2

FORECAST SUMMARY

July, 2020

SACRAMENTO
COUNTY

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INTRODUCTION

Forecasts of aviation activity have been developed in support of the passenger and cargo demand for Sacramento International Airport. This includes forecasts for enplaned passengers, air cargo, and aircraft operations (air carrier, all-cargo, general aviation, and military operations). The forecasts are "unconstrained" and do not include specific assumptions about physical, regulatory, environmental, or other impediments to aviation activity growth at the Airport. Using Calendar Year (CY) 2018 as the base year, annual forecasts have been prepared for four future demand planning activity levels (PALs):

PAL 1 (2023) , PAL 2 (2028), PAL 3 (2033), and PAL 4 (2038).

The coronavirus pandemic, starting in early 2020, has created conditions for the start of another global recession. Recent economic projections prepared by the UCLA Anderson School of Management (UCLA Anderson Forecast) state that recovery to an employment level equivalent to the last months of 2019 will not occur until late 2022, for California and the entire nation. It is also anticipated that total passenger enplanements will drop by approximately 50% in 2020 and that it will take approximately 5 years for the Airport's passenger enplanements to reach their 2019 peak level.

It is expected that airport development projects will experience an approximate 5- to 10-year delay.

Historical Aviation Activity

Factors Affecting Aviation Demand

Aviation Demand Forecast

A review of the Airport's recent historical aviation activity has a critical role in the development of a forecast. This forecast reviews historical aviation activity data from 1990 or more recent, depending on the analysis and the data that is available. It also identifies conditions of the Base Case Year (2018).

The qualitative and quantitative factors that can influence future aviation activity at the Airport are discussed in this section. These factors are considered, either directly or indirectly, in developing the aviation activity forecasts for SMF.

This section presents forecasts for enplaned passengers, air cargo, aircraft operations, and fleet mix at the Airport. A preferred Base Case Forecast is presented, as well as high growth and low growth scenarios.

2-1 HISTORICAL AVIATION ACTIVITY

A review of the Airport's recent historical aviation activity has a critical role in the development of a forecast. Most importantly it provides a means for comparing the projected growth of the forecast with what has happened in the past. This forecast reviews historical aviation activity data from 1990 or more recent, depending on the analysis and the data that is available. It also identifies conditions of the Base Case Year (2018). A review of enplanements by month over the past five years shows that June has been the most active month for enplanements in four of those years. **Figure 2-1** show a comparison of monthly enplanements by calendar year from 2014-2018.

Figure 2-1 Historical Enplanements by Month (2014 - 2018)
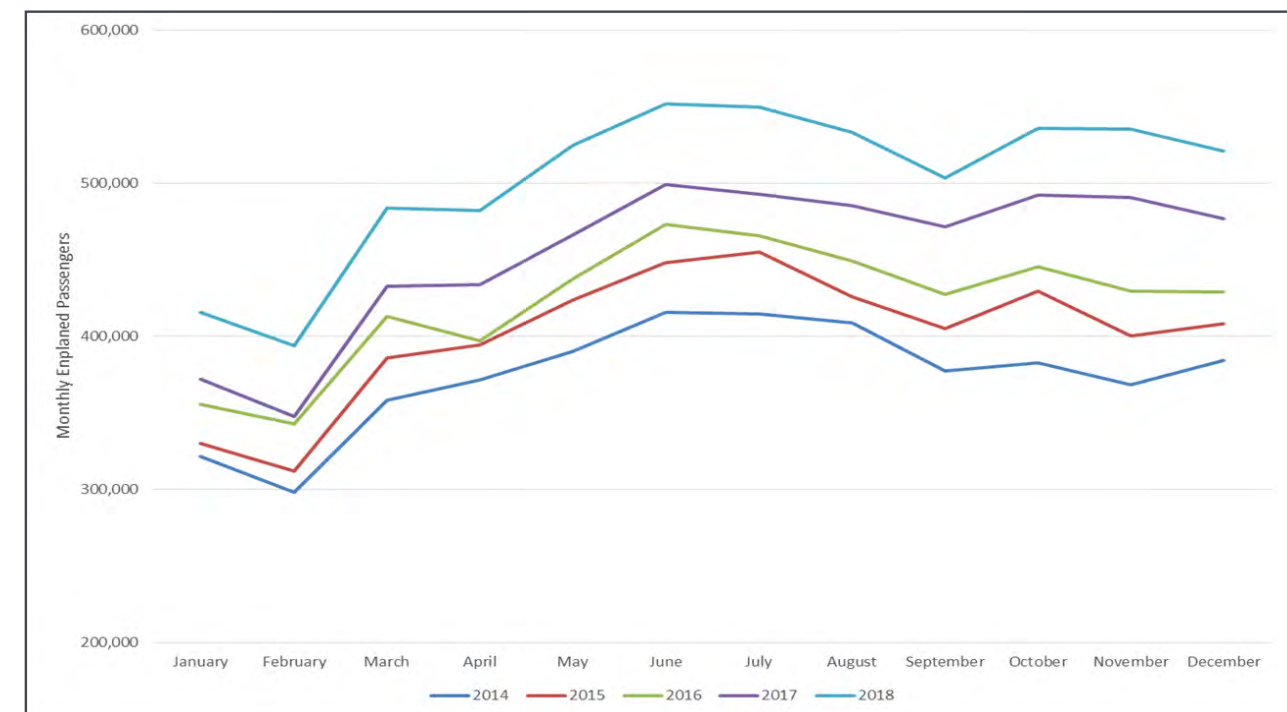
Source: Sacramento County Department of Airports, 2019.

Enplanements

An enplanement indicates a passenger boarding a commercial aircraft at an airport. SMF is primarily an origin & destination (O&D) airport, meaning that passengers generally begin and end their trip in Sacramento, rather than connect through Sacramento to a different destination.

Since 1990, annual enplanements at SMF have increased at a compounded annual growth rate (CAGR) of 4.4% for total enplanements. The Airport experienced a decrease in passenger activity beginning in 2008 lasting until 2013 due to the Great Recession. Since 2013, passenger activity at SMF has continuously increased, reaching previous peak level activity experienced in 2007 by 2017 (**Figure 2-2**).

Air Service

Over the past several years most of the mainline carriers and their regional affiliates operating at SMF have been consistent in sustaining their share of enplanements. The most noticeable differences from 2012 to 2018 resulted from the merger

between American Airlines and US Airways (now operating as American Airlines) and Frontier Airlines leaving SMF in 2013 and returning in late 2018.
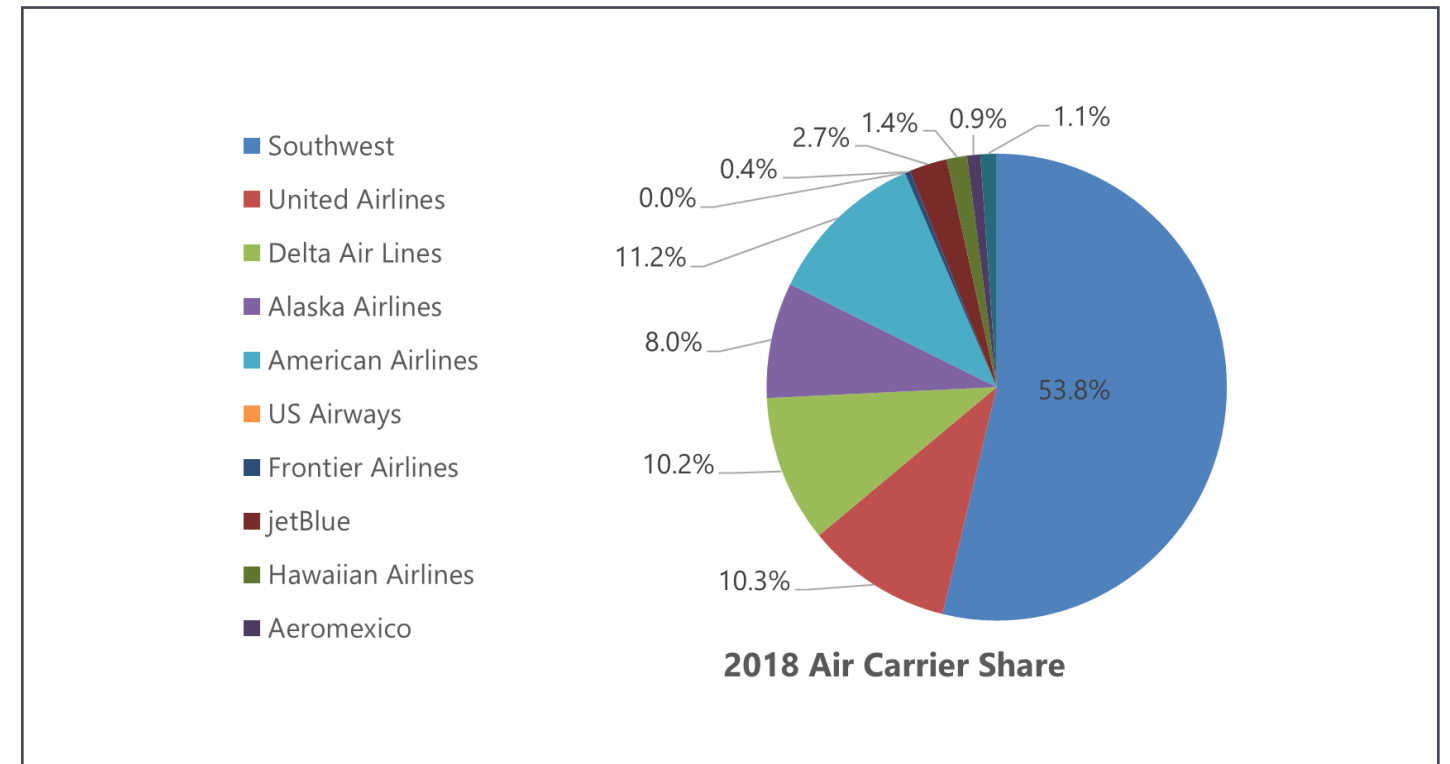
The largest share of enplanements at the Airport in both 2012 and 2018 belonged to Southwest Airlines at 50.9% and 53.8%, respectively. The remaining larger domestic carriers (United, Delta, American/US Airways, and Alaska) make up a large portion of the remaining traffic at SMF, accounting for a combined share of 40.3% in 2012 and 39.7% in 2018 (**Figure 2-3**).

Figure 2-4 displays the domestic destinations served nonstop from SMF in 2018, inclusive of seasonal service. While four 2012 destinations have been dropped over the intervening six years (Arcata/Eureka, Detroit, Palm Springs, and Philadelphia), several long-distance markets have been added since the last passenger forecast was completed for SMF in 2012, which are shown in orange on the figure. SMF served five international destinations in 2018: Cabo San Lucas, Guadalajara, Guanajuato, Mexico City, and Vancouver.
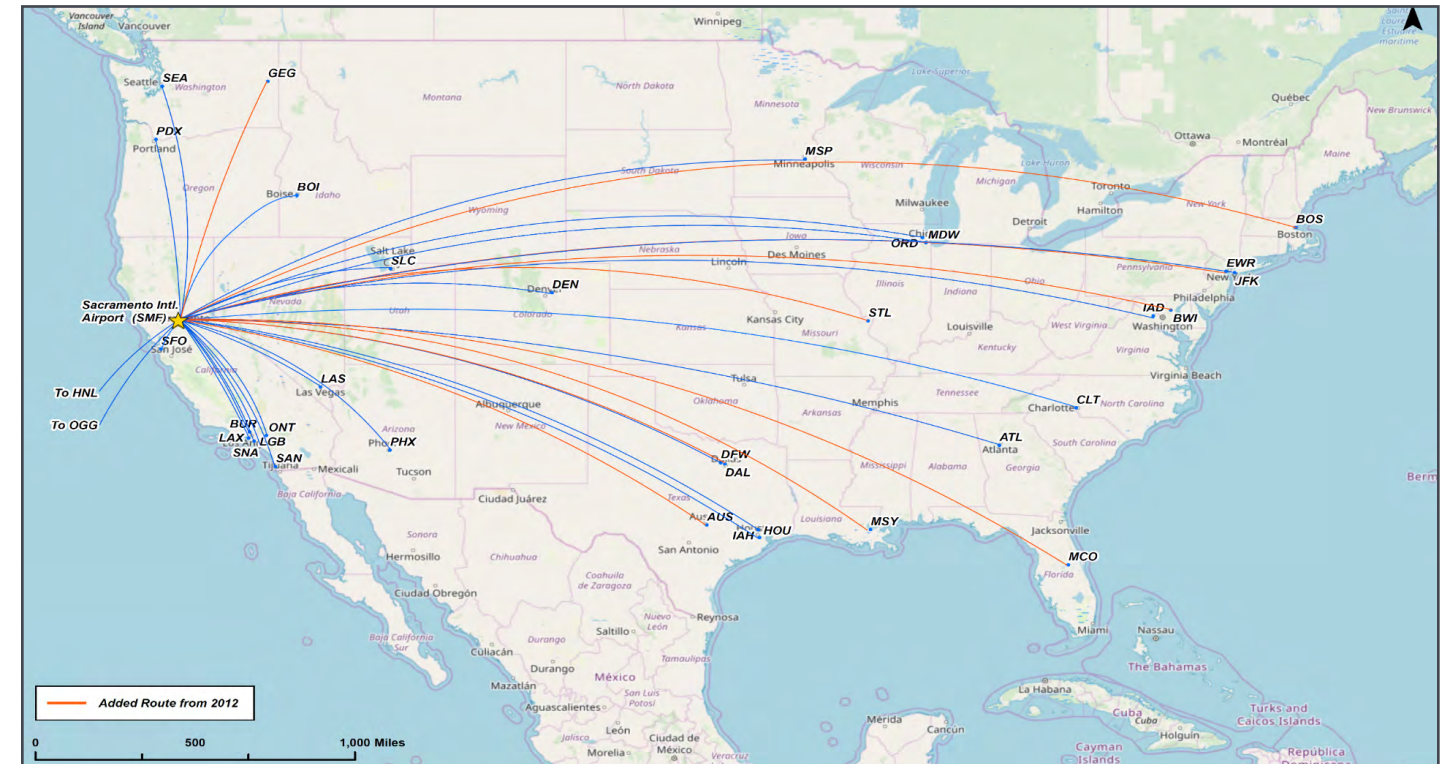
Figure 2-3 Air Carrier Market Share (2018)

Source: Sacramento County Department of Airports, 2019.

Figure 2-2 Historical Domestic Enplanements (1990-2018)

Source: Sacramento County Department of Airports, 2019.

Figure 2-4 Non-Stop Domestic Destinations (2018)

Source: Sacramento County Department of Airports, 2019.

Air Cargo

Prior to 2017, SMF was primarily served by two all-cargo airlines: Federal Express (FedEx) and Westair Industries. Between 2011 and 2016 three other cargo operators (Airborne Express, Ameriflights, and UPS) operated out of SMF on a limited basis. In the Sacramento region, UPS operates primarily at Mather Airport.

Starting in October 2017, contracted cargo operators working with Amazon began service into SMF on a sustained basis, growing from 7,000 tons of total cargo freight in the last quarter of 2017, to nearly 51,000 tons in calendar year 2018. The addition of Amazon cargo at SMF increased total cargo tonnage at the Airport by 73% between 2016 and 2018.

Prior to 2018, total air cargo at SMF reached a peak in 2007. After the effects of the recession in 2008, air cargo remained relatively stable, between 63,800 and 68,600 metric tons from 2010 until 2016 (**Figure 2-5**).

Aircraft Operations

Aircraft operations, defined as either a takeoff or a landing by an aircraft are typically stratified into three categories: commercial, general aviation, and military operations.

While total commercial operations have fluctuated and have increased 10% from 108,000 in 2000 to 118,900 in 2018, the growth in commercial operations has been entirely in the air carrier category as air taxi/commuter operations have decreased nearly 45% over the same time period. In addition, passenger enplanements have increased by 52% over the same time period.

General Aviation (GA) operations since 2003 have decreased 74% from 34,700 to 8,900. Military operations at SMF have averaged approximately 3,100 annual operations between 2003 and 2018. In 2018, military operations totaled 2,215. **Figure 2-6** presents the summary of aircraft operations at SMF, by category, between 2003 and 2018.

Figure 2-5 SMF Historic Air Cargo (2003-2018)
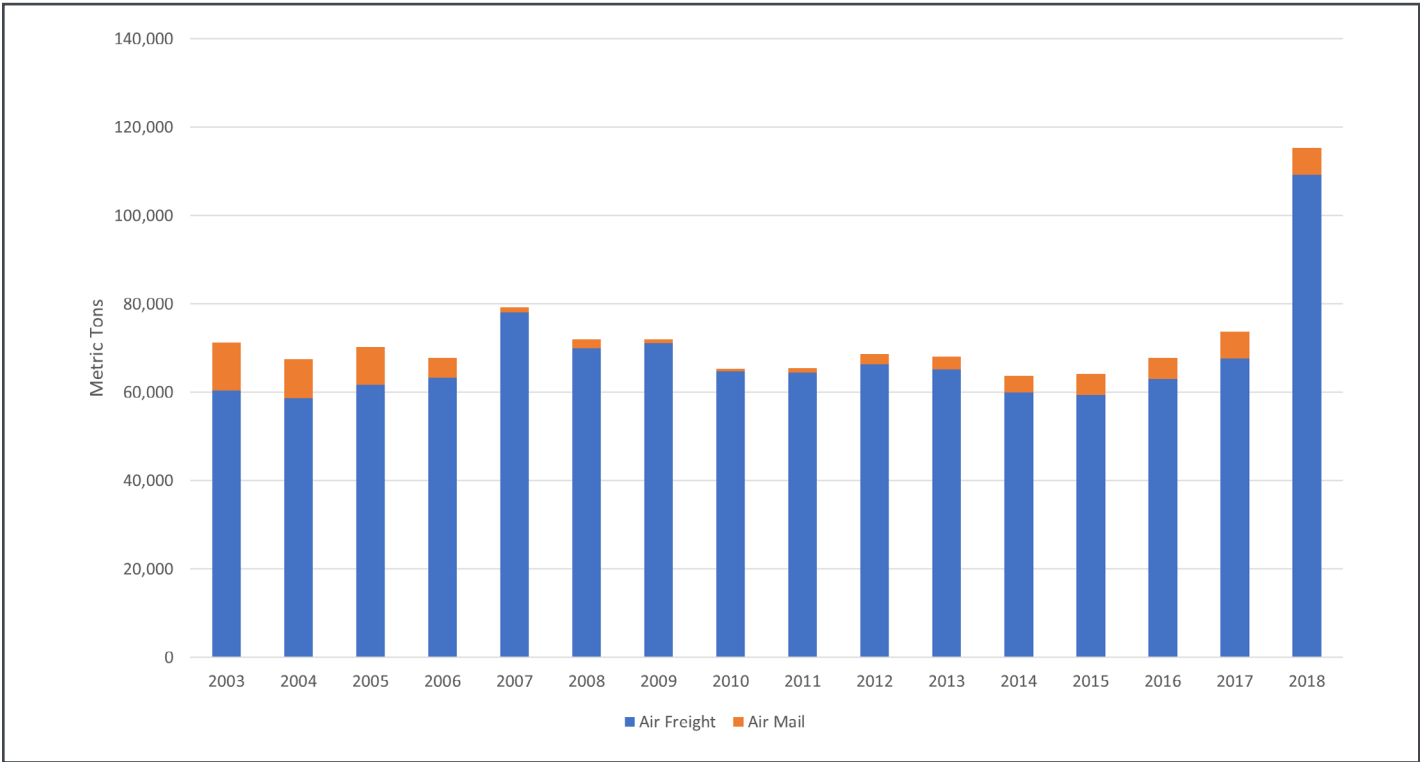
Source: Sacramento County Department of Airports.

Figure 2-6 Historic Aircraft Operations by Category (2003-2018)
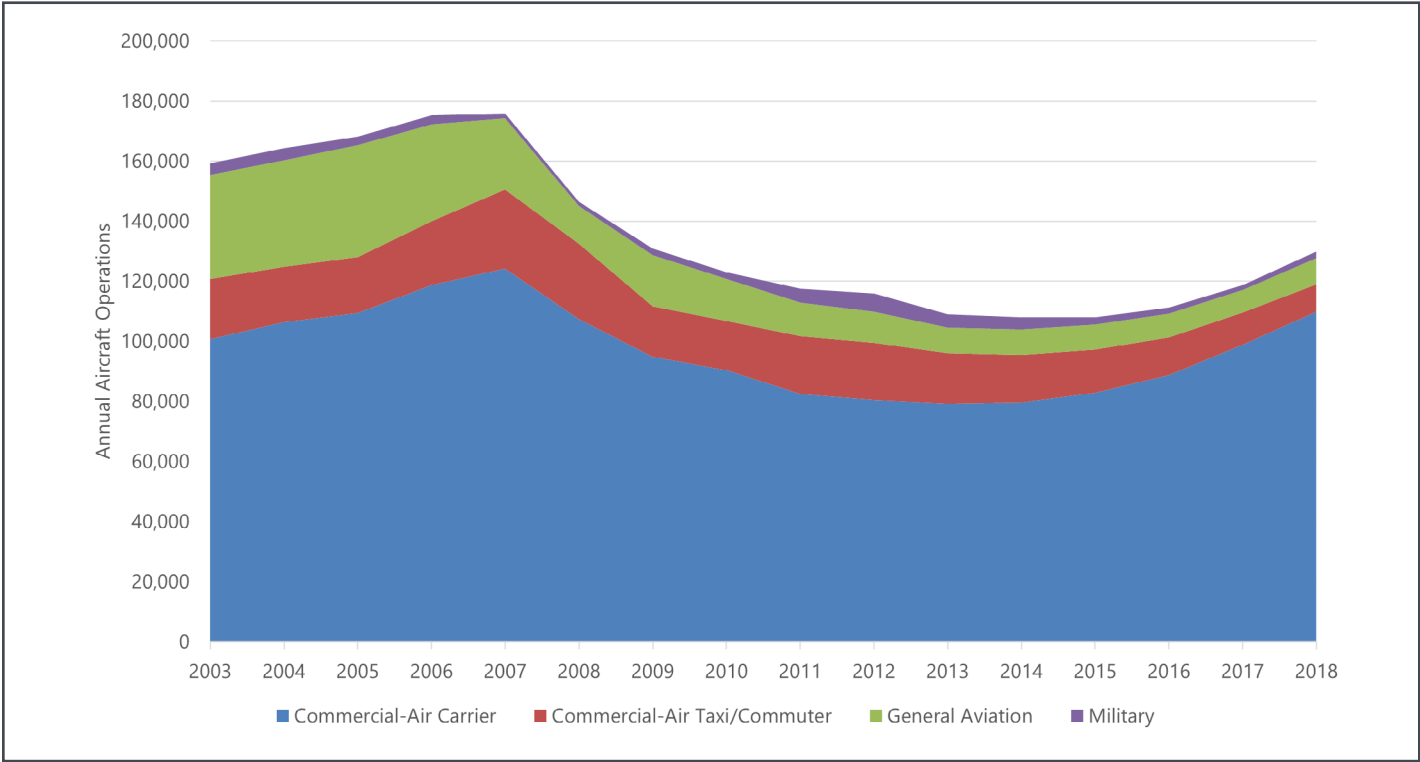
Source: FAA OPSNET, 2019.
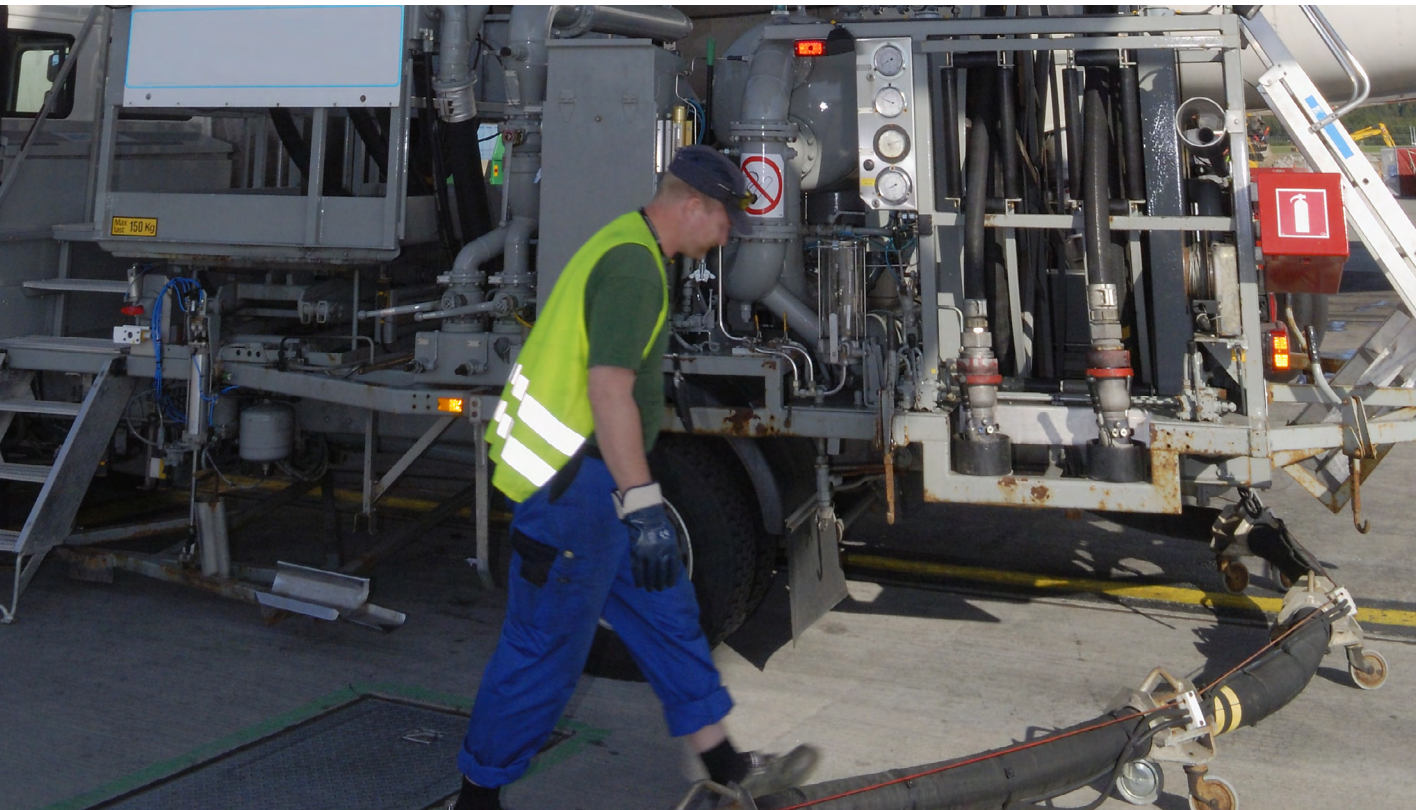
2-2 FACTORS AFFECTING AVIATION DEMAND

The qualitative and quantitative factors that can influence future aviation activity at the Airport are discussed in this section. These factors are considered, either directly or indirectly, in developing the aviation activity forecasts for SMF. **Table 2-1** summarizes the values of the projected socioeconomic variables for the forecast horizon years out to 2038.

Table 2-1 Forecast - Key Socioeconomic Variables (2018-2038)

|	2018	2023	2028	2033	2038
Sacramento Region					
Total Population	2,620,519	2,762,504	2,909,356	3,055,675	3,194,217
Total Employment	1,498,730	1,619,093	1,743,588	1,866,309	1,978,885
Personal Income Per Capita	$46,996	$49,940	$52,749	$55,011	$56,927
Gross Regional Product (millions)	$124,575	$136,802	$149,677	$162,725	$175,217
State of California					
Total Population	40,020,786	42,083,206	44,209,830	46,318,410	48,299,773
Total Employment	24,479,790	26,414,198	28,350,837	30,219,539	31,907,896
Personal Income Per Capita	$52,550	$55,660	$58,542	$60,872	$62,882
Gross Regional Product (millions)	$2,493,298	$2,737,861	$2,990,595	$3,246,069	$3,493,551
United States					
Total Population	328,910,940	344,505,124	360,689,467	376,816,133	392,026,522
Total Employment	202,637,900	217,444,775	232,064,789	246,223,311	259,305,819
Personal Income Per Capita	$54,095	$57,597	$60,873	$63,568	$65,984
Gross Domestic Product (millions)	$20,656,977	$22,632,504	$24,671,615	$26,753,810	$28,819,660

Source: Woods & Poole, Inc., 2019

Airport Service Area

Establishing an accurate airport service area is a critical first step to a forecast, as it provides the extent to which commercial passengers can be anticipated to originate from. Understanding this area provides the necessary foundation for determining what socioeconomic data should be used in forecast models, so that the projections are accurately defined by the characteristics of the people served.

The 2013 Aviation Demand Forecast and catchment area study produced an in-depth and thorough analysis of what it considered the SMF Service Area, by developing primary and secondary service areas related to catchment areas that were built off a drive-time analyses, population densities, access costs, passenger preferences, and airfares of SMF and four other commercial airports: San Francisco International Airport (SFO), Oakland International Airport (OAK), Mineta San Jose International Airport (SJC), and Reno-Tahoe International Airport (RNO). The results of the analysis identified Primary and Secondary Service Areas for SMF, outlined below and shown on **Figure 2-7**.

The Primary Service Area of SMF includes the counties of:

- El Dorado
- Sutter
- Placer
- Yolo
- Sacramento
- Yuba
- San Juaquin

The Secondary Service Area of SMF includes the counties of:

- Amador
- Nevada
- Butte
- Shasta
- Calaveras
- Solano
- Colusa
- Stanislaus
- Glenn
- Tehama
- Napa

Key Socioeconomic Indicators and Trends

The Sacramento-Roseville Combined Statistical Area (CSA) (or the Sacramento Region) was selected as an appropriate source of historical and projected socioeconomic data for the region and the Airport. The 2018 Sacramento-Roseville CSA , which includes the California counties of El Dorado, Nevada, Placer, Sacramento, Sutter, Yolo, and Yuba, closely resembles the Airport's Primary Service Area .

The economy of the Sacramento Region plays a vital role and has a direct impact on long-term passenger and cargo demand at SMF. In general, there is a correlation among areas with greater populations, employment, Personal Income Per Capita (PIPC), and Gross Regional Product (GRP) and a strong aviation service demand. Specifically, these key socioeconomic indicators or drivers tend to have an influence on O&D enplanements and their future projections.

Figure 2-7 SMF Service Area Map

Sacramento International Airport Service Area

Legend
- Primary Service Area
- Secondary Service Area
- Outside Service Area
- Major Air Carrier Airport
- Other Airport

RS&H

Source: SMF Aviation Demand Forecast, 2013; RS&H, 2019
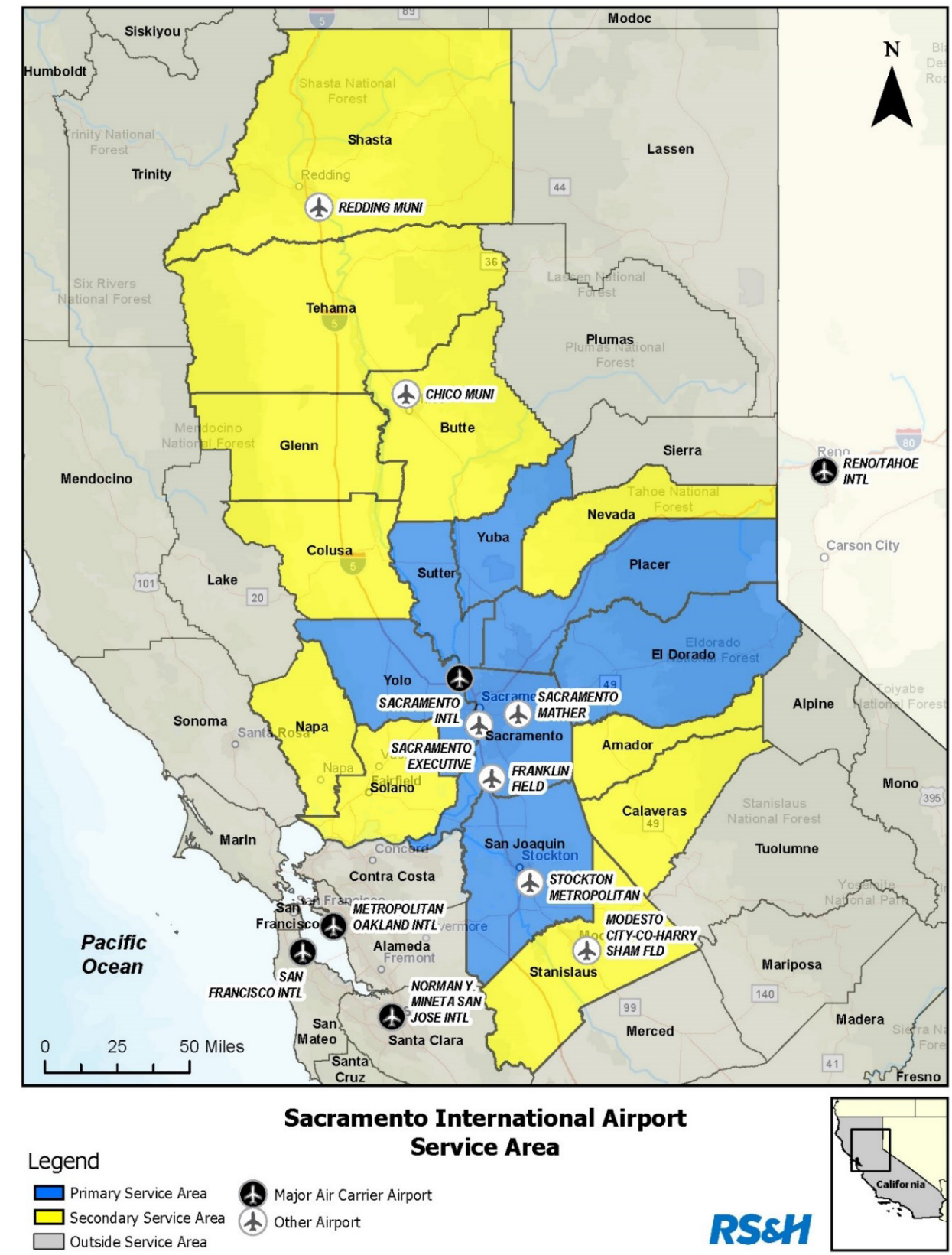
Historical Analysis

The results of the historical socioeconomic analysis showed that from 1990 to 2018 the key variables for the Sacramento Region all increased at rates higher than the state of California and the U.S., except for PIPC in which the Average Annual Growth Rates (AAGR) of the Sacramento Region and the U.S. were the same at 1.7%, and the state of California was slightly higher at 1.8%.

Figure 2-8 shows a comparison of the AAGR for the key socioeconomic variables from 1990-2018.

Forecast Analysis

While still showing AAGRs that increase over the next 20 years, the socioeconomic forecast analysis for 2019-2038 projects slower growth in each key variable compared to the rates of growth in the historical analysis.

The forecast for the Sacramento Region's population growth, while slight, has a greater AAGR (1.0%), than the state of California and the U.S. (0.9%). Similarly, the forecast for employment of the Sacramento Region (1.4%) AAGR is slightly greater than the state of California (1.3%) AAGR, and U.S. (1.2%) AAGR. The forecast of PIPC for the Sacramento Region and the U.S is identical at 1.0% AAGR, compared to the state of California which is slightly less at 0.9% AAGR. The forecast for GRP projects identical growth rates for the Sacramento Region, state of California, and U.S. at (1.7% AAGR).

Figure 2-9 shows a comparison of the AAGR for the key socioeconomic variables projected for 2019-2038.

E-Commerce Trends

Cargo operations and freight tonnage have increased significantly at SMF with the introduction of contracted cargo operators working with e-commerce companies such as Amazon on a sustained basis. Amazon's activity at the Airport is supported by the Fulfillment Center located along Power Line Road immediately east of the Airport. Since starting operations in the last quarter of 2017, cargo tonnage associated with Amazon operations is responsible for 54% of the cargo growth at SMF in 2017, and 99.8% of all cargo tonnage growth in 2018.

Since 2015, commercial service airports have experienced strong air cargo tonnage growth due to e-commerce operators. Airports that have been selected as network operations for contracted cargo operators working with Amazon are experiencing even higher growth rates. The Amazon national hub at Cincinnati/Northern Kentucky (CVG) is rapidly expanding, with its air cargo facilities anticipated for completion in 2020. Beyond CVG, Amazon and its contracted cargo operators have established operations at 26 other airports nationwide since 2016. SMF along with Stockton Metropolitan Airport are the only Amazon destinations in the Central/Northern California and Nevada region. The next closest destinations are Ontario International and March Air Reserve Base near the City of Riverside to the south of Sacramento (390 and 410 miles, respectively), Portland International to the north (480 miles), and Denver International to the east (910 miles).

If air cargo expansion continues to grow for Amazon, so will its available fleet of aircraft. News stories in 2019 outlined the planned expansion from 50 aircraft (a mix of Boeing 737 and 767 freighters) to 70 aircraft beginning in 2020. Given this reported expansion in both fleet capabilities and airport cargo facilities, it is reasonable to estimate that cargo growth due to Amazon and other e-commerce businesses will continue to be strong over the next several years. As Amazon and its contracted cargo operation begins to mature in its services and capabilities, growth may subside to more typical levels experienced in the industry prior to this latest boom.

Figure 2-8 Historical Growth Rates of Socioeconomic Predictors (1990-2018)
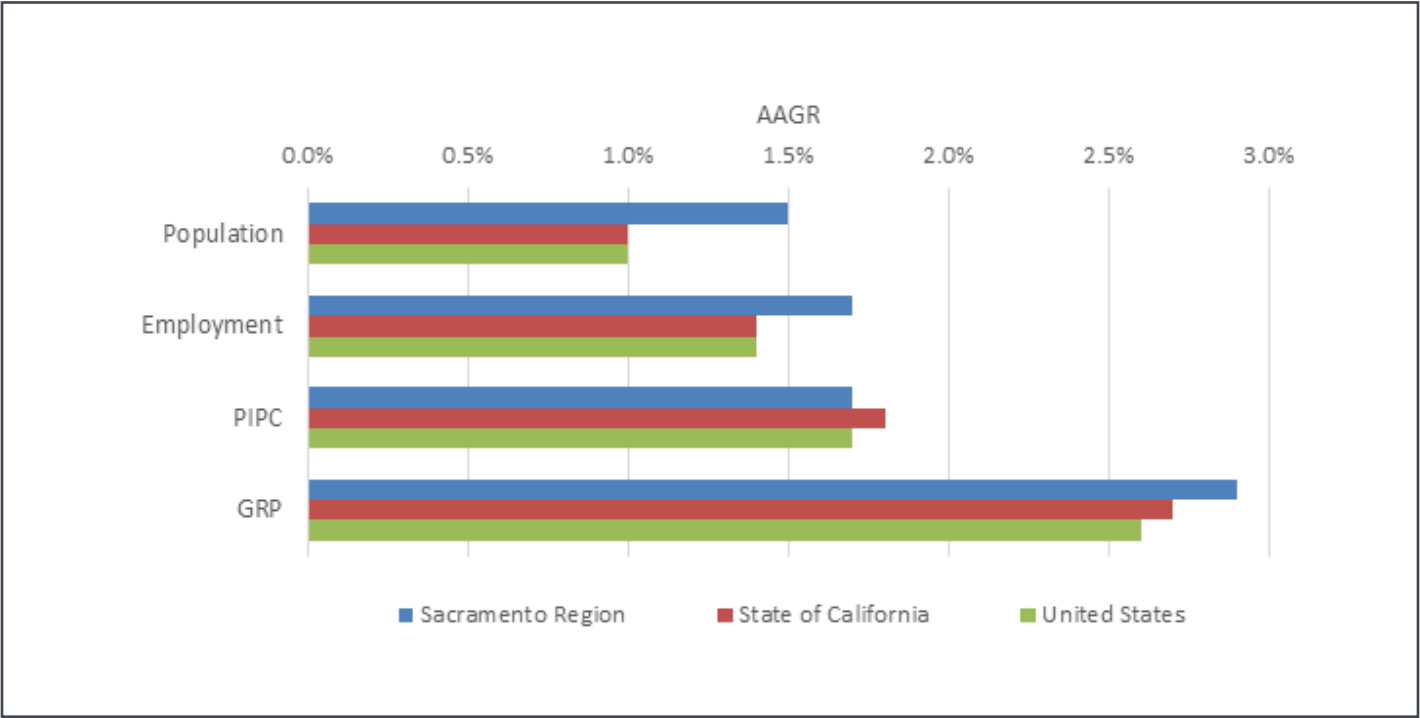
Source: Woods & Poole, Inc., 2018; RS&H Analysis, 2018

Figure 2-9 Forecast - Growth Rates of Socioeconomic Predictors (2019-2038)
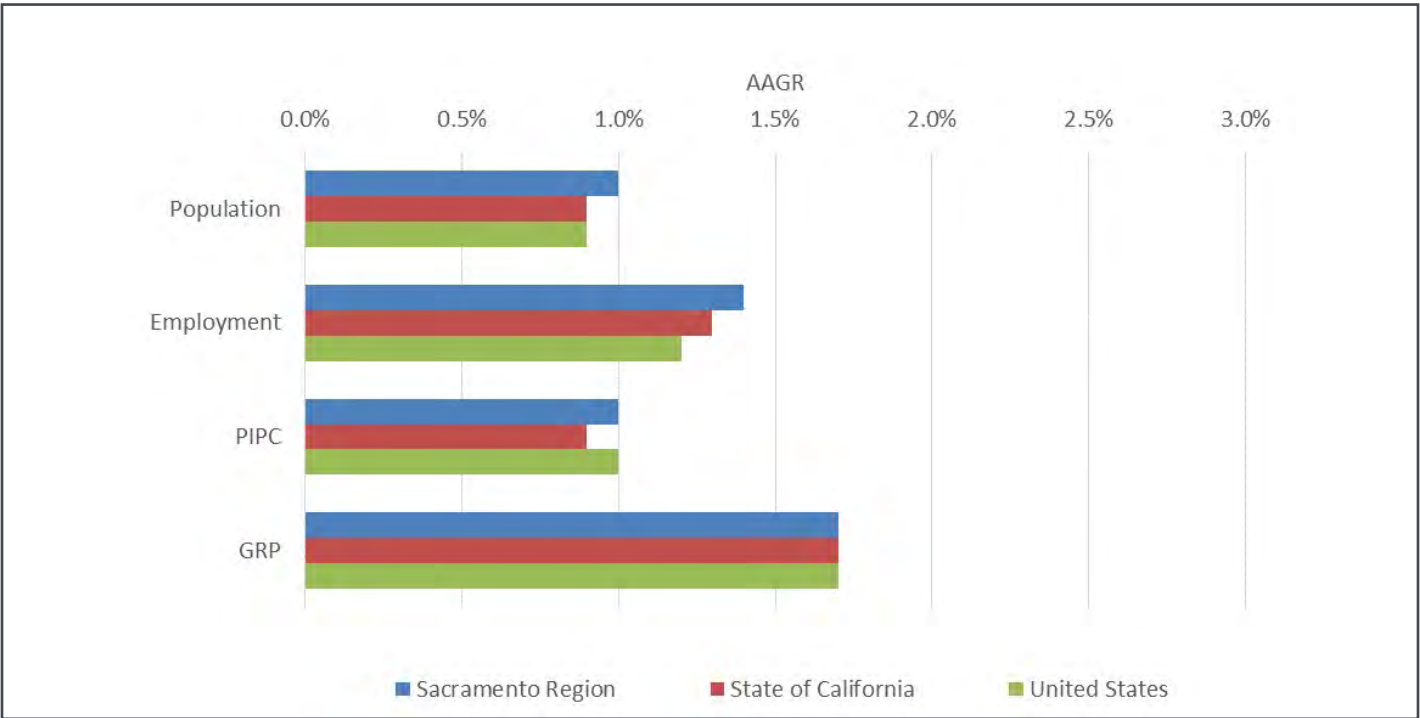
Source: Woods & Poole, Inc., 2018; RS&H Analysis, 2018

AVIATION DEMAND FORECAST

2-3

This section presents forecasts for enplaned passengers, air cargo, aircraft operations, and fleet mix at the Airport. A preferred Base Case Forecast is presented, as well as high growth and low growth scenarios.

Enplanements Forecast

The enplaned passenger forecast was developed using three different methodologies (historical trend analysis, linear regression analysis, and market share analysis). Of the domestic passenger enplanement forecast options, the Sacramento Region Airports market share model was selected for the base case enplanements forecast, showing a CAGR of 2.6% in total enplanements over the forecast period **(Table 2-2)**. The market share analysis takes into account the growth of the region as a whole, instead of benchmarking to the national trend.

International enplanements are anticipated to grow to approximately 318,200 enplanements in 2038 with an AAGR of 4.5%. **Figure 2-11** shows the selected international passenger enplanements forecast through the 2038 horizon period AAGR of 4.5%.

The Base Case enplanement forecast was supplemented by two sensitivity forecasts for advance planning purposes only, to represent a range of potential passenger activity at SMF through the planning horizon. The high growth forecast

Table 2-2 Base Case Enplanement Forecast Summary

Year	Domestic Enplanements	International Enplanements	Total Enplanements
2018	5,898,684	132,946	6,031,630
2023	7,082,000	176,700	7,355,300
2028	7,826,000	225,200	8,196,600
2033	8,782,000	273,400	9,148,500
2038	9,864,000	318,200	10,166,400
CAGR			
2018-2023	4.0%	5.9%	4.0%
2023-2028	2.1%	5.0%	2.2%
2028-2033	2.1%	4.0%	2.2%
2018-2038	2.6%	4.5%	2.6%

Source: RS&H, 2019.

was developed assuming an increasing market share of the Sacramento region airports for domestic enplanements while keeping the international enplanement forecast the same as the Base Case. The low growth forecast was developed assuming a 1.5% annual growth rate for domestic enplanements from 2019 through 2038 (using the 2019 projected domestic enplanements from the Base Case forecast), while the international enplanements were assumed to grow at half the rate as the Base Case.

Figure 2-10 summarizes the passenger enplanement forecasts for the Base Case, Low Growth, and High Growth scenarios, also compared to the FAA Terminal Area Forecast (TAF). **Figure 2-11** shows the selected international passenger enplanements forecast through the 2038 horizon period.

Air Cargo Forecast

The air cargo forecast utilized a multiple regression analysis in which cargo tonnage is derived using predictor variables that have a statistical correlation with its growth.
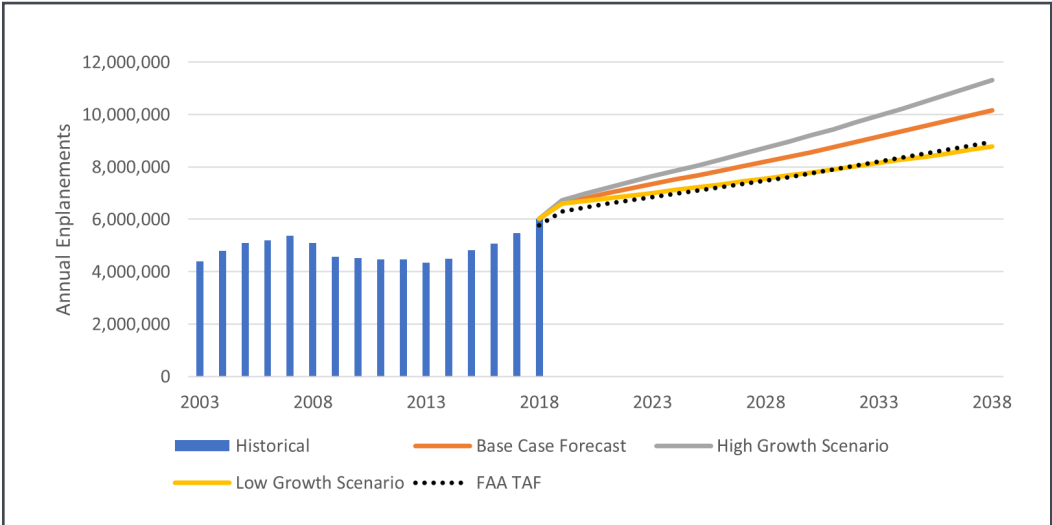
The base case cargo tonnage forecast was supplemented by two sensitivity forecasts to be used by the SCDA for advance planning purposes only, to represent a range of potential cargo activity at SMF through the planning horizon. The high growth forecast was developed assuming a CAGR of 7.0% over the first five years, 5.5% from 2023 to 2028, and 4.0% for the final ten years of the planning period. The low growth forecast was developed assuming a 1.5% CAGR for cargo tonnage through 2038, representing the typical growth rate at SMF before the arrival of contracted cargo operators working with Amazon in 2017.

Table 2-3 and **Figure 2-12** summarize the cargo forecasts for the Base Case, Low Growth, and High Growth scenarios.

Fleet Mix

The most demanding aircraft expected to use the Airport within the planning period are the MD-11 and DC-10 operated by FedEx. FedEx does not plan to retire these aircraft anytime soon and is expected to continue serving the Airport using the MD-11 and DC-10 through the planning period. Based on the Traffic Flow Management System Count (TFMSC) data, the McDonnell Douglas MD-11F, operated by FedEx, conducted 745 operations in 2018. These FedEx operations include some operations by DC-10 aircraft (both aircraft are airplane design group IV).

An airport operations forecast fleet mix was developed for the SMF Runway 16R/34L Pavement Rehabilitation project, completed in 2018. The forecast fleet mix for the years of 2027 and 2035 were used for the runway rehabilitation project. The description of aircraft types and percentage break-down by type of aircraft is shown in **Table 2-4** and **Table 2-5**.

Figure 2-10 Passenger Enplanements Forecast Comparison

Source: RS&H analysis, 2019; FAA TAF, 2018.

Figure 2-11 Selected International Enplanements Forecast
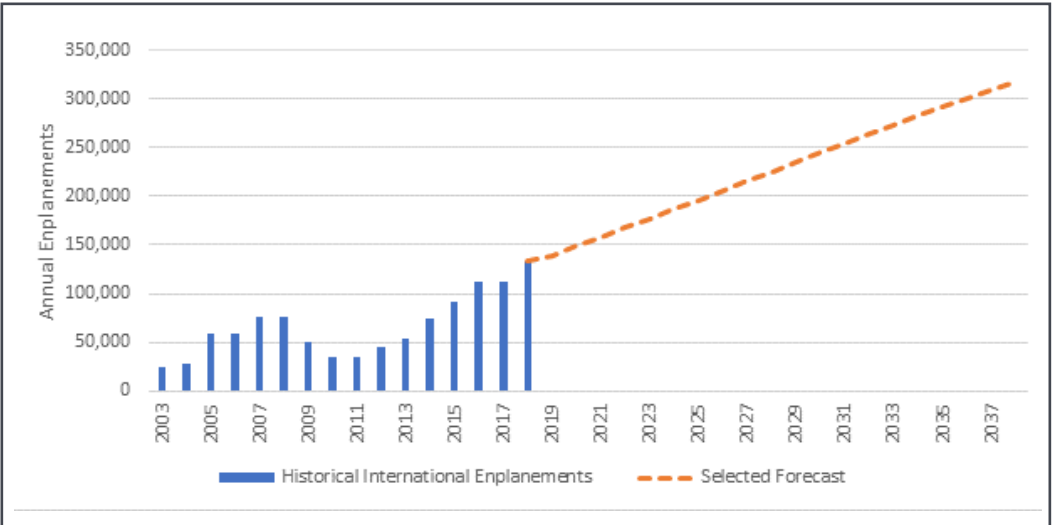
Source: RS&H analysis, 2020; FAA TAF, 2018.

Table 2-3 Air Cargo Forecast Summary

Year	Base Case Forecast	High Growth Scenario	Low Growth Scenario
2018	109,197	109,197	109,197
2023	144,853	153,155	117,636
2028	187,553	200,167	126,728
2033	229,761	243,534	136,522
2038	268,641	296,296	147,073
CAGR			
2018-2023	5.8%	7.0%	1.5%
2023-2028	5.3%	5.5%	1.5%
2028-2033	4.1%	4.0%	1.5%
2018-2038	4.6%	5.1%	1.5%

Notes: Values shown in metric tons.
Source: RS&H, 2020.

Table 2-4 Aircraft Category Descriptions

Aircraft class (a)	Description
A	Small single-engine propeller aircraft weighing 41,000 pounds or less (e.g., P28A, C208)
B	Twin-engine aircraft weighing 41,000 pounds or less (e.g., PA31, C550, C560, E120, BE20, BE9L)
C	Large jet aircraft weighing more than 41,000 pounds, but no more than 255,000 pounds (e.g., B737, DH8A, C135)
D	Heavy jet aircraft weighing 255,000 pounds or greater (e.g., A380, B777, B767, and B757)

Source: Sacramento County Department of Airports, 2019.

Table 2-5 Fleet Mix Distribution

FAA Aircraft Class	Fleet Mix Distribution	
	Baseline (2016)	Forecast (2035)
A	7%	6%
B	7%	6%
C	83%	85%
D	3%	3%
TOTAL	**100%**	**100%**

Source: Sacramento County Department of Airports, 2019.

Aircraft Operations

The forecast of annual aircraft operations was derived from the passenger enplanement forecast and cargo tonnage activity, and an evaluation of air taxi, general aviation, and military operations. Each sector was developed as follows:

- Passenger airline operations (both regional and mainline) are based on the enplaned passenger forecast and assumptions regarding average seats per departing aircraft and enplaned passenger load factor.

- Cargo airline operations are based on the air cargo forecast and assumptions regarding average cargo tonnage per operation and the split between cargo on cargo airlines versus passenger airlines.

- Air taxi and charter operations, and military operations are based on data for the base year (2018) of the forecast and carried forward through the 2038 horizon year. While these operations can vary in any given year, the numbers for each category have been relatively stable over the past 4 to 6 years. Military operations have stabilized after a period of decline since 2012.

- General aviation operations are forecast to increase at an average rate of 0.3% per year from 2018 to 2038. This increase is based on the national growth in overall general aviation operations included in the FAA Aerospace Forecast.

The high growth and low growth operations forecasts were developed based on the same assumptions, but utilizing the scenario forecasts for passenger enplanements and cargo tonnage (**Table 2-6** and **Figure 2-13**).

Table 2-6 Aircraft Operations Forecast Summary

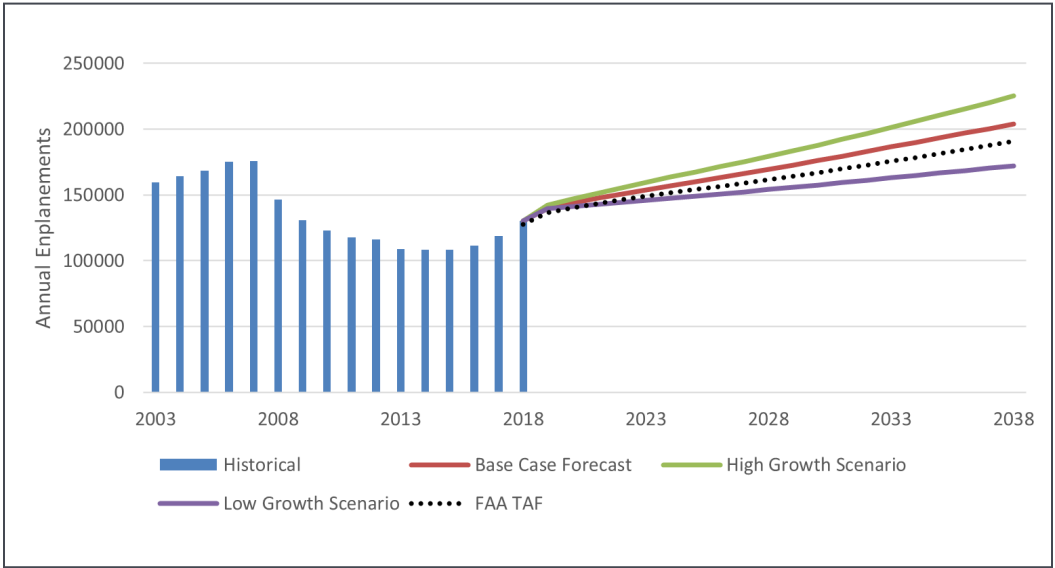| Scenario	Base Year 2018	Forecast Years				AAGR 2018-2038
		2023	2028	2033	2038	
Base Case Forecast						
Air Carrier		129,333	142,002	156,190	171,087	2.0%
Cargo	118,863	10,685	13,494	16,123	18,387	4.0%
Air Taxi/Charter		2,500	2,500	2,500	2,500	0.0%
General Aviation	8,881	9,015	9,151	9,289	9,429	0.3%
Military	2,215	2,300	2,300	2,300	2,300	0.2%
Total Operations	**129,959**	**153,833**	**169,447**	**186,402**	**203,703**	**2.3%**
Low Growth Scenario						
Air Carrier		123,248	131,001	139,190	147,843	1.2%
Cargo	118,863	8,677	9,118	9,580	10,066	1.0%
Air Taxi/Charter		2,500	2,500	2,500	2,500	0.0%
General Aviation	8,881	9,015	9,151	9,289	9,429	0.3%
Military	2,215	2,300	2,300	2,300	2,300	0.2%
Total Operations	**129,959**	**145,740**	**154,070**	**162,859**	**172,138**	**1.4%**
High Growth Scenario						
Air Carrier		134,409	151,106	170,078	190,544	2.5%
Cargo	118,863	11,297	14,401	17,090	20,280	4.5%
Air Taxi/Charter		2,500	2,500	2,500	2,500	0.0%
General Aviation	8,881	9,015	9,151	9,289	9,429	0.3%
Military	2,215	2,300	2,300	2,300	2,300	0.2%
Total Operations	**129,959**	**159,521**	**179,458**	**201,258**	**225,054**	**2.8%**

Source: RS&H analysis, 2020.

Figure 2-12 Air Cargo Forecast Comparison
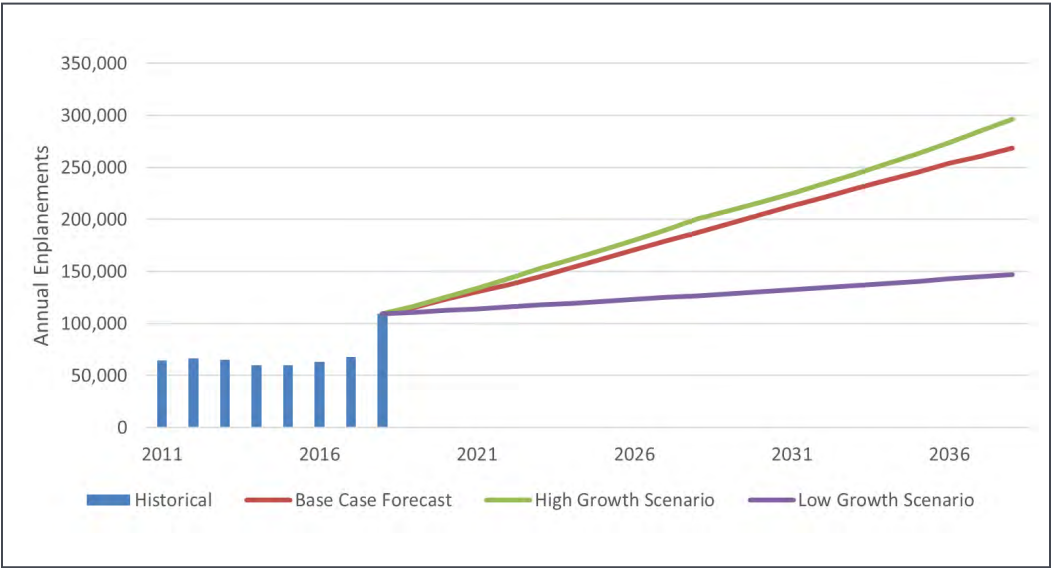
Source: RS&H analysis, 2020; FAA TAF, 2018.

Figure 2-13 Aircraft Operations Forecast Comparison

Source: RS&H analysis, 2020; FAA TAF, 2018.

Sacramento County