CHAPTER 3.

AVIATION ACTIVITY FORECASTS

Introduction

Developing aviation activity forecasts is an essential step in analyzing existing airport facilities and identifying future needs and requirements of the facilities. While forecasting, by nature, is not exact, it does establish general estimates for future aviation activity levels and provides a defined rationale for necessary changes at the Airport as demands increase.

Airport activity forecasts are largely influenced by local airport factors, aviation industry trends, and overarching regional socioeconomic market conditions, as described in the previous sections. Overall, aviation activity forecasts are developed to meet five main objectives:

1. Provide a realistic and sustainable estimate
2. Be based on the latest available data
3. Reflect current conditions at the Airport
4. Be supported by information in the Master Plan
5. Provide adequate justification for future airport development.

The aviation activity forecasts presented in this chapter were developed for the 20-year planning period (2018-2038) and are based on historic activity, industry trends, local socioeconomic data, and consider the changes that have occurred at FNL since the completion of previous planning studies. The forecasts utilize fiscal year (FY) 2018 (October 1, 2017 through September 31, 2018) as the base year and project future activity through 2038, identified in 5-year increments.

This chapter is organized to first describe current and historic activity levels. Prior to forecasting future activity levels for FNL, previous planning efforts and forecasts were reviewed and summarized, along with an industry and regional socioeconomic overview.

3.1 Current Statistics and Aviation Environment

Before examining current and future activity levels at the Airport, historical and projected socioeconomic conditions were evaluated to develop a series of assumptions that served as a foundation for developing the forecasts described in this chapter. These variables represent a variety of physical, operational, and socioeconomic considerations, which in varying degrees relate to or affect aviation activity at FNL. Generally, the socioeconomic conditions of a region correlate with aviation activity within that region. Population, employment, and income are indicators that typically influence aviation activity. Population figures indicate the general number of persons served by the airport, and therefore the potential customer base, while employment and income indicate the degree to which the population served by the airport has enough disposable income to put toward the purchasing of airfares.

The level and types of aviation activity occurring at an airport are dependent upon many factors, but generally reflective of the services available to aircraft operators, the meteorological conditions under which the Airport operates (daily and seasonally), the businesses located on the Airport or within the community the Airport serves, and the general economic conditions prevalent within the surrounding area.

These variables represent the basis for developing a set of assumptions pertaining to variety of physical, operational, socioeconomic considerations, and to varying degrees, relate to and affect aviation activity at FNL.

3.1.1 Weather Conditions

Current FNL weather data that was collected and analyzed shows, the Airport is not adversely affected by poor weather conditions, except for a few days a year. Visual Flight Rules (VFR) meteorological conditions occur, on average, approximately 98.91% of the time annually. In addition, the Airport has a complement of electronic landing guidance systems to assist aircraft operations during periods when weather conditions minimize a pilot's visual capacity. Therefore, aircraft can operate at FNL on a regular basis throughout the year, with limited interruption due to weather.

3.1.2 Socioeconomic Conditions

Population. The northern Colorado region has seen significant population growth since in recent years. According the Colorado State Demographer's Office, the population of Fort Collins-Loveland area and the Fort Collins Metropolitan Statistical Area (MSA), which is recognized as Larimer County by the US Office of Management and Budget (OMB), increased 14.59% and 14.76%, respectively, between 2010 and 2017. The cities of Fort Collins and Loveland, as well as the Fort Collins MSA, increased more than the state population during this period, which was 11.07%. When evaluated together, the population of Weld and Larimer Counties, which are home to the three largest cities in northern Colorado, increased 16.86% during this period.

Population growth in the northern Colorado area is expected to continue and the major cities in the region (Fort Collins, Loveland, and Greely) are projected to be among the top five fastest growing cities in Colorado. As illustrated in **Table 3-1**, the projected average annual growth rate (AAGR) for the Fort Collins MSA and Weld and Larimer Counties between 2018 and 2038 is 1.29% and 1.77%, respectively.

Employment. The Colorado Department of Labor and Employment reports that there were 205,656 people in the Fort Collins MSA labor force in Q2 of 2018, with an unemployment rate of 2.7%, which is also the unemployment rate in the state of Colorado for the same period. The unemployment rate in the Fort Collins MSA is lower than the that of the US for the same period – 4.0%.

For a decade after the Great Recession, the Fort Collins MSA experienced low unemployment rates and a steady increase in household incomes, increasing purchasing power and stimulating the local economy.

In 2020, the COVID-19 pandemic led to the largest increase in unemployment in modern U.S. history. At the end of Q2 2020, the unemployment rate for the Fort Collins MSA was 9.2%, which represented the lowest unemployment rate of the seven Colorado MSAs and was below the state unemployment rate of 10.7% and the national rate of 11.2%.

Income.[1] The 2016 per capita income for the Fort Collins-Loveland MSA and the state of Colorado was $32,433 and $33,230. This compares to the 2016 US per capita income of $33,205. The 2016 median household income for the Fort Collins-Loveland MSA, the state of Colorado, and the US was $61,942, $62,520, and $55,322, respectively.

Table 3-1: Historical Population Data and Population Projections

Year	Weld and Larimer Counties	Larimer County (MSA)[3]	Fort Collins/ Loveland	State of Colorado
HISTORIC				
1990[1]	319,027	186,136	125,110	3,304,042
2000[1]	436,164	251,494	169,260	4,338,801
2010[1]	554,762	299,630	210,845	5,050,332
2018[2]	663,439	349,079	246,730	5,689,227
PROJECTED				
2023[2]	745,478	378,657	267,636	5,838,181
2028[2]	840,208	411,630	290,941	5,765,527
2033[2]	933,289	442,186	312,539	5,689,227
2038[2]	1,025,940	471,028	332,925	5,838,181
Projected AAGR 2018-2038	**1.77%**	**1.29%**	**1.29%**	**0.13%**

SOURCE: Mead & Hunt, 2018.
NOTES:

1. U.S. Census & Demographic Services Center, Colorado Department of Local Affairs, State Demography Office. Available at: https://demography.dola.colorado.gov/population/data/historical_census/. Accessed November 12, 2018.
2. U.S. Census & Demographic Services Center, Colorado Department of Local Affairs, State Demography Office. Available at: https://demography.dola.colorado.gov/population/population-totals-colorado-substate/#population-totals-for-colorado-and-sub-state-regions. Accessed November 12, 2018.
3. The US Office of Management and Budget (OMB) defines metropolitan statistical areas (MSAs) according to published standards that are applied to Census Bureau data. The OMB recognizes the Fort Collins MSA as Larimer County.

[1] Unless otherwise noted, the data source for income data is the U.S. Census Bureau, 2012-2016 American Community Survey 5-year estimates.

3.1.3 Community Support

FNL benefits from the support of both the cities of Loveland and Fort Collins, as well as Larimer County. FNL also benefits from the healthy local industry, and the support of the citizens of Fort Collins, Loveland, and the surrounding communities. Increased interest in development at or near the Airport is associated with economic growth, regional demand, land values, and streamlining of Airport development processes. The Airport is recognized as a vital asset contributing to the economic stability of the city, region, and state.

3.1.4 Aviation Industry[2]

The Airport is located within a thriving region for aviation. FNL is part of the nine-county Metro Denver and Northern Colorado region's airport system, which serves as significant economic engine, with a regional impact of nearly $28 billion that supports over 195,750 jobs in all industries.

In 2017, Aviation was the nine-county region's fastest growing cluster, with 5.7% employment growth between 2016 and 2017, compared with a nationwide increase of 0.1%. Employment in the region's aviation cluster grew for the sixth-consecutive year in 2017. Between 2012 and 2017, aviation employment increased by 23.1%, compared with 4.1% nationally. The strong growth of the Aviation industry in the nine-county region is attributed to the location, low overall costs of doing aviation-related business, and access to aviation-related training programs.

3.1.5 Emerging Technology

As a vital asset to a major commercial center in the Fort Collins/Loveland area and a key component of the region's growing high-tech/innovation-focused economy, the Airport is well positioned to support advancing aviation technology sectors, including hybrid and electric propulsion for civil and commercial aircraft as well as electric vertical takeoff and landing (eVTOL) aircraft for urban mobility. There are currently nearly 100 electrically propelled aircraft being developed around the world; more than half were unveiled within just the last 18 months.[3]

[2] Unless otherwise noted, Aviation Industry information was sourced from the Metro Denver Economic Development Corporation, AVIATION: Metro Denver and Northern Colorado Industry Cluster Profile, 2018.

[3] Roland Berger Strategy Consultants. *Electric flight just over the horizon*. Available at: https://www.rolandberger.com/en/Insights/Global-Topics/Electric-Propulsion/. Accessed December 18, 2018.

In an effort to achieve large reductions in aviation carbon emissions, both start-up companies and large aerospace companies are developing battery technology for all-electric power generation primarily intended for general aviation aircraft and urban air mobility vehicles. While the introduction of electric and hybrid-electric aircraft will be a phased process, it's likely to start with general aviation, including short-range urban air taxis, followed by regional aircraft, and eventually long-range commercial aircraft.[4]

As emerging technologies, the regulatory framework; certification and licensing requirements; and maintenance, infrastructure, and operational needs are still being developed and there is not yet enough information available to develop forecasts for these types of aviation activity. However, recent market studies commissioned by NASA, as well as those published by financial investment and analysis companies, such as Morgan Stanley, estimate that as many as 100,000 eVTOL aircraft could be flying commercially in the coming decades as part of an emerging $500 billion to $2 trillion market.[5]

3.1.6 Remote Tower Project

In 2017, the Colorado Department of Transportation (CDOT) Aeronautics Division and the FAA contracted with Searidge Technologies to build a remote air-traffic control tower at FNL, which will utilize cameras and radar to monitor and control FNL traffic. This project is being completed to improve safety and help attract commercial airlines to FNL. In addition to revolutionizing future airport and aircraft operations, the remote tower project demonstrates FNL's leadership in incorporating new technology as an avenue to improve the National Airspace System (NAS).

Based on the current project schedule, testing for the remote tower will begin in 2020. When Allegiant Air ceased service at FNL in 2012, they cited the lack of a tower and safety concerns as contributing factors and have indicated to the Airport that should the remote tower project prove successful, they would be interested in reinitiating service.

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[4] Velocci, Tony (for Dassault Systèmes North America). *Electric Propulsion Will be Propelling Aviation Into its Next Golden Age* (2018). Available at: https://blogs.3ds.com/northamerica/electric-propulsion-will-be-propelling-aviation-into-its-next-golden-age/?linkId=61035033. Accessed December 18, 2018.

[5] Wolfe, Frank (2019, January 15). *"Promise of eVTOL "Coming to Be Realized," GAMA Says*. Retrieved from https://www.rotorandwing.com/2019/01/15/promise-evtol-coming-realized-gama-says/.

3.1.7 Community/Airport Location Potential

In addition to the Fort Collins-Loveland area, many of the surrounding communities of the northern Front Range region of Colorado benefit from the proximity of a high-quality aviation facility and, in turn, provide an economic base that serves as a market for commercial passenger service and can attract additional based aircraft and industrial/business development. This impact was documented in the latest Colorado Department of Transportation (CDOT) Division of Aeronautics (the Division) Economic Impact Study, completed in 2020. According to the Study, the total annual economic contribution of FNL is estimated to be almost $161 million in output and 1,072 jobs, with an annual payroll of nearly $52 million.

Economic activity was defined as the "economic contribution" of the Airport to the region and state economy in terms of total jobs, wages, and economic activity (business receipts).

In addition to the larger regional economic impact generated by the Airport, some local businesses rely heavily on the Airport to maintain a healthy, synergistic, environment. According to the Study, those businesses that are dependent or rely upon the Airport produced nearly $161 million in economic activity, almost $52 million in wages, and 1,072 jobs according to 2018 data, which demonstrates the value that the Airport provides to the local community.

In **Appendix D - General Aviation Industry Analysis**, Aviation Management Consulting Group (AMCG) notes that FNL's role as a regional airport when compared with competing and comparable airports remains viable because of factors such as local community business and industry, traditional economic analysis, airport infrastructure, licensed pilots, registered aircraft, and overall demographics.

3.1.8 Potential Challenges

Generally, there are very few negative factors that have potential to significantly impact future aviation activity at FNL. However, as part of the planning process it is important to consider broad factors that could have a negative or neutralizing impact on the Airport, and the aviation industry. From an on-airport facilities standpoint, runway length and width, and lack of appropriate passenger terminal facilities could potentially be considered negative factors.

Other potential challenges could include the relatively slow growth in general aviation activity nationally for the past 20 years. New general aviation aircraft deliveries and active general aviation aircraft have both declined during the past

20 years and are anticipated to grow relatively slowly at 2.6% and 0.1%, respectively (AMCG, 2018).

The current state of the airline industry also presents some potential challenges for FNL as described in **Appendix C - Passenger Demand Analysis.** Potential challenges associated with reinstating commercial service could include:

- **Industry trends:** Airline frequency and capacity changes; airline profitability; airline consolidation; bankruptcies, mergers and acquisitions; fleet changes; the fluctuating price of fuel; the pilot shortage; and low-cost carrier competition.
- **Major network airlines:** With Denver International Airport (DEN) located approximately one-hour from FNL, traditional major network airlines such as American, Delta, United or Southwest, are unlikely to serve the market in the near term. Looking longer term, American may be a possibility.
- **Ultra-low-cost carriers:** A number of low-cost carriers have a presence at DEN. It is unknown if any of these carriers would be willing to operate from both markets.

3.2 Historical Airport Activity

The aviation activity profile provides a baseline for the forecasts by identifying trends in activity at FNL and providing context for any changes in aviation activity that have occurred. Sources of information include the FAA, Airport management, and Airport tenants. This section summarizes historical operations and based aircraft information. Prior to 2020, FNL was a non-towered airport so IFR records and the FAA TAF are the primary resources for historical aviation activity at the Airport. Historical operations and based aircraft data are summarized in **Table 3-2**. Because FNL was a non-towered airport, operations were been primarily tracked through instrument flight rules (IFR) filings and historical TAF data.

Table 3-2: Historical Aviation Activity

Northern Colorado Regional Airport (FNL) Aircraft Operations							
Year	Passenger Enplanements	Operations					Total Based Aircraft
		Air Carrier	Air Taxi & Commuter	GA	Military	Total	
2003	4,901	348	0	101,735	200	102,283	208
2004	30,333	736	0	105,804	200	106,740	215
2005	32,394	876	0	110,035	200	111,111	222*
2006	33,262	1,014	0	114,436	200	115,650	230
2007	29,069	1,154	0	119,015	200	120,369	230
2008	30,800	1,167	0	120,775	200	122,142	230
2009	31,809	1,209	0	122,452	200	123,861	220
2010	31,297	526	3,500	106,500	200	107,226	219
2011	44,662	624	3,500	106,500	200	107,324	215
2012	43,798	660	3,500	106,500	200	107,360	237
2013	4,872	600	3,500	106,500	200	107,300	247
2014	1,733	150	3,500	94,650	200	95,000	248
2015	2,978	110	3,500	94,650	200	94,960	263
2016	3,720	46	3,500	94,650	200	94,896	263
2017	3,288	48	3,500	95,776	200	96,024	266

SOURCES: FAA TAF (FNL 1998-2017) and 2007 FNL Airport Master Plan.
NOTE: * 2007 Master Plan notes that a based aircraft count was conducted Spring 2005 by Airport Personnel and that there were 204 based aircraft in 2005.

3.2.1 Summary of Historical Enplanements and Operations

Passenger Enplanements. The fluctuations in passenger enplanements since 2003 are primarily related to whether an airline was providing commercial service at FNL in a particular year, as illustrated in **Table 3-2**. Enplanements grew significantly in 2003-2004 when Allegiant added commercial service. Enplanements peaked in 2011 at 44,662 when Allegiant was providing service to both Phoenix-Mesa and Las Vegas. Enplanements increased by more than 10,000 between 2010 and 2011 when Allegiant added Phoenix-Mesa as a second destination. When Allegiant discontinued its FNL service in the fall of 2012, passenger enplanements decreased significantly.

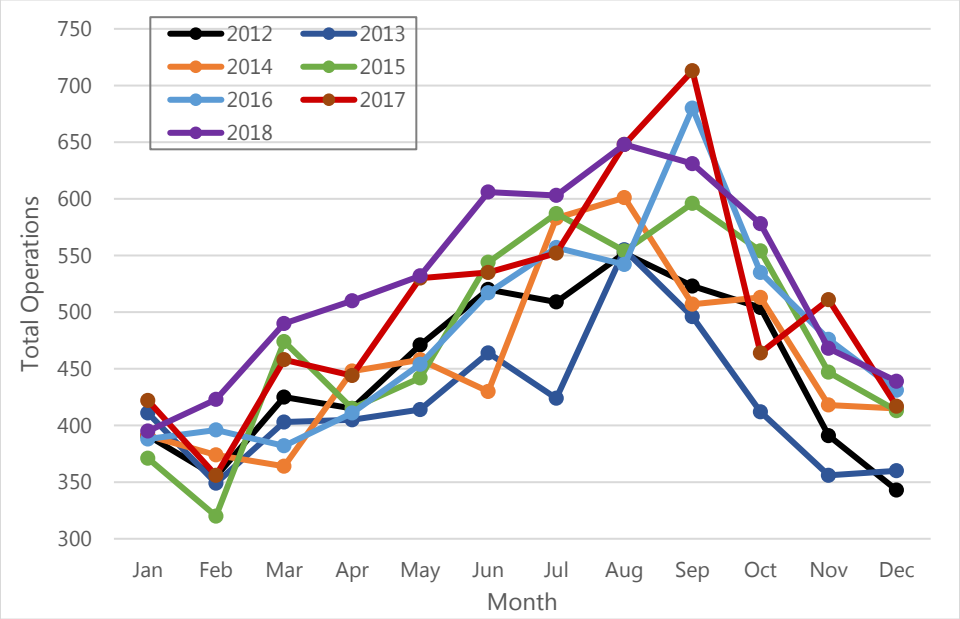
The load factor on Allegiant's service to Las Vegas improved over time, exceeding 90% on an annual basis for the first time in 2008. Loads continued to be strong through 2012. The Phoenix-Mesa service had strong load factor performance, averaging 92-93%. With the introduction of air traffic control in 2020 and return of a commercial service airline, FNL could minimize the need of individuals to commute to alternate departing airports (i.e., Denver International Airport), ultimately increasing the number of enplanements to 2004-2012 levels.

Total Operations. While it is important to identify historical and current trends as part of the forecasting process, historical activity levels at non-towered airports like FNL represent estimates, rather than actual counts, and different data sources generally provide conflicting information. For instance, the current aviation activity levels at FNL recorded in the FAA Terminal Area Forecast (TAF) and the Airport Master Record Form 5010 (effective September 13, 2018) show different operations counts.

As illustrated in **Table 3-2**, historical TAF data shows that total aircraft operations (either a takeoff or a landing) increased steadily between 2003-2009, before beginning to decline until 2016, and increasing slighting in 2017. Estimated annual counts have ranged from a low of 94,896 operations in 2016 to a high of approximately 123,861 operations in 2009.

Additional operational data was collected from the FAA Traffic Flow Management System Counts (TFMSC) for FNL between 2012 and 2018 and illustrated in **Table 3-2**. TFMSC data only reflects operations on an Instrument Flight Rules (IFR) flight plan, which has been approximately 4-6% of the total annual operations at FNL since 2010. While filed IFR flight plans represent only a small percentage of all operations at FNL when compared to historical TAF operations, this data does illustrate an increasing trend in IFR operations at FNL with a seasonal peaking of IFR operations in late summer (August and September) each year.

Figure 3-1: Historical TFMSC Operations



SOURCE: FAA Traffic Flow Management System Counts (TFMSC), Aviation System Performance Metrics (ASPM), IFR operations 2012-2018.

Air Carrier Operations. Air carrier operations are defined as commercially operated aircraft capable of accommodating more than 60 passenger seats. In 2003, Allegiant Air began serving FNL and ceased operations in 2012. After two years of no scheduled service, Elite Airways entered the market with service to Chicago Rockford International Airport. Elite provided service from 2015 to 2016.

From 2003-2012, Allegiant provided air service on a less-than-daily basis to Las Vegas. Allegiant also provided service to Phoenix-Mesa from 2010 to 2012. As illustrated in **Table 3-2**, the years with higher annual air carrier aircraft operations coincide with the years Allegiant provided commercial service at FNL from 2003-2012. Scheduled available seats peaked for the year ended March 31, 2012, with 46,350 annual seats and 309 annual flights. The lowest service level occurred from the first quarter of 2013 through the second quarter of 2015 when the Airport had no scheduled commercial airline service. Elite's service provided far fewer seats and flights than the previous service provided by Allegiant. Since 2016, when Elite stopped providing service, there has been no scheduled commercial air service at FNL.

FNL does not currently have scheduled air carrier activity. Commercial service aircraft operations at FNL are currently represented by a combination of regional jet and narrow-body jet aircraft that are operated by Elite Airways (CRJ 100/200 and Embraer 135/145) and Sun Country Airlines (Boeing 737s) and other charter aircraft operators associated with Colorado State University and Northern

Colorado University sports teams charter operations. FNL also has some charter flight diversions from Denver International Airport during inclement weather.

Air Taxi/Commuter Operations. Air Taxi operations are defined as those aircraft capable of seating less than 60 passengers, which are being utilized for commercial passenger or air freight service and which use a three-letter company designator or the "Tango" designation. For purposes of this study, Air Taxi aircraft utilized for scheduled passenger service are included in the air carrier operations category, and those utilized for freight or other purposes are included in the general aviation operations category. As illustrated in **Table 3-2,** there are no recorded air taxi operations from 2003-2009. Since 2010 annual Air Taxi operations have remained at 3,500. Air Taxi operations at FNL are primarily from charter aircraft operations and fractional ownership turboprops or small jets.

General Aviation (GA) Operations. Most operations at FNL fall under the general aviation category. GA includes a wide range of operations, including flight training, air ambulance, wildland firefighting, pipeline survey, and corporate aviation. Based on historical TAF estimates, GA traffic contributed between 98 and 99 percent of all operations at FNL between 1998 and 2017.

Military Operations. Since 2003, there have been an estimated 200 military operations at FNL annually. Historically, military aircraft have infrequently operated at FNL. Military operations have generally been related to training and/or operational purposes. FAA Traffic Flow Management System Counts (TFMSC) data indicates that helicopters, particularly the Sikorsky SH-60 Seahawk and UH 60-Blackhawk, have accounted for the majority of military operations since 2007.

3.2.2 Historical Based Aircraft Mix

The number of aircraft that can be expected to base at any airport is dependent upon many factors, such as aircraft maintenance facilities, airport communication practices, services provided at the Airport, airport proximity and access, and similar factors. According to Airport Management there are currently 256 based aircraft at FNL, which are summarized in **Table 3-3**.

Table 3-3: 2018 Based Aircraft by Type

2018 Airport Reported Based Aircraft								
	Single Engine	**Multi Engine**	**Jet**	**Helicopters**	**Gliders**	**Military**	**Ultra-Light**	**Total**
Based Aircraft	216	16	9	13	1	0	1	256

SOURCE: FAA National Based Aircraft Inventory

3.2.3 Fleet Mix/Aircraft Type Operations

FAA Aircraft Classification.

Table 3-4 identifies a fleet mix breakdown of FY 2018 FNL aircraft operations by FAA category per the TFMSC database. While TFMSC data only reflects operations on an Instrument Flight Rules (IFR) flight plan, which are primarily high-performance aircraft, and such operations account for approximately 4-6% of the total operations when compared to historical TAF operations, the TFMSC data provides a breakdown of the types of aircraft that make up the total IFR operations at FNL. From this TFMSC information, it's possible to estimate the percentage of total operations by each aircraft type.

The FAA Airport Reference Code (ARC) is a classification by aircraft category determined by the Aircraft Approach Category (defined by the aircraft approach speed and expressed by letter A through D) and the Airplane Design Group (defined by the wingspan and tail height and expressed by Roman numeral I through III). The information summarized in this table represents the best estimate at determining the breakdown of FY 2018 airport operations in ARC categories.

Table 3-4: FY 2018 TFMSC Operations Estimate by ARC

FAA ARC Category (Aircraft Type)	Operations	Percentage
General Aviation/Air Carrier/Air Taxi	5,286	94.43%
A-I (single engine piston)	*1,056*	*18.86%*
A-II (single and multi-engine piston)	*243*	*4.34%*
B-I (multi-engine piston, singe engine turboprop and small jet)	*989*	*17.67%*
B-II (multi-engine turboprop and small jet)	*1,666*	*29.76%*
B-III (multi-engine turboprop)	*14*	*0.25%*
C-I (small business jet)	*422*	*7.54%*
C-II (medium business jet)	*633*	*11.31%*
C-III (large business jet)	*27*	*0.48%*
D-I (medium business jet)	*35*	*0.63%*
D-II (large business jet)	*102*	*1.82%*
D-III (large business jet)	*99*	*1.77%*
Helicopter	116	2.07%
Military	91	1.63%
No Data	105	1.88%
Total	**5,598**	**100%**

SOURCE: FAA Traffic Flow Management System Counts (TFMSC), Aviation System Performance Metrics (ASPM), IFR operations FY 2018.

3.3 Forecast Documentation Review and Data Sources

To provide context for the development of future activity levels, it's important to not only to consider historical aviation activity data, but also existing projections for both the region and the Airport made by other independent organizations. In addition to that collecting and analyzing historical aviation activity data, a documentation review was also conducted to ascertain and assess available forecast-related data pertinent to the FNL forecasts, including FAA guidance documents, published industry analysis and statistical studies, and other approved state, local, and Airport studies.

The following reports, studies, publications, and associated projections were referenced to provide support and guidance in the development of the aviation activity forecasts presented in this chapter.

The COVID-19 pandemic greatly disrupted the aviation industry in 2020. The decline in commercial air travel was especially severe and recovery to pre-pandemic levels will likely take several years. The following forecasts were made prior to the pandemic, therefore do not consider its impacts.

3.3.1 Historical Forecasting Documents

2007 Fort Collins-Loveland Municipal Airport Master Plan (Chapter B – Forecasts of Aviation Activity). The last Master Plan, completed in 2007, used 2003 as the base year and forecasted aviation activity through the year 2023. Overall, the 2007 Plan forecasted aviation activity to increase over the course of the 20-year planning period. Based on a combination of commercial service and general aviation forecasting methods. The 2007 Plan forecasted total operations to increase from 102,283 in 2003 to 151,776 by 2023.

2013 State Aviation System Plan. FNL airport activity projections published in the Colorado Department of Transportation (CDOT) Division of Aeronautics *Colorado Aviation System Plan* (CASP), which was last completed in 2011, were also referenced. From 2010 through 2030, CDOT estimated that total operations at FNL would increase by about 1.3% annually, which is slightly less than the 1.5% average annual growth rate of other commercial service airports in the state.

3.3.2 Federal Aviation Administration Published Data and Guidance

Federal Aviation Administration Terminal Area Forecast (TAF) 2008-2038. The TAF is FAA developed forecasting tool that is updated annually and used by the FAA to determine budget and staffing needs. Due to limited staff resources, the FAA cannot forecast in as great of detail at smaller regional airports as they can at large airports. However, the TAF provides a guideline for developing forecasts, and is utilized by FAA to compare scenario-driven forecasts (like those presented in this chapter) with the forecasts developed by the FAA. The TAF for FNL does not consider important localized aviation environment factors (such as the remote tower project at FNL and high potential for reinstitution of commercial service). Aviation activity forecasts are one of the two master plan components that require FAA approval. It is important to note that if a preferred forecast varies more than 10% from the TAF in the first five years or 15% within the first 10 years, it must be supported by an acceptable forecast methodology and analysis.

Federal Aviation Administration Aerospace Forecasts Fiscal Years 2018-2038. FAA prepares annual updates of this document, which examines the current economic and aviation outlook, as well as macro level forecasts of aviation activity and the aircraft fleet in the U.S. The 2018 FAA forecast calls for U.S. carrier passenger growth over the next 20 years to average 1.9% annually. Overall, the

2018-2038 FAA Aerospace Forecast projects active general aviation pilots to decrease about 22,600 (down 0.4% annually) over the next 20 years. In the long term, it's predicted that the aviation industry will be competitive and profitable, characterized by increasing demand for air travel and airfares growing more slowly than inflation, reflecting over the long term a growing U.S. and global economy.

The long-term outlook for general aviation is stable to optimistic, as growth at the high-end offsets continuing retirements at the traditional low end of the segment.

The active general aviation fleet is forecast to remain relatively stable between 2018 and 2038. Both private and commercial pilot certificates are projected to decrease at an average annual rate of 0.8 and 0.5 percent, respectively until 2038. The Student pilot forecast is currently suspended because of the April 2016 rule change that the new student pilot certificates do not expire. This change generates a cumulative increase in the certificate numbers and breaks the link between student pilot and advanced certificate levels of private pilot or higher. Currently, there is insufficient data to formulate a reliable forecast for the student pilots.

Federal Aviation Administration Advisory Circular 150/5070-6B (Change 2), Airport Master Plans. This AC describes the methodology for preparing airport master plans, including the development of FAA compliant forecasts. For the forecasting component of master planning, it provides key guidance on preparing aviation activity forecasts and it identifies what elements should be forecasted.

Federal Aviation Administration Form 5010-1, Airport Master Record: An Airport Master Record, commonly referred to as the 5010, summarizes aeronautical data and physical and operational characteristics of active airports included in the National Airspace System (NAS). Airport data are compiled from both physical inspections of the airport, and the National Airspace System Resources (NASR) database. FNL's last FAA inspection was on May 15, 2019.

Forecasting Aviation Activity by Airport (Prepared for FAA by GRA, Inc.). GRA, Inc. developed this document for FAA in 2001, which provides guidance for those preparing and reviewing airport activity forecasts. The FAA follows this guidance when developing the TAF.

3.3.3 Industry Reports

Aircraft Manufacturer Marketing Outlooks. Demand for aviation services is generally driven by changes in economic activity. The aviation industry declined with the economy during the 2008 recession and has been slowly recovering ever since. Aircraft manufacturers have increased production to supply commercial airline fleet renewal programs, and general aviation operators have sought more fuel efficient and technologically capable aircraft. The FAA Aerospace Forecast expects U.S. scheduled domestic airline passengers to increase by an average of 1.9% through 2038.

Based on figures released by the General Aviation Manufactures Association (GAMA), U.S. manufacturers of general aviation aircraft delivered 2,324 aircraft in 2017, 2.4% more than 2016. Overall piston deliveries increased by 6.5%, with single-engine deliveries up 5.2%, and the much smaller multi-engine category up 15.5%. In the turbine categories, turbojet deliveries were up 1.3%. Turboprop deliveries were down 3.3% in 2017.

Overall, forecasts from the FAA, GAMA, and the commercial airline manufacturers show the long-term outlook for the aviation industry is one of growth.

3.4 Forecast Approach and Methodology

Now that existing and historical socioeconomic data and Airport activity and trends have been collected, analyzed, and presented, and industry trends and their relevance to FNL have been identified, this information will be used to inform and develop realistic forecasts of future demand (both aircraft operations and based aircraft) at FNL for the 20-year planning period (2018-2038).

Various forecast statistical methods (trend, market share, and regression) were considered and assessed for applicability in developing a range of reasonable forecast scenarios.

While the forecast method(s) provide a means for developing quantifiable aviation demand, the confidence and correlations for each forecast method is susceptible to some level of uncertainty. Therefore, the forecast scenarios are documented and substantiated by historic FNL activity trends, FAA statistical industry-related projections, and other applicable national, local, and industry-related data sources. Although activity levels during individual years might be above or below the forecast projections, the Airport's future developments should conform to the tracking of actual activity. For this reason, the forecasts do not necessarily coincide to a specific year, and are considered 'unconstrained',

which assumes facilities and services are, or will be, sufficiently available to accommodate user demands when the demand arises.

From this, a single preferred forecast is selected based on qualified research and professional industry knowledge, as found acceptable upon Airport Management and the Planning and Development Subcommittee (PDSC) review.

The preferred forecast is then compared with the FAA TAF for consistency and submitted to the FAA for review and formal written approval. FAA forecast approval guidance indicates that:

> *For all classes of airports, forecasts for total enplanements, based aircraft, and total operations are considered consistent with the TAF if the forecasts differ by less than 10% in the 5-year forecast period, and 15% in the 10-year forecast period.*[6]

Given the anticipated start of testing of the remote tower in 2020 at FNL, and the high potential for reintroducing commercial air service, a low forecast scenario (representing no commercial service for the duration of the planning period) and a range of scenarios that consider future commercial service are tested to support fiscally judicious financial recommendations. A high forecast scenario is also used to test the adequacy of programmed facility improvements to accommodate demand that is beyond the recommended forecast.

3.5 Aviation Activity Forecasts

Aviation activity forecasts for airports are often established using several sets of assumptions to generate a range of possible forecast scenarios. Several forecast scenarios are used in this Master Plan Update, the primary purpose of which is to provide a long-term facilities development plan for the Airport that safely and efficiently accommodates anticipated demand. The forecasts presented in this section will be used to inform the future Airport and AIA land use compatibility program.

Forecasting any type of future activity is as much an art as a science, particularly in the current climate of airline deregulation and changing operating methodologies (legacy airline hub and spoke systems vs. low cost carrier's point-to-point systems). Any forecast represents a "best guess" or "deducted guess" at a particular point in time. It must, therefore, be revised and updated periodically to reflect new conditions and developments.

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[6] FAA Airports, *Memo: Review and Approval of Aviation Forecasts* (2008). Available at: https://www.faa.gov/airports/planning_capacity/media/approval_local_forecasts_2008.pdf. Accessed November 14, 2018.

The projections of aviation demand at FNL the next 20-year planning period are based on the information presented above and summarized in the following sections, along with a description of the various forecast methodologies considered.

3.5.1 Passenger Enplanements Forecast

Passenger enplanement forecasts are an important element of the forecasting effort as they form the cornerstone of formulating air carrier and commuter operations projections. Commercial passenger service was reintroduced at FNL by Allegiant in 2003, after several years of no scheduled passenger service. Allegiant discontinued its commercial service at FNL again in 2012.

Four enplanement scenarios, ranging from low to high growth, are presented in this section and subsequently compared with the TAF.

3.5.1.1 Enplanement Scenarios

The four passenger enplanement scenarios are presented in this section for consideration. They are based on a variety of assumptions that consider a range of potential scenarios related to the return of commercial service following the establishment of air traffic control as part of the remote tower project in 2020. Each scenario assumes 3,388 enplanements in 2018 as the base year, which represents estimates provided by Airport management and information provided in the TAF. The scenarios described below are compared against each other and to the TAF in **Table 3-5**.

- **Scenario One – Low Growth/No Commercial Service (1.29%):** This scenario projects enplanements to increase at a CAGR of 1.29%, which is equal to the projected population average annual growth rate (AAGR) for the Fort Collins MSA between 2018 and 2038, as reported by the State of Colorado Demographer's Office projections. This scenario is the most conservative scenario assumes that no air carriers will provide commercial service at FNL within the 20-year planning period.

- **Scenario Two – Medium Growth/Low-Cost Carrier Service to One Destination (3.25%):** This scenario represents a somewhat conservative approach to the potential for Allegiant's return to FNL as the scenario anticipates that the only commercial service destination is Las Vegas. Given Allegiant's successful history in providing commercial service to Las Vegas, it is reasonable to believe they will provide this service again after air traffic control is in place and the remote tower begins testing. It assumes that Allegiant provides service on a less than daily basis to Las Vegas, generally with four weekly roundtrips.

Allegiant's tendency to provide less than daily service was historically driven by aircraft type as they used MD-80's, which were expensive to operate. Following the transition to Airbus A-320 aircraft, Allegiant has provided more daily service from regional airports like FNL, as their ability to park aircraft on historically slower days such as Tuesday, Wednesday, or Saturday, has been limited.

As illustrated in **Table 3-5**, this scenario has flat growth for the first two years of the planning period (2018 and 2019). In 2020, Allegiant returns with commercial service to Las Vegas with 30,000 enplanements, which is approximately the number of enplanements Allegiant had in its first year of providing FNL commercial service to Las Vegas in 2008. From 2020 through the end of the planning period, this scenario reflects a 3.25% CAGR, the same growth rate as projected by the TAF for the planning period.

Scenario Three – Medium Growth/Low-Cost Carrier Service to Two Destinations (3.25%): This scenario considers the return of Allegiant Air return to FNL with service two both Las Vegas and Phoenix. This scenario utilizes a 3.25% CAGR for FNL enplanements, which is equivalent to the TAF for the planning period (2018-2038). This scenario represents a more optimistic approach with Allegiant's return to FNL and initial service to both Las Vegas and Phoenix-Mesa. Like Scenario 2, the scenario shows flat growth for the first two years of the planning period (2018 and 2019). In 2020, Allegiant returns with service to Las Vegas and Phoenix-Mesa with 44,000 enplanements.

- **Scenario 4 – High Growth/Low-Cost Carrier Commercial Service to Two Destinations and A Regional Carrier to One Destination (4.7%):** This is the most optimistic scenario for future commercial service at FNL. Scenario Four assumes that Allegiant returns with daily service two destinations and second carrier provides service to one destination. Regional airline service would mostly likely be to a major hub like DFW or PHX. Additional low-cost service may be provided to a number of potential destinations from FNL as described on pages 36 and 37 of **Appendix C**. Scenario 4 reflects a 4.70% CAGR, which correlates to the historical TAF air carrier enplanement counts from 2008-2012, when Allegiant was providing commercial service at FNL.

The forecast scenarios described above are also illustrated in **Figure 3-2**, along with the historical TAF reported passenger enplanements from 2008-2017.

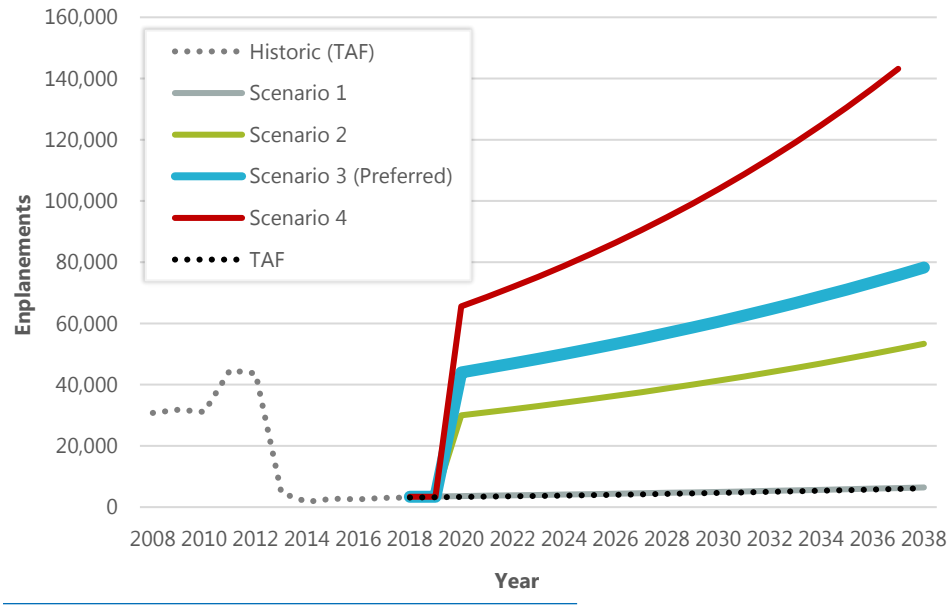
Table 3-5: Forecasted Enplanements Scenario Comparison

Year	TAF	Scenario One[1]	Scenario Two[1]	Scenario Three[1]	Scenario Four[2]
2018	**3,388**	**3,388**	**3,388**	**3,388**	**3,388**
2019	3,488	3,498	3,388	3,388	3,388
2020	3,588	3,612	30,000	44,000	65,580
2021	3,688	3,729	30,975	45,430	68,662
2022	3,788	3,850	31,982	46,906	71,889
2023	**3,888**	**3,976**	**33,021**	**48,431**	**75,268**
2024	4,019	4,105	34,094	50,005	78,806
2025	4,154	4,238	35,202	51,630	82,510
2026	4,294	4,376	36,346	53,308	86,388
2027	4,438	4,518	37,528	55,041	90,448
2028	**4,590**	**4,665**	**38,747**	**56,829**	**94,699**
2029	4,746	4,817	40,007	58,676	99,150
2030	4,908	4,973	41,307	60,583	103,810
2031	5,076	5,135	42,649	62,552	108,689
2032	5,247	5,302	44,035	64,585	113,797
2033	**5,425**	**5,474**	**45,467**	**66,684**	**119,146**
2034	5,611	5,652	46,944	68,852	124,746
2035	5,803	5,835	48,470	71,089	130,609
2036	6,002	6,025	50,045	73,400	136,747
2037	6,208	6,221	51,672	75,785	143,174
2038	**6,423**	**6,423**	**53,351**	**78,248**	**149,903**
CAGR (2018-2038)	**3.25%**	**3.25%**	**14.78%**	**17.00%**	**20.86%**
CAGR (2020-2038)	**3.29%**	**3.25%**	**3.25%**	**3.25%**	**4.70%**

SOURCES: Mead & Hunt, 2018.
U.S. Census & Demographic Services Center, Colorado Department of Local Affairs, State Demography Office. Available at: https://demography.dola.colorado.gov/population/population-totals-colorado-substate/#population-totals-for-colorado-and-sub-state-regions. Accessed October 1, 2018.
FAA 2018 APO Terminal Area Forecast Detail Report for FNL.

NOTES: Low- and medium growth forecasts are based on TAF projected enplanements 3.25% CAGR 2020-2038.
High growth forecast is based on TAF historical air carrier enplanements 4.70% CAGR 2004-2012.

Figure 3-2: Historical Passenger Enplanements and Forecast Enplanement Scenarios



SOURCE: Mead & Hunt, 2018.
NOTE: Data source is FAA 2018 APO Terminal Area Forecast Detail Report for FNL.

Preferred Passenger Enplanements Forecast Scenario. Based on Allegiant's historical success at FNL with service to two destinations, Scenario 3 is the preferred passenger enplanement forecast because it is reasonable to assume that Allegiant will initiate service following the introduction of air traffic control as part of the remote tower project. Also, historical enplanements and operations show that Allegiant's service at FNL was successful operating at around a 93% load factor between 2010 and 2012, when Allegiant provided service to both Las Vegas and Phoenix-Mesa.

Additional justification for this preferred passenger enplanements forecast relative to Allegiant Air is included on pages 34 and 35 of **Appendix C**. Allegiant Travel (parent company of Allegiant) has demonstrated consistent growth since the early 2000s. In October 2018, Allegiant posted its 63rd consecutive profitable quarter and noted that since 2016, the company has grown 20% in capacity (available seats per mile) carrying 13.6 million passengers during the previous twelve months, an increase of 1.64 million passengers over 2016.[7]

[7] (Allegiant Travel Company Investor Relations, 2018). Available at: http://ir.allegiantair.com/news-releases/news-release-details/allegiant-travel-company-third-quarter-2018-financial-results.

3.5.2 Commercial Operations Forecast

The establishment of projected passenger enplanements is required to properly project commercial service operations and there is usually a direct relationship between passenger enplanements and commercial service operations. If enplanements increase, operations will generally increase to accommodate the demand. However, the relationship can vary significantly, in that enplanements can increase without increasing operations, or even increase following a decrease in operations. Often, this is a result of airlines using larger aircraft with greater seating capacity, or more efficient scheduling with increased passenger load factors. The Boarding Load Factor (BLF) of the A320 was used to determine the forecast of commercial service operations. The BLF is the ratio of seats available for passenger boarding on an aircraft compared to the number of passengers actually boarding (for example, if an aircraft has fifty seats available and twenty-five passengers board, the BLF is 50%).

According to the 2018 FAA baseline estimates in the FAA Aerospace Forecasts Fiscal Years 2018-2038, average load factors of approximately 84.7% increasing to 86.6% are anticipated to be achieved by the air carrier industry through 2038. Historically, low-cost air service at FNL operated near a 93% BLF during the period when service was offered to two destinations; therefore, this was used as the BLF in the air carrier operations forecast presented in **Table 3-6**, which shows that with continued additions of the A320 aircraft, the average seats per departure (177 seats) and the projected BLF (approximately 93%) are anticipated to remain consistent throughout the planning period. As shown in **Table 3-6**, the projected numbers of total commercial operations in 2038 is 4,454.

Table 3-6: Commercial Service Forecast

Year	Air Carrier Enplanements	Average # of Seats/ Departure	BLF	Departures	Air Carrier Operations[2]	Commuter/ Air Taxi Operations[3]	Total Commercial Operations[4]
2018	3,388	177	76.6%	25	50	3,500	3,550
2023	48,431	177	92.8%	295	590	3,500	4,090
2028	56,829	177	92.8%	346	692	3,500	4,192
2033	66,684	177	92.8%	406	812	3,500	4,312
2038	78,248	177	92.7%	477	954	3,500	4,454

SOURCE: Mead & Hunt, 2018.
NOTES:
1. 2018 enplanements and operational data sourced from the 2018 FAA TAF.
2. Operations = Departures x 2.
3. Private charters at FNL are considered air taxi operations (and accounted for in the general aviation forecast). Public Charters are considered non-scheduled commercial service aircraft operations.
4. 2018 commercial operations data sourced from the 2018 FAA TAF.

3.5.3 Air Cargo Activity Forecast

Historically, air cargo activity has been closely associated with the Gross Domestic Product (GDP). National factors and trends that potentially stimulate demand for air cargo include increased market opportunities through open skies agreements, decreased costs from global airline alliances, and increased business volumes attributable to e-commerce. Factors and trends that could potentially limit growth of air cargo include increased use of e-mail, decreased costs of sending documents via facsimile, and the increased costs to airlines in meeting environmental and security restrictions.

Perhaps the most influential component currently affecting the air cargo industry is the security directives emanating from the 9/11 terrorist attacks in 2001. Directives since that time have strengthened security standards for transporting cargo on passenger flights (i.e., no USPS package weighing more than 13 ounces can be shipped on a passenger aircraft) and have required air cargo carriers to conduct random inspections of cargo. These restrictions are anticipated to remain in place for the foreseeable future and, in fact, may become more stringent.

Air Cargo activity at the Airport is generally counted in the general aviation air taxi category. It is anticipated that there is a low potential for increased cargo activity at FNL given the proximity to Denver International Airport (DEN).

3.5.4 Military Operations Forecast

As a percentage of total annual aircraft operations, the number of military operations at the Airport has historically been low (approximately 200 operations per year). There have been no indicators that suggest a significant increase the number of military operations in the future at FNL and the Department of Defense (DoD) does not typically publicize plans for future military use of publicly owned airports; therefore, the number of military aircraft operations is projected to remain at historic levels throughout the planning period, with 200 annual operations.

3.5.5 General Aviation Aircraft (GA) Operations Forecast

Many different factors impact the number of GA operations at an airport including, but not limited to:

- Total based aircraft
- Area demographics
- Activity and policies of neighboring airports
- National trends

In developing the GA activity forecasts, national trends were considered along with airport-specific data and trends identified within the northeast region of Colorado to appropriately reflect current GA operation activity and provide realistic projections for the 20-year planning period as shown in **Table 3-7.** Note that these forecasts serve only as estimates and the reasoning, assumptions, and trends that the numbers represent are the most important element of this forecasting element.

The four GA forecast scenarios anticipate GA traffic will increase in 2019 with the planned relocation of Aims Community College (ACC) flight training operations program to FNL. Based on information provided to Airport Management by ACC, there would be an additional 25 to 30 program related flights a day at the Airport beginning in 2019. Outside of this immediate increase projected in 2019, the forecast scenarios generated for this assume, for the most part, straight-line growth. While it is recognized that straight-line (consistent) growth never occurs year after year for many years, average annual growth methodologies are appropriate for intermediate and long-range planning purposes.

General Aviation (GA) Operations Forecasts

Four total forecasting scenarios were considered based upon national, regional, and local trends.

- **Scenario One – Flat Growth/(0%):** This scenario shows an immediate increase of 6,500 GA operations in 2019 associated with the ACC flight operations program and no growth through the remainder of the planning period. While this scenario does not project a decline in GA operations, it represents the most conservative projection based on the general flat growth or a slight decline over the 20-year planning period.
- **Scenario Two – Low Growth/(1.2%):** This scenario also shows an immediate increase of 6,500 operations in 2019 associated with the ACC flight operations program and forecasts GA operations to increase 1.21% annually, which is equal to the TAF projected growth rate for FNL GA/Air Taxi during planning period (2018-2038).
- **Scenario Three – Medium Growth/(1.8%):** This scenario also shows an immediate increase of 6,500 operations in 2019 associated with the ACC flight operations program and forecasts GA operations to increase 1.77% annually, which is equal to the combined average annual growth rate (AAGR) for Weld and Larimer Counties projected through planning period (2018-2038).

- **Scenario Four – High Growth/(4.2%):** This scenario also shows an immediate increase of 6,500 operations in 2019 associated with the ACC flight operations program and forecasts GA operations to increase at 4.2% annually, which is equal to the 2017 growth rate for general aviation deliveries as reported by the FAA Aerospace Forecast (Fiscal Year 2018-38).

Preferred General Aviation (GA) Operations Forecast Scenario. Scenario Three is the preferred forecast scenario for GA operations because it mirrors the anticipated growth in northern Colorado, and it positions FNL to be at 65% capacity within 15 years (2033) and 70% capacity by the end of the planning period (2038).[8]

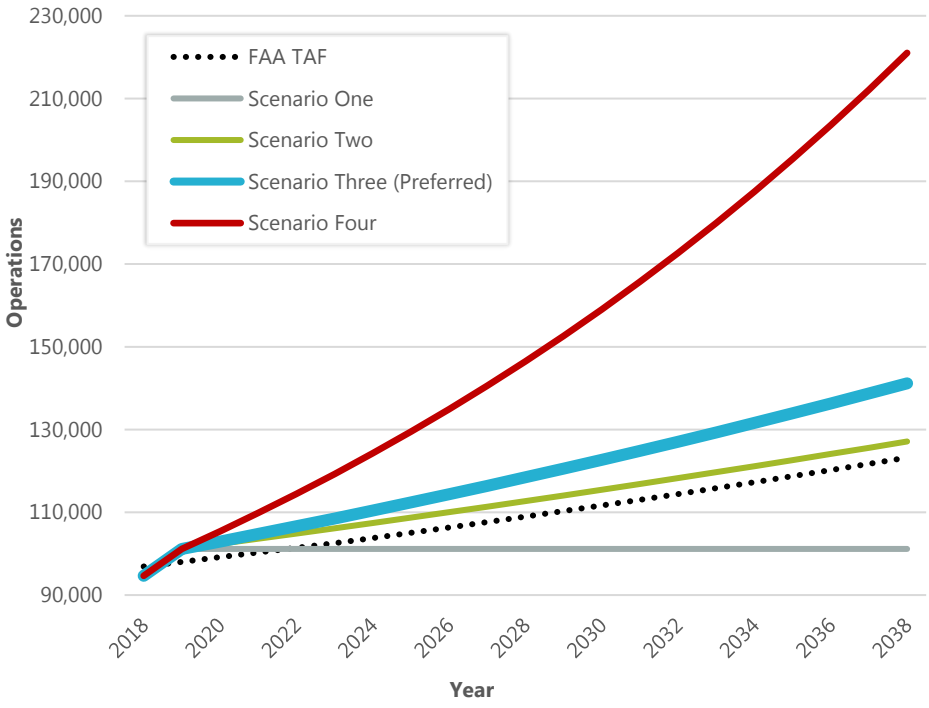
Table 3-7: General Aviation (GA) Operations Forecast Scenarios, 2013-2038

Year	TAF (1.21%) [1]	2007 Master Plan (4.0% then 1.27) [2]	Scenario One (0.00%)	Scenario Two (1.21%)	Scenario Three (1.77%) *Preferred*	Scenario Four (4.20%)
2018[3]	96,901	140,425	94,650	94,650	94,650	94,650
2023	102,530	149,572	101,150	106,135	108,504	119,244
2028	108,952	--	101,150	112,714	118,452	146,479
2033	115,836	--	101,150	119,700	129,313	179,934
2038	123,217	--	101,150	127,119	141,170	221,031

SOURCE: Mead & Hunt, 2018.
NOTES: -- Data not available.
1. FAA Terminal Area Forecast, Fiscal Years 20018-2038, issued January 2017. Includes air taxi operations.
2. Preferred forecast obtained from the 2007 Fort Collins-Loveland Municipal Airport Master Plan Update, which assumed that FNL would attract based aircraft following the closure of the Downtown Fort Collins Airport and operations would grow at 4% annually from 2008-2013 and at 1.27% after that, which translated to the average annual population growth rate for Larimer County 2003-2008.
3. 2018 base year scenario data sourced from FNL Airport Master Record 5010.

[8] Capacity estimates are based on 200,000 operations per year for a single runway airport.

Figure 3-3: General Aviation (GA)/Air Taxi Operations Forecasts, 2018-2038



SOURCE: Mead & Hunt, 2018.

Forecasted operations are also categorized as local or itinerant operations. The Air Traffic Control Handbook defines a local operation as any operation performed by an aircraft operating in the local traffic pattern or within sight of the tower, or aircraft known to be departing or arriving from flight in local practice areas, or aircraft executing practice instrument approaches at the Airport.

Local operations currently account for 37.1% of all Airport operations and are expected to increase to 47.1% by the end of the planning period as a result of approximately 6,500 additional operations annually associated with the ACC flight school. Based on this consideration, local and itinerant operations forecasts are summarized in **Table 3-8**.

Table 3-8: Local and Itinerant Operations Forecast

Year	Local	Itinerant	Total
2018	35,208	59,692	94,900
2023	43,280	66,013	109,294
2028	50,244	69,100	119,344
2033	58,125	72,200	130,325
2038	67,034	75,289	142,324

SOURCE: Mead & Hunt, 2018.
NOTES: 2018 base year data sourced from the FNL Airport Master Record 5010.

3.5.6 General Aviation (GA) Based Aircraft Forecast

The number of general aviation aircraft that can be expected to base at an airport depends on several factors including, airport radio communications, available facilities, airport operator services, airport proximity and access, aircraft basing capacity available at adjacent airports, and similar considerations. GA operators are particularly sensitive to both the quality and location of their basing facilities, with proximity of home and work often being identified as the primary consideration in the selection of an aircraft basing location.

The based aircraft forecasts for the 20-year planning period are based on the preferred GA operations forecast and five growth scenarios illustrated in **Figure 3-4** and described below. Each of the five forecast scenarios assume that ACC will base seven aircraft at FNL beginning in the fall of 2019.

General Aviation (GA) Based Aircraft Forecasts

In a similar fashion to GA-related operations, forecast scenarios were examined relating to the number of total based aircraft at FNL.

- **Scenario One – Low Growth/(0.77%):** This scenario illustrates a 0.77% average annual growth rate, equivalent to the compound annual growth rate of the total national based aircraft according to the FAA Aerospace Forecast (2018-2038).
- **Scenario Two – Medium-Low Growth/(0.82%):** This scenario illustrates a 0.82% average annual growth rate, equivalent to the average annual growth rate of based aircraft in Colorado according to the TAF (2018-2038).
- **Scenario Three – Medium-High Growth/(0.89%):** This scenario illustrates a 0.89% average annual growth rate, equivalent to the

average annual growth rate of based aircraft in the Northwest Mountain Region according to the TAF (2018-2038).

- **Scenario Four – High Growth/(2.03%):** This scenario illustrates a 2.03% average annual growth rate, equivalent to the historic average annual growth rate of the population in Fort Collins and Loveland (1990-2010).
- **Average Growth/(1.13%):** This scenario represents the average growth rate of scenarios one through four.

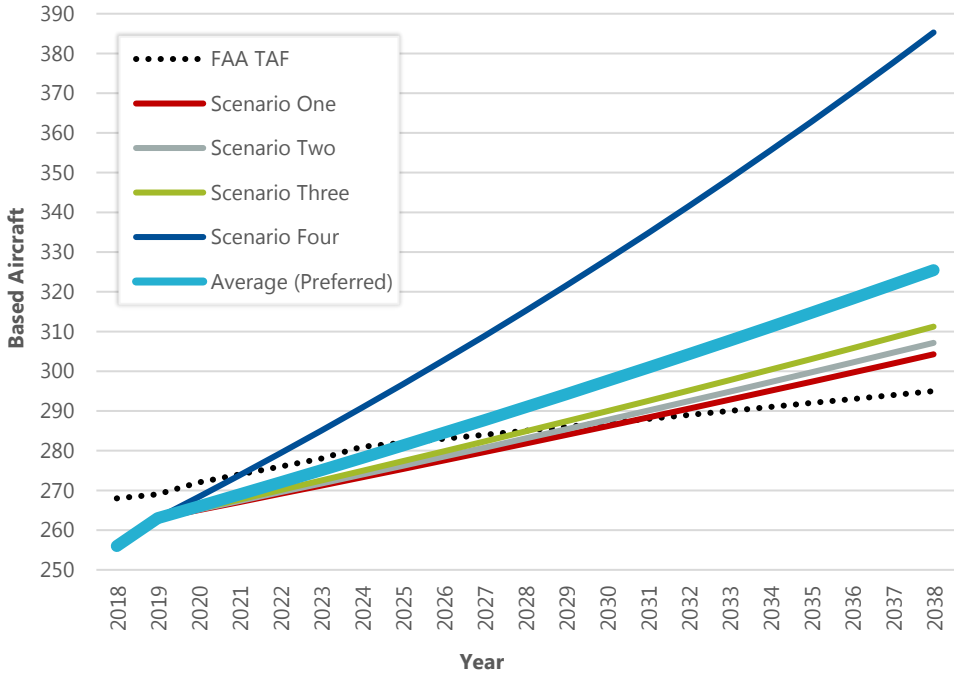
Preferred Based Aircraft Forecast Scenario. The average growth scenario is the preferred forecast scenario for based aircraft and summarized in **Table 3-9**. Following the addition of approximately seven based aircraft associated with ACC in 2019, based aircraft are projected to grow at 1.13% through the end of the planning period.

Table 3-9: General Aviation (GA) Based Aircraft Forecast, 2018-2038

Year	Preferred GA Operations Forecast	Scenario One	Scenario Two	Scenario Three	Scenario Four	Average Scenario (Preferred)
2018	94,650	256	256	256	256	**256**
2023	108,504	271	272	272	285	**275**
2028	118,452	282	283	285	315	**291**
2033	129,313	293	295	298	348	**308**
2038	141,170	304	307	311	385	**325**

SOURCE: Mead & Hunt, 2018.

Figure 3-4: Based Aircraft Forecast Scenarios, 2018-2038



SOURCE: Mead & Hunt, 2018.

3.5.7 Based Aircraft by Type

The mix of based aircraft anticipated at FNL throughout the planning period is illustrated in **Table 3-10**. Single-engine aircraft currently represent a high percentage of based aircraft at the Airport and this is expected to remain the same throughout the planning period. The number of multi-engine piston aircraft based at FNL is expected to remain constant throughout the planning period and based aircraft in the glider/ultra-light category are expected to grow only slightly. The percentage of business jet aircraft is expected to increase as a part of the total based aircraft population. This is in line, first, with overall trends in general aviation, but even more importantly, parallels the economic development and growth expectations and projections characteristic of the region. Based helicopters are anticipated to grow only slightly.

Table 3-10: General Aviation (GA) Based Aircraft Fleet Mix, 2018-2038

Aircraft Type	2018[1]	2023	2028	2033	2038
Single-engine Piston	216	230	241	253	265
Multi-engine Piston	16	16	16	16	16
Glider/Ultra-Light	2	3	4	5	6
Business Jet	9	11	13	15	17
Helicopter	13	15	17	19	21
Total Based Aircraft	**256**	**275**	**291**	**308**	**325**

SOURCE: Mead & Hunt, 2018.
NOTES: 1. 2018 based aircraft fleet mix breakdown provided by FNL Airport Management.

3.5.8 Critical (Design) Aircraft Analysis and Forecasts of Operations by Runway Design Code (RDC)

The types of aircraft presently utilizing FNL and those projected to utilize the Airport in the future have a significant impact on the planning and design of airport facilities. Airport design standards are based on the "critical aircraft," often referred to as the design aircraft that currently utilize the Airport on a regular basis (regular use).

In June of 2017, FAA published AC 150/5000-17, *Critical Aircraft and Regular Use Determination*, which defines "critical aircraft" as the most demanding aircraft type, or grouping of aircraft with similar characteristics, that make regular use of the airport. Regular use is 500 or more annual operations, including itinerant and local, excluding touch-and-go operations. An operation is defined as either a takeoff or landing.

The design aircraft can be either one specific aircraft or a composite of more than one aircraft representing the highest Aircraft Approach Category (AAC) and Airplane Design Group (ADG). The selected AAC and ADG are combined to form the Runway Design Code (RDC) of a runway. The RDC determines the dimensional criteria standards that apply to that runway. The first component, depicted by a letter (A-E), is the AAC and relates to the aircraft approach speed. The second component, depicted by a roman numeral (I-V), is the ADG and relates to the aircraft wingspan, and tail height. In general, aircraft approach speed applies to the design standards for runways and runway-related facilities, while aircraft wingspan is primarily related to separation criteria associated with taxiways and taxilanes.

Runway 15/33. Runway 15/33 accommodates most of the small aircraft (aircraft weighing less than 12,500 pounds) and all of the large aircraft (aircraft weighing more than 12,500 pounds). The 2007 Master Plan determined that the "Design Aircraft" for Runway 15/33 was the Allegiant operated MD-83 (narrow body commercial passenger jet aircraft with a passenger seating capacity of 162).

In 2011, the last full calendar year Allegiant provided commercial service, there were 537 MD-83 operations. However, Allegiant has since retired its MD-83 fleet and has transitioned to an all Airbus fleet of A319 aircraft (narrow body commercial passenger jet aircraft with a passenger seating capacity of 156) and A320 aircraft (narrow body commercial passenger jet aircraft with a passenger seating capacity of 177). Like the MD-83, both the A319 and the A320 have a C-III ARC. Even though there is no commercial service at FNL currently, it is anticipated that once their need for air traffic control is met, Allegiant will resume providing commercial service with the A320 aircraft.

Many of the sports charters currently operating at FNL include 737s, which have an ARC of C/DIII. The Airport is also utilized by the business jet fleet, many of which have C- or D- approach speeds and the new, larger business jets (i.e., the Gulfstream V, Canadair Global Express, and the Boeing Business Jet) that have ADG III wingspans.

While the total number of annual C/D aircraft operations is currently less than the 500 operations threshold, the Airport is already designed to accommodate C/D-III aircraft. It is anticipated that commercial service will resume and the A319/A320 will be the design aircraft and consequently, it is recommended that ARC C/D-III criteria continue to be maintained so as not to prohibit commercial service aircraft from operating at FNL in the future.

Runway 6/24. Runway 6/24 is primarily used as an emergency runway and it can only accommodate smaller general aviation aircraft (under 12,500 pounds). The design aircraft fleet for this runway is made up of the single engine piston-driven general aviation aircraft (e.g., the Beech Bonanza, Cessna 172, etc.). The approach speeds for these aircraft are less than 121 knots and wingspans are less than 49 feet. This indicates that this runway should be designed using ARC B-I (small aircraft only) dimensional criteria.

3.6 Aviation Forecasts Summary

Overall, total aircraft operations, passenger enplanements, and based aircraft at FNL are anticipated to increase over the course of the 20-year planning period. **Table 3-11** summarizes the preferred aviation activity forecasts presented in this chapter. This forecast information will be used in the following chapter to document and analyze both airside and landside facility requirements. Therefore, these forecasts of aviation activity represent the basis for planning and implementation decisions related to future airport development that can accommodate the forecasted aviation activity growth at FNL.

After identifying the preferred aviation operations and based aircraft forecasts, an assessment of the current and future critical aircraft was conducted. The critical aircraft determination is a very important outcome of this chapter because it is a key consideration in the development of the remaining sections of this Plan. The critical aircraft is used to analyze facility requirements, aid in the development of alternatives, and guide the design and programming of future airport facilities. In other words, the aviation activity forecasts (and critical aircraft determination) serve as the foundation from which future development needs are determined and implementation decisions will be made.

Table 3-11: Summary of Aviation Activity Forecasts, 2018-2038

Aviation Activity	2018	2023	2028	2033	2038
OPERATIONS					
Commercial Service	50[1]	590	692	812	954
General Aviation	94,650[2]	108,504	118,452	129,313	141,170
Single Engine Piston	*63,298[3]*	*72,372*	*79,008*	*86,252*	*94,160*
Multi-Engine Piston	*28,470[3]*	*32,009*	*34,351*	*36,854*	*39,528*
Turboprop	*285[3]*	*597*	*948*	*1,358*	*1,835*
Business Jet	*2,847[3]*	*3,526*	*4,146*	*4,849*	*5,647*
Military	200[2]	200	200	200	200
TOTAL OPERATIONS	**94,900[2]**	**109,294**	**119,344**	**130,325**	**142,324**
Local Operations	35,208[2]	43,280	50,244	58,125	67,034
Itinerant Operations	59,692[2]	66,013	69,100	72,200	75,289
PASSENGER ENPLANEMENTS					
Enplanements	**3,388[2]**	**48,431**	**56,829**	**66,684**	**78,248**
BASED AIRCRAFT BY TYPE					
Single Engine Piston	216[1]	230	241	253	265
Multi-Engine Piston	16[1]	16	16	16	16
Glider/Ultra-Light	2[1]	3	4	5	6
Business Jet	9[1]	11	13	15	17
Helicopter	13[1]	15	17	19	21
Total Based Aircraft	**256[4]**	**275**	**291**	**308**	**325**

SOURCE: Mead & Hunt, 2018.
NOTES:
1.FAA 2018 APO Terminal Area Forecast Detail Report for FNL.
2. Base year data source: FAA Form 5010.
3. Percentages of GA operations by aircraft by type were extrapolated using the percentages identified in the 2007 Fort Collins-Loveland Airport Master Plan.
4. National Based Aircraft Inventory

Table 3-12 provides a comparison of the preferred aviation activity forecasts and the FAA TAF aviation activity forecasts. As previously noted, forecasts for total enplanements, based aircraft, and total operations are considered consistent with the TAF if the forecasts differ by less than 10% in the 5-year forecast period (2023), and 15% in the 10-year forecast period (2028).

While the preferred forecasts for total operations and based aircraft are consistent with the FAA TAF, the preferred enplanements and commercial operations forecasts are not consistent with TAF forecasts, as the TAF does not account for the anticipated return of commercial service. This information is presented below in **Table 3-12**.

Table 3-12: Master Plan Forecasts/TAF Forecast Comparison, 2018-2038

Aviation Activity	Master Plan Forecast (Preferred)	January 2018 TAF	AF/TAF % Difference
ENPLANEMENTS			
Base Year (2018)	3,388	3,388	0.0%
2023	48,431	3,888	1,145.7%
2028	56,829	4,590	1,138.1%
2033	78,248	5,425	1,342.4%
COMMERCIAL OPERATIONS			
Base Year (2018)	50	50	0.0%
2023	590	60	883.3%
2028	692	70	888.6%
2033	812	80	915.0%
TOTAL OPERATIONS			
Base Year (2018)	94,900	97,151	-2.3%
2023	109,294	102,790	6.3%
2028	119,344	109,222	9.3%
2033	130,325	116,116	12.2%
BASED AIRCRAFT			
Base Year (2018)	256	268	-4.5%
2023	275	278	-1.1%
2028	291	285	2.1%
2033	308	290	6.2%

SOURCE: Mead & Hunt, 2018.

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