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2.1. COVID-19 PREFACE

In December 2019, a new strain of coronavirus (COVID-19) emerged in Wuhan, China. On March 11, 2020, the World Health Organization (WHO) declared COVID-19 a global pandemic. In response, the U.S. government issued restrictions on travel into the U.S. by foreign nationals and advised U.S. citizens to avoid all international travel to contain the outbreak in the U.S. In addition, 42 states announced "shelter-in-place" orders which required people to stay in their homes except to purchase groceries and other goods, care for a relative or friend, seek necessary health care, or go to a job that was labeled "essential." As nationwide COVID-19 cases began to wane in May 2020, shelter-in-place orders were gradually lifted and local economies slowly reopened. However, a second surge in cases, especially in southern and western states including Arizona, prompted the temporary reversal of many reopening plans and brought further uncertainty to the future of the virus and the country's long-term economic health.

As of August 2020, nationwide COVID-19 cases and virus-related deaths were on the decline. However, the virus has engulfed the world and forced the global economy to a near standstill. It has impacted nearly every industry and sector, resulting in significant financial loss and uncertainty. While the immediate economic impacts from the pandemic have been evident, the long-term effects on general aviation (GA) remain largely unknown in the absence of historical precedent. From analyzing existing Airport data and consulting industry organizations and publications, this preface describes various factors related to COVID-19 that may impact GA operations and demand forecasts at Cottonwood Municipal Airport.

2.1.1. General Aviation Demand

According to the National Business Aviation Association (NBAA), COVID-19 has led to widespread declines in traffic and revenue at GA airports across the country. Fuel sales generally represent a substantial portion of income for small airports and FBOs, and overall fuel sales nationwide have dropped in Q1 of 2020.[1] Additionally, as more aircraft sit dormant, ongoing maintenance and continued airworthiness requirements are delayed. Tourism has also been a victim of COVID-19, and a steep decline in air tour operations have reflected this trend.

Cottonwood Municipal Airport experienced a 51 percent and 58 percent year-over-year decrease in AvGas 100L and Jet A fuel sales by volume, respectively, for the month of March 2020. It can be reasonably deduced that this significant decrease in fuel sales was a direct result of COVID-19, including stay-at-home orders and individual safety precautions. In spite of this decrease, the Airport experienced a 25 percent, 60 percent, and 25 percent year-over-year increase in AvGas 100L fuel sales for the months of April, May, and June 2020, respectively, and a 29-percent year-over-year increase in Jet A fuel sales for the month of June 2020. This indicates that any immediate impacts that were experienced at the Airport at the onset of the COVID-19 outbreak were largely temporary and that long-term activity is likely to be unaffected over the 20-year planning horizon.

[1] National Business Aviation Association, COVID-19 Impacting General Aviation Airports, 2020.

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2.1.2. Expired Pilot Licenses and Certificates

Federal regulations require pilots to renew medical certificates, pilot and instructor certificates, instrument proficiency checks, and airman knowledge tests within prescribed time periods. Many of these renewals, exams, and checks must be performed in person. Closed businesses and travel restrictions resulting from COVID-19 have created a barrier for pilots to meet the necessary airman and aircraft requirements. In April 2020, the FAA issued various relief to pilots in the wake of the pandemic, including extensions of pilot medical certificates, knowledge test results, flight instructor certificates, and instrument currency requirements.[2] Although relief has been issued, a backup in license and certificate renewals may cause a short-term dip in GA traffic. Alternatively, some pilots may choose not to renew the required licenses and certificates due to economic or health concerns, potentially impacting GA in the long term.

2.1.3. Business Jet Aircraft

COVID-19's impact on global business is vast. While the FAA has forecast an overall increase in business jet aircraft over the next 20 years, a reduction in corporate profits may adversely impact business jet demand.[3] Additionally, as the pandemic forces people to rely on telecommuting and teleconferencing technologies, businesses may pull back on travel spending in the long term. Although these factors may affect GA airports that largely cater to business jets, Cottonwood Municipal Airport does not currently nor is projected to serve a substantial amount of corporate/business activity and it is not anticipated that the Airport will be significantly impacted by industry impacts associated with COVID-19. Rather, the Airport's existing jet operations associated with leisure travel and type ratings are expected to continue to grow as forecast in this report.

2.1.4. CARES Act

The Coronavirus Aid, Relief, and Economic Security (CARES) Act (H.R. 748, Public Law 116-136) was signed by the President on March 27, 2020. The CARES Act included $10 billion in economic relief to be distributed to eligible U.S. airports in response to COVID-19. The Act increased the federal share of Airport Improvement Program (AIP) grants to 100 percent for FAA fiscal year 2020, and new funds were distributed by various formulas for all airports that are part of the national airport system, including commercial service airports, reliever airports, and some public-owned general aviation airports. Under the CARES Airport Program, general aviation airports received funds based on their categories as listed in the current NPIAS Report.[4] Classified as a Basic GA airport in the 2019-2023 NPIAS, Cottonwood Municipal Airport was eligible to receive $20,000.[5] The CARES Act funds were available to reimburse operational expenses, debt service payments, and capital expenditures directly related to the Airport.

[2] Federal Aviation Administration, Special Federal Aviation Regulation, 2020.
[3] Federal Aviation Administration, *FAA Aerospace Forecast 2020-2040*, 2020.
[4] Federal Aviation Administration, 2020 CARES Act Grants (https://www.faa.gov/airports/cares_act/)
[5] Federal Aviation Administration, CARES Act Airport Grants – Frequently Asked Questions, 2020.

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2.1.5. Future Outbreaks

Experts have indicated that additional outbreaks may occur throughout the remainder of 2020, especially during the fall and winter seasons.[6] According to the Arizona Department of Health Services, in July 2020 the State of Arizona experienced a steep spike in new COVID-19 cases and gradual increases in COVID-19-related hospitalizations and deaths, the majority of which were located in Maricopa County.[7] While the uptick in cases may be related to an overall increase in testing availability, the spike is an example of the extreme uncertainty of this pandemic.

Without a vaccine, future outbreaks will require additional mitigative measures such as business closures and travel restrictions, which may further affect a recovering economy. This scenario would heavily impact an already crippled aviation industry, and airports may face similar challenges to those experienced during the pandemic's initial onset. Further, a rise in COVID-19 cases in certain areas and varying regulations enacted by local governments may inconsistently impact GA operations on a regional basis.

As previously discussed, operational and fuel sales data indicate that, despite an initial drop in activity due to the onset of stay-at-home orders and personal safety precautions, Cottonwood Municipal Airport has experienced healthy growth year-over-year in April, May, and June 2020. This indicates that overall activity at the Airport should remain steady in the near-term with possible fluctuations based on potential regional outbreaks, and that long-term activity is not expected to be adversely impacted by COVID-19.

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[6] Center for Infectious Disease Research and Policy, *Report: The Future of the COVID-19 Pandemic*, 2020.
[7] Arizona Department of Health Services, COVID-19 Data Dashboard (https://www.azdhs.gov/preparedness/epidemiology-disease-control/infectious-disease-epidemiology/covid-19/dashboards/index.php)

2.2. CHAPTER INTRODUCTION

Forecasting aviation activity is a critical step to ensuring airport planning and development efforts are consistent with future demand and needs. The forecasts are used to determine the type, size, and timing of new or expanded facilities, and also help justify the financial investment required for airport improvements. Forecasts are among the two components of a Master Plan Update that are reviewed and approved by the FAA—the other being the ALP.

This chapter presents forecasts of aviation activity at Cottonwood Municipal Airport for a 20-year planning horizon, with 2019 as the base year and 2039 as the ultimate forecast year. These forecasts are unconstrained, implying that requisite facilities will be developed to accommodate all aviation activity demand over the forecast period. Specific facility needs resulting from these forecasts are presented in later chapters of this Master Plan Update.

Included in this chapter are overviews of historical aviation activity, assumptions used in forecast analyses, and methodologies used to project future demand at the Airport. Data were collected from various FAA sources, including Terminal Area Forecast (TAF) records, Traffic Flow Management System Counts (TFMSC) database, the FAA Form 5010-1 Airport Master Record (5010 Airport Master Record), and the FAA National Based Aircraft Inventory Program. Additionally, socioeconomic data for the City of Cottonwood, Yavapai County, and the State of Arizona were evaluated for conditions and trends that may impact demand at the Airport.

2.3. TRENDS AND FACTORS THAT IMPACT AVIATION DEMAND

Understanding aviation trends and related factors can provide direction and insight to the forecast methodology outcomes and aid in the selection of a preferred forecast. Since activity at Cottonwood Municipal Airport is associated with general aviation, this section primarily focuses on trends at the national, regional, and local levels that impact non-commercial activity.

The FAA provides an overview of GA trends and forecasts in its annual Aerospace Forecast. The most recent Aerospace Forecast, published in April 2020 for Fiscal Years 2020 to 2040, has acknowledged that GA activity in the U.S. has experienced a decline in recent years but the long-term outlook remains stable, with a slight decrease in the total GA fleet of 0.9 percent over the next twenty years. The future of GA will be characterized by a decline in fixed-wing piston aircraft and a growth in turbine aviation activity (including rotorcraft)—largely in conjunction with an increase in the corporate aviation sector. Additionally, increases in experimental and light sport aircraft are also forecast to further offset the decline in fixed-wing piston aircraft. With new and more sophisticated aircraft entering the market, especially the increasing size of the business jet fleet and the growing popularity of light sport aircraft, total GA hours flown is forecast to increase despite the declining number of GA aircraft. Overall, GA operations are forecast to increase an average 0.4 percent annually through 2040, driven primarily by increases in turbine-powered aircraft.

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The number of certified pilots and the demand for commercial pilots also impacts GA activity trends. Although the number of GA pilots is projected to decrease approximately 0.2 percent annually between 2020 and 2040, individuals pursuing commercial pilot and air transport pilot (ATP) certificates utilize GA aircraft in their initial flight training phases. According to the *FAA Aerospace Forecast 2020-2040*, the number of both commercial pilot and ATP certificates have steadily increased between 2016 and 2019 and are forecast to continue to increase at an annual rate of 0.7 percent through 2040. While some tenants at Cottonwood Municipal Airport do provide flight training, there is not a designated commercial pilot training program currently active at the Airport.

GA activity is largely driven by economic factors, and the forecasts developed for this Master Plan Update consider the routine ebb and flow in aviation activity levels while projecting likely long-term trends. Although historical data are used to project Airport needs and future demand, it is important to recognize that short-term fluctuations in activity may occur due to unforeseen factors. Economic health and strong consumer spending in the U.S. have served as catalysts for growth in business jet aircraft and other GA activity. However, unforeseen factors such as political instability, trade wars, and health crises can have adverse economic impacts and negatively affect GA. The preface to this chapter specifically addresses the impacts and uncertainties associated with the COVID-19 pandemic.

Additional uncertainties in GA forecasting include future oil prices, the implementation of NextGen technologies, and increasing concerns over aviation's environmental impact. According to the U.S. Government Accountability Office (GAO), a positive correlation has been found to exist between oil prices and GA hours flown.[8] Although oil prices were forecast to gradually increase on an annual basis, recent market volatility as a result of COVID-19 has further proven the considerable uncertainty of the future of oil prices.

NextGen is an FAA initiative to develop new technology geared toward making air travel safer and more efficient by replacing older and existing technology. As part of the NextGen initiative, aircraft operators (both commercial and private) are required to pursue NextGen practices and equip aircraft with updated technologies. This requirement has historically proven to be a slight deterrent to small and recreational aircraft activity and could continue to impact system-wide operational activity in the future. Additionally, increasing concerns about aviation's environmental impacts (including noise pollution and emissions) could potentially be a catalyst for more stringent requirements and greater barriers to entry for pilots, ultimately limiting GA's growth.

As previously discussed, GA related to corporate travel is expected to increase over the next 20 years. This trend has greatly impacted operations at Cottonwood Municipal Airport as there have been recent spikes in corporate jet activity. It is anticipated that the Airport's new FBO, its central location within the Verde Valley, and current demand will continue to draw corporate jet activity well into the future. A detailed discussion on future operations and based aircraft is presented later in this chapter.

[8] U.S. Government Accountability Office, Impact of Fuel Price Increases on the Aviation Industry, 2014.

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2.4. HISTORICAL ACTIVITY

As a GA airport, Cottonwood Municipal Airport's two primary indicators of activity are aircraft operations and based aircraft. An aircraft operation is defined as either a takeoff or a landing, with a touch-and-go (typically executed as a training maneuver) counting as two operations. The FAA defines based aircraft as operational and airworthy aircraft registered in the FAA Aircraft Registry that are located at an airport for the majority of the year.[9] Several data sources identify operational information and based aircraft at the Airport:

- **FAA TAF:** The TAF is the official FAA forecast of aviation activity for U.S. airports, containing historical data and projections for active airports in the NPIAS. The TAF is updated annually and reports data based on the FAA's fiscal year (October 1 through September 30).
- **FAA TFMSC:** The TFMSC database reports operations by aircraft type, weight class, date, approach and design category, and user class. However, it does not always contain this data for every operation conducted at an airport because it is usually derived from filed flight plans and/or radar detection.
- **5010 Airport Master Record:** The 5010 Airport Master Record contains data describing the physical and operational characteristics of civil public-use airports, joint-use military airports, and private-use military airports that are active and in the NAS. The data source provides a "snapshot" of operational activity and based aircraft for the year it is published based on TAF data. The latest published 5010 Airport Master Record for Cottonwood Municipal Airport includes annual operations and based aircraft for the 12-month period ending on April 4, 2019.
- **FAA National Based Aircraft Inventory Program:** Airports are required to upload based aircraft data to the FAA National Based Aircraft Inventory Program database (basedaircraft.com) annually for registered aircraft to be properly validated at the correct airport. It is often the case that a host airport accommodates aircraft that are not captured in the database as being registered at that airport. This is typically attributed to an aircraft being registered at a location of business other than at the host airport's location, or when an aircraft is based seasonally at multiple airports.

As a GA airport with no ATCT, accurate historical operational data are largely limited. The FAA's TAF applies macroeconomic industry assumptions to forecasts for most non-towered GA airports. Available data published in the FAA's TFMSC database are based on filed IFR flight plans and often do not accurately reflect total operations at non-towered airports. Additionally, there are often discrepancies between the actual number of based aircraft that require permanent or semi-permanent accommodations and the number that is validated in the FAA's National Based Aircraft Inventory Program. However, as the official forecast and based aircraft database of U.S. airports, respectively, the TAF and the National Based Aircraft Inventory Program were considered the best resources to develop forecasts of aviation demand published in this Master Plan Update. It should be noted that the Airport is expected to install aircraft operational monitoring equipment in late 2020, which will allow the Airport to track takeoff and landing operations more accurately.

[9] Federal Aviation Administration, *General Aviation Airports: A National Asset*, May 2012.

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For comparison purposes, historical based aircraft and GA operations from the TAF, the National Based Aircraft Inventory Program, the 5010 Airport Master Record, and the Airport's 2001 Master Plan Update forecasts are presented in **Tables 2.1** and **2.2**, respectively.

Table 2.1 - Historical Based Aircraft

Year	FAA TAF	National Based Aircraft Inventory Program	Arizona State Aviation System Plan	5010 Airport Master Record	2001 Master Plan Update Forecast
2009	57	-	-	-	-
2010	55	-	-	-	50
2011	50	-	-	-	-
2012	52	-	-	-	-
2013	52	-	-	-	-
2014	52	-	-	-	-
2015	14	-	-	-	56
2016	16	-	44	-	-
2017	15	-	-	-	-
2018	33	-	-	-	-
2019	33	64	-	34	-
AAGR 2009 - 2019	**-4.21%**	-	**-**	**-**	**-**

Sources:
FAA Terminal Area Forecast (issued January 2020).
FAA National Based Aircraft Inventory Program.
Arizona State Aviation System Plan Update, 2018.
FAA Form 5010-1, Airport Master Record (effective May 21, 2020).
Cottonwood Municipal Airport, 2001 Master Plan Update.

Notes:
FAA TAF = FAA Terminal Area Forecast
AAGR = Average annual growth rate.

Table 2.2 - Historical General Aviation Operations

Year	FAA TAF	Arizona State Aviation System Plan	5010 Airport Master Record	2001 Master Plan Update Forecast
2009	18,700	-	-	-
2010	18,700	-	-	25,500
2011	18,700	-	-	-
2012	18,700	-	-	-
2013	18,700	-	-	-
2014	18,700	-	-	-
2015	18,800	-	-	29,000
2016	18,800	19,000	-	-
2017	18,800	-	-	-
2018	18,800	-	-	-
2019	18,800	-	20,740*	-
AAGR 2009 - 2019	**1.06%**	**-**	**-**	**-**

Sources:
FAA Terminal Area Forecast (issued January 2020).
Arizona State Aviation System Plan Update, 2018.
FAA Form 5010-1, Airport Master Record (effective May 21, 2020).
Cottonwood Municipal Airport, 2001 Master Plan Update.

Notes:
FAA TAF = FAA Terminal Area Forecast
AAGR = Average annual growth rate
** = Operations for 12 months ending 4/22/2019*

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2.5. FORECASTING ASSUMPTIONS

Aviation activity at an airport is generally driven by controllable factors (e.g., hangar rents, services provided, maintenance of facilities) and non-controllable factors (e.g., local/national economic conditions, availability of funding, location). As shifts in activity type and volume are anticipated to occur over the 20-year planning horizon, the following assumptions pertaining to forecast development have been identified:

- Based on historical activity and existing facilities and services, it is assumed the Airport will continue to sustain its FAA-designated GA status by catering to smaller GA aircraft, including single and twin piston, small- to medium-sized turboprop aircraft, and some small- to medium-sized corporate jets. The Airport is not expected to serve scheduled commercial service over the 20-year planning horizon.
- Socioeconomic data provided by Woods & Poole Economics, Inc. and the City of Cottonwood's 2015 Economic Development Strategic Plan are indicative of existing and future conditions at the State, regional, and local levels.
- The Airport will continue to be included in the FAA's NPIAS and will be eligible to receive AIP grants.
- Forecasts presented in this chapter are unconstrained, meaning that there are no extenuating circumstances that are anticipated to limit or restrict potential demand or operational functionality of the Airport.

2.6. SOCIOECONOMIC FORECASTS

Given an airport's role within the regional and national system and the demands of the population base that it serves, the socioeconomic conditions of a local community can often influence existing and future aviation-related activity. Therefore, some forecasts of aircraft operations and based aircraft in this chapter utilize historical and forecast socioeconomic data to identify expected aviation demand. The following is a recap of the socioeconomic data and forecasts for the City of Cottonwood, Yavapai County, and the State of Arizona as presented in **Chapter 1 - Inventory of Existing Conditions**:

- **Population:** The City of Cottonwood, Yavapai County, and the State of Arizona experienced population growth between 2009 and 2019 with AAGRs of 0.77 percent, 1.16 percent, and 1.41 percent, respectively. Populations are expected to continue to increase between 2019 and 2039 with forecast AAGRs of 1.23 percent for the city, 1.52 percent for the county, and 1.56 percent for the state.
- **Employment:** The growth in employment in Yavapai County and the State of Arizona has outpaced population growth since 2009 with AAGRs of 1.31 percent and 1.62 percent, respectively. Employment is projected to continue to rise faster than population through 2039, with forecast AAGRs of 1.64 percent for the County and 1.72 percent for the State. This key metric is an indicator that labor markets are expected to remain strong in the region and across the State.
- **Per Capita Personal Income (PCPI):** PCPI provides a broad measure of individual economic well-being and is another indicator used to gauge the economic growth of a community. PCPI indicates the

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general ability of individuals to purchase products and services (e.g., personal aircraft or corporate travel). Both Yavapai County (1.29 percent) and the State of Arizona (1.06 percent) have experienced increases in PCPI since 2009. Projected PCPI for both the county and the state are forecast to increase over the next 20 years, with AAGRs of 1.36 percent and 1.39 percent, respectively.

- **Gross Regional Product (GRP):** Gross regional product (GRP) is a key representation of the general health of a region's overall economy. The GRP of Yavapai County had an AAGR of 1.41 percent between 2009 and 2019 and a forecast AAGR of 2.46 percent through 2039, an indication of the region's strong projected growth.

2.7. BASED AIRCRAFT FORECASTS

As previously noted, based aircraft are defined as operational and airworthy aircraft registered in the FAA Aircraft Registry that are located at a specific airport for the majority of the year. Forecasts of based aircraft influence the planning and development of required hangar space, aircraft parking apron, and other related facilities. As seen above in **Table 2.2**, the TAF shows that based aircraft at Cottonwood Municipal Airport have declined between 2009 and 2019, characterized by a substantial dip in based aircraft between 2014 and 2015. The data published in the TAF differ substantially from the FAA National Based Aircraft Inventory Program for 2019. According to Airport management, this can be attributed to inconsistent reporting and a historical misrepresentation of based aircraft. As such, the overall approach to develop forecasts for this Master Plan Update is based on analysis of the FAA National Based Aircraft Inventory Program, existing activity, and identification of trends that will most likely impact aviation activity in the future.

A thorough in-person inventory of based aircraft was conducted by Airport staff in June 2020. The inventory identified 77 non-itinerant aircraft that were stored long term on apron areas utilizing tie-downs or in hangars. 64 of these aircraft were validated as based aircraft, with the remainder found to be registered at other airports, de-registered, or registered to the Airport's over-the-fence tenants. These over-the-fence aircraft were not included in the based aircraft count as it is not anticipated that they will drive airfield facility needs (e.g., apron space, hangars, aviation services). Additionally, these over-the-fence tenants are responsible for maintaining and improving airfield pavements that are exclusively for their use. The FAA National Based Aircraft Inventory Program database was updated in June 2020 to reflect this inventory. Based on this analysis, a baseline estimate of 64 based aircraft was established for forecasting purposes. The Airport's based aircraft during the planning horizon were forecast using several methodologies, culminating in a recommended methodology and forecast. These methodologies and forecasts are detailed below.

2.7.1. Based Aircraft – Socioeconomic Variable Forecast

Various socioeconomic characteristics, including population, employment, PCPI, and GRP can provide insight into the economic health of a specific locality or region. The forecasts presented in this section assumed that the future number of based aircraft at the Airport would mimic the forecast growth rates of socioeconomic characteristics for the compared geographic areas that were summarized in **Section 1.5.** As previously discussed, the population for the City of Cottonwood was extrapolated based on the City's 2015 Economic

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Development Strategic Plan, and the socioeconomic characteristics for Yavapai County and the State of Arizona were sourced from Woods & Poole Economics, Inc. The resultant forecasts for based aircraft according to this methodology are depicted in **Table 2.3**.

Table 2.3 - Based Aircraft: Socioeconomic Variable Forecast

Year	Population			Employment*		PCPI		GRP
	Cotton-wood	Yavapai County	AZ	Yavapai County	AZ	Yavapai County	AZ	Yavapai County
2019	64	64	64	64	64	64	64	64
2024	68	69	69	69	70	68	69	72
2029	72	74	75	75	76	73	74	82
2034	77	80	81	82	83	78	79	92
2039	82	87	87	89	90	84	84	104
AAGR 2019-2039	1.23%	1.52%	1.56%	1.64%	1.72%	1.36%	1.39%	2.46%

Sources:
Woods & Poole Economics, Inc., 2019.
City of Cottonwood Economic Development Plan, 2015.
FAA Form 5010-1, Airport Master Record (effective May 21, 2020).
FAA National Based Aircraft Inventory Program database
Kimley-Horn, 2012.

Notes:
** = Employment status includes population 16 years and over.*
PCPI = Per capita personal income
GRP = Gross regional product
AZ = State of Arizona
AAGR = Average annual growth rate

As shown above, the based aircraft forecasts predicated on socioeconomic projections indicate that based aircraft at the Airport could range from 84 to 104 by 2039. This range reflects AAGRs of 1.39 percent (PCPI for Yavapai County) to 2.46 percent (GRP for Yavapai County) over the planning horizon.

2.7.2. Based Aircraft – Regional Market Share Forecast

The purpose of examining forecasts of neighboring airport activity is to account for variables that may impact the regional airport system and to identify factors that could affect based aircraft trends. The market share forecast compares Cottonwood Municipal Airport's share of based aircraft with that of a larger market. This analysis was developed using TAF projections of based aircraft at NPIAS airports within a 50-mile radius of the Airport: Prescott Ernest A. Love Field (PRC), Sedona (SEZ), Flagstaff Pulliam (FLG), and H.A. Clark Memorial Field (CMR) in Williams.

Shown below in **Table 2.4**, Cottonwood Municipal Airport's market share of based aircraft, according to the TAF, has decreased overall between 2009 and 2018, particularly with a significant decrease between 2014 and 2015. As previously noted, this substantial decrease is likely due to inconsistent data reporting and a misrepresentation of historically based aircraft at the Airport between 2009 and 2018. However, as the base year utilizes updated data from the FAA's National Based Aircraft Inventory Program, the Airport's based aircraft 2019 market share is 11.43 percent.

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Table 2.4 - Based Aircraft: Historical Market Share

Year	Ernest A. Love Field	Sedona Airport	Flagstaff Pulliam Airport	H.A. Clark Memorial Field	Cottonwood Municipal Airport	Total	% Cottonwood Municipal
2009	242	66	135	16	57	516	11.05%
2010	238	66	134	16	55	509	10.81%
2011	238	66	134	16	50	504	9.92%
2012	232	78	134	12	52	508	10.24%
2013	231	78	134	4	52	499	10.42%
2014	231	65	134	4	52	486	10.70%
2015	207	62	137	3	14	423	3.31%
2016	206	61	139	3	16	425	3.76%
2017	319	54	114	3	15	505	2.97%
2018	314	54	115	3	33	519	6.36%
2019	322	54	117	3	64	560	11.43%
AAGR 2009-2019	**4.04%**	**-1.62%**	**-1.24%**	**-11.67%**	**14.03%**	**1.11%**	-

Sources:
FAA Terminal Area Forecast (issued January 2020).
FAA National Based Aircraft Inventory Program.
Kimley-Horn, 2020.

Notes:
AAGR = Average annual growth rate

Table 2.5 below presents three growth scenarios that were developed for based aircraft at the Cottonwood Municipal Airport using a market share comparison: low-, medium-, and high-growth scenarios.

The low-growth scenario assumed that the Airport's current market share of based aircraft in the region (11.43 percent) would remain constant throughout the planning horizon. This percentage was applied to TAF forecasts of based aircraft at other airports within the region and resulted in 95 based aircraft at Cottonwood Municipal Airport by 2039, which represents an AAGR of 2.01 percent.

The high-growth scenario assumed that the Airport's based aircraft market share would increase to 13 percent by 2039. This forecast reflects the following factors: 1) Incremental projected growth in the Airport's based aircraft; 2) Increased demand for fuel and new hangars; and 3) Anticipated economic growth within the City of Cottonwood, Yavapai County, and the State of Arizona. These factors support a high-growth methodology that increases the Airport's market share of based aircraft gradually over the 20-year planning horizon. This scenario resulted in 108 based aircraft in 2039, representing an AAGR of 2.67 percent.

The medium-growth scenario was developed by averaging the high- and low-growth scenarios, which resulted in 102 based aircraft in 2039 (12.21 percent market share) and an AAGR of 2.35 percent.

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Table 2.5 - Based Aircraft: Regional Market Share Forecast

Year	Total Regional Based Aircraft	Low		Medium		High	
		P52 Based Aircraft	P52 Market Share	P52 Based Aircraft	P52 Market Share	P52 Based Aircraft	P52 Based Aircraft
2019	560	64	11.43%	64	11.43%	64	11.43%
2024	611	70	11.43%	71	11.63%	72	11.82%
2029	679	78	11.43%	80	11.82%	83	12.14%
2034	752	86	11.43%	90	12.02%	95	12.61%
2039	834	95	11.43%	102	12.21%	108	13.00%
AAGR 2019-2039	2.01%	2.01%	-	2.35%	-	2.67%	-

Sources:
FAA Terminal Area Forecast (Issued January 2020).
FAA National Based Aircraft Inventory Program.
Kimley-Horn, 2020.

Notes:
P52 = Cottonwood Municipal Airport FAA location identifier.
AAGR = Average annual growth rate

2.7.3. Based Aircraft – Recommended Forecast

Although accurate historical data were limited for these analyses, the Airport's June 2020 inventory of based aircraft confirmed that total based aircraft have increased significantly between 2009 and 2020. This increase can be attributed to population and economic growth within the City of Cottonwood and Yavapai County, increased demand and private investment at the Airport, and an evolution of the Airport's based aircraft and operational fleet mix (described in further detail in the following sections). Overall, the data indicate that the Airport's based aircraft growth is largely driven by the region's strong economy. Since employment is a key indicator of economic health (job opportunities may lead to population increases from outside an area and greater economic output), the recommended forecast for based aircraft at Cottonwood Municipal Airport is the **Yavapai County employment scenario**. This methodology forecast 89 based aircraft by 2039 and an AAGR of 1.64 percent.

While the regional market share forecasts resulted in similar growth rates, these methodologies examined external factors that appear to have less direct impacts on based aircraft at Cottonwood Municipal Airport. For example, based aircraft activity at Ernest A. Love Field in Prescott is largely driven by flight training demand, and based aircraft at Flagstaff Pulliam Airport reflect the area's robust tourism industry. For forecasting purposes, based aircraft trends at airports located close to each other but that generally serve different segments of aviation are not always the best indicators of activity at each individual airport in the region.

A summary of based aircraft forecasts presented in this section is depicted below in **Figure 2.1**.

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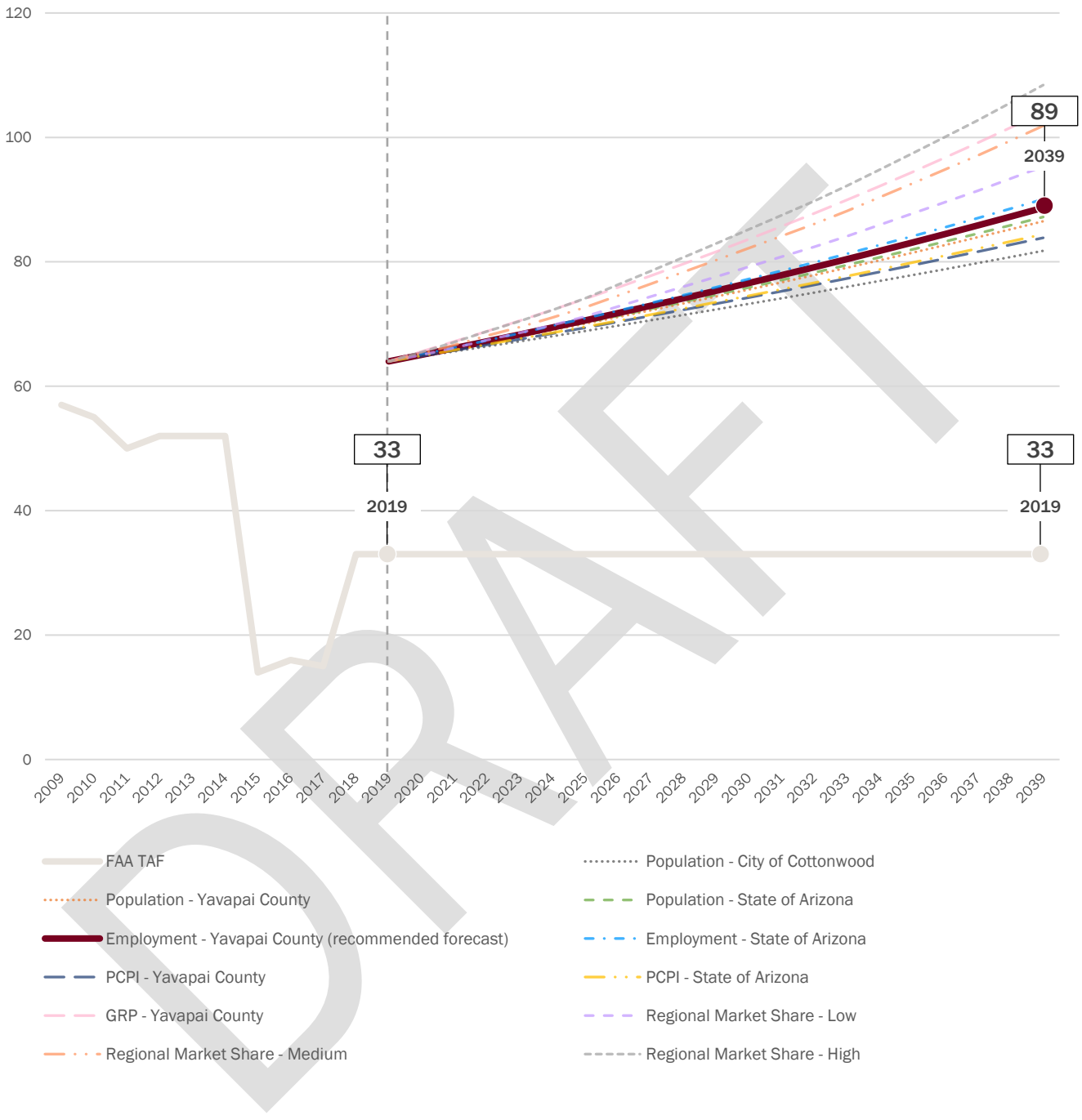
Figure 2.1 - Based Aircraft – Forecast Summary and Recommended Forecast



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Sources:
FAA Terminal Area Forecast (issued January 2020).
Woods & Poole Economics, Inc., 2019.
City of Cottonwood Economic Development Plan, 2015.
FAA Form 5010-1, Airport Master Record (effective May 21, 2020).
FAA National Based Aircraft Inventory Program.
Kimley-Horn, 2012.

Notes:
FAA TAF = FAA Terminal Area Forecast
PCPI = Per capita personal income
GRP = Gross regional product

2.7.4. Based Aircraft – Fleet Mix Forecast

An airport's fleet mix impacts facility needs pertaining to size and type of aircraft storage hangars, aircraft tie-downs, aircraft parking apron, pavement strength, and others. Similar to many GA airports, the majority of Cottonwood Municipal Airport's based aircraft are single-engine piston aircraft. According to the FAA's National Based Aircraft Inventory Program, the Airport had 44 single-engine piston aircraft, five multi-engine piston aircraft, two turboprop aircraft, two jet aircraft, and 11 helicopters as of June 2020.

The Airport's fleet mix forecast was informed by industry trends identified in the *FAA Aerospace Forecasts 2020-2040*, input from Airport staff and tenants, and general assumptions regarding existing and future activity. The following trends from the *FAA Aerospace Forecasts 2020-2040* were consulted for this forecast:

- Single-engine piston aircraft are forecast to **decrease** 1 percent annually
- Multi-engine piston aircraft are forecast to **decrease** 0.5 percent annually
- Turboprop aircraft are forecast to **increase** 1.2 percent annually
- Jet aircraft are forecast to **increase** 2.2 percent annually
- Rotorcraft (helicopters) are forecast to **increase** 1.6 percent annually
- "Other" aircraft (e.g., light sport, experimental) are forecast to **increase** 3.4 percent annually

The following information based on Airport activity and local conditions was also used to inform this forecast:

- A new full-service FBO, Wiseman Aviation, is now based at the Airport
- The Airport maintains a waitlist for its current hangars
- At the time this forecast was being developed, a 10-unit hangar was in the preliminary design phase
- At the time this forecast was being developed, two privately-owned hangars were under construction
- It is anticipated that six small business jets will be based at the Airport within five to ten years
- The City of Cottonwood and Yavapai County are experiencing substantial economic growth

Based on these trends and forecasts, **Table 2.6** depicts the existing and projected based aircraft fleet mix.

Table 2.6 - Based Aircraft: Fleet Mix Forecast

Year	Single-engine Piston	Multi-engine Piston	Turboprop	Jet	Rotorcraft	Other	Total*
2019	44	5	2	2	11	0	64
2024	45	5	2	4	12	1	69
2029	47	6	2	5	13	2	75
2034	48	6	4	6	14	3	82
2039	53	6	5	7	15	3	89
AAGR 2019-2039	**0.82%**	**1.05%**	**5.99%**	**7.13%**	**1.56%**	**6.72%**	**1.64%**

Sources:
FAA National Based Aircraft Inventory Program.
Federal Aviation Administration Aerospace Forecast 2020-2040.
Kimley-Horn, 2020.

Notes:
AAGR = Average annual growth rate
** = Total based aircraft are based on the preferred forecast (Yavapai County employment scenario).*

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2.8. GENERAL AVIATION OPERATIONS FORECASTS

Aircraft operations volume and fleet mix forecasts determine funding and design criteria at airports. Aircraft operations at GA airports comprise nearly all segments of activity (with the exception of commercial air carrier and military operations), including training, corporate aviation, medical operations, and recreational activity. This section presents forecasts of GA operations at the Airport over the 20-year planning horizon.

As a non-towered airport, development of accurate operational estimates is challenging given that there is no comprehensive record of all aircraft operations. The TAF (issued January 2020) estimated a total of 18,800 GA operations at the Airport in 2019, and this number serves as the base-year figure of total GA operations for these forecasts. Several factors impact the volume of airport operations, including the number and type of based aircraft, socioeconomic variables, economic and aviation trends, and capability and condition of facilities. GA operations forecasts were developed using various methodologies, including socioeconomic variable comparisons, regional market share, and operations per based aircraft (OPBA).

2.8.1. GA Operations – Socioeconomic Variable Forecast

Similar to based aircraft forecasts presented in the previous section, forecasts of GA operations were developed using the same socioeconomic methodologies, where the population for the City of Cottonwood was extrapolated based on the City's 2015 Economic Development Strategic Plan and the socioeconomic characteristics for the State of Arizona and Yavapai County (including Yavapai County GRP) were sourced from Woods & Poole Economics, Inc. This methodology assumed that GA operations would change at the same rate as the comparison socioeconomic indicators. As shown in **Table 2.7**, the aircraft operations forecasts based on socioeconomic data resulted in a range of 24,020 to 30,569 annual GA operations by 2039, reflecting AAGRs between 1.23 percent and 2.46 percent over the planning horizon.

Table 2.7 - GA Operations: Socioeconomic Variable Forecast

Year	Population			Employment		PCPI		GRP
	Cotton-wood	Yavapai County	AZ	Yavapai County	AZ	Yavapai County	AZ	Yavapai County
2019	18,800	18,800	18,800	18,800	18,800	18,800	18,800	18,800
2024	20,044	20,351	20,385	20,586	20,653	20,369	20,418	21,438
2029	21,265	21,998	22,077	22,399	22,557	21,898	22,005	24,280
2034	22,660	23,700	23,834	24,212	24,486	23,264	23,407	27,316
2039	24,020	25,416	25,619	26,053	26,455	24,633	24,800	30,569
AAGR 2019-2039	**1.23%**	**1.52%**	**1.56%**	**1.64%**	**1.72%**	**1.36%**	**1.39%**	**2.46%**

Sources:
Woods & Poole Economics, Inc., 2019.
City of Cottonwood Economic Development Plan, 2015.
FAA Terminal Area Forecast (Issued January 2020).
Kimley-Horn, 2012.

Notes:
PCPI = Per capita personal income
GRP = Gross regional product
AZ = State of Arizona
AAGR = Average annual growth rate

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2.8.2. GA Operations – Regional Market Share Forecast

The regional market share methodology compares the Airport's market share of aircraft operations to the GA operations at the five airports within a 50-mile radius of the Airport (described in **Section 2.6.2**). Like the regional market share forecast for based aircraft, this methodology compared activity at Cottonwood Municipal Airport with TAF forecasts of GA operations at regional airports. As shown below in **Table 2.8**, the Airport possesses a regional market share of GA operations of 5.73 percent in 2019.

Table 2.8 - GA Operations: Historical Market Share

Year	Ernest A. Love Field	Sedona Airport	Flagstaff Pulliam Airport	H.A. Clark Memorial Field	Cottonwood Municipal Airport	Total	% Cottonwood Municipal
2009	253,410	48,000	34,059	8,100	18,700	362,269	5.16%
2010	227,269	48,000	30,424	8,100	18,700	332,493	5.62%
2011	248,580	48,000	34,119	8,100	18,700	357,499	5.23%
2012	244,293	33,600	43,201	6,100	18,700	345,894	5.41%
2013	256,796	33,600	38,881	6,100	18,700	354,077	5.28%
2014	276,482	33,600	40,674	6,100	18,700	375,556	4.98%
2015	273,176	33,600	44,263	6,100	18,800	375,939	5.00%
2016	255,486	33,600	44,127	6,500	18,800	358,513	5.24%
2017	230,007	33,600	39,486	6,500	18,800	328,393	5.72%
2018	241,258	33,600	42,956	6,500	18,800	343,114	5.48%
2019	229,654	33,600	39,282	6,500	18,800	327,836	5.73%
AAGR 2009-2019	-0.74%	-3.00%	2.09%	-1.81%	0.05%	-0.84%	-

Sources:
FAA Terminal Area Forecast (Issued January 2020).
Kimley-Horn, 2020.

Note: AAGR = Average annual growth rate

Table 2.9 below shows three scenarios that were developed for GA operations: low, medium, and high.

The low-growth scenario assumed that the Airport's regional market share of GA operations of 5.73 percent would remain constant throughout the 20-year planning horizon. This figure (5.73 percent) was applied to TAF forecasts of GA operations at airports within the region and resulted in 19,507 GA operations at Cottonwood Municipal Airport in 2039, which represents an AAGR of 0.19 percent.

The high-growth scenario for GA operations assumed that the Airport's market share of operations would increase to 8 percent by 2039. This aggressive forecast is based on: 1) Incremental projected growth in the Airport's based aircraft as previously described **Section 2.6**; 2) Increased demand for fuel and new hangars; 3) Impacts to Airport operations by potential new users and the expansion of existing tenants; 4) Anticipated economic growth within the City of Cottonwood, Yavapai County, and the State of Arizona; and 5) The historical decline of GA operations at regional airports (except for Flagstaff Pulliam and Cottonwood Municipal Airport) as depicted above in **Table 2.8**. The high-growth scenario resulted in 27,213 operations at the Airport in 2039, representing an AARG of 1.87 percent.

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The medium-growth scenario was developed by averaging the product of the high- and low-growth scenarios, which resulted in 23,360 GA operations in 2039 and an AAGR of 1.09 percent.

Table 2.9 - GA Operations: Regional Market Share Forecast

Year	Regional GA Operations	Low		Medium		High	
		P52 GA Operations	P52 Market Share	P52 GA Operations	P52 Market Share	P52 GA Operations	P52 Market Share
2019	327,836	18,800	5.73%	18,800	5.73%	18,800	5.73%
2024	327,222	18,765	5.73%	19,691	6.02%	20,618	6.30%
2029	331,462	19,008	5.73%	20,885	6.30%	22,762	6.87%
2034	335,773	19,255	5.73%	22,108	6.58%	24,960	7.43%
2039	340,165	19,507	5.73%	23,360	6.87%	27,213	8.00%
AAGR 2019-2039	0.19%	0.19%	-	1.09%	-	1.87%	-

Sources:
FAA Terminal Area Forecast (Issued January 2020).
Kimley-Horn, 2020.

Notes
GA = General Aviation
P52 = FAA location identifier for Cottonwood Municipal Airport
AAGR = Average annual growth rate

2.8.3. GA Operations – FAA Aerospace Forecast Fleet Mix

As previously discussed, the FAA reports aviation trends and forecasts in its annual Aerospace Forecast. Absent of other variables, this forecast methodology assumed that growth rates by aircraft type at Cottonwood Municipal Airport would mimic projections of GA hours flown by aircraft type described in the *FAA Aerospace Forecast 2020-2040*:

- Single-engine piston aircraft operations are forecast to **decrease** 1 percent annually
- Multi-engine piston aircraft operations are forecast to **decrease** 0.3 percent annually
- Turboprop aircraft operations are forecast to **increase** 1.3 percent annually
- Jet aircraft operations are forecast to **increase** 2.6 percent annually
- Rotorcraft (helicopter) operations are forecast to **increase** 2.1 percent annually
- "Other" operations (e.g., light sport, experimental) are forecast to **increase** 4.2 percent annually

As shown in **Table 2.10**, these annual growth rates were applied to base-year operations by aircraft type. It should be noted that base-year operations by aircraft type were not sourced directly from the TFMSC, which is derived from IFR flights and/or traffic that is captured by the FAA's enroute computers, as the data are not representative of all 2019 operations. Rather, to obtain base-year figures that are more representative of actual operations, the following information was applied to this forecast:

- **Jet aircraft:** Interviews with tenants and Airport management revealed that approximately 120 small jet operations occur at the Airport on an annual basis. The majority of these operations are related

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to Cessna Citation type ratings that operate VFR. Therefore, these operations are not captured by the TFMSC. Based on this information, 120 was used as the base-year figure for jet operations.

- **Turboprop aircraft:** The base-year figure for turboprop aircraft (214) was sourced directly from the TFMSC database as it can be reasonably assumed that these larger aircraft file IFR flight plans and/or can be tracked by the FAA's enroute computers. Turboprop aircraft accounted for more than 54 percent of the Airport's 2019 TFMSC operations.
- **Single-engine piston, multi-engine piston, rotorcraft, and other/experimental aircraft:** Jet and turboprop aircraft made up approximately 64 percent of the Airport's 2019 TFMSC operations. Based on tenant mix, based aircraft, and airfield observations, it cannot be reasonably assumed that this reported fleet mix reflects the Airport's true operations. Additionally, operations by single-engine piston, multi-engine piston, rotorcraft, and other/experimental aircraft are less likely to be captured by the TFMSC database (e.g., VFR flights, operations that remain in the local airspace). Therefore, base-year operations for these aircraft types were deduced by comparing the respective TFMSC percentages of operations to total operations from the TAF.

  For example: of the 395 GA operations at the Airport that were reported by the TFMSC database, 251 were performed by jet or turboprop aircraft. Since operations by jet and turboprop aircraft have already been accounted for based on the aforementioned logic, the remaining 144 TFMSC operations *(395 – 251 = 144)* were used as the base for this sub-analysis. Of the Airport's 144 non-jet and non-turboprop TFMSC operations, 93 (or 64.58 percent) were performed by single-engine piston aircraft. This percentage (64.58 percent) was then compared to the non-jet and non-turboprop 2019 TAF operations (18,466) *(18,800 total GA operations – 334 jet and turboprop operations = 18,466)*. This results in a base-year operations figure for single-engine piston aircraft of 11,926 *(18,466 x 64.58 percent)*. This process was repeated for multi-engine piston aircraft, rotorcraft, and other/experimental aircraft.

Based on nationwide industry trends alone, the results of this forecast show a decline in total GA operations at the Airport over the 20-year planning horizon. The overall AAGR of -0.51 percent is a product of the fact that the vast majority of the Airport's existing operations are performed by single-engine and multi-engine piston aircraft, both of which are forecast to decline in the long term. This forecast methodology, however, does not account for other variables such as new tenants, hangar demand, and regional socioeconomic conditions.

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Table 2.10 - GA Operations: FAA Aerospace Fleet Mix

Year	Single-Engine Piston [1]	Multi-Engine Piston [1]	Turboprop [2]	Jet [3]	Rotorcraft [1]	Other/ Experimental [1]	Total
2019	11,926	6,027	214	120	128	385	18,800
2024	11,341	5,937	228	136	142	473	18,258
2029	10,786	5,849	244	155	158	581	17,771
2034	10,257	5,762	260	176	175	713	17,343
2039	9,754	5,676	277	201	194	876	16,978
AAGR 2009-2019	**-1.00%**	**-0.30%**	**1.30%**	**2.60%**	**2.10%**	**4.20%**	**-0.51%**

Sources:
FAA Traffic Flow Management System Counts database.
FAA Terminal Area Forecast (Issued January 2020).
Kimley-Horn, 2020.

Notes
1 = 2019 operations were calculated by comparing the respective TFMSC percentages of operations (minus jet and turboprop operations) to total TAF operations.
2 = 2019 operations were sourced directly from the TFMSC database as it can be reasonably assumed that these larger aircraft file IFR flight plans and/or can be tracked by the FAA's enroute computers.
3 = Tenant and Airport staff interviews revealed that approximately 120 small jet operations occur at the Airport on an annual basis. Most of these operations are for the purpose of performing local Cessna Citation type ratings that operate VFR. Therefore, these operations are not captured by the TFMSC.
AAGR = Average annual growth rate

2.8.4. GA Operations – Operations per Based Aircraft Forecast

The final methodology to forecast GA operations utilizes a ratio of OPBA to estimate future demand. Because accurate historical based aircraft data were limited, the OPBA methodology assumed that the ratio of GA operations to based aircraft in base year 2019 (294) would remain constant throughout the 20-year forecast horizon. This ratio was applied to the recommended based aircraft forecast described in the previous section. As shown in **Table 2.11**, this methodology resulted in 26,054 GA operations by 2039 and an AAGR of 1.64 percent.

Table 2.11 - GA Operations: Operations per Based Aircraft Forecast

Year	Recommended Forecast – Based Aircraft	Operations per Based Aircraft Forecast	GA Operations
2019	64	294	18,800
2024	69	294	20,398
2029	75	294	22,132
2034	82	294	24,013
2039	89	294	26,054
AAGR 2019 - 2039	**1.64%**	-	**1.64%**

Sources:
FAA National Based Aircraft Inventory Program.
FAA Terminal Area Forecast (Issued January 2020).
Kimley-Horn, 2020.

Notes:
GA = General aviation
AAGR = Average annual growth rate

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2.8.5. GA Operations – Recommended Forecast

While GA operations at the Airport are expected to increase with economic growth in the region, there is strong demand for hangar space, fuel, and other airport facilities. The socioeconomic, regional market share, and FAA Aerospace fleet mix forecasts rely solely on single variables to project the Airport's GA operations (e.g., regional growth factors, national industry trends). Alternatively, the OPBA forecast accounts for national industry trends, regional economic growth, and airport-specific anticipated demand by incorporating the recommended based aircraft forecast and operations data from the TAF. Due to strong regional growth and a projected increase in the Airport's based aircraft, **OPBA is the recommended forecast for GA operations at the Cottonwood Municipal Airport.** As previously depicted in **Table 2.10**, this scenario forecast 26,054 operations by 2039 and an AAGR of 1.64 percent. A summary of GA operations forecasts is provided below in **Figure 2.2**.

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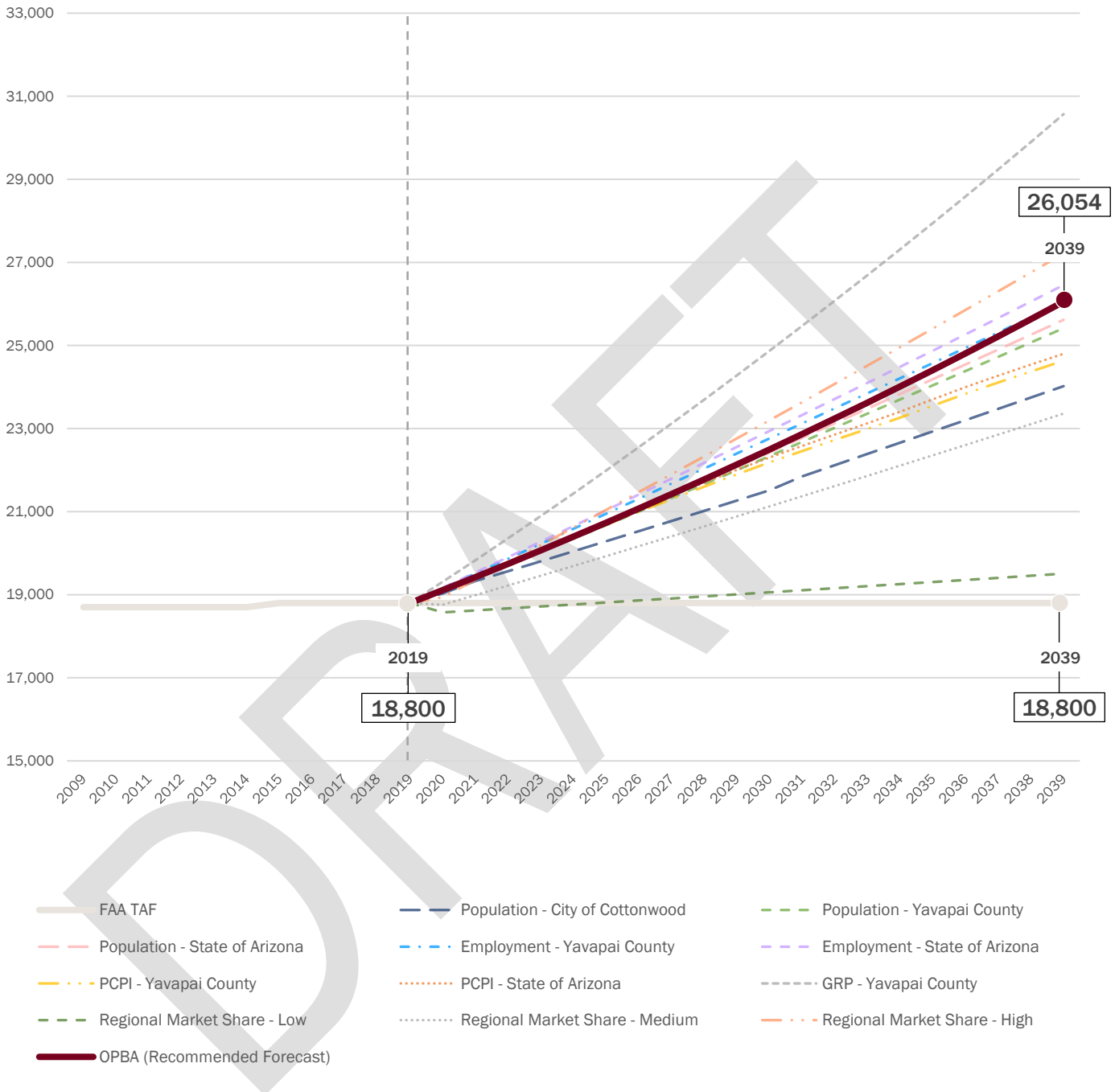
Figure 2.2 - GA Operations – Forecast Summary and Recommended Forecast



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Sources:
FAA Terminal Area Forecast (issued January 2020).
Woods & Poole Economics, Inc., 2019.
FAA National Based Aircraft Inventory Program.
Kimley-Horn, 2012.

Notes:
FAA TAF = FAA Terminal Area Forecast
PCPI = Per capita personal income
OPBA = Operations per based aircraft

2.9. OPERATIONS TYPES FORECASTS

This section utilizes the recommended forecast for GA operations (the OPBA forecast), as analyzed in **Section 1.7**, to review additional operational activity at the Airport, including military, local/itinerant, time-of-day, and IFR operations over the 20-year planning horizon.

2.9.1. Military Operations Forecast

As previously noted, Cottonwood Municipal Airport experiences a limited number of military operations. According to the TAF, the Airport averaged 22 military operations per year between 2009 and 2019, or approximately 0.5 percent of annual operations. Military operations at public use airports can be difficult to predict as activity is typically not tied to the same drivers that impact general aviation. As such, the TAF is the preferred methodology for military operations at the Airport, which projects 0 local and 100 itinerant military operations annually between 2019 and 2039.

2.9.2. Local/Itinerant Operations Forecast

Aircraft operations are categorized as local or itinerant. Local operations are flights that depart from the Airport and remain in the Airport's traffic pattern or have a designated practice area within a 20-mile radius of the Airport. Local operations also include touch-and-go and training activity. Itinerant operations are flights that land at the Airport from another airport or depart from the Airport and leave the Airport's immediate area.[10]

In 2019, among Cottonwood Municipal Airport's 18,900 operations approximately 42.33 percent were local and 57.67 percent were itinerant according to the TAF. Based on this data and in consultation with Airport management, it was assumed that these local/itinerant percentages would remain consistent throughout the planning horizon. Local and itinerant operations forecasts are shown in **Table 2.12**.

Table 2.12 - Local/Itinerant Operations Forecast

Year	Total Operations*	Local Operations	% Local	Itinerant Operations	% Itinerant
2019	18,900	8,000	42.33%	10,900	57.67%
2024	20,498	8,677	42.33%	11,821	57.67%
2029	22,232	9,411	42.33%	12,821	57.67%
2034	24,113	10,207	42.33%	13,906	57.67%
2039	26,154	11,071	42.33%	15,083	57.67%
AAGR 2019-2039	**1.64%**	**1.64%**	-	**1.64%**	-

Sources:
FAA Terminal Area Forecast (Issued January 2020).
Kimley-Horn, 2020.

Notes:
AAGR = Average annual growth rate
** = Total operations include all forecast GA and military operations.*

[10] Federal Aviation Administration, Advisory Circular 150/5070-6B, Change 2, *Airport Master Plans*, 2015.

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2.9.3. Daytime/Evening Operations Forecast

The FAA defines nighttime operations as those that are conducted between 10:00 pm and 7:00 am. Daytime and evening operations are important elements to include in the planning process because noise impacts created by aircraft arriving or departing at night are greater than during the day. The forecast of daytime and evening operations can also help drive facility requirements such as improvements to airport lighting and NAVAIDs.

According to Airport management, approximately 10 percent of aircraft operations are estimated to occur at nighttime as many operations occur between 6:00 am and 7:00 am. As shown in **Table 2.13**, it is anticipated that the percentage of daytime/evening operations will remain constant throughout the planning horizon.

Table 2.13 - Daytime/Evening Operations Forecast

Year	Total Operations*	Daytime Operations	% Daytime	Nighttime Operations	% Nighttime
2019	18,900	17,010	90.00%	1,890	10.00%
2024	20,498	18,448	90.00%	2,050	10.00%
2029	22,232	20,009	90.00%	2,223	10.00%
2034	24,113	21,702	90.00%	2,411	10.00%
2039	26,154	23,538	90.00%	2,615	10.00%
AAGR 2019-2039	**1.64%**	**1.64%**	-	**1.64%**	-

Sources:
FAA Terminal Area Forecast (Issued January 2020).
Kimley-Horn, 2020.

Notes:
AAGR = Average annual growth rate
** = Total operations include all forecast GA and military operations.*

2.9.4. Instrument Operations Forecast

An instrument operation is a takeoff or landing conducted during IFR conditions or operations aboard aircraft that enter Class A airspace during a flight (18,000 feet MSL). Aircraft that can operate in Class A airspace are typically commercial or corporate-type turbo-props and jets.

Because Cottonwood Municipal Airport is a non-towered airport, the exact number of annual instrument approaches (AIA) cannot be determined. However, the FAA's TFMSC database includes data for IFR flights and those flights captured by the FAA's enroute computers. As described in **Chapter 1 - Inventory of Existing Conditions**, the Airport is served by one SIAP for instrument approaches (an RNAV GPS that is aligned with Runway 32) and one ODP for instrument departures. Aircraft operations that utilize these procedures are reported in the FAA's TFMSC database and can be used to determine the approximate number of IFR flights.

According to the TFMSC database, IFR operations accounted for approximately 2.09 percent of total annual operations at the Airport in 2019. This analysis assumed that this figure (2.09 percent) would remain

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constant throughout the 20-year planning period. As shown in **Table 2.14**, annual IFR operations were forecast to reach 547 by 2039, which represents an AAGR of 1.64 percent from 2019 to 2039.

Table 2.14 - Instrument Operations Forecast

Year	Total Operations*	Instrument Operations	% Instrument	Visual Operations	% Visual
2019	18,900	395	2.09%	18,505	97.91%
2024	20,498	428	2.09%	20,070	97.91%
2029	22,232	465	2.09%	21,767	97.91%
2034	24,113	504	2.09%	23,609	97.91%
2039	26,154	547	2.09%	25,607	97.91%
AAGR 2019-2039	1.64%	1.64%	-	1.64%	-

Sources:
FAA Terminal Area Forecast (Issued January 2020).
FAA Traffic Flow Management System Counts database.
Kimley-Horn, 2020.

Note:
AAGR = Average annual growth rate
** = Total operations include all forecast GA and military operations.*

2.9.5. Touch-and-Go Operations Forecast

A touch-and-go operation is conducted by an aircraft that lands and departs on a runway without stopping or exiting. This type of operation is typically associated with flight training. Touch-and-go operations forecasts are important to identify because they impact airfield capacity, which is presented in **Chapter 3 - Facility Requirements** of this Master Plan Update.

Based on feedback from Airport Management, it was identified that approximately half of local operations at the Airport are touch and go. This figure was applied to forecast local operations and held constant throughout the projection period. As shown in **Table 2.15**, the Airport is anticipated to experience 5,514 touch-and-go operations by 2039.

Table 2.15 - Touch-and-Go Operations Forecast

Year	Total Operations*	Local Operations	Touch-and-Go Operations
2019	18,900	8,000	4,000
2024	20,498	8,634	4,317
2029	22,232	9,368	4,684
2034	24,113	10,165	5,082
2039	26,154	11,029	5,514
AAGR 2019 - 2039	1.64%	1.62%	1.62%

Sources:
FAA Terminal Area Forecast (Issued January 2020).
Cottonwood Municipal Airport Management
Kimley-Horn, 2020.

Note:
AAGR = Average annual growth rate
** = Total operations include all forecast GA and military operations.*

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2.10. PEAK OPERATIONS FORECASTS

Forecasts of peak activity are utilized to identify airfield capacity constraints, itinerant aircraft parking needs, and other facility requirements. Identification of peak periods that occur on a regular basis is essential to ensure that facilities are not underutilized or over-planned. The periods used in the capacity analysis and facility requirements are as follows:

- **Peak Month:** the calendar month when peak activity occurs
- **Peak Month Average Day (PMAD):** daily average activity that occurs in the peak month
- **Peak Hour:** representative hour that best reflects elevated levels of activity that occurs on a regular basis

Peak operations forecasts are displayed in **Table 2.16**. Without ATCT data or physical operations counts, the FAA TFMSC database was consulted to identify peak month forecasts for years 2009 through 2019. Historically, the Airport's peak month fluctuated, but peak-month operations consistently represented approximately 12 percent of annual operations according to the TFMSC database. This figure was applied to total forecast annual operations and held constant through the 20-year planning horizon. Additionally, projections of PMAD were determined by dividing peak-month operations by 30. According to Airport management, peak-hour operations were estimated to account for 15 percent of PMAD operations, which was held constant through the 20-year planning horizon.

Table 2.16 - Peak Operations Forecast

Year	Total Operations [1]	Peak Month Operations [2]	PMAD Operations	Peak Hour Operations [3]
2019	18,900	2,268	76	11
2024	20,498	2,460	82	12
2029	22,232	2,668	89	13
2034	24,113	2,894	96	14
2039	26,154	3,138	105	16
AAGR 2019 - 2039	**1.64%**	**1.64%**	**1.64%**	**1.64%**

Sources:
FAA Traffic Flow Management System Counts database.
Kimley-Horn, 2020.

Notes:
PMAD = Peak month average day
1 = Total operations include all forecast GA and military operations.
2 = Peak month operations represent approximately 12% of annual operations.
3 = Peak hour operations were estimated to account for approximately 15% of PMAD operations.

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2.11. CRITICAL AIRCRAFT

Airside facility planning is largely driven by criteria and standards developed by the FAA that emphasize safety and efficiency while protecting federal investment in airport transportation infrastructure. These design criteria and standards are contained within AC 150/5300-13A and cover various airport infrastructure and their functions for a wide range of size and performance characteristics of aircraft that are anticipated to use an airport, including runway and taxiway dimensions, separation distances between aircraft and various objects, airspace protection requirements, and land use controls. Airport sponsors that accept federal AIP grants are required to adhere to the FAA design standards.

As discussed in **Chapter 1 - Inventory of Existing Conditions**, the FAA classifies and groups aircraft with similar approach speeds and sizes into an ARC. Each airport's ARC is representative of the critical aircraft. Defined in AC 150/5300-13A, the critical aircraft is the most demanding aircraft that conducts at least 500 operations per year at an airport, not including touch-and-go operations. This aircraft, or a combination of multiple aircraft, presents the most demand on the airport in terms of operational and physical characteristics.

An airport's ARC is comprised of two components: the AAC and the ADG. The AAC relates to the approach speed of an aircraft and groups aircraft based on final approach speed at the maximum landing weight (MLW). Approach categories, depicted in letters, and corresponding approach-speed thresholds are depicted in **Table 2.17**. As shown in **Table 2.18**, the ADG is represented by a Roman numeral and relates to the physical size of the aircraft, specifically wingspan and tail height. Aircraft dimensional standards affect airfield geometry design including separation criteria for runways, taxiways, and aircraft parking areas.

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Table 2.17 - Aircraft Approach Categories

Aircraft Approach Category	Approach Speed
A	Approach speed less than 91 knots
B	Approach speed 91 knots or more but less than 121 knots
C	Approach speed 121 knots or more but less than 141 knots
D	Approach speed 141 knots or more but less than 166 knots
E	Approach speed 166 knots or more

Source: *FAA Advisory Circular 150/5300-13A, Change 1, Airport Design, 2014.*

Table 2.18 - Airplane Design Groups

Airplane Design Group	Tail Height (feet)	Wingspan (feet)
I	< 20	< 49'
II	20' - < 30'	49' - < 79'
III	30' - < 45'	79' - < 118'
IV	45' - < 60'	118' - < 171'
V	60' - < 66'	171' - < 214'

Source: *FAA Advisory Circular 150/5300-13A, Change 1, Airport Design, 2014.*

A lower ARC typically represents smaller, slower aircraft used for recreation and/or training. Higher ARCs usually indicate larger commercial or military aircraft. ARC designations in the middle categories generally include turboprops and corporate jets. It should be noted that an airport's ARC is used for planning and design only and does not limit the aircraft that may be able to operate safely at an airport.

2.11.1. Existing ARC and Critical Aircraft

Cottonwood Municipal Airport's 2006 ALP (the Airport's current ALP at the time of writing) designated the Airport's ARC as B-I with the Cessna Citation I as the critical aircraft. Additionally, both the 2001 Master Plan Update and the ALP recommended the Airport ultimately plan for a future ARC of B-II and use the Beechcraft King Air 300 as the critical aircraft.

With no ATCT or operational monitoring equipment at the Airport, the exact numbers of annual operations by aircraft type are unknown. However, the FAA's TFMSC database was used to obtain information on IFR operations and operations recorded by the FAA's enroute computers between 2010 and 2019. The TFMSC did not show 500 operations conducted by any single aircraft type or group of aircraft in 2019. According to the database, the aircraft types with the highest number of operations in 2019 included the Beechcraft King Air 90 (B-I; 80 operations), the Piper Malibu Meridian (A-I; 66 operations), the Piper Cheyenne II (B-I; 45 operations), and the Cessna Skyhawk 172/Cutlass (A-I; 41 operations).

Based on FAA criteria, further analysis of the TFMSC data and discussions with Airport management have resulted in an existing ARC designation of A-I (small) with all aircraft within the A-I (small) category making up the Airport's critical aircraft. The FAA defines "small" aircraft as those with an MTOW of 12,500 pounds or less. This determination accounts for the large number of based aircraft with an A-I (small) designation and the limited operational data from the TFMSC.

2.11.2. Future ARC and Critical Aircraft

To identify the Airport's future ARC and critical aircraft, TFMSC data for base year 2019 were examined by aircraft characteristics (AAC/ADG) and type. Additionally, the following information obtained from Airport management and tenants (which is not represented in the TFMSC data but is pertinent to this forecast) was also incorporated into the analysis:

- As part of type-rating training activity, an Airport tenant conducts approximately 104 VFR operations annually with a Cessna Citation I, which has an AAC/ADG of B-I (small). These operations are not accounted for in the TFMSC database since they are conducted under VFR. Therefore, 104 operations were added to total B-I operations for base year 2019 (**Table 2.19**). For purposes of the operations-by-aircraft-type analysis (**Table 2.20**), 104 annual operations were held constant for the Cessna Citation I through 2039 since it is anticipated that the type-rating training activity will remain relatively stable throughout the 20-year planning horizon.

Once base-year figures were established, a linear regression analysis was conducted for the years 2015 through 2019 and projected through 2039. As presented below in **Table 2.19**, the AAC/ADG analysis showed

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that B-I aircraft would collectively account for more than 500 annual operations by 2029. Furthermore, the analysis based on aircraft type (**Table 2.20**) showed that the Cessna Citation I, Beechcraft King Air 90, and Piper Cheyenne II would conduct the majority of B-I operations at the Airport and would collectively account for 512 operations by 2030. With all three aircraft possessing an AAC/ADG of B-I (small), these aircraft will represent the most demanding group of aircraft that conduct at least 500 operations per year at the Airport. As previously stated, the FAA defines "small" aircraft as those with an MTOW of 12,500 pounds or less. The Cessna Citation I, Beechcraft King Air 90, and the Piper Cheyenne II have MTOWs of 11,850 pounds, 9,300 pounds, and 9,000 pounds, respectively.

Table 2.19 - Critical Aircraft: Operations by Aircraft Approach Category / Airplane Design Group

Year	A-I	A-II	B-I	B-II	C-I
2019	236	18	266	44	0
2024	511	39	375	59	3
2029	727	54	528	88	4
2034	943	69	681	117	5
2039	1,159	84	834	146	6

Sources:
FAA Traffic Flow Management System Counts database.
Kimley-Horn, 2020.

Table 2.20 - Critical Aircraft: Operations by Aircraft Type

Year	Cessna Citation I	Beechcraft King Air 90	Piper Cheyenne II	Total Critical Aircraft [1]	Total B-I+ Operations [2]
2019	104	86	56	246	310
2024	104	153	89	346	418
2029	104	236	144	484	577
2030	104	253	155	512	608
2034	104	319	199	622	736
2039	104	402	254	760	895

Sources:
FAA Traffic Flow Management System Counts database.
Kimley-Horn, 2020.

Notes:
1 = Total critical aircraft include forecast operations by the Cessna Citation I, Beechcraft King Air 90, and Piper Cheyenne II.
2 = Total B-I+ operations include all operations by aircraft with an AAC/ADG of B-I, B-II, C-I, and C-II.

This forecast results in a future ARC of B-I (small). Based on regularly occurring activity and similar aircraft characteristics, **the Airport's future critical aircraft is recommended to be a combination of the Cessna Citation I, Beechcraft King Air 90, and the Piper Cheyenne II.** Physical characteristics of these aircraft are presented below in **Table 2.22**. It should be noted that operational activity could trigger this change earlier than 2029 based on existing and potential future tenant demand.

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Table 2.21 - Critical Aircraft: Future Critical Aircraft Characteristics

Aircraft Type	2019 Ops.	2039 Ops.[1]	AAC + ADG [2]	Taxiway Design Group	Wingspan (feet)	Tail Height (feet)	Length (feet)	Approach Speed (knots)	MTOW (lbs.)
Cessna Citation I	104	104	B-I (small)	2	47.08	14.4	43.60	107	11,850
Beechcraft King Air 90	80	205	B-I (small)	1A	45.92	14.67	35.50	100	9,300
Piper Cheyenne II	45	386	B-I (small)	1A	42.69	12.75	34.67	98	9,000

Sources:
FAA Traffic Flow Management System Counts database.
FAA Aircraft Characteristics Database.

Notes:
Ops. = Operations
ARC = Airport reference code
MTOW = Maximum certificated takeoff weight
1 = 2039 operations are based on the critical aircraft forecast as presented in Section 2.11.2.
2 = The FAA defines "small" aircraft as those with an MTOW of 12,500 pounds or less.

2.12. FORECAST SUMMARY

Table 2.23 presents a summary of recommended forecasts developed in this chapter. As discussed, the number of based aircraft and GA operations are tied with significant socioeconomic growth in the region as well as demand for existing and new Airport facilities. Therefore, based aircraft are expected to increase commensurate with employment growth of Yavapai County, and GA operations per based aircraft are expected to remain constant throughout the 20-year planning horizon. Although the proportion of single- and multi-engine piston aircraft is anticipated to decrease in relation to the Airport's total number of based aircraft (in line with national aviation industry trends), an increase in turboprop, jet, experimental/light sport, and rotorcraft aircraft is anticipated to greatly contribute to the increase in based aircraft and GA operations through 2039. The forecasts analyzed in this chapter are used to inform facility needs presented in **Chapter 3 – Facility Requirements**.

Table 2.22 - Aviation Activity Forecast Summary

Year	Based Aircraft	GA Operations
2019	64	18,800
2024	69	20,398
2029	75	22,132
2034	82	24,013
2039	89	26,054
AAGR 2019 - 2039	**1.64%**	**1.64%**

Sources:
FAA Terminal Area Forecast (issued January 2020).
FAA Traffic Flow Management System Counts database.
Cottonwood Municipal Airport Management.
Kimley-Horn, 2020.

Note: *AAGR = Average annual growth rate.*

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2.13. FAA FORECAST REVIEW AND APPROVAL

FAA Airport District Offices (ADOs) are responsible for forecast approvals. When reviewing a sponsor's forecast, the FAA must ensure that the forecast is based on reasonable planning assumptions, uses current data, and is developed using appropriate forecast methods. Additional discussion on assumptions and methodologies can be found in the FAA Aviation Policy and Plans Office (APO) report, *Forecasting Aviation Activity by Airport*. After a thorough review of the forecast, the FAA then determines if the forecast is consistent with the TAF. For all classes of airports, forecasts are considered consistent with the TAF if they meet the following criterion:

- Forecasts differ by less than 10 percent in the 5-year forecast period
- Forecasts differ by less than 15 percent in the 10-year forecast period

If the forecast is not consistent with the TAF, differences must be resolved if the forecast is to be used in FAA decision making. This may involve revisions to the airport sponsor's submitted forecasts, adjustments to the TAF, or both. If a forecast is inconsistent with the TAF, however, it may still be reviewed by an ADO if:

- Five- and ten-year forecasts do not exceed 200 based aircraft or 200,000 total annual operations, AND
- Any related development associated with the forecasts will not require an Environmental Impact Study (EIS) and/or Benefit/Cost Analysis (BCA)

Tables 2.24 and 2.25 below present the FAA tables that contain a 15-year comparison of recommended forecasts developed in this chapter and forecasts identified in the TAF, issued January 2020. The tables were obtained from Appendix B and Appendix C of "Forecasting Aviation Activity by Airport" prepared by the FAA's Office of Aviation Policy and Plans Statistics and Forecast Branch.

As shown in Table 2.24, the forecasts of based aircraft and GA operations exceed the FAA's 10- and 15-percent criteria in the 5- and 10-year forecast periods, respectively. For based aircraft, forecasts are inconsistent with the TAF because base-year data were obtained from an actual aircraft inventory that was uploaded to and validated by the FAA National Based Aircraft Inventory Program rather than data sourced directly from the TAF. For GA operations, TAF data do not represent a complete picture of aviation activity at the Airport since there is no tower to create a comprehensive record of all takeoffs and landings. Most notably, the TAF's forecasts for both based aircraft and GA operations remain constant throughout the planning period, whereas the forecasts presented in this chapter are informed by various market and industry trends. Overall, the TAF's historical and projected data do not incorporate the substantial growth that the Airport and Yavapai County have experienced and are expected to continue to experience throughout the 20-year planning horizon.

It should also be noted that the five- and ten-year forecasts do not exceed 200 based aircraft or 200,000 total annual operations. Additionally, it is anticipated that related development associated with these forecasts will not require an EIS or BCA. Therefore, according to the FAA, these forecasts may still be reviewed by the ADO despite the fact that they are inconsistent with current TAF data.

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Table 2.23 - FAA Template for Comparing Airport Planning and TAF Forecasts

Year		P52 Forecast	TAF	P52 / TAF % Difference
Based Aircraft				
Base Year	2019	64	33	93.9%
Base Year + 5 Years	2024	69	33	110.4%
Base Year + 10 Years	2029	75	33	128.3%
Base Year + 15 Years	2034	82	33	147.7%
Base Year + 20 Years	2039	89	33	168.8%
Itinerant GA Operations				
Base Year	2019	10,800	10,800	0.0%
Base Year + 5 Years	2024	11,721	10,800	8.5%
Base Year + 10 Years	2029	12,721	10,800	17.8%
Base Year + 15 Years	2034	13,806	10,800	27.8%
Base Year + 20 Years	2039	14,983	10,800	38.7%
Local GA Operations				
Base Year	2019	8,000	8,000	0.0%
Base Year + 5 Years	2024	8,677	8,000	8.5%
Base Year + 10 Years	2029	9,411	8,000	17.6%
Base Year + 15 Years	2034	10,207	8,000	27.6%
Base Year + 20 Years	2039	11,071	8,000	38.4%
Total GA Operations				
Base Year	2019	18,800	18,800	0.0%
Base Year + 5 Years	2024	20,398	18,800	8.5%
Base Year + 10 Years	2029	22,132	18,800	17.7%
Base Year + 15 Years	2034	24,013	18,800	27.7%
Base Year + 20 Years	2039	26,054	18,800	38.6%
Total Operations				
Base Year	2019	18,900	18,900	0.0%
Base Year + 5 Years	2024	20,498	18,900	8.5%
Base Year + 10 Years	2029	22,232	18,900	17.6%
Base Year + 15 Years	2034	24,113	18,900	27.6%
Base Year + 20 Years	2039	26,154	18,900	38.4%

Sources:
FAA Terminal Area Forecast (issued January 2020).
Kimley-Horn, 2020.

Notes:
P52 = Cottonwood Municipal Airport FAA location identifier
TAF = FAA Terminal Area Forecast
TAF data is on a U.S. government fiscal year basis (October through September).
Table is developed from Appendix C in the FAA Report "Forecasting Aviation Activity by Airport."

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Table 2.24 - Template for Summarizing and Documenting Airport Planning Forecasts

A. Forecast Levels and Growth Rates							
	Base Year (2019)	Base Year + 5 Years (2024)	Base Year + 10 Years (2029)	Base Year + 15 Years (2034)	Base Year to +5 Years (2024)	Base Year to +10 Years (2029)	Base Year to +15 Years (2034)
	Operations				Average Annual Growth Rates		
Itinerant							
GA	10,800	11,721	12,721	13,806	1.7%	1.7%	1.7%
Military	100	100	100	100	-	-	-
Local							
GA	8,000	8,677	9,411	10,207	1.6%	1.6%	1.6%
Military	0	0	0	0	-	-	-
Total Ops.	**18,900**	**20,498**	**22,232**	**24,113**	**1.6%**	**1.6%**	**1.6%**
Instrument and Peak Hour Operations							
Instrument Ops.	395	428	465	504	1.6%	1.6%	1.6%
Peak Hour Ops.	11	12	13	14	1.6%	1.6%	1.6%
	Based Aircraft						
Single Engine (Nonjet)	44	45	47	48	0.7%	0.7%	0.6%
Multi Engine (Nonjet)	5	5	6	6	-0.5%	1.8%	1.2%
Tubroprop	2	2	2	4	0.7%	0.0%	4.7%
Jet Engine	2	4	5	6	N/A	N/A	N/A
Helicopter	11	12	13	14	1.6%	1.7%	1.6%
Other	0	1	2	3	100.0%	100.0%	100.0%
Total Based Aircraft	**64**	**69**	**75**	**82**	**1.6%**	**1.6%**	**1.6%**

B. Operational Factors				
	Base Year (2019)	Base Year + 5 Years (2024)	Base Year + 10 Years (2029)	Base Year + 15 Years (2034)
GA Operations per Based Aircraft	294	294	294	294

Sources:
FAA Terminal Area Forecast (issued January 2020).
FAA Traffic Flow Management System Counts database.
FAA Aircraft Characteristics Database.
Kimley-Horn, 2020.

Notes:
GA = General aviation
OPBA = Operations per based aircraft
Table is developed from Appendix B in the FAA Report "Forecasting Aviation Activity by Airport."

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