9.3%
Tahoe Vista	51,958	65,022	25.14%	9.3%
Kings Beach	35,507	40,324	13.57%	9.3%
Nevada County	45,864	57,884	26.21%	8.9%
Placer County	57,535	70,568	22.65%	9.3%
California		58,931		10.4%

Source: California Department of Finance

Median household incomes for the communities filing returns within the District were between $60,000 and $67,000 during 2009 compared to $58,931 reported for California. The lowest household incomes were reported for Kings Beach ($40,324) and the highest was Truckee ($67,398). It should be noted that Truckee has the highest population of the various communities assessed. Furthermore, Truckee's average household income for 2009 was reported at $82,837, which indicates the presence of very high earners. Employment reported for Truckee includes approximately 9,500 jobs: 21.0% professional, 19.5% services, 17.2% management/business/ financial, 13.5% sales, 11.2% administrative support (Truckee Donner Chamber of Commerce). Incomes for second homes, which accounts for about 50% of area households, are often reported outside of the District. The second homes contribute significantly to the area's economy and may be indicative of higher discretionary spending than is discernable by reviewing the locally reported data. Unemployment for Truckee during 2012 was 8.9% compared to 10.4% for California.

Potentially changing the income reporting dynamic associated with the area's high volume of second-homes is the effect of cellular telephone, internet communication, and electronic data transfer systems is having on job locations and business models. Increasingly, remote connectivity is enabling individuals to select permanent

residence based on personal preference instead of proximity to employment centers and sources of market demand. This trend combined with the successful efforts of local government to incentivize economic diversification can be expected to increase growth in non-recreational/tourist employment sectors, year-round population, and average incomes. Some of these changing trends can be discerned from **Table 2-7** for the Truckee-Grass Valley micropolitan statistical area.

Table 2-7 Truckee-Grass Valley µSA Top Five Industries by Number of Employees

2000		2012		2025	
Retail	12.5%	Healthcare	12.6%	Prof/Tech Services	11.4%
Construction	11.7%	Prof/Tech Services	12.5%	Healthcare	11.1%
Healthcare	9.1%	Construction	8.9%	Retail	9.4%
Government	9.0%	Real Estate	8.5%	Construction	8.9%
Prof/Tech Services	8.1%	Retail	8.4%	Real Estate	8.6%
Total Employment	50,528	Total Employment	55,348	Total Employment	63,256

Source: Woods & Poole, Inc. 2012

For purposes of this master plan, the economic outlook for the region is for moderate expansion comparable with past trends in terms of job and income growth. Specifically, total employment and median household income are expected to increase at 1.0% and 1.5%, respectively.

3.4 Educational Profile

The area's workforce is highly educated. 55% of Truckee residents have an associate degree or higher, compared to 37.7% for California. Of these, 33.1% have a bachelor degree compared to 19.2% for California. Although this master plan does not draw a specific correlation between education and demand for aviation services and support, the statistic is indicative of a sustainable skilled employment base, which indirectly translates to aviation activity.

3.5 Residential Property Values

As indicated in the FAA Aerospace Forecasts, demand for aviation activity broadly correlates with economic health. At the national level, the federal government typically evaluates the overall health of the economy using Gross Domestic Product (GDP). The FAA, however, correlates aviation demand more directly with changes in personal disposable income (income after taxes). For the Truckee-Tahoe area, incomes associated with second homeowners are usually reported elsewhere. By their nature, the proportion of second homes (about 50%) is perhaps most indicative of high incomes, discretionary spending capacity, and wealth. Such individuals have a much higher propensity to travel by airline, chartered flights, or corporately operated aircraft. Resort destinations with high levels of second homes are also more likely to operate personal aircraft for travel between primary and secondary residences and have seasonal vehicles stored near their second home.

Figure 2-1 provides a comparison of the area home values. The chart reveals that median home values for the North Lake are generally 20% higher than the State of California with some areas averaging over 60% higher. The difference is more significant between local values with those of Nevada and Placer counties. Values appear to have bottomed out and have begun to climb quickly, from 9% to 30% between January 2012 and June 2013. New home construction is expected to recover and increase 2% per year through 2025 (Town of Truckee, General Plan).

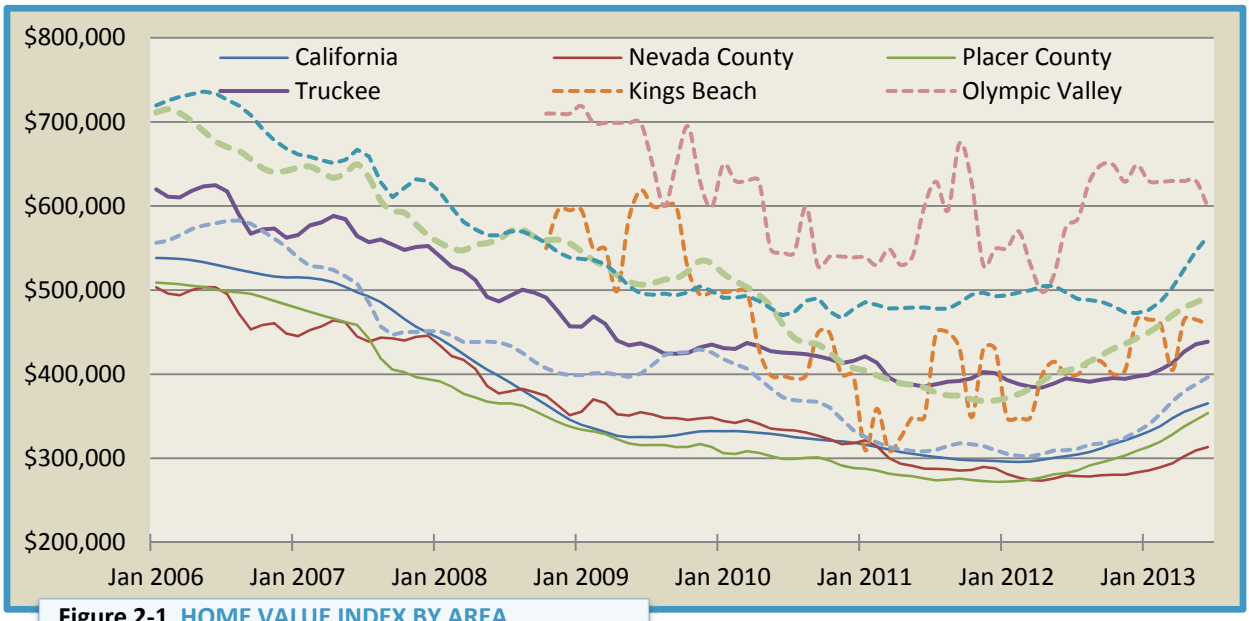


Figure 2-1 HOME VALUE INDEX BY AREA
Source: Zillow, July 2013

The Housing Element of the Truckee General Plan includes these guiding principles: provide an adequate number of housing sites, encourage a variety of housing types, and provide housing to meet the needs of residents especially those that work in the Town. Housing units were inventoried at 10,823 in 2004. The 2025 projection is for 17,800 housing units with a total build-out capacity of 19,901 units. This total includes primary and secondary residential units. The rate of growth experienced for housing from 2000–2005 was used as a baseline for projecting 2025 housing units.

One underlying factor will remain unchanged: the Lake Tahoe area will retain its strong locational appeal for homeowners. Relative to this master plan, the area is expected to grow and approach build-out just beyond that plan's 2025 timeframe (Town of Truckee: 2025 General Plan). Local efforts to increase affordable housing may increase price stability and increase employment diversity. This plan will assume that the housing market will recover and grow at a stable rate and maintain comparatively high valuations and related discretionary spending capacity. The area will remain influenced by high-income homeowners that will have a higher than average propensity to travel to and from the area on a regular basis using a variety of means, including: personal vehicle, scheduled airline, chartered aircraft, corporate-owned aircraft, and personal aircraft. Combining the 2% growth in housing units with an average value increase of 8.8% per year (i.e., the average experienced between 2000 and 2009) for the Truckee planning area, total valuations will increase to $34 billion in 2025 from approximately $9 billion today (Mead & Hunt calculation).

3.6 Other Development

Various local efforts are underway to incentivize commercial and light industrial development. The Truckee General Plan also predicts a significant increase in non-residential development, as measured in floor space, within its defined planning area. Non-residential development was inventoried in 2005 to be 2.8 million square feet. Non-residential development is expected to average 2.4% annually (to 5 million square feet by 2025). Totals for each development type are shown in Table 2-8 on the following page.

Table 2-8 2025 General Plan Non-Residential Build-out Projections	
Development Type	**2025 Square Feet**
Commercial	1,994,000
Office	952,000
Light Industrial / Warehouse	1,259,000
Religious	85,700
Lodging	(1,392 rooms) 700,000
Total Square Feet	5,000,000
Source: Town of Truckee 2025 General Plan, Table I-3	

Specific non-tourism related employment sectors being targeted include healthcare related industries and "new-economy" businesses, such as high-tech and information-based businesses.

4. AIRPORT ROLE

TRK is classified as a "General Aviation Airport" by the FAA National Plan of Integrated Airport Systems (NPIAS). The airport provides transportation access by year-round, second-homeowners, and both frequent and occasional visitors to the area. Individual flights include personal, business, training, recreational, and emergency service support. Commercial (i.e., for-profit) operations are limited to non-scheduled air taxi flights that carry fewer than 10 passengers. There are no scheduled commercial airline operations. A wide range of aircraft types use the airport including helicopters, single- and multi-engine propeller aircraft, gliders, and business jets. Majority of operations are by light piston airplanes and gliders. However, the focus of TRK in the future will be on accommodating turboprop and business jet aircraft, as these aircraft continue to gain a greater share of the national fleet mix. This focus acknowledges national trends but is subject to limitations in accordance with community expectations.

As a "Community Airport" the TTAD does not currently seek to encourage: all-weather operational capability, nighttime aircraft activity, scheduled commercial flight operations, nor operations by aircraft larger than the ones presently using the airport.

The TTAD operates its facility as a "Community Airport". In doing so, the TTAD engages and actively seeks opportunities to support local initiatives and to provide facilities that can be used for community and/or joint aviation-community purposes. Initiatives include: open-space preservation, sponsoring educational programs and youth activities, and hosting aviation-related family events. Additionally, TTAD has undertaken several initiatives to reduce off-airport annoyance, enhance aviation-community trust, and enhance safety. Facilities that benefit the general public include: an on-airport restaurant, picnic areas, children's park, and emergency helipad sites (future). Public meeting space available at TRK is being used by groups such as the Girl Scouts, American Youth Soccer, Chamber of Commerce, and Toastmasters.

The role of the airport is not expected to change in the foreseeable future. It is expected that activity at the airport will increase comparable with the overall growth of the community and that the mix of aircraft types using the airport will be changed incrementally over time consistent with broad-scale changes affecting the U.S. general aviation industry.

5. AIRPORT SERVICE AREA

This Airport Service Area shown in **Figure 2-2** is defined by having a driving time to the airport of one hour or less in good weather conditions (i.e., locations within 50 miles of TRK). Also shown are other nearby airports. Most are classified as general aviation airports that service similar aircraft types as those using TRK. **Table 2-9** highlights major features of these airports, with distance from TRK.

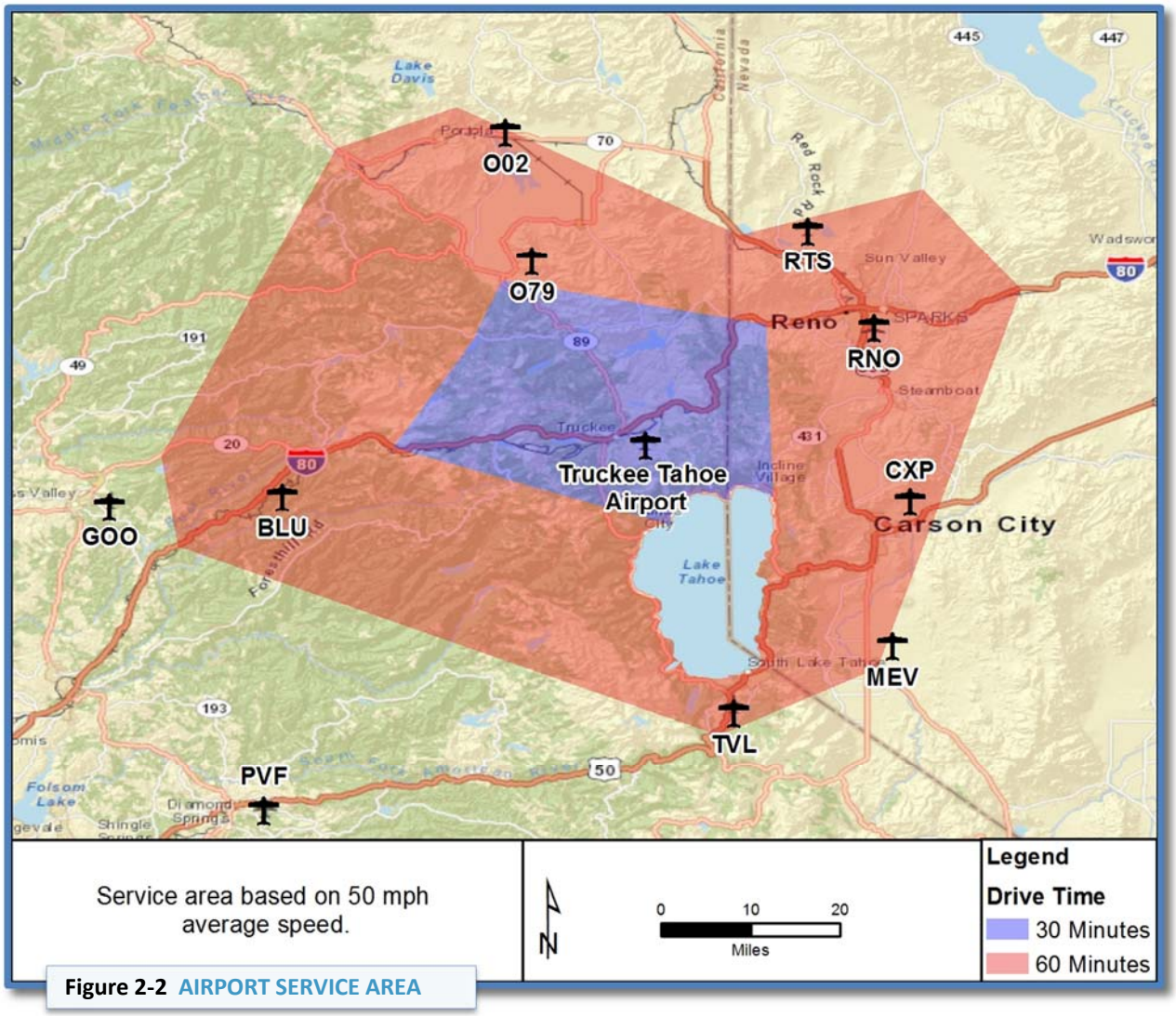


Figure 2-2 AIRPORT SERVICE AREA

Table 2-9 Area Airports			
Airport	**Distance from TRK (NM)**	**Runways (longest in feet)**	**Major Facilities**
TRK – Truckee–Tahoe Airport	N/A	2 (7,000)	• Fuel – 100LL, Jet A and Jet A1+ • Hangars and tie-downs for parking • Airframe and powerplant service.
RNO – Reno Tahoe International	20 NE	3 (11,002')	• Air carrier services and passenger terminal • Customs landing rights airport • Fuel – 100LL and Jet A1+ • Hangars and tie-downs for parking • Airframe and powerplant service. • Deicing facilities
CXP – Carson City	20 E	1 (6,100')	• Fuel – 100LL and Jet A • Hangars and tiedowns for parking • Airframe and powerplant service.
O79 – Sierraville Dearwater	20 NW	1 (3,260')	• Tiedowns
RTS – Reno/Stead	24 NE	2 (9,000')	• Fuel – 100LL and Jet A • Tie-downs for parking • Airframe and powerplant service.
MEV – Minden-Tahoe	26 SE	3 (7,400')	• Fuel – 100LL and Jet A • Hangars and tie-downs for parking Airframe and powerplant service.
TVL – Lake Tahoe	26 S	1 (8,544)	• Fuel – 100LL and Jet A
BLU – Blue Canyon – Nyack	27 W	1 (3,300')	• Tiedowns
O02 – Nervino Beckwourth	31 N	1 (3,260')	• Fuel – 100LL • Tie-downs for parking
GOO – Grass Valley	46 W	1 (4,351')	• Fuel – 100LL and Jet A • Tie-downs for parking Airframe and powerplant service.
PVF – Placerville	53 SW	1 (3,910')	• Fuel – 100LL and Jet A • Tie-downs for parking Airframe and powerplant service.
Source: Airnav.com			

6. RECENT ACTIVITY AND TRENDS

Current year activity provides an accurate "snapshot" for purposes of comparison, analyzing trends, and to function as a "base year" starting point in the forecasts to be developed. The trends in activity may be used to validate the assumptions used in the development of previous forecasts, compare with trends of a larger geographic area, and to extrapolate new activity projections.

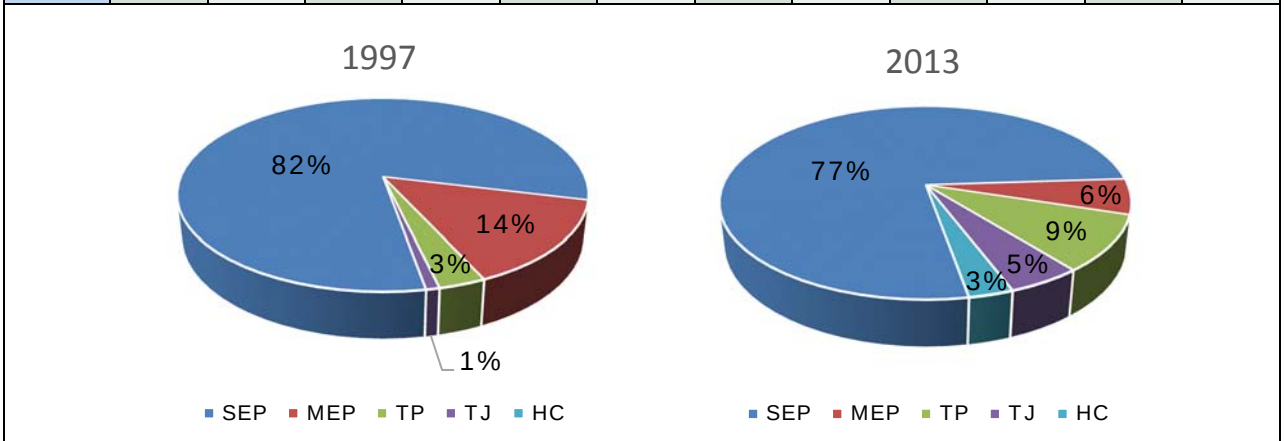
6.1 Based Aircraft

It should be noted that some airports do not maintain historic records of based aircraft. Individual aircraft may be based at more than one location and are often registered to a non-airport household and business addresses remote from the based location. In the case of TRK, based aircraft records maintained by the District and included in prior planning efforts are considered to be reasonably accurate. However, the number of based aircraft is significantly higher during the summer and winter peaks than during the spring and fall. The term 'based aircraft' in this plan refers to aircraft that are stored at the Airport, either permanently or seasonally. This should not be confused with aircraft that are based at TRK for tax purposes. Aircraft that call TRK home for tax purposes may also be considered 'seasonally based' if they house at another airport during the winter. Alternatively, aircraft that call another airport home for tax purposes may store at TRK seasonally.

The District provided data on the types of aircraft based at TRK in 2013. These totals are presented in **Table 2-10**. It is estimated that two-thirds of the based aircraft fleet is stored at TRK on a year-round, or continuous basis. This number is equal to the based aircraft total in the FAA's National Based Aircraft Inventory Program that represent aircraft permanently based at TRK in 2013.

Table 2-10 Based Aircraft

Year	Single-Engine Piston		Multi-Engine Piston		Turbo Prop		Turbo Jet		Helicopter		Total[1]	
1997[2]	182		32		7		2		0		223	
2013[3]	155		12		19		10		6		202	
	Permanent	Seasonal	Permanent	Seasonal	Permanent	Seasonal	Permanent	Seasonal	Permanent	Seasonal	Permanent	Seasonal
	103	52	8	4	13	6	7	3	4	2	135	67



Notes: SEP= Single-Engine Piston; MEP= Multi-Engine Piston; TP= Turbo-Prop, TJ= Turbo-Jet; HC= Helicopter.
1- Total based aircraft include permanently and seasonally based aircraft.
2- Source is 1998 Master Plan permanently based aircraft increased 70% to combine seasonally based aircraft.
3- TRK Airport Management Records for based aircraft on December 12, 2013. Records do not differentiate permanent and seasonal occupancy. Records do not include 18 aircraft on current waiting list for executive hangars.

6.2 Aircraft Operations

Most non-towered airports do not monitor actual activity (e.g., takeoffs and landings). For reporting and planning purposes, airport operators rely on estimations. Various methods may be employed to estimate activity; typically, little effort is expended to validate the accuracy of those estimates. For general aviation airports in particular, accepted methods for estimating activity have been complicated by a combination of abrupt declines in new aircraft production and significant swings in aircraft utilization.

In 2007, the District began counting departures using a four-camera video system (**Figure 2-3**). The motion-activated cameras are strategically installed along the taxiway route to photograph aircraft as they enter the runway; one camera is installed at each of the four possible departure directions. The system is being continuously enhanced for accuracy (e.g. reconciling false camera reports). Based on camera counts, the historic estimates of operations contained in the 1998 master plan are believed to be overstated. This master plan therefore emphasizes the changes in activity that has occurred between 2007 and 2012.

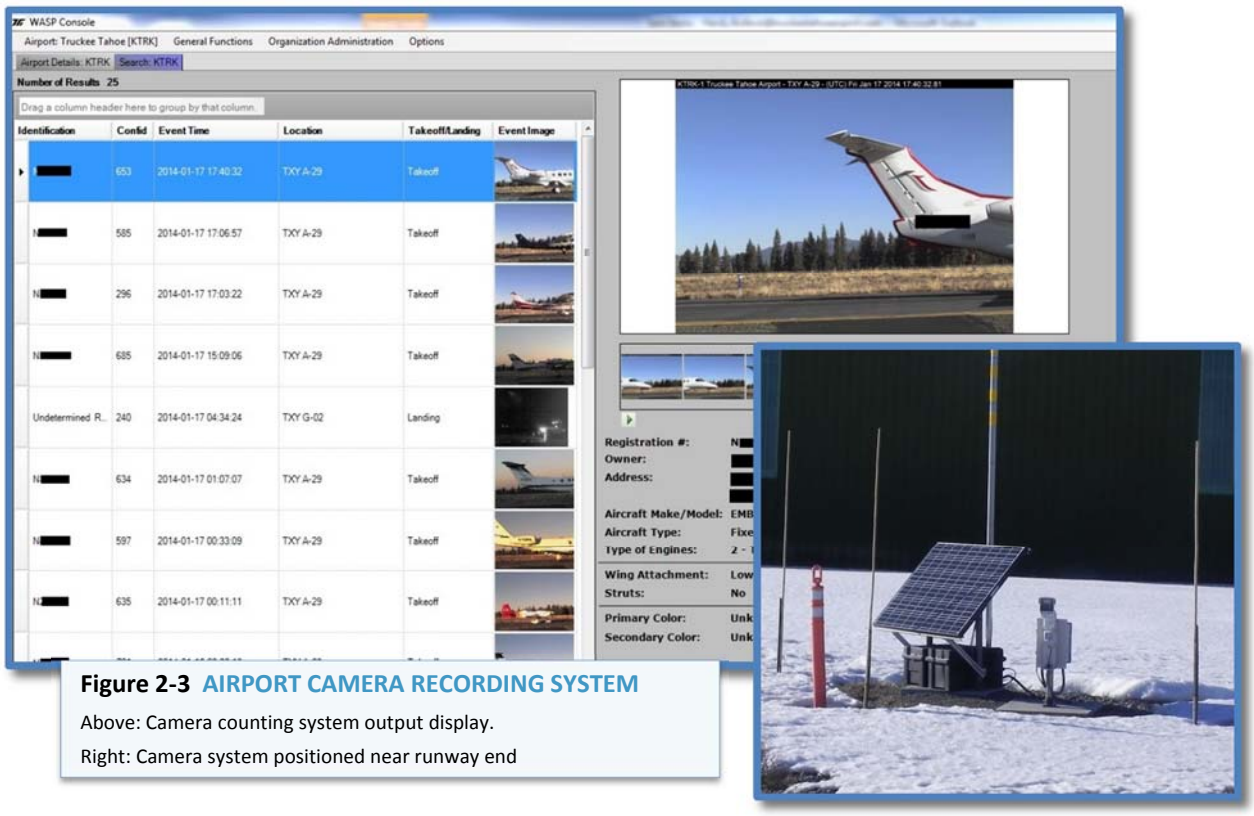


Figure 2-3 AIRPORT CAMERA RECORDING SYSTEM

Above: Camera counting system output display.

Right: Camera system positioned near runway end

The camera system also provides a wealth of reliable data in terms of: aircraft type (including transient aircraft), runway utilization, and nighttime activity. This data is usually not available even at a towered airport. The system, however, does not record arriving aircraft, overflights, low approaches, touch-and-gos, or helicopter flights. Therefore, the operational estimates assume that the number of arrivals is the same as departures in whole and with respect to individual aircraft types. TTAD estimated the additional activity using the multi-lats (radar) tracking system. **Table 2-11** summarizes the recent changes in operational activity. Total annual operations were over 40% higher in 2012 than 2007. The difference between 2007 and 2012, when annualized, is 7.58% per year although actual changes in annual activity fluctuated between positive and negative from year to year. 2010 was the busiest year of the 5-year sample. Included in the activity data is glider activity which comprises flights by non-powered

gliders and the powered tow plane. Total activity related to gliders has averaged about 5,000 operations per year over the sampling period and 5,250 were recorded in 2012. There were also over 1,600 helicopter operations during 2012 approximately half of which are air ambulance. (**Table 2-22** later in this Chapter breaks out operations by aircraft type for 2012.)

Table 2-11 TRK Annual Operations

Year	Itinerant	Local	Total
2007	7,845	10,521	18,366
2008	3,440	9,743	13,183
2009	10,319	10,957	21,276
2010	17,339	12,196	29,535
2011	11,933	11,242	23,175
2012	14,902	11,568	26,470
CAGR	13.69%	1.92%	7.58%

Table Notes:
- Operation: A takeoff or a landing. Each is a single operation.
- Itinerant: Aircraft operations between airports.
- Local: Aircraft operations occurring at or near the airport and not involving another destination. At TRK, these include touch-and-go practice, glider flights, and glider-tow operations.
- CARG: Compounded annual growth rate.
- Source: TRK Records interpreted by Mead & Hunt, Inc.

As can be expected, TRK experiences significant seasonal variations in activity (see **Figure 2-4**). Peak operational activity occurs during the summer; July is the busiest month. During the winter turbo-prop, turbo-jet and helicopter operations comprise between 40% and 50% of the operating mix. The winter peak occurs in February.

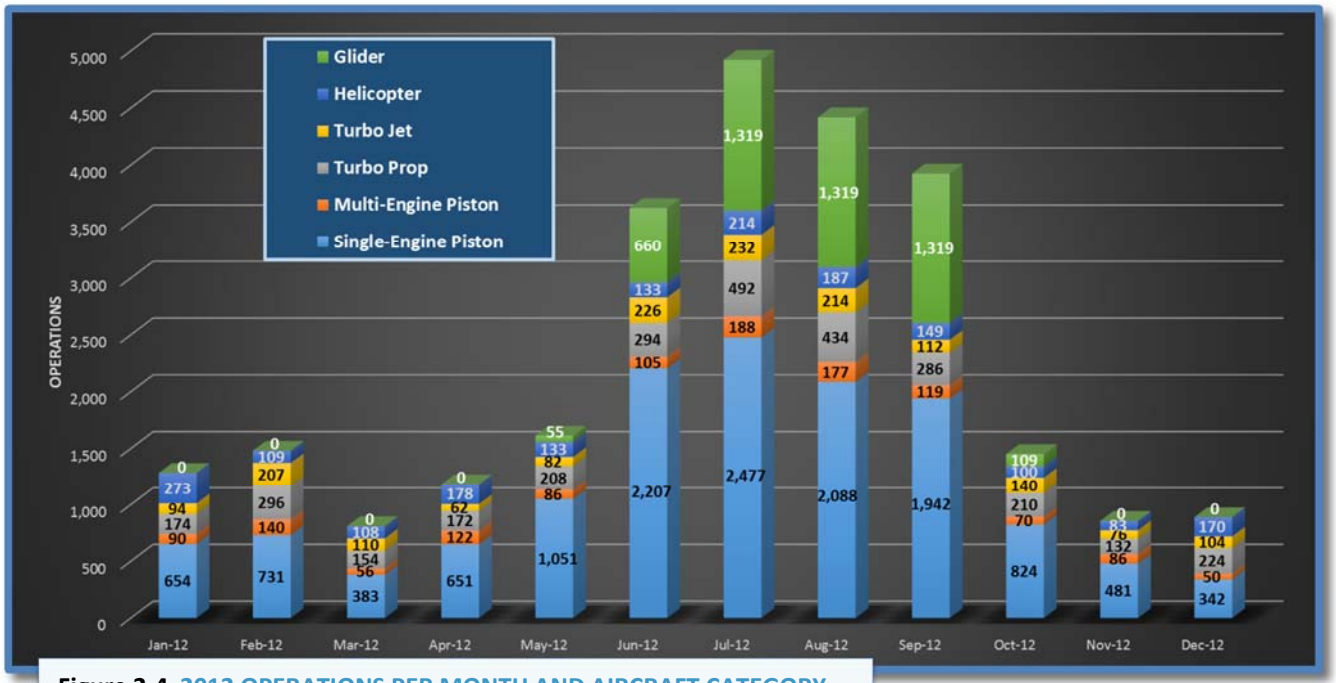


Figure 2-4 2012 OPERATIONS PER MONTH AND AIRCRAFT CATEGORY

7. DEMAND INFLUENCES

Aviation activity at TRK is influenced by a unique combination of market demand, policy restrictions, and facility constraints. This section describes the influence that each has on existing and future demand to be accommodated at TRK.

7.1 Market Demand

Truckee has always been and will continue to be a desired location to visit and visit regularly. The profile of seasonal visitors is changing to encompass a larger radius (e.g., from the Bay Area to Los Angeles). Increasingly, with changes in technology combined with local initiatives to diversify the economy, the area is also becoming a place to live and work year round. This changing socio-economic profile will likely be reflected in the airport's activity, which should also be expected to increase proportionally and experience a gradual flattening of the high/low activity cycles.

Also of note is the area's access to high income/wealth individuals, a highly educated contributing population, and a comparatively high percentage of business owners and company managers. These individuals have a higher propensity to travel more frequently, own aircraft, and use chartered flight services than the general population. Continued socio-economic growth of the area will likely result in additional demand for based aircraft, particularly turbo-props and turbo-jets, and increased operations by these aircraft types, the combination of which could include based aircraft flights by the owner and chartered transient operations.

The volume of light piston airplanes have been declining for several decades as airplane retirements have outpaced new deliveries. This change is being experienced at TRK; there are some vacant T-hangar units. Although nationally the rate of decline is slowing, recovery of this segment will be slow through the 2025 planning horizon. Generally, increases in light piston demand would be supported by modest increases in population and/or a reduction in storage capacity elsewhere (i.e., closure of a nearby airport or redevelopment that reduces storage capacity, such as the removal of hangars).

7.2 Policy Restrictions

The District operates TRK as a "Community Airport" that places significant emphasis on influencing off-airport visual, noise, and perceived safety impacts associated with overflights, takeoffs, and landings. There are presently several volunteer incentives to dissuade nighttime operations with discussions now focusing on ways to extend these programs to transient operators. Likewise, the District does not wish to encourage all-weather operations by pursuing lower approach minimums. Recent discussions have included the degree to which an internally heated, air/chemical-spray or infrared deicing facility might incentivize all-weather activity and how to minimize that potential if such a facility were pursued. Supporting all of these efforts is TRK's own challenging flight environment (i.e., high altitude, surrounding mountains, and fast-changing weather patterns) that dissuades much of this activity. For example, nighttime activity is significantly lower [as a percentage of total operations] than those of a typical lowland airport. Various questions raised during this master plan process included:

- **Will increased use by turbo-prop and turbo-jets, particularly transient operators, increase nighttime and all-weather operations?**
- **What impact might new technologies and weather aids such as GPS-navigation, synthetic vision, other flight automation enhancements, surface and/or mountain peak weather monitoring, radio-repeater or data-link enhancements, and wing/engine design improvements have on nighttime and all-weather operations?**

- **Will aircraft using the airport get any larger; how can this be prevented at TRK?**

Currently, TRK experiences limited nighttime operations. The District is committed to monitoring potential increases in nighttime activity that may result from increased use of advanced aircraft systems and performance. Some examples include: synthetic vision, enhanced wing/airframe design, and engine performance enhancements. The District will periodically reevaluate its operational incentive programs and policies to address increases in nighttime activity over time.

TRK currently receives infrequent operations by the largest airplanes in the general aviation fleet. These operations can be accommodated with the facilities that are in place today. Because the higher end business jet market desires access to smaller airports such as TRK, there is a marketplace incentive for airplane purchasers and manufacturers to moderate the physical size of the aircraft. For this reason, the maximum size of aircraft expected to use TRK is not expected to increase beyond what is already present. Marketplace emphasis is instead expected to concentrate on engine, wing, emissions, and noise performance enhancements. That said, operations by these and smaller turbo-prop and turbo-jet aircraft are expected to increase as a percentage of total operations. When combined with the potential for further declines in small piston airplane operations, the result will be an increase in the average aircraft size. The average increase in aircraft size is a national trend that may be unavoidable. For most general aviation airports, these anticipated changes in the fleet mix have crucial financial, facility design, operational, and community implications.

7.3 Facility Constraints

The airside (i.e., runway-taxiway) environment does not impose significant constraints to operational demands: the runways are sufficiently long enough to accommodate the aircraft that wish to access TRK. Although there is no significant demand for use by heavier aircraft, the pavement strength is only sufficient to accommodate current aircraft. Airfield pavements cannot accommodate regular use by airline or airliner-type business jets; pavement strengthening would be necessary.

TRK's primary constraints are on the landside (i.e., hangars and apron) environment. At the time this master plan was being prepared, there were 15 airplanes on a waiting list for "executive" or "box" hangars. These hangars are larger than the T-hangars that house primarily light piston aircraft. The lack of sufficient hangar space constitutes a constraint on "natural" demand that would otherwise be in place today. Housing more aircraft would contribute to additional operational activity. However, in some cases the demand for larger aircraft is from current operators of smaller, piston aircraft. In this case, larger aircraft would replace the smaller piston aircraft and result in a net-zero increase in operations.

Other constraints relate to all-weather capability such as instrument approach procedures and deicing capability. The approach minimums are high, essentially providing for a descent through a cloud layer and landing in semi-visual conditions (more than 1-mile visibility). Likewise, TRK does not have a deicing facility that would enable continued operations during a winter storm. The combination high approach minimums and lack of deicing likely contributes to a portion of planned flights diverting to another airport or cancelling a trip. Other operators, such as air charter operators in general, may conduct additional drop off / pick up operations or reposition to other airports. In these cases, the operator is avoiding snow/ice accumulation during day-long or overnight stopovers.

8. AVIATION FORECASTS

This section details the analysis undertaken to derive a preferred forecast of aviation demand. The forecasts will be used in subsequent sections of this master plan to derive demand-driven facility requirements and also to assess

potential operational impacts. Aviation activity at TRK consists of two primary components: the number and type of aircraft to be based at the airport and the operations (i.e., takeoffs and landings). The peaking characteristics of both components are also particularly important since the airport experiences particularly dramatic changes between seasonal highs and lows.

8.1 Based Aircraft Forecasts

Based aircraft are the aircraft that are located, or based, at TRK (The term 'based aircraft' in this plan refers to aircraft that are stored at the Airport, either permanently or seasonally and should not be confused with aircraft that are based at TRK for tax purposes). As mentioned, TRK experiences significant seasonal fluctuations in activity, including the number of aircraft that are stored at the airport. **Currently, 66% of the based aircraft are stored at the airport year-round. However, the combined seasonal and home-based aircraft pay for facilities on a year-round basis. Therefore, the forecasts assess total based aircraft which most accurately reflect the airport's storage facility needs.** It is also expected that a higher proportion of aircraft will base permanently at TRK rather than seasonally in the future.

Two primary methods were used to estimate demand for based aircraft through 2025. Method #1, Total Based Aircraft Method, first projects the demand for total aircraft and then breaks the total projection into aircraft categories. Method #2, Aircraft Category Method, is the reverse of the first. It projects growth within the aircraft categories and then combines the estimates to form total demand. To establish initial demand, both methodologies use 202 total based aircraft and 15 wait-listed aircraft to form a total 2013 base-year demand of 217 aircraft. Both methods also attempt to correlate future aviation demand with the growth anticipated within the District. The forecasts also considered how TRK is evolving relative to national aviation trends. Section 8 concludes with a recommended based aircraft forecast for use in gauging operational activity in related to the based aircraft in Section 9 and for estimating aircraft storage needs through 2025 in Chapter 3.

METHOD #1: TOTAL BASED AIRCRAFT METHOD

The first method assumes that total demand for based aircraft will reflect socio-economic growth within the District communities (see Section 3, Regional Analysis). **Table 2-12** identifies a time-trend rate and various socio-economic rates to project a corresponding change in total based aircraft. The home-value variable, which included a growth rate of 8.8%, was discarded since it produced a significantly higher level of growth and because of its overall volatility. The remaining variables were then averaged to produce an annual growth rate of 1.45%.

Table 2-12 Method #1: Total Based Aircraft Demand

Year	Time-Trend	Population	Employment	Household Income	Commercial Floor Space	Combined Average
2013	217	217	217	217	217	217
2015	219	226	221	224	228	219
2020	222	249	233	241	256	240
2025	226	275	245	259	288	258
CAGR[1]	0.350%	2.000%	1.000%	1.500%	2.400%	1.45%

CAGR – Compound Annual Growth Rate, 2013 to 2025
Note: Includes seasonal and year-round based aircraft.

A future fleet mix (as a percentage of total based aircraft) was developed by comparing TRK's 1997 and 2013 mix of aircraft with those of the entire United States General Aviation Fleet. FAA national forecasts were then assessed for applicability at TRK consistent with past trends. **Table 2-13** identifies the fleet mix percentages for 1997, base

year 2013, and future years. Generally speaking, the changes to TRK's based aircraft fleet reflect those of the U.S., except for turbine aircraft (turbo-props and turbo-jets) which have increased more significantly than national trends. Based on TRK's recent trends combined with the regional conditions assessment, this section suggests particularly strong demand to base single-engine piston, turbo-prop, and turbo-jet airplanes relative to the national mix. **Table 2-14** summarizes the based aircraft mix forecast for Method #1 by applying the combined average total demand of Table 2-12 with the TRK specific fleet mix percentages of **Table 2-13**.

Table 2-13 Method #1: Fleet Mix Percentages: TRK / US General Aviation Fleet

Year	SEP		MEP		TP		TJ		HC	
	TRK	US	TRK	US	TRK	US	TRK	US	TRK	US
1997	81.61	68.69	14.35	9.70	3.14	2.65	0.90	3.22	0.00	3.29
2013	71.89	61.60	5.53	7.07	12.44	4.38	7.37	5.39	2.76	4.84
2015	70.82	60.01	5.44	6.94	13.04	4.57	7.89	5.89	2.80	5.27
2020	68.16	57.60	5.22	6.64	14.52	4.89	9.20	6.81	2.90	6.00
2025	65.50	55.34	5.00	6.25	16.00	5.22	10.50	7.87	3.00	6.66

SEP- Single Engine Piston Airplane
MEP- Multi-Engine Piston Airplane
TP- Turbo-Prop Airplane
TJ- Turbo-Jet Airplane
HC- Helicopter (combines piston and turbine engine types)
2013 Base Year includes 15 waitlist aircraft

Table 2-14 Method #1: Based Aircraft Demand Forecast

Year	SEP	MEP	TP	TJ	HC	Total
1997	182	32	7	2	0	223
2013	156	12	27	16	6	217
2015	158	12	29	18	6	223
2020	164	13	35	22	7	240
2025	169	13	41	27	8	258

Note: Includes seasonal and year-round based aircraft.

METHOD #2: AIRCRAFT CATEGORY METHOD

The second method assumes that the aircraft categories will change in a manner that reflects a blend trends that are specific to TRK and those of the U.S. general aviation as a whole. **Table 2-15** compares average annual changes in the TRK based aircraft fleet with those of the U.S. fleet between 1997 and 2012 and shows growth rates for the national fleet from 2013 through 2033, as projected in the FAA's Aerospace Forecast FY 2013-2033.

Table 2-15 Comparison of Annual Changes in Fleet Mix

	SEP	MEP	TP	TJ	HC
TRK[1] 1997-2013	-0.96%	-5.95%	8.80%	13.88%	NA[2]
US GA Fleet[3] 2000-2012	-0.78%	-2.48%	4.41%	4.51%	3.39%
US GA Fleet[3] 2013-2033	-0.25%	-0.63%	1.69%	3.53%	2.67%

1- TRK Fleet mix changes compare 1997 based aircraft with 2013 based aircraft combined with 15 wait-listed airplanes.
2- There were no helicopters based at TRK in 1997 and 6 in 2012 (average growth= 0.4 units / year).
3- Historical and projected U.S. growth rates derived using Table 28, FAA Aerospace Forecast FY 2013-2033.

Table 2-16 applies Method #2 to project TRK's future fleet mix and corresponding total aircraft through 2025. For single-engine piston aircraft, historic annual changes at TRK closely tracked those of the U.S. general aviation fleet. Multi-engine piston aircraft actually declined at TRK at a greater rate than the U.S. general aviation fleet. For Method #2, the projected FAA forecast growth rates were applied to the single-engine and multi-engine piston categories at TRK. The FAA national forecasts were also applied to helicopters given their more recent introduction at TRK.

The rate of growth for turbo-prop aircraft at TRK was two times higher than that experienced nationwide from 2000-2012. The forecasts apply a corresponding factor to the national forecasts to reflect this condition; however, because turbo-prop production is forecast to decline, the rate of growth will be slower than that experienced at TRK between 1997 and 2013. Annual growth associated with turbo-jet storage (including waitlist aircraft) was over three times higher at TRK than nationally. The forecasts assume demand to base jet airplanes at TRK will taper to twice that which is projected for the nation as a whole.

Table 2-16 Method #2: Based Aircraft Demand Forecast

Year	SEP	MEP	TP	TJ	HC	Total
1997	182	32	7	2	0	223
2013	156	12	27	16	6	217
2015	155	12	29	18	6	221
2020	153	11	34	26	7	232
2025	151	11	40	36	8	247

Note: Includes seasonal and year-round based aircraft.

BASED AIRCRAFT FORECAST SELECTION

The two forecasting methods produce noticeably different results. Most notably, demand for single-engine airplane storage increases in Method #1 and decreases in Method #2. Due to this difference the Method #2 also produced a lower total demand for aircraft storage. Demand for turbo-jet storage is also higher in Method #2. The methods produced similar results for multi-engine piston, turbo-props, and helicopters.

The purpose of the forecast analysis is to provide a realistic framework from which to gauge future facility needs, financial impacts, and policy. Both methods are valid for accomplishing this goal. Given the regional analysis, there is strong likelihood that socio-economic growth in the area will help maintain demand for piston aircraft similar to what is in place today. Likewise, it is assumed that demand for turbo-props and jet storage will continue to increase, but that the demand will likely be tapered by local policies and the need to develop the storage units needed to accommodate the demand. The recommended forecast, included in **Table 2-17**, blends methods 1 and 2 to better balance the nationally projected declines in piston aircraft and the historically higher than average demand for turbo-prop and turbo-jet storage.

Currently, 66% of the based aircraft are stored at the airport year-round. However, the combined seasonal and home-based aircraft pay for facilities on a year-round basis. Therefore, the forecasts assess total based aircraft which most accurately reflect the airport's storage facility needs. **Table 2-17 includes permanent (aircraft in the FAA's National Based Aircraft Inventory Program) and seasonal based aircraft.**

Table 2-17 Selected Based Aircraft Demand Forecast

Year		Single Piston		Multi Piston		Turboprop		Turbojet		Helicopter		Total	
2013	Total	156		12		27		16		6		217	
	Based / Seasonal	104	52	8	4	18	9	11	5	4	2	145	72
2015	Total	157		12		29		18		6		222	
	Based / Seasonal	105	52	8	4	19	10	12	6	4	2	148	74
2020	Total	158		12		34		24		7		235	
	Based / Seasonal	105	53	8	4	23	11	16	8	5	2	157	78
2025	Total	160		12		41		32		8		253	
	Based / Seasonal	106	54	8	4	27	14	21	11	5	3	167	86

8.2 Aircraft Operations Forecast

The methodologies used for projecting aircraft operational activity at an airport are similar to ones used to project based aircraft demand. Aircraft operations are generally divided into two separate components: itinerant and local. Itinerant operations occur between airports and, at TRK in particular, are highly influenced by its appeal as a seasonal destination. Itinerant operations are affected by the economy in general. Local operations are those that occur nearby and don't involve another airport. They are highly influenced by light aircraft training activity, such as practice takeoffs and landings, touch-and-go operations, and glider activity. Locally based aircraft make up the majority of local operations.

Historical operation data is presented in Table 2-11 in Section 6 above. As mentioned, operations from 2007 are considered very accurate since TRK installed a camera recording system that records every departure. The camera does not capture touch-and-go activity by fixed wing and helicopter aircraft, and these operations are estimated. For these forecasts, the last complete year of data available is 2012 (26,740 total operations) and this is used for base year data for operations.

Itinerant Operation: Takeoff or landing operations of airplanes going from one airport to another airport that involves a trip of at least 20 miles.

Local Operation: Any operation performed by an aircraft that (a) operates in the local traffic pattern or within sight of the tower or airport, or (b) is known to be departing for, or arriving from, flight in local practice areas located within a 20-mile radius of the control tower or airport. *(FAA AC 150/5325-4B)*

Three methods were used to project future operations at TRK: Method #1 focuses on itinerant operations and projects these based on socio-economic factors. Methods 2 and 3 focus on local operations. Method #2 uses the same socio-economic factors as Method #1 while Method #3 estimates future local operations as a function of projected based aircraft.

ITINERANT OPERATIONS

Method #1 assumes changing trends in itinerant operations are a function of economic conditions. From 2007 to 2012, itinerant operations increased at an average annual rate of 13.69%, with 14,902 itinerant operations in 2012. Itinerant operations are not expected to maintain this rate of growth throughout the planning period, but rather grow at rates similar to local socio-economic factors introduced in Section 4 above.

Method #1 looks at the economic indicators associated with the local economy and projects itinerant operations at rates between 1.0% and 2.4% per year. For instance, population growth in the region is projected at 1.0%, so this rate is applied to itinerant operations. The selected itinerant operation forecast uses an average of the socio-economic growth rates (1.725%). Each of the variable rates and selected forecast in itinerant operations are summarized in **Table 2-18**.

Table 2-18 Method #1: Itinerant Operations: Socio-Economic Growth

Year	Population	Employment	Household Income	Commercial Floor Space	Selected Master Plan Forecast
2012	14,902	14,902	14,902	14,902	14,902
2015	15,814	15,354	15,583	16,001	15,687
2020	17,460	16,137	16,787	18,015	17,087
2025	19,277	16,960	18,084	20,284	18,612
CAGR[1]	2.000%	1.000%	1.500%	2.400%	1.725%

1. CAGR – Compound Annual Growth Rate, 2012 to 2025

LOCAL OPERATIONS

Local operations include glider activity, training flights, and miscellaneous activity such as low/missed approaches and aborted takeoffs and landings. From 2007 to 2012, local operations increased at an average annual rate of 1.92%, with 11,568 local operations in 2012. Glider activity remained relatively constant over this time. For local forecasts, it is assumed that glider and glider-tow activity will remain constant through 2025 (about 5,250 per year). So while glider operations are considered local, these are removed from projections in Methods 2 and 3, and then re-included in the local operations summary table.

Method #2 for projecting local operations is based on population growth and shown in **Table 2-19**. This scenario projects growth in local operations (of powered aircraft) based on the population growth rate of 2.0%.

Table 2-19 Method #2: Local Operations: Population Growth

Year	Local[1]		
	SEP	MEP	Total[2]
2012	5,694	624	6,318
2015	6,043	662	6,705
2020	6,671	731	7,403
2025	7,366	807	8,173
CAGR	2.000%	2.000%	2.000%

1. Local operations are primarily practice training activity being conducted by single and multi-engine piston airplanes.
2. Excludes glider activity and operations by the glider tow-plane.

Method #3 projects local operations as a function of based aircraft. This method reflects the national decline in the types of aircraft (piston) that perform local training flights for which there has also been a declining number of operations per aircraft.

At most airports, the majority of local operations are those being conducted by locally based aircraft. TRK camera counts taken from June 28 through July 8, 2012 were analyzed to determine that single-engine airplanes account for 90.12% of piston activity; the remainder are multi-engine piston airplanes. A ratio of local operations per based aircraft per year was then derived using based aircraft and operations records for 2012: 36.5 for single-engine piston and 52 for each multi-engine piston. These ratios were held constant and applied to the selected based aircraft forecast (Table 2-17) to estimate future local activity being conducted by piston aircraft. The results of Method #3 are detailed in **Table 2-20**.

Table 2-20 Method #3: Local Operations: Based Aircraft Growth

Year	Based SEP[1]	SEP Local Operations[1]	Based MEP[1]	MEP Local Operations[1]	Total Local Operations[2]
2012	156	5,694	12	624	6,318
2015	157	5,720	12	624	6,344
2020	158	5,784	12	624	6,408
2025	160	5,847	12	624	6,471
CAGR	0.204%		0.000%		0.184%

1. Local operations are primarily practice training activity being conducted by single and multi-engine piston airplanes.
2. Excludes glider activity and operations by the glider tow-plane.

SELECTED LOCAL FORECASTS

Method #2 uses 2.0% CAGR for local piston operations and Method #3 uses 0.184%. The selected forecast for local powered operations uses an average between the two methods: 1.092% CAGR. This rate is applied to both single-engine and multi-engine piston aircraft. The selected local operations are presented in **Table 2-21**, and include glider operations which are not expected to grow throughout the planning period.

Table 2-21 Selected Local Operations Forecast

Year	Glider[1]	Powered Local[2]			Total Local
		SEP	MEP	Total	
2012	5,250	5,694	624	6,318	11,568
2015	5,250	5,883	645	6,527	11,777
2020	5,250	6,211	681	6,892	12,142
2025	5,250	6,558	719	7,276	12,527
CAGR	0.000%	1.092%	1.092%	1.092%	0.614%

1. Glider activity includes glider operations and the operations by the glider tow-plane. No growth projected.
2. Other Local Operations are primarily practice training activity being conducted by light single and multi-engine piston airplanes.

SELECTED OPERATION FORECASTS

Selected forecasts for itinerant operations (Table 2-18) and local (Table 2-21) are separated into operations by aircraft type in **Table 2-22**. This table gives a better idea of growth in operations for each aircraft type. As with based aircraft, growth in operations by turboprop and jet aircraft is expected to outpace piston aircraft.

Table 2-22 Selected Operation Forecast: Aircraft Type

Year	SEP		MEP		TP	TJ	HC	Glider[1]	Total
	Itinerant	Local	Itinerant	Local					
2012	8,031	5,694	857	624	2,866	1,532	1,616	5,250	26,470
2015	8,235	5,883	784	645	2,980	2,040	1,647	5,250	27,464
2020	8,971	6,211	854	681	3,247	2,221	1,794	5,250	29,229
2025	9,772	6,558	930	719	3,536	2,420	1,954	5,250	31,139

1. Glider activity includes glider operations and the operations by the glider tow-plane.

In addition to showing operations separated by local and itinerant activity, the selected forecasts are broken out to show operations by based aircraft and transient aircraft in **Table 2-23**. Operations by based aircraft are strictly those by aircraft that hangar at TRK. Transient operations are those by aircraft based at other airports.

Based Operation: Any operation performed by any aircraft based at the airport.

Transient Operation: Any operation performed by any aircraft not based at the airport.

The percentage of 2013 operations that are by based versus transient aircraft are estimated by the airport. For piston aircraft, an estimated 46% of operations are by based and 54% by transient aircraft. For turboprops, the split is 10% based and 90% transient. Jets are 2% based and 98% transient, and helicopter operations are 84% based and 16% transient. It is projected a greater share of jets and turboprops will base at TRK in the future. Therefore, it is expected that operations by based turboprops and jets will increase over time.

Table 2-23 Selected Operation Forecast: Based and Transient Aircraft

Year	SEP		MEP		TP		TJ		HC		Glider[1]	Total	
	Based	Transient	Based	Transient	Based	Transient	Based	Transient	Based	Transient	Based	Based	Transient
2012	6,314	7,412	681	800	269	2,597	22	1,510	1,357	259	5,250	13,893	12,577
2015	6,494	7,624	657	772	328	2,653	102	1,937	1,384	264	5,250	14,215	13,249
2020	6,984	8,198	706	829	455	2,792	178	2,044	1,507	287	5,250	15,079	14,150
2025	7,512	8,818	759	891	530	3,006	290	2,129	1,642	313	5,250	15,983	15,156

1. Glider activity includes glider operations and the operations by the glider tow-plane.

9. PEAKING CHARACTERISTICS

Planning for aviation facilities is often based on peak periods of activity. This is particularly important at TRK because of the seasonal concentration of activity that occurs during the summer combined with a changing operational mix that occurs throughout the year. This section identifies monthly, daily, and hourly peaking characteristics related to transient operations. The information will be helpful for identifying the airport's paved apron needs (summer) and potential overnight/temporary hangar demand (winter). Overnight hangar demand is related primarily to larger air taxi/ business-aviation aircraft for purposes of avoiding snow/ice accumulation or to melt it in advance of a planned departure**. Tables 2-24** and **2-25** project peak summer and winter activity, respectively.

Table 2-24 Summer Peaking Characteristics

	2012			2015			2020			2025		
	Month (July)	Day (÷30)	Hour (15% Day)	Month (July)	Day (÷30)	Hour (15% Day)	Month (July)	Day (÷30)	Hour (15% Day)	Month (July)	Day (÷30)	Hour (15% Day)
ITINERANT:												
SEP	1,138	38	6	1,175	39	6	1,249	42	6	1,324	44	7
MEP	136	5	1	134	4	1	130	4	1	126	4	1
TP	492	16	2	522	17	3	576	19	3	636	21	3
TJ < 12.5k	72	2	0	76	3	0	84	3	0	93	3	0
TJ < 20k	78	3	0	83	3	0	91	3	0	101	3	1
TJ> 20k	82	3	0	87	3	0	96	3	0	106	4	1
HC	214	7	1	227	8	1	251	8	1	277	9	1
TOTAL	2,212	74	11	2,305	77	12	2,479	83	12	2,664	89	13
LOCAL:												
SEP	1,339	45	7	1,358	45	7	1,396	47	7	1,434	48	7
MEP	52	2	0	52	2	0	50	2	0	50	2	0
Glider	1,319	44	7	1,319	44	7	1,319	44	7	1,319	44	7
TOTAL	2,710	90	14	2,729	91	14	2,765	92	14	2,803	93	14
TOTAL:	4,922	164	25	5,034	168	25	5,244	175	26	5,467	182	27
% Annual	18.60%			18.29%			17.83%			17.36%		

Table 2-25 Winter Peaking Characteristics												
	2012			2015			2020			2025		
	Month (February)	Day (÷30)	Hour (15% Day)	Month (February)	Day (÷30)	Hour (15% Day)	Month (February)	Day (÷30)	Hour (15% Day)	Month (February)	Day (÷30)	Hour (15% Day)
ITINERANT:												
SEP	560	19	3	578	19	3	614	20	3	651	22	3
MEP	101	3	1	100	3	0	97	3	0	94	3	0
TP	296	10	1	314	10	2	347	12	2	383	13	2
TJ < 12.5k	91	3	0	97	3	0	107	4	1	118	4	1
TJ < 20k	54	2	0	58	2	0	64	2	0	70	2	0
TJ> 20k	62	2	0	65	2	0	72	2	0	80	3	0
HC	109	4	1	115	4	1	127	4	1	141	5	1
TOTAL	1,272	42	6	1,327	44	7	1,428	48	7	1,536	51	8
LOCAL:												
SEP	172	6	1	178	6	1	188	6	1	200	7	1
MEP	39	1	0	38	1	0	38	1	0	38	1	0
Glider	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	210	7	1	216	7	1	226	8	1	238	8	1
TOTAL:	1,483	49	7	1,543	51	8	1,654	55	8	1,774	59	9
% Annual	5.60%			5.60%			5.62%			5.63%		

10. FORECAST SUMMARY

The forecasts of aviation demand covered in this chapter will form the basis of both facility planning and land use policy at Truckee Tahoe Airport. For reference, **Table 2-26** provides a summary of all aviation projections described in this chapter. Succeeding chapters of this plan will further refine the demand forecasts to translate the forecast demand into specific facility requirements and also to assess potential impacts such as overflights/noise. Activity projections are often used by airport operators and dependent businesses for financial and business planning purposes.

Table 2-26 Forecast Summary				
	2012 (Actual)	2015	2020	2025
BASED AIRCRAFT[1,2]:				
Single-Engine Piston	156	157	158	160
Multi-Engine Piston	12	12	12	12
Turbo-Prop	27	29	34	41
Turbo-Jet	16	18	24	32
Helicopter	6	6	7	8
TOTAL	217	222	235	253
OPERATIONS:				
Itinerant	14,902	15,687	17,087	18,612
Local	11,568	11,777	12,142	12,527
TOTAL	26,470	27,464	29,229	31,139
PEAK CONDITIONS:				
Peak Month (July)	4,922	5,034	5,244	5,467
(% annual)	(18.60%)	(18.29%)	(17.83%)	(17.36%)
Average Day/ Peak Month	164	168	175	182
Peak Hour (15%)	25	25	26	27

1. Based aircraft numbers include executive hangar waitlist to reflect actual demand.
2. Based aircraft totals equal permanent and seasonally based aircraft. Permanent based aircraft mirror what is in the FAA's National Based Aircraft Inventory Program. See Table 2-17 for more detailed based aircraft info.

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