

3. Forecast of Aviation Demand - Draft

This chapter examines and projects several components of aviation activity in Iowa. Forecasts developed in the 2020 Iowa Statewide Aviation System Plan Update (SASP 2020) help verify airport roles and provide a framework to guide analysis for future system needs to best support Iowa's airports. Projections of general aviation activity for the state were prepared for the 5-year (2024), 10-year (2029), and 20-year (2039) periods. Commercial service operations, enplanement, and air cargo projections were also developed as a part of SASP 2020 for the same time periods.

Projections of aviation demand developed for the system airports are documented in the following sections:

- Influence of COVID-19 Pandemic
- Current and Historic Activity in Iowa
- Industry Trends, Issues, and Technologies that May Impact Future Aviation Growth
- Socioeconomic Trends that May Impact Future Aviation Growth
- Projections of Aviation Demand
 - Commercial Passenger Enplanements
 - Based Aircraft
 - Aircraft Operations
 - Air Cargo

3.1 Influence of COVID-19 Pandemic

The COVID-19 pandemic caused a national and global health crisis in early 2020. As a result of lockdowns, stay-at-home orders, and other restrictions, the pandemic caused a severe shock to the economy resulting in an economic downturn. Unlike previous crises experienced in the aviation industry, both aviation demand and supply were severely impacted due to consumer/passenger safety concerns and the suspension and restrictions of flights.

Airlines made deep capacity cuts and grounded fleets. General aviation activity and aircraft orders slowed drastically, corporate travel, flight training, and skydiving operations, slowed and large gathering events like airshows were cancelled.

COVID-19 impacted the commercial service and general aviation activity presented in this chapter. The long-term implications of the pandemic and recession on the aviation industry are still unknown. However, the aviation industry is resilient, and it is anticipated that activity will return to pre-pandemic levels. Recovery to pre-crisis levels in the past have ranged from three years post 9/11 to more than seven years after the financial crisis of 2008¹. The forecasts that are developed for Iowa will take into consideration these uncertainties as well as other historical trends.

3.2 Historic and Current Aviation Activity in Iowa

Historic activity data for airports in Iowa provide a baseline from which future activity can sometimes be projected. While historic trends are not always reflective of future periods, historic data does provide insight

¹ Airlines for America, "Tracking the Impacts of COVID-19," June 18, 2020.

into how aviation-related trends may be tied to future growth. This section discusses how aviation activity has changed in Iowa.

3.2.1 Commercial Service Trends in Iowa

Iowa has eight (8) commercial service airports. They are:

- Southeast Iowa Regional (Burlington)
- Eastern Iowa (Cedar Rapids)
- Des Moines International
- Dubuque Regional
- Fort Dodge Regional
- Mason City Municipal
- Sioux Gateway
- Waterloo Municipal

Four of these airports (Southeast Iowa Regional, Fort Dodge Regional, Waterloo Municipal, and Mason City Municipal) are included in the Essential Air Service (EAS) Program and their service is subsidized by the United States Department of Transportation.

The eight Iowa airports served approximately 2.2 million commercial enplanements in 2019. Since 2009, statewide enplanements in Iowa have grown at an average annual rate of 4.5 percent, as shown in **Table 3-1**. Increases in enplanements at Des Moines International and Eastern Iowa drove most of the statewide growth. They are the largest airports in the state and are served by multiple carriers. Enplanements at Burlington Municipal, Fort Dodge Regional, Sioux Gateway, and Waterloo Municipal all experienced enplanement growth over the last decade. As shown in **Table 3-1**, Mason City Municipal had declining levels of passenger enplanements and enplanements at Dubuque Regional remained relatively unchanged.

Table 3-1: Historic Enplanements at Iowa Commercial Service

Airport Name	2009	2011	2013	2015	2017	2019	CAGR 2009-19
Des Moines International	852,804	931,600	1,077,724	1,155,515	1,256,404	1,426,579	5.3%
Dubuque Regional	39,349	36,137	33,411	37,998	40,258	38,020	-0.3%
Eastern Iowa (Cedar Rapids)	474,351	431,637	519,540	555,425	573,642	671,692	3.5%
Fort Dodge Regional	5,363	10,864	3,059	4,062	7,140	8,207	4.3%
Mason City Municipal	11,075	11,594	3,153	6,752	7,500	8,139	-3.0%
Sioux Gateway	33,058	28,072	25,029	25,859	41,746	47,066	3.6%
Southeast Iowa Regional (Burlington)	1,973	7,005	6,403	6,900	7,657	7,967	15.0%
Waterloo Municipal	22,232	22,036	20,867	26,530	27,288	23,478	0.5%
Total	1,440,205	1,478,945	1,689,186	1,819,041	1,961,635	2,231,148	4.5%

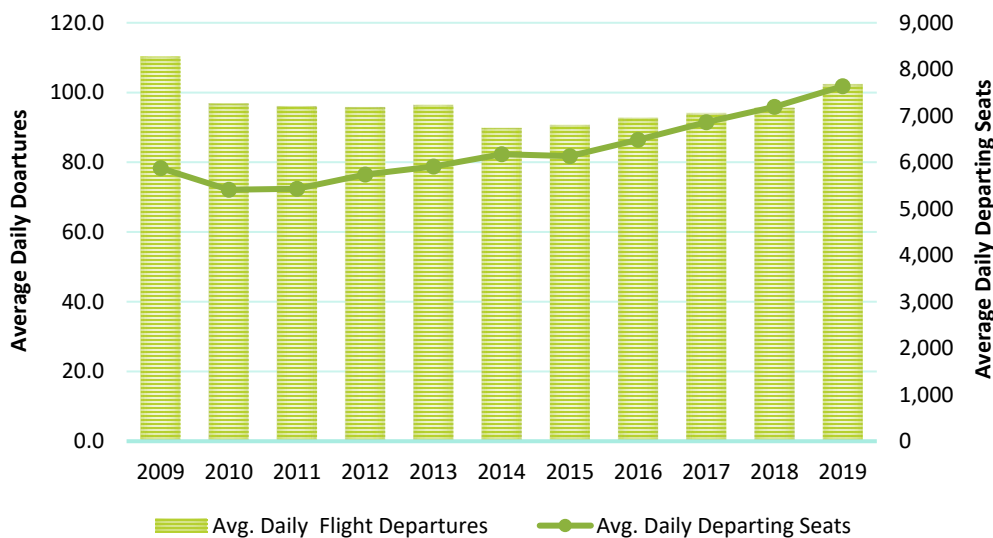
Source: US DOT Schedule T-100

Note: CAGR = Compound Annual Growth Rate

As shown in **Figure 3-1**, service levels (as measured by average daily commercial aircraft departures and departing seats) in Iowa fell between 2009 and 2010. In response to the recession of 2007-2009, airlines focused on profitability by cutting unprofitable and redundant flying throughout their networks and by minimizing the number of departing seats to be more in line with passenger demand. This action resulted in fewer empty seats on each departing flight. In addition, it became less cost-effective for airlines to fly 50-seat regional jets between short-haul markets; this led to the retirement of many commercial aircraft with lower seating capacities. Fewer empty seats have resulted in greater airline profitability. While the number of flight departures has remained between 90 and 100 per day since 2010, airlines have been adding larger aircraft. This means the same number or even fewer commercial flights can carry more passenger enplanements. Over the past five years, new service to Iowa’s commercial airports has been provided primarily by low fare carriers.

Southwest, Allegiant, and Frontier have entered Iowa markets, increasing both seat capacity and competition to popular markets.

Figure 3-1: Historic Flight Departures and Departing Seats in Iowa



Source: Official Airline Guide

Table 3-2 shows that average seats per departing commercial flight have grown from 53.3 in 2009 to 74.6 in 2019. The number of carriers providing service to airports in Iowa has dropped due largely to mainline carrier mergers. The total number of nonstop destinations has remained relatively unchanged over the last 10 years.

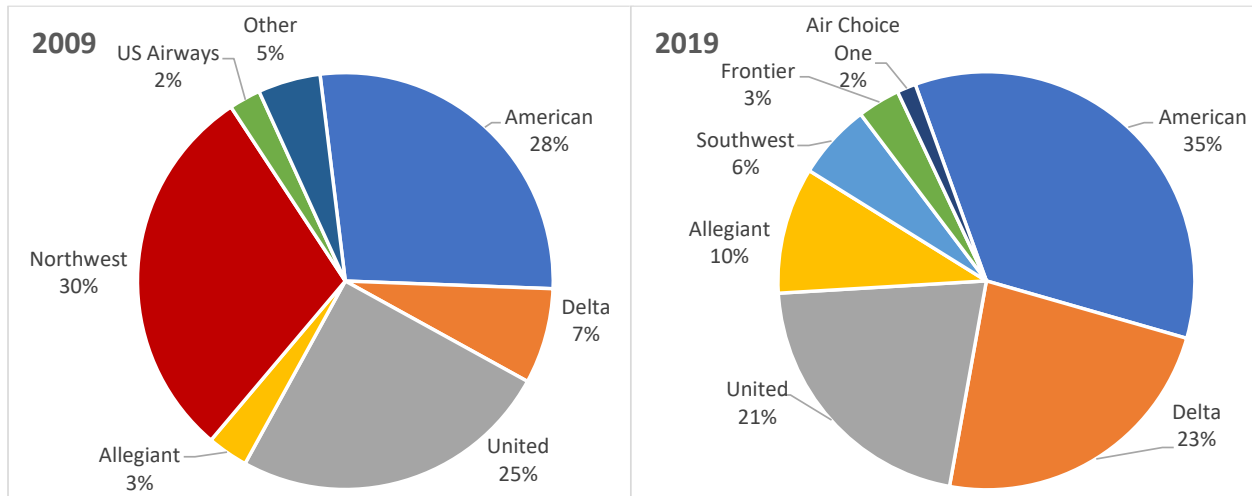
Table 3-2: Iowa Air Service Summary (2009-2019)

	2009	2011	2013	2015	2017	2019	% Change 2009-19
Average Daily Flight Departures	110.3	96.0	96.3	90.6	94.0	102.3	-7.2%
Average Daily Departing Seats	5,874	5,431	5,907	6,134	6,863	7,635	30.0%
Average Seats per Flight	53.3	56.5	61.3	67.7	73.0	74.6	40.1%
No. of Carriers	10	9	11	8	7	7	-30.0%
No. of Nonstop Destinations Served	24	20	21	23	24	25	4.2%

Source: Official Airline Guide

Figure 3-2 presents the carrier share of monthly departing seats at commercial service airports for 2009 and 2019. As shown, the carrier mix in the state has shifted with the mergers of Delta and Northwest (2010), United and Continental (2012), and US Airways and American (2015). Southwest (serving Des Moines) entered the state in 2012 and Frontier (serving Des Moines and Cedar Rapids) entered the market in 2010. Allegiant has also maintained a growing presence. American, Delta, and United continue to be the largest carriers in the state but the share of capacity offered on low cost carriers has shifted. In 2009, three percent of the seats departing Iowa airports were on low cost carriers. By 2019, the number of seats on low cost carriers rose to 19 percent.

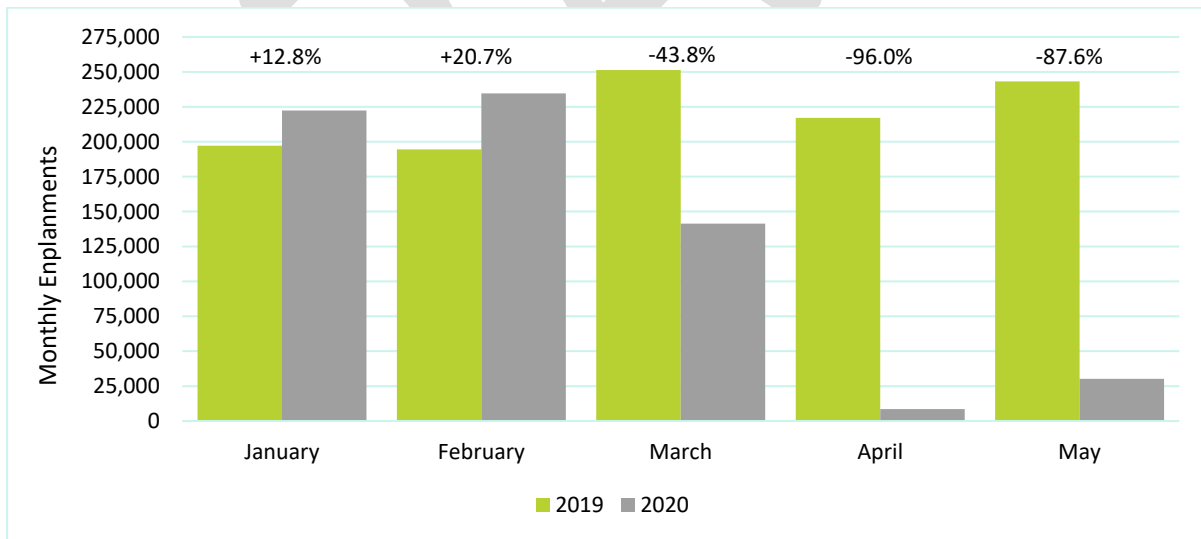
Figure 3-2: Carrier Shares of Iowa Commercial Aircraft Seat Capacity



Source: Official Airline Guide

The coronavirus had a tremendous impact on the commercial service airlines and the airports they serve around the world. United States airports first felt the impact in March 2020. An example of this decline is shown in **Figure 3-3**; enplanements dropped nearly 44 percent at the two busiest Iowa airports, Des Moines International and Eastern Iowa, in March 2020 compared to March 2019. April enplanements were down 96 percent and May enplanements (the most recent month available) were up slightly from April but still down 88 percent from the previous year.

Figure 3-3: Year over Year Change in Enplanements at Des Moines International Airport and Eastern Iowa Airport



Source: dsairport.com

It is anticipated that service and passenger levels will take a while to recover and passenger confidence in flying will not fully return until there is a vaccine for COVID-19. According to Fitch Ratings, most United States airports, including those in Iowa, are expected to see enplanement declines of approximately 50 percent in

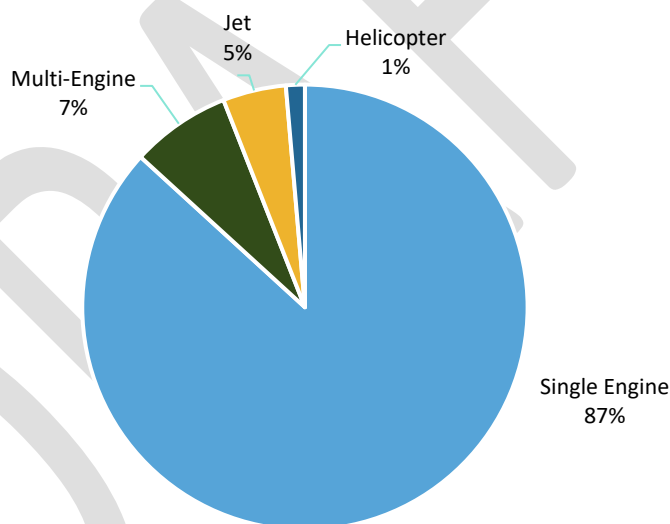
calendar year 2020, with a recovery of 85 percent in 2021, 95 percent in 2022, and 100 percent in 2023, all relative to 2019. These assumptions were considered in the development of enplanement projections.

3.2.2 General Aviation Trends in Iowa

According to the Federal Aviation Administration (FAA), a based aircraft is an aircraft that is operational and airworthy, which is typically based at a facility for a majority of the year. In 2019, 2,519 aircraft were reported to be based at Iowa’s 114 system airports. Based aircraft have remained relatively constant since the first Iowa Aviation System Plan was conducted in 2003 but has declined slightly since the last study was completed in 2010. This overall decline mirrors the decline in active general aviation aircraft experienced in the United States over the last two decades.

Figure 3-4 presents the percent of aircraft by equipment type based at Iowa’s study airports. As shown, more than 85 percent of the aircraft in the state are single-engine aircraft (2,155). Multi-engine aircraft (180) make up seven percent of the statewide fleet, while jets (114) represent five percent. There are 34 rotorcraft-based at study airports or approximately one percent of the fleet.

Figure 3-4: Iowa Aircraft Fleet Mix (2019)



Source: FAA National Based Aircraft Inventory Program, FAA Airport IQ 5010

For this analysis, an operation is defined as either a takeoff or a landing. Current general aviation aircraft operational data for the 2020 SASP was derived from the FAA’s 5010 reports or from data reported by an airport air traffic control tower (ATCT). For non-towered airports, annual operations reported on the FAA Form 5010 are estimates and are not verified through actual counts. Annual general aviation operations at Iowa system airports for 2019 are estimated to be 905,000. This total includes estimates and actual ATCT counts. Five airports in Iowa have an ATCT, one of which is a federal contracted tower.²

To better understand the state’s trends in based aircraft and general aviation operations, comparative information for the United States and FAA’s Central Region³ was reviewed. As shown in **Figure 3-5** between 2000 and 2019, based aircraft in Iowa increased 0.3 percent per year on average. This compares to a decline

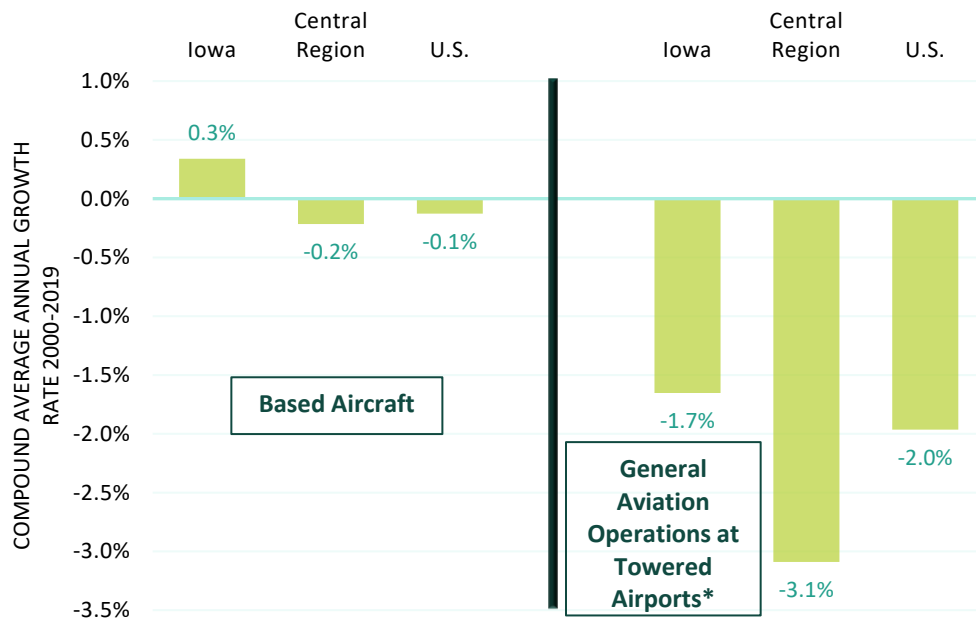
² Towered airports in Iowa included Eastern Iowa Airport, Des Moines International, Dubuque Regional*, Sioux Gateway, and Waterloo Municipal. *Indicates this airport has a federal contract tower.

³ FAA Central Region includes Iowa, Kansas, Missouri, and Nebraska.

of -0.2 percent in the region and -0.1 percent nationally. In terms of general aviation operations, reviewing operations at towered airports is the most accurate means for determining change. Iowa’s average annual decline in general aviation operations at towered airports since 2000 (-1.7 percent) was less than the decline by all towered airports in the in the Central Region (-3.1 percent) and the United States. (-2.0 percent).

The overall trend in based aircraft and general aviation operations for the state show that Iowa experienced changes when compared to the both the region and the United States overall. This helps substantiate that future aviation growth at Iowa system airports will be similar to national trends projected by FAA.

Figure 3-5: Comparison of Iowa, FAA Central Region, and U.S. General Aviation Activity Trends 2000-2019



Sources: Based Aircraft: Iowa DOT Records, National Based Aircraft Inventory and FAA 5010, FAA Terminal Area Forecast, and FAA Aerospace Forecasts Fiscal Years 2020-2040. Operations: FAA ATADS database and FAA Aerospace Forecasts Fiscal Years 2020-2040.

Notes: *Does not include air taxi operations, since this category is typically a mix of regional airlines operations and air taxi operations. Only itinerant and local general aviation operation as recorded in the ATADS database. Central Region includes Iowa, Kansas, Missouri, and Nebraska.

Over the past 20 years, general aviation demand in Iowa and across the country has been impacted by declining general aviation usage. Several key national events have attributed to the decline in overall general aviation operations in Iowa including fewer pilots, the events of September 11, 2001, the Great Recession that occurred between 2007 and 2009, and currently the COVID-19 pandemic.

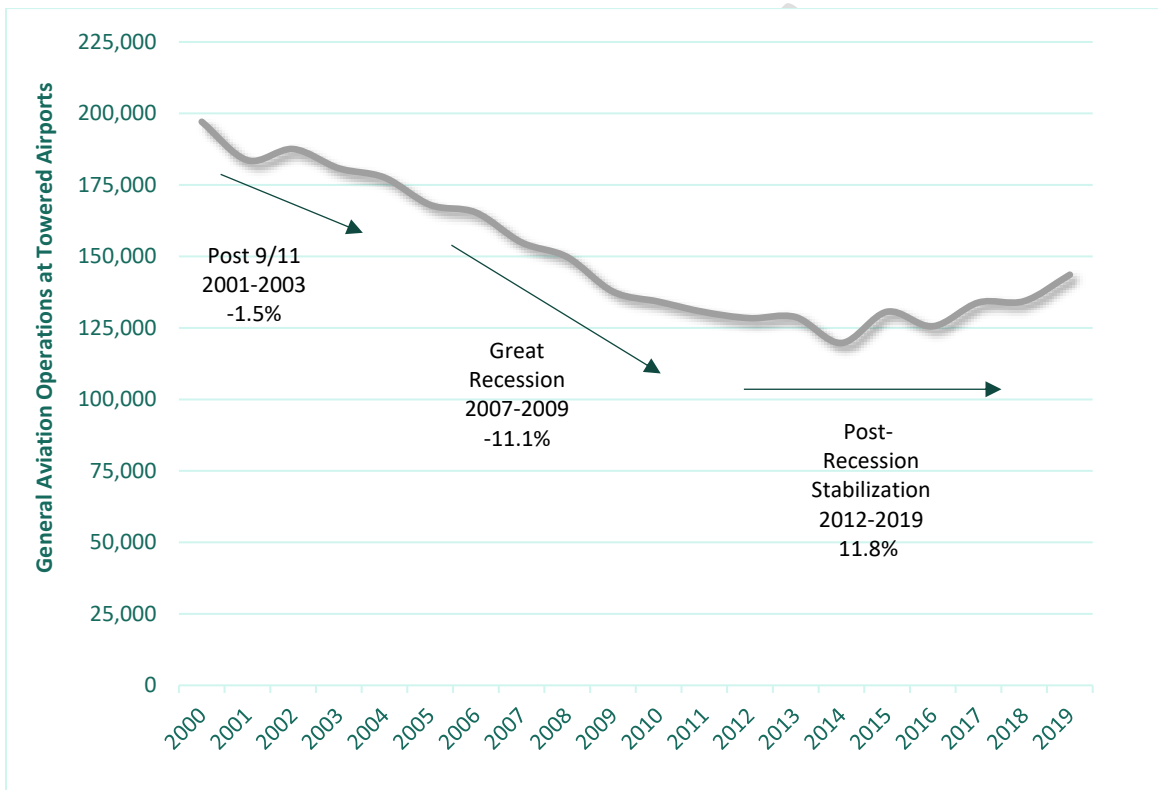
As shown in **Figure 3-6**, general aviation operations at towered airports⁴ in Iowa fell 1.5 percent in the years following September 11th (2001-2003) and then fell another -11.1 percent during the Great Recession. These specific events coupled with increases in fuel prices, rising cost of general aviation aircraft, declining numbers of pilots and flight training, and changes in how companies do business such as the increased utilization of

⁴ A year over year comparison of general aviation operations in Iowa was only available for the larger airports with air traffic control towers that report operations by type to the FAA. In 2019, general aviation operations at towered airports accounted for 21% of the total general aviation operations in the state estimated as part of the IASP.

technology and how corporate aviation is used as a business strategy help explain a decline in Iowa’s general aviation activity. General aviation operations have not rebounded since September 11 and the Great Recession, but they did begin to stabilize and increase beginning in 2015.

Due to the COVID-19 pandemic and recession that shocked the economy, Iowa has seen another decline in general aviation operations at its airports in 2020 and likely into 2023 as the industry recovers from the suspension of most travel. These trends further indicate that general aviation operations in Iowa may experience limited growth in the immediate future.

Figure 3-6: Change in General Aviation Operations at Towered Airports in Iowa



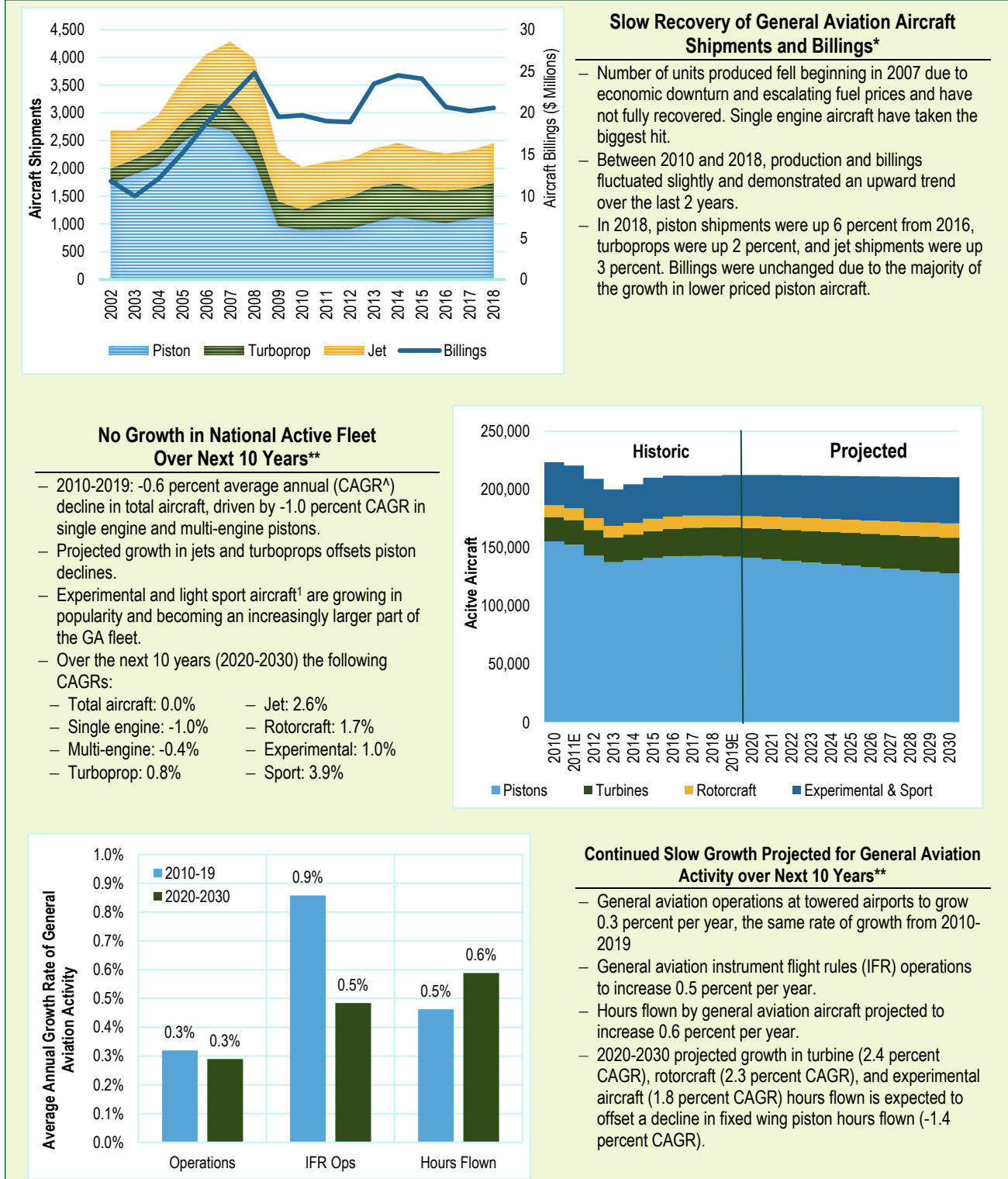
Source: FAA ATADS database

Note: Only itinerant and local general aviation operations are included in analysis. General aviation operations in the Commuter/Air Taxi category are not included.

3.3 Industry Trends and Issues that May Impact Future Aviation Growth

At the national level, fluctuating trends regarding general aviation usage and economic upturns/downturns have impacted general aviation demand. Slow economic recovery and economic uncertainties have and will continue to impact general aviation demand over the next decade. Some of the national trends that will impact aviation demand at Iowa airports are shown and discussed here. **Figure 3-7** presents recent and projected trends in general aviation aircraft orders, active aircraft fleet, and operations.

Figure 3-7: General Aviation Trends



Sources: * GAMA Quarterly Shipments and Billings; ** FAA Aerospace Forecasts, Fiscal Year 2020-2040

Note: ¹Light sport aircraft are defined as 1-2 person simple-to-operate, easy-to-fly aircraft that have a max weight of 1,320 lbs.

[^]CAGR=compound annual growth rate

Table 3-3 presents several of the recent and projected national aviation trends as opportunities for general aviation growth in the Iowa system or threats to aviation growth. The national trends have impacted Iowa in the past and will continue to impact future growth. It is important to note that the impact of COVID-19 on these trends is unknown at the time this report was written but will undoubtedly have a significant impact (positive or negative) on items such as business flying, air charter activity, flight training, and aircraft sales. National trends have been taken into consideration during the development of demand projections presented later in this chapter.

Table 3-3: National Trends Influencing General Aviation Growth

Opportunities for General Aviation Growth	Threats to General Aviation Growth
<p>Increased Delivery of Several Aircraft Types 2020-2030 (FAA): Delivery of some types of GA aircraft is expected to increase:</p> <ul style="list-style-type: none"> - Turbo Jet: 2.6% CAGR[^] - Rotorcraft: 1.7% CAGR - Turboprop: 0.8% CAGR <p>Because of lower entry and operating costs, industry growth is also projected for light sport and experimental aircraft.</p> <ul style="list-style-type: none"> - Light Sport: 3.9% CAGR - Experimental Aircraft: 1.0% CAGR 	<p>Decline in Single-Engine Piston Fleet (FAA): The single engine piston fleet makes up the largest percentage of GA fleet. FAA projects contraction of this portion of the fleet at a rate of -1.0% annually over the next 10 years.</p> <ul style="list-style-type: none"> - 2010: 139,520 - 2019E: 129,535 - 2030 Projected: 115,710 <p>According to GAMA, new piston airplane sales dropped dramatically following the economic recession and have not recovered.</p>
<p>Increase in Business Flying: Business use of general aviation aircraft as a tool to increase efficiency and productivity remains strong. The Tax Cuts and Jobs Act of 2017 provided tax savings on new and used aircraft for corporate use and oil prices remain low. Business aviation:</p> <ul style="list-style-type: none"> - Provides time efficiencies for companies - Tends to purchase more fuel - Is more a consistent activity and higher revenue generators for airports - Seen as a safer alternative post COVID-19 	<p>Limited Growth in Annual GA Operations at Towered Airports (FAA): GA operations at all towered airports experienced low growth of 0.3% per year between 2010 and 2019. A small increase is expected over the next 20 years.</p> <ul style="list-style-type: none"> - 2010: 26.6 million - 2019: 27.4 million - 2030 Projected: 28.8 million
<p>On-Demand Charter Activity Remains Strong: WheelsUp, NetJets, XOJet and other companies have experienced more aircraft share sales and an increase in flight hours in the last 10 years. Companies are investing more often in a variety of products including fractional ownership, jet cards, and club membership programs. These items allow businesses of all sizes to utilize business aviation without purchasing an aircraft.</p>	<p>Decline in Active Private Pilots (FAA) The number of active private pilots in the U.S. has declined 0.9% on average since 2010 due to changing recreation trends, the increasing cost of aircraft the increasing cost to fly. The FAA is actually forecasting a slight decline (-0.5% annually) over the period due to legislative changes to certification, aging pilots, and high educational costs to become a pilot.</p>
<p>Flight Training Materializing at Record Pace: Airline pilot hiring has surged since 2013 to keep up with demand and pilot retirements. Airlines hired more than 5,000 pilots in 2019. This has meant large increases in flight training-related operations at many general aviation airports around the country.</p>	<p>Phase Out of 100 LL Fuel to Non-Leaded Fuel: AvGas production was down 30% in 2016 compared to 10 years earlier. Plans to replace 100LL fuel with a non-leaded aviation fuel could result in a reduction in the piston GA fleet though the FAA has stated that any new fuel should be compatible with the existing fleet.</p>
<p>Evolution of Electric Aircraft: The growing concern over aviation emission has shifted the focus of manufacturers toward the development of all-electric aircraft. New electric aircraft models are being developed to be used as a flying taxi. The development of flying taxis is expected to increase the demand for the general aviation market in the future.</p>	<p>Increase in Cost of New GA Aircraft: The cost to purchase a new single-engine piston plane has increased significantly.</p> <ul style="list-style-type: none"> - Piper Seneca: \$650,000 (2005) v. \$1 million (2018) - Cirrus SR22 GTS: \$335,000 (2005) v. \$760,000 (2018) - Cessna 172 Skyhawk: \$230,000 (2005) v. \$379,000 (2018)

Sources: FAA Aerospace Forecast Fiscal Years 2020-2040, GAMA Quarterly Shipments and Billings, other industry sources
 Note: ^CAGR=compound annual growth rate

3.3.1 *Emerging Technologies*

Several technologies are on the horizon that have the potential to shape transportation in the future. These include unmanned aerial vehicles (UAVs), rapidly developing autonomous vehicles, and electric and other alternate fuel source vehicles. While it is not currently known how these technologies will ultimately develop, this section provides insight into a few of the technological developments and potential impacts that the Iowa airport system will face in the coming years.

Unmanned Aerial Vehicles (UAV). A drone or a UAV typically refers to a pilotless aircraft that operates through a combination of technologies including computer vision, artificial intelligence, and object avoidance systems. UAV technology is becoming more widely-used every day, and the benefits of this technology extend well beyond recreational use. As more companies look to capitalize on commercial opportunities, investment into UAV continues to grow. UAVs offer safe, cost-effective solutions for applications ranging from data collection to delivery. As autonomy and collision-avoidance technologies improve, so too will UAVs' abilities to perform increasingly complex tasks. According to a 2016 report by PwC, the emerging global market for business services using drones is valued at over \$127 billion. In the aviation industry, UAVs are commonly used for inspecting aircraft, airfields, powerline, and buildings as well as for wildlife control. Drones are also being used for agricultural spraying, search and rescue, and aerial photography. The use of UAVs for the transport of goods is in development and UAVs for passengers is also getting closer to fruition each year and will likely be available in the next decade and prevalent in 20 years.

Autonomous Vehicles. As driverless cars become more capable and common, they will change people's travel habits not only around their own communities but across much larger distances. The impacts of these new technologies will likely affect many facets of aviation and could substantially change the aviation industry and the airport system. A future with driverless cars means people will have more options instead of driving on their own. Airlines may reduce route availability and frequency as more people chose to drive to regional destinations or larger airports. In turn, airports may receive lower revenue from parking lots and will likely need to accommodate autonomous vehicles for passenger drop-off and pick-off. Vehicles that support aviation activities such maintenance equipment; baggage, cargo handling, and other carts; and other ground transportation options such as airport shuttles may also become autonomous.

Alternative Fuel. The advancement of alternative and sustainable fuel will undoubtedly impact aviation and airport planning in Iowa and around the world in the future. Using alternative fuels and advanced vehicles (zero emissions and zero gas) instead of conventional fuels and vehicles helps conserve fuel and lowers vehicle and aircraft emissions. New aircraft are becoming more efficient by improving engines, enhancing aerodynamics, and using lighter materials. These new technologies combined with alternative fuels will offer aircraft more cost efficiencies and be better for the environment. Sustainable alternative fuels currently cost more than conventional fuel (likely due to a lack of competitiveness in the market), which directly acts as a barrier to their utilization. However, in the next 20 years, advancements will continue, and airports will need to accommodate vehicles using alternative fuels by offering charging stations or alternative fuel for aircraft, equipment, ground transportation, cars, and UAVs.

3.4 **Socioeconomic Trends That May Impact Future Aviation Growth**

Factors that may influence future aviation activity that are independent of historical airport activity include area socioeconomic and demographic trends. Socioeconomic characteristics are often examined to derive an understanding of the dynamics of projected aviation growth. As socioeconomic activity increases, general aviation activity also generally increases. A summary of Iowa's historical and projected trends in population and employment are discussed below. These trends were considered when projections of aviation demand for each system airport were developed.

Population. Over the 20-year historic period of 1999 and 2019, statewide population grew at an average annual rate of 0.4 percent per year. In 2019, Iowa’s estimated population was 3.16 million, up from 2.91 million in 1999 (see **Figure 3-8**). Over the last 10 years, statewide population grew at the same annual rate of 0.4 percent. Between 2019 and 2029, population is estimated to increase at 0.3 percent per year on average.⁵

The rates of historical and projected population growth experienced in Iowa are below those experienced in the United States overall. Between 1999 and 2019, U.S. population grew at an average annual rate of 0.8 percent, and it is projected that that the national population growth rate will be 0.7 percent per year over the next 10 years.

Employment. Between 1999 and 2019, employment in Iowa increased at an average annual rate of 0.6 percent per year. This compares to a 1.1 percent CAGR experienced overall in the United States. In 2019, it was estimated that state employment was 2.12 million, up from 1.89 million in 1999 (**Figure 3-8**). Over the last 10 years, statewide employment grew at a slightly higher rate of 0.8 percent per year on average. Employment in Iowa is projected to grow at 0.8 percent per year on average between 2019 and 2029, slightly below the projected U.S. CAGR of 1.1 percent over the same period.⁶

Figure 3-8: Historical and Projected Iowa Population and Employment



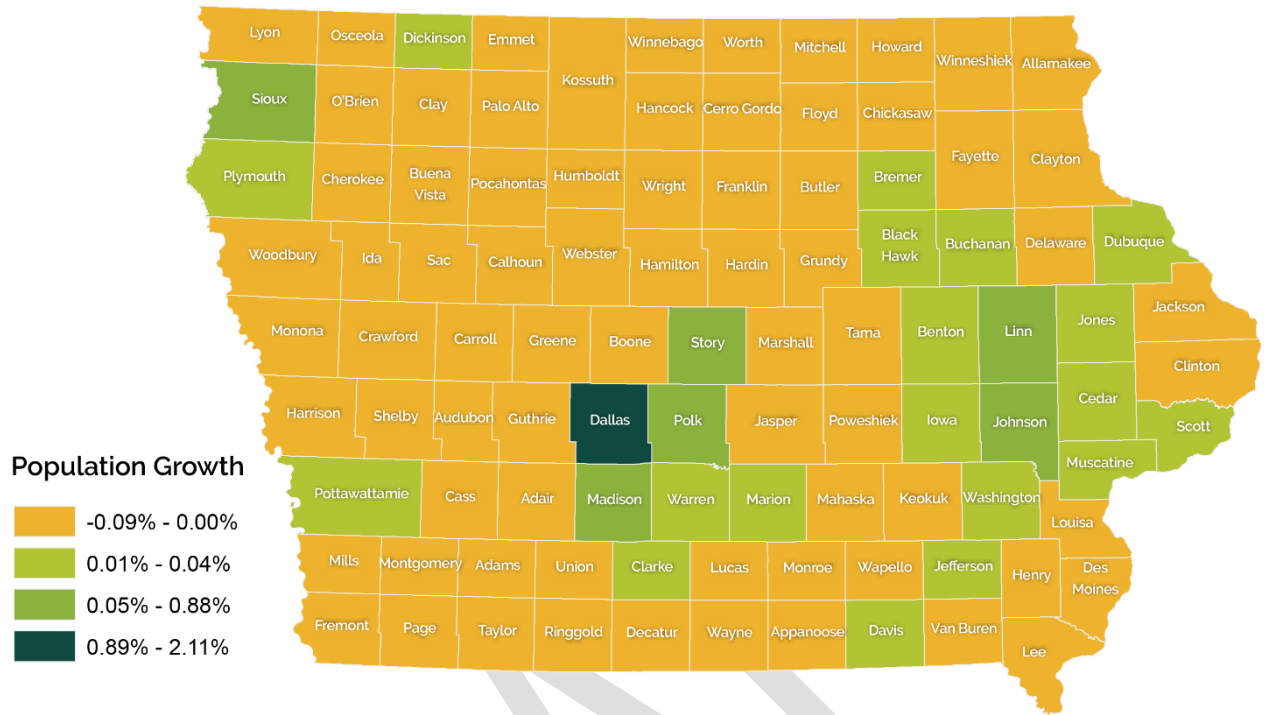
Sources: U.S. Census Bureau, U.S. Department of Commerce, Woods & Poole Economics, Inc.

Figure 3-9 presents projected rates of population change by Iowa county. Much of the highest growth is projected to occur near the Ames, Cedar Rapids, Iowa City and the metro areas of Des Moines. Dallas County in the Des Moines-Ames-West Des Moines Combined Statistical Area (CSA) and Johnson County in the Cedar Rapids-Iowa City CSA are expected to experience the highest rates of population growth between 2019 and 2039. Population declines are anticipated in more than half the counties in Iowa. Employment growth rates by county show a similar trend and are presented in **Figure 3-10**.

⁵ U.S. Census Bureau and Woods & Poole Economics, Inc.

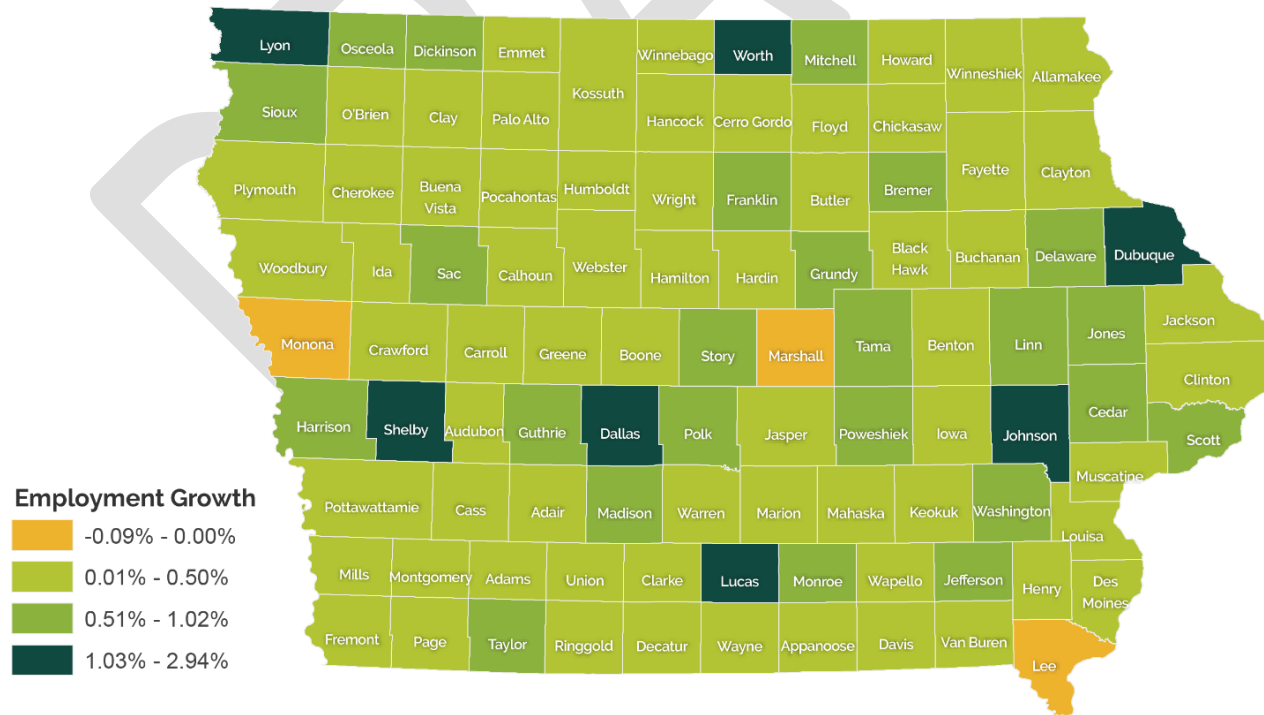
⁶ U.S. Department of Commerce and Woods & Poole Economics, Inc.

Figure 3-9: Projected Population Growth By Iowa County (2019-2039)



Source: Jviation, Inc.

Figure 3-10: Projected Employment Growth Rate By Iowa County (2019-2039)



Source: Jviation, Inc.

3.5 Projections of Aviation Demand

For the 2020 SASP, projections of aviation demand were developed for commercial passenger enplanements, based aircraft, aircraft operations (commercial service and general aviation), and air cargo. The following assumptions were used to establish demand projections for system airports:

- The decline in aviation activity due to the COVID-19 pandemic has not been quantified in this report as it is still too early to predict long term impacts.
- Other economic disturbances may cause year-to-year demand variations.
- In many instances, aviation activity at system airports will generally reflect the national aviation industry. The FAA projects low rates of growth or no growth for most aspects of aviation.
- Fuel prices will continue to fluctuate and the future availability of 100LL fuel (needed to fly piston aircraft) may further impact the general aviation projections.
- Projections are unconstrained with respect to facilities.

Several methodologies were reviewed that considered historic trends, socioeconomic growth, and national aviation projections.

3.5.1 Commercial Passenger Enplanements

Table 3-4 presents the enplanement projections for Iowa's commercial service airports. It is important to note that these projections are made for system planning purposes only. Airports should do their own analyses of the COVID-19 impacts at their individual airport enplanement levels for airport planning purposes. The following assumptions were made:

- Commercial service enplanements at all of Iowa's airports will return to pre-COVID 2019 annual levels in 2023. 2019 enplanements were adopted as 2023 enplanements and annual growth rate projections were applied through 2039.
- The level of air service and economic conditions at each of Iowa's commercial service airports in 2019 will be assumed to be the similar to 2023 conditions.
- National enplanement growth projections from the FAA Aerospace Forecasts FY2020-2040, will be similar to those developed four years later, and can be applied to 2023 base year enplanements.

For Iowa's commercial airports, a methodology was used that applied a variation of the FAA's enplanement growth rate projection from the *FAA Aerospace Forecasts FY2020-2040* to each airport's enplanements starting in 2023 (which is assumed to be the same level of enplanements as 2019). The growth rate selected for each airport was based on each airport's recent historic growth (2009-2019) in enplanements.

Based on this approach, Iowa can expect an average annual rate of growth of 2.2 percent for all enplanements over the forecast period. Enplanements are expected to reach 3.48 million by 2039. This rate of growth is slightly higher than the 2.1 percent national rate of growth for all United States enplanements projected by the FAA in its *Aerospace Forecasts FY2020-2040*. Des Moines International is expected to see the highest rate of growth in enplanements, with an average annual growth rate of 2.6 percent; the airport is projected to have 2.4 million enplanements by 2039. Eastern Iowa and Sioux Gateway are projected to grow at 1.6 percent, on average, over the next 20 years. It is anticipated that Dubuque Regional will grow at 0.8 percent per year, and the four EAS airports will growth at 0.4 percent per year on average over the 20-year period.

Table 3-4: Iowa Enplanement Projections

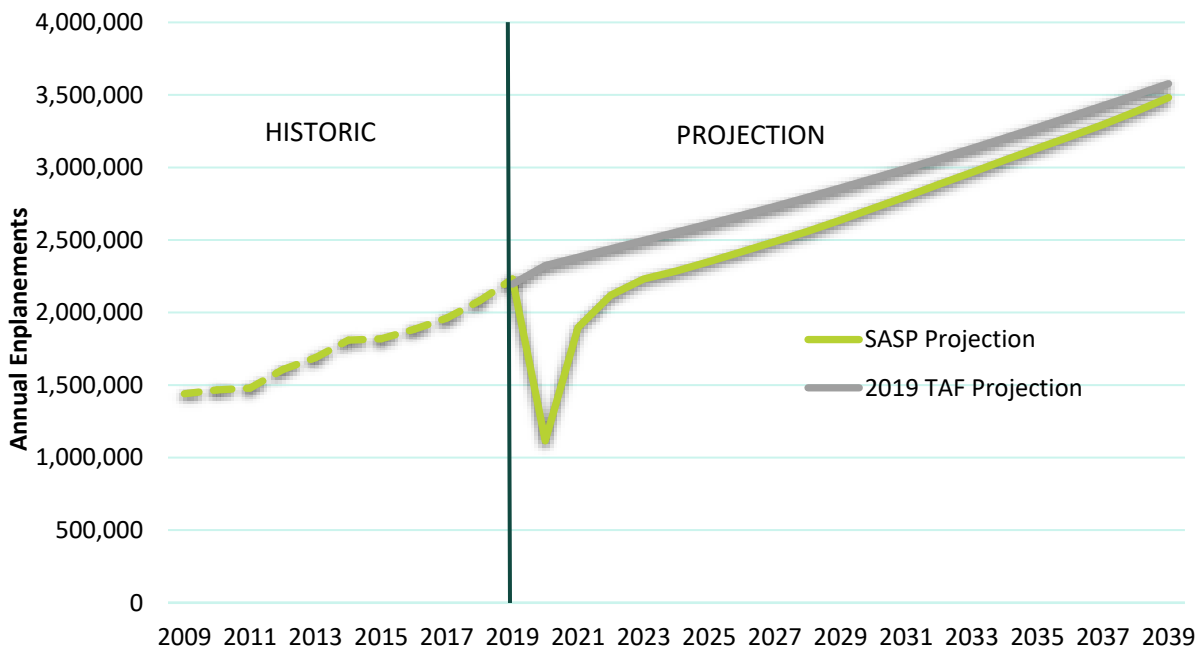
Airport Name	2019/2023	2024	2029	2039	CAGR 2019-2039
Southeast Iowa Regional (Burlington)	7,970	8,000	8,230	8,680	0.4%
Des Moines International	1,426,580	1,466,810	1,728,450	2,371,850	2.6%
Dubuque Regional	38,020	38,380	40,560	45,120	0.8%
Eastern Iowa (Cedar Rapids)	671,690	684,320	763,910	944,370	1.6%
Fort Dodge Regional	8,210	8,250	8,480	8,940	0.4%
Mason City Municipal	8,140	8,180	8,410	8,870	0.4%
Sioux Gateway	47,070	47,950	53,530	66,170	1.6%
Waterloo Municipal	23,480	23,600	24,250	25,580	0.4%
Total	2,231,150	2,285,490	2,635,810	3,479,590	2.2%

Source: Marr Arnold Planning

Note: CAGR = Compound Annual Growth Rate; Totals may not sum due to rounding.

The statewide enplanement projections are graphically depicted in **Figure 3-11**. For comparison, the FAA’s Terminal Area Forecast (TAF) projections for statewide enplanements are also included. FAA publishes their projections in January each year and most recent projections do not take COVID-19 impacts into consideration. FAA TAF projected statewide enplanement reaching 3.58 million in 2039 which represents an average annual growth rate of 2.5 percent between 2019 and 2039. FAA projections for 2039 was 2.7 percent higher than the SASP’s 2039 projection.

Figure 3-11: Iowa Enplanement Projections



Source: Marr Arnold Planning, FAA Terminal Area Forecasts

3.5.2 Based Aircraft

Estimating the number of aircraft anticipated to be based at system airports over the next 20 years helps the state plan for future facility and infrastructure, if needed. Initially, based aircraft were projected using four methodologies. A summary of the four scenarios used to develop based aircraft projections are discussed below and are shown in **Table 3-5**; this table summarizes statewide results for the four projection methodologies examined for the 2020 SASP.

- Scenario 1 – Historic Based Aircraft Growth and FAA Active General Aviation Fleet Growth.** This methodology considered historic growth from 2010-2019 for based aircraft at each airport. A range of growth rates was then applied based on the FAA’s projected growth rate for active general aviation in the U.S. which were derived from the *FAA Aerospace Forecasts, Fiscal Years 2020-2040*. This methodology considered the operational fleet mix of aircraft at all airports and projected a slightly higher rate of growth for those airports that have aircraft types that are expected to see higher rates of future growth. This scenario produces a statewide annual growth rate of 0.44 percent over the 20-year period.
- Scenario 2 – County Employment Growth and FAA Active General Aviation Fleet Growth.** Similar to Scenario 1, this methodology applies FAA’s projected growth rate for active general aviation aircraft and projects a slightly higher rate of growth for those airports that are located in county’s that are projected to experience high rates of employment growth. Woods & Poole Economics, Inc. developed the employment projections used to support this scenario and fleet mix projections were derived from the *FAA Aerospace Forecasts, Fiscal Years 2020-2040*. This scenario produces a statewide annual growth rate of 0.17 percent over the planning period.
- Scenario 3 – County Population Growth.** This scenario assumes that growth in based aircraft at each airport will be equal to the rate of projected population growth in which the airport is located. Woods & Poole Economics, Inc. developed the population projections used to support this scenario and projects an annual growth rate of 0.10 percent.
- Scenario 4 – Market Share and FAA Active General Aviation Fleet Growth by Type.** The projections of based aircraft in Iowa applies the FAA’s projected rate of growth for each aircraft type to the 2019 total statewide based aircraft by type. Based on this scenario, total statewide based aircraft are projected to decline by -0.75 percent per year over the next 20 years.

Table 3-5: Comparison Of Based Aircraft Projection Scenarios

Scenario	2019	2024	2029	2039	CAGR 2019-2039
1 – Historic Based Aircraft Growth & FAA Active General Aviation Fleet Growth	2,520	2,580	2,630	2,750	0.44%
2 – County Employment Growth & FAA Active General Aviation Fleet Growth	2,520	2,540	2,560	2,610	0.17%
3 – County Population Growth	2,520	2,540	2,550	2,570	0.10%
4 – Market Share & FAA Active General Aviation Fleet Growth by Type	2,520	2,430	2,340	2,170	-0.75%

Source: Marr Arnold Planning

Note: CAGR = compound annual growth rate

Scenario 3 – County Population Growth was selected as the preferred projection for based aircraft because of the correlation between aircraft ownership and population size. This scenario produces a reasonable projection of based aircraft over the 20-year planning period that results in growth rates that fall in the middle of the four scenarios that were evaluated. Projected aircraft by airport are presented in **Table 3-9** at the end of the chapter. Based on this projected rate, there will be approximately 50 additional aircraft based in Iowa by 2039.

3.5.3 Aircraft Operations

Commercial Service Operations

Commercial airlines, or air carriers, operate under Federal Aviation Regulation (FAR) 121 certificates and provide scheduled commercial service for paying customers. **Table 3-6** presents commercial service operations, generally consisting of air carrier and commuter operations, forecasts through 2039. It is important to note that commercial service operations do not include air taxi operations because air taxi operations are governed by FAR Part 135 regulations. These types of operations are included in general aviation operational activity. A methodology similar to the one used to project enplanements was utilized. A combination of the historic five-year trend at each airport and a percent of the FAA Aerospace rate was applied.

Des Moines International and Eastern Iowa are expected to continue handling the majority of the growth with a 0.7 percent annual growth. Airline utilization of larger aircraft and higher load capacities will allow for higher enplanement growth and a lower rate of growth for airline operations through 2039. Commercial service operation at the four EAS airports are expected to remain unchanged through the 20-year forecast period. Commercial operations across the state are anticipated to grow 0.6 percent annually. This would mean an increase of more than 10,300 additional commercial operations taking place in Iowa by 2039.

Table 3-6: Iowa Commercial Service Operations Projections

Airport Name	2019/2023	2024	2029	2039	CAGR 2019-2039
Southeast Iowa Regional (Burlington)	3,200	3,200	3,200	3,200	0.0%
Des Moines International	38,370	38,570	40,270	44,010	0.7%
Dubuque Regional	2,000	2,010	2,100	2,290	0.7%
Eastern Iowa (Cedar Rapids)	24,720	24,850	25,940	28,350	0.7%
Fort Dodge Regional	3,000	3,000	3,000	3,000	0.0%
Mason City Municipal	3,400	3,400	3,400	3,400	0.0%
Sioux Gateway	2,600	2,680	2,920	3,420	1.3%
Waterloo Municipal	1,400	1,400	1,400	1,400	0.0%
Total	78,690	79,100	82,230	89,070	0.6%

Sources: US DOT, Schedule T-100. Marr Arnold Planning, FAA Terminal Area Forecasts

Note: CAGR = compound annual growth rate; Totals may not sum due to rounding.

General Aviation Aircraft Operations

Different factors impact the number of operations at an airport. These factors include, but are not limited to:

- Total based aircraft
- Airport facilities and services such as a control tower, fuel, and an FBO
- Airport location
- Activity and facilities at neighboring or competing airports

- Area demographics including business density
- National trends

These factors were considered in the development of projections of annual operations for each system airport. A summary of the methodologies used to develop projections of general aviation aircraft operations are shown in **Table 3-7**.

- **Scenario 1 – Operations Per Based Aircraft (OPBA).** OPBA is calculated by dividing the number of total operations by the number of aircraft based at each airport. In this scenario, total operations at each airport are projected by applying the airport’s 2019 OPBA ratio to the airport’s preferred projection of based aircraft. Utilizing this methodology, it is projected that total general aviation aircraft operations at system airports will grow annually at 0.10 percent over the 20-year forecast period.
- **Scenario 2 – County Employment Growth.** This scenario assumes that the growth of general aviation operations at each airport will be equal to the average annual projected rate of employment growth for the county in which the airport is located. Employment projections for each Iowa county were obtained from Woods & Poole Economics, Inc. and produces a 0.55 percent annual growth rate over the forecast period.
- **Scenario 3 – Historic Activity and FAA Hours Flown Growth.** This scenario considered the 2019 operational fleet mix and 2019 Instrument Flight Rules (IFR) activity at each airport. This information was obtained from the FAA’s Traffic Flow Management System Counts (TFMSC). A range of projected growth rates was identified and then applied based on the FAA’s projected growth rates for general aviation aircraft hours flown (derived from the *FAA Aerospace Forecasts, Fiscal Years 2020-2040*). The annual growth rate for total general aviation operations developed in this scenario is 0.62 percent.
- **Scenario 4 – Market Share and FAA General Aviation Operations Growth.** This scenario assumes that airports will maintain their share of the total general aviation operations at towered airports. Based on this scenario, total statewide general aviation operations are projected to increase by 0.29 percent per year over the next 20 years.

Table 3-7: Comparison Of General Aviation Operations Projection Scenarios

Scenario	2019	2024	2029	2039	CAGR 2019-2039
1 – OPBA	905,150	910,300	914,000	921,800	0.10%
2 – Employment Growth	905,150	929,750	955,400	1,010,110	0.55%
3 – Historic Activity & FAA Hours Flown Growth	905,150	932,860	961,940	1,024,510	0.62%
4 – Market Share & FAA General Aviation Operations Growth	905,150	918,520	932,090	959,830	0.29%

Source: Marr Arnold Planning

Note: CAGR = compound annual growth rate; Totals may not sum due to rounding.

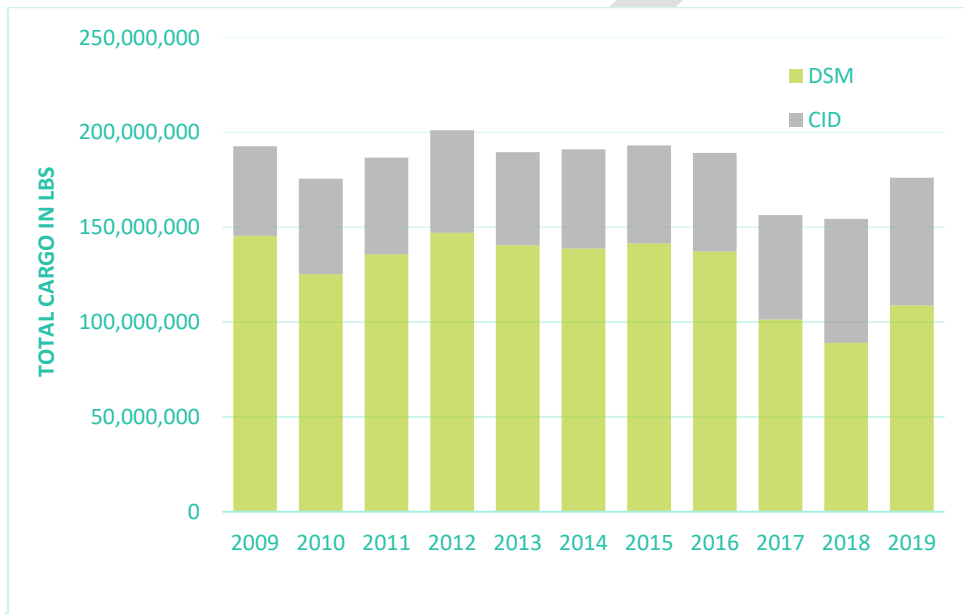
Scenario 4 – Market Share and FAA General Aviation Operations Growth was selected as the preferred projection for general aviation operations. This scenario produces a reasonable and conservative projection of general aviation operations over the 20-year planning period that takes into consideration activity levels within Iowa and FAA’s projections of general aviation operations. Projected general aviation operations by airport are presented in **Table 3-9** at the end of the chapter.

3.5.4 Air Cargo

Air cargo data by type (air freight/mail) is reported by commercial carriers (airlines, as well as, FedEx, UPS, and smaller all-cargo companies) to Iowa airports. More than 176 million pounds of air freight and mail were

enplaned and deplaned at Iowa airports in 2019. Des Moines International and Eastern Iowa handle nearly all of cargo carried in the state. Integrated carrier UPS has daily scheduled service to and from both Des Moines International and Eastern Iowa airports in addition to cargo carried in the underbelly of passenger aircraft. The amount of air cargo carried on passenger airlines at the other six commercial service airports in Iowa is a small fraction of that carried at the two largest airports in Iowa and has not been included due to the limited availability of data. The level of air cargo carried at Des Moines International and Eastern Iowa has fluctuated between 150 million and 200 million pounds since 2009 as shown **Figure 3-12**. Air cargo levels and operations have not been as impacted by COVID-19 as the passenger airlines. While cargo carried on the underbelly of aircraft is down due to altered schedules, UPS has maintained its schedules at both Des Moines International and Eastern Iowa and 2020 cargo levels have been strong through May 2020.

Figure 3-12: Historic Air Cargo At DSM And CID



Sources: DSM and CID airport records

The *FAA Aerospace Forecasts FY2020-2040* anticipates volume of domestic air freight/mail in terms of revenue ton miles will grow at 1.9 percent. This rate of growth has been applied to project Iowa air cargo growth. Statewide projections of enplaned and deplaned cargo is presented in **Table 3-8**. Statewide air cargo projected to at an average annual rate of 1.9 percent and will reach 257 million pounds by 2039. This rate of growth is conservative compared to Boeing’s *World Air Cargo Forecast 2018-2037*, which predict North American air cargo to grow at a CAGR of 2.3 percent through their 20-year forecasts.

Table 3-8: Iowa Air Cargo Projections

Airport Name	2019/2023	2024	2029	2039	CAGR 2019-2039
Des Moines International	108,736,000	119,465,990	131,254,800	158,437,150	1.9%
Eastern Iowa	67,395,850	74,046,420	81,353,270	98,201,210	1.9%
Total	176,133,870	193,514,430	212,610,090	256,640,400	1.9%

Sources: Marr Arnold Planning

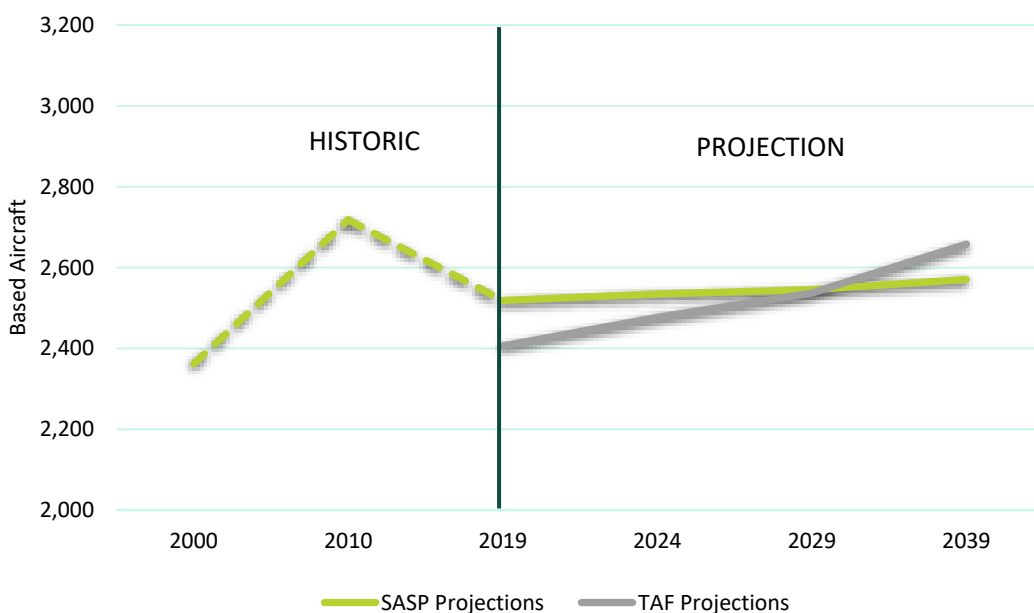
Note: CAGR = compound annual growth rate; Totals may not sum due to rounding.

3.6 Summary

The 2020 SASP takes a conservative approach to projecting the future aviation demand for system airports and considers regional and national aviation trends. Over the last 20 years, Iowa has been fortunate to remain relatively stable and resilient through national and global events that have hit the aviation industry. Aviation activity in terms of based aircraft have held constant over the last decade; general aviation operations in the state have fared better compared to the region and nation; and related to commercial service activity, Iowa has seen a steady increase in the number of departing seats over the period as airlines have shifted to using larger aircraft with more seats. Looking forward, it is anticipated that growth will continue to be seen in the metropolitan/urban areas and general aviation will continue to support the transportation and economic networks while taking advantage of emerging technologies and opportunities for growth that were discussed previously.

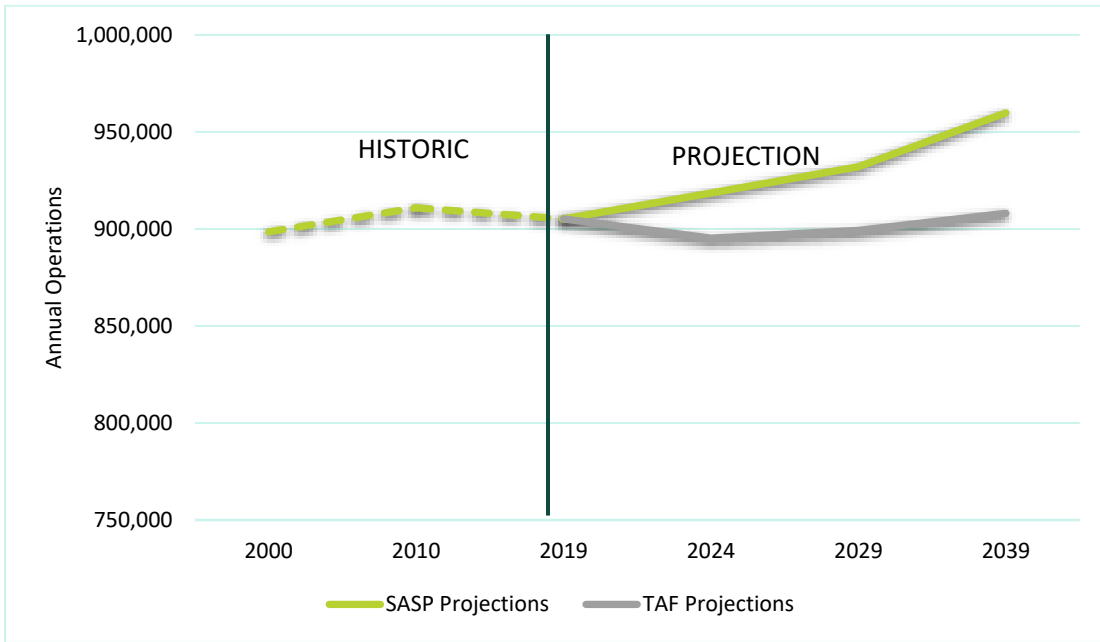
Various scenarios were considered to project based aircraft and airport operations. While the exact impact is unknown, these projections assume it will take approximately two years for the industry to rebound to 2019 levels following the COVID pandemic. **Table 3-9** presents based aircraft and general aviation operations projections for each system airport. As shown, it is anticipated that general aviation activity will either remain the same or decline slightly at all airports in the state. This is in line with national FAA projections. These projections are developed on a system planning level of detail, compared to that of a master plan. On a statewide basis, based aircraft projections and general aviation operations are -3 percent of FAA Terminal Area Forecast (TAF) projections for based aircraft and 6 percent of the TAF operations projections over the 20-year period (see **Figures 3-13** and **3-14**). Projections associated with comprehensive airport master plans and airport layout plans will guide actual individual airport development. Projections of demand presented in this chapter help establish future systemwide needs.

Figure 3-13: Iowa Based Aircraft Projections



Source: Marr Arnold Planning, FAA Terminal Area Forecasts

Figure 3-14: Iowa General Aviation Operations Projections



Source: Marr Arnold Planning, FAA Terminal Area Forecasts

Projections of commercial service operations and enplanements at the eight system airports with scheduled air carrier service is anticipated to increase during the planning period. Enplanements are projected to increase from just over 2.2 million in 2019 to nearly 3.5 million in 2039. Air cargo activity is also anticipated to increase in line with FAA national projections for the industry; from 176.1 million pounds in 2019 to more than 256.6 million pounds in 2039.

Table 3-9: Projections of General Aviation Based Aircraft And Operations In Iowa By Airport

ID	Associated City	Airport Name	Based Aircraft					General Aviation Operations				
			2019 Actual	2024	2029	2039	CAGR 2019-2039	2019 Actual	2024	2029	2039	CAGR 2019-2039
Commercial Service												
BRL	Burlington	Southeast Iowa Regional	30	30	30	30	-0.03%	15,000	15,222	15,446	15,906	0.29%
CID	Cedar Rapids	Eastern Iowa	128	131	135	141	0.50%	31,650	32,118	32,592	33,562	0.29%
DSM	Des Moines	Des Moines International	111	115	119	127	0.68%	32,370	32,848	33,333	34,325	0.29%
DBQ	Dubuque	Dubuque Regional	71	72	73	74	0.22%	62,143	63,061	63,992	65,897	0.29%
FOD	Fort Dodge	Fort Dodge Regional	23	23	23	22	-0.20%	17,500	17,759	18,021	18,557	0.29%
MCW	Mason City	Mason City Municipal	50	49	49	48	-0.26%	30,000	30,443	30,893	31,812	0.29%
SUX	Sioux City	Sioux Gateway	71	71	71	71	-0.03%	13,202	13,397	13,595	14,000	0.29%
ALO	Waterloo	Waterloo Municipal	79	80	80	81	0.13%	16,328	16,569	16,814	17,314	0.29%
General Aviation												
4C7	Ackley	Ackley Municipal	4	4	4	4	-0.41%	450	457	463	477	0.29%
4C8	Albia	Albia Municipal	5	5	5	5	-0.09%	2,000	2,030	2,060	2,121	0.29%
AXA	Algona	Algona Municipal	28	27	26	25	-0.63%	8,750	8,879	9,010	9,279	0.29%
K98	Allison	Allison Municipal	5	5	5	5	-0.08%	1,250	1,268	1,287	1,326	0.29%
C11	Amana	Amana	5	5	5	5	0.06%	1,550	1,573	1,596	1,644	0.29%
AMW	Ames	Ames Municipal	60	62	64	67	0.56%	31,596	32,063	32,536	33,505	0.29%
Y43	Anita	Anita Municipal	4	4	4	4	-0.36%	1,000	1,015	1,030	1,060	0.29%
IKV	Ankeny	Ankeny Regional	96	99	103	110	0.68%	48,600	49,318	50,046	51,536	0.29%
AIO	Atlantic	Atlantic Municipal	27	27	26	25	-0.36%	8,050	8,169	8,290	8,536	0.29%
ADU	Audubon	Audubon County	1	1	1	1	-0.68%	1,152	1,169	1,186	1,222	0.29%
Y46	Bedford	Bedford Municipal	4	4	4	4	-0.43%	2,000	2,030	2,060	2,121	0.29%

ID	Associated City	Airport Name	Based Aircraft					General Aviation Operations				
			2019 Actual	2024	2029	2039	CAGR 2019-2039	2019 Actual	2024	2029	2039	CAGR 2019-2039
TZT	Belle Plaine	Belle Plaine Municipal	10	10	10	10	0.07%	2,000	2,030	2,060	2,121	0.29%
Y48	Belmond	Belmond Municipal	1	1	1	1	-0.42%	250	254	257	265	0.29%
4K6	Bloomfield	Bloomfield Municipal	9	9	9	9	0.14%	2,500	2,537	2,574	2,651	0.29%
BNW	Boone	Boone Municipal	35	35	35	35	-0.02%	11,630	11,802	11,976	12,333	0.29%
CIN	Carroll	Arthur N. Neu	17	17	17	16	-0.23%	7,033	7,137	7,242	7,458	0.29%
TVK	Centerville	Centerville Municipal	14	14	14	13	-0.40%	5,750	5,835	5,921	6,097	0.29%
CNC	Chariton	Chariton Municipal	10	10	10	9	-0.41%	3,250	3,298	3,347	3,446	0.29%
CCY	Charles City	Charles City Municipal	17	17	17	16	-0.32%	5,400	5,480	5,561	5,726	0.29%
CKP	Cherokee	Cherokee Municipal	19	19	18	17	-0.53%	11,200	11,365	11,533	11,877	0.29%
ICL	Clarinda	Schenck Field	23	23	23	23	-0.10%	5,500	5,581	5,664	5,832	0.29%
CAV	Clarion	Clarion Municipal	13	13	13	12	-0.42%	3,750	3,805	3,862	3,977	0.29%
CWI	Clinton	Clinton Municipal	29	29	29	29	-0.06%	14,637	14,853	15,073	15,521	0.29%
CRZ	Corning	Corning Municipal	8	8	8	7	-0.73%	2,000	2,030	2,060	2,121	0.29%
CBF	Council Bluffs	Council Bluffs Municipal	58	59	59	60	0.18%	44,314	44,969	45,633	46,991	0.29%
CJJ	Cresco	Ellen Church Field	8	8	8	8	-0.36%	1,500	1,522	1,545	1,591	0.29%
CSQ	Creston	Creston Municipal	26	26	26	26	0.03%	4,500	4,566	4,634	4,772	0.29%
DVN	Davenport	Davenport Municipal	101	102	102	103	0.12%	26,727	27,122	27,522	28,342	0.29%
DEH	Decorah	Decorah Municipal	31	31	31	30	-0.17%	9,100	9,234	9,371	9,650	0.00%
DNS	Denison	Denison Municipal	10	10	10	10	-0.06%	7,951	8,068	8,188	8,431	0.29%
IA8	Dyersville	Dyersville Area	4	4	4	4	0.22%	-	-	-	-	0.00%
EAG	Eagle Grove	Eagle Grove Municipal	8	8	8	7	-0.42%	2,000	2,030	2,060	2,121	0.29%
27P	Eldora	Eldora	2	2	2	2	-0.41%	-	-	-	-	0.00%

ID	Associated City	Airport Name	Based Aircraft					General Aviation Operations				
			2019 Actual	2024	2029	2039	CAGR 2019-2039	2019 Actual	2024	2029	2039	CAGR 2019-2039
I27	Elkader	Elkader	4	4	4	4	-0.21%	500	507	515	530	0.29%
EGQ	Emmetsburg	Emmetsburg Municipal	10	10	10	9	-0.44%	2,250	2,283	2,317	2,386	0.29%
EST	Esterville	Esterville Municipal	19	19	18	17	-0.55%	9,450	9,590	9,731	10,021	0.29%
FFL	Fairfield	Fairfield Municipal	20	20	20	21	0.16%	6,815	6,916	7,018	7,227	0.29%
FXY	Forest City	Forest City Municipal	16	16	15	15	-0.39%	5,950	6,038	6,127	6,309	0.29%
FSW	Fort Madison	Fort Madison Municipal	10	10	10	10	-0.08%	1,908	1,936	1,965	2,023	0.29%
GFZ	Greenfield	Greenfield Municipal	25	24	24	23	-0.52%	4,998	5,072	5,147	5,300	0.29%
GGI	Grinnell	Grinnell Regional	16	16	16	16	-0.17%	5,950	6,038	6,127	6,309	0.29%
6K7	Grundy Center	Grundy Center Municipal	1	1	1	1	-0.03%	250	254	257	265	0.29%
GCT	Guthrie Center	Guthrie County Regional	12	12	12	11	-0.29%	2,750	2,791	2,832	2,916	0.29%
HPT	Hampton	Hampton Municipal	21	21	21	20	-0.21%	4,500	4,566	4,634	4,772	0.29%
HNR	Harlan	Harlan Municipal	24	24	23	22	-0.41%	7,700	7,814	7,929	8,165	0.29%
0K7	Humboldt	Humboldt Municipal	14	14	14	13	-0.33%	4,000	4,059	4,119	4,242	0.29%
IDG	Ida Grove	Ida Grove Municipal	5	5	5	5	-0.58%	1,250	1,268	1,287	1,326	0.29%
IIB	Independence	Independence Municipal	27	27	27	27	0.07%	7,935	8,052	8,171	8,414	0.29%
IOW	Iowa City	Iowa City Municipal	74	77	81	88	0.88%	16,800	17,048	17,300	17,815	0.29%
IFA	Iowa Falls	Iowa Falls Municipal	12	12	12	11	-0.41%	5,200	5,277	5,355	5,514	0.29%
EFW	Jefferson	Jefferson Municipal	22	22	21	20	-0.53%	5,650	5,733	5,818	5,991	0.29%
EOK	Keokuk	Keokuk Municipal	22	22	22	22	-0.08%	7,594	7,706	7,820	8,053	0.29%
6K9	Keosauqua	Keosauqua Municipal	4	4	4	4	-0.12%	400	406	412	424	0.29%
OXV	Knoxville	Knoxville Municipal	36	36	36	37	0.06%	9,500	9,640	9,783	10,074	0.29%
0Y6	Lake Mills	Lake Mills Municipal	4	4	4	4	-0.43%	1,000	1,015	1,030	1,060	0.29%

ID	Associated City	Airport Name	Based Aircraft					General Aviation Operations				
			2019 Actual	2024	2029	2039	CAGR 2019-2039	2019 Actual	2024	2029	2039	CAGR 2019-2039
LWD	Lamoni	Lamoni Municipal	19	19	19	18	-0.30%	4,000	4,059	4,119	4,242	0.29%
2VA	Larchwood	Zanagger Vintage Airpark	21	21	21	21	-0.11%	800	812	824	848	0.29%
LRJ	Le Mars	Le Mars Municipal	19	19	19	19	0.05%	12,590	12,776	12,965	13,351	0.29%
C27	Manchester	Manchester Municipal	9	9	9	9	-0.19%	1,100	1,116	1,133	1,166	0.29%
MEY	Mapleton	Mapleton Municipal	9	9	9	8	-0.64%	3,250	3,298	3,347	3,446	0.29%
OQW	Maquoketa	Maquoketa Municipal	10	10	10	10	-0.14%	3,250	3,298	3,347	3,446	0.29%
C17	Marion	Marion	49	50	52	54	0.50%	17,060	17,312	17,568	18,091	0.29%
MIW	Marshalltown	Marshalltown Municipal	36	36	36	36	0.00%	12,845	13,035	13,227	13,621	0.29%
SXK	Maurice	Sioux County Regional	36	37	37	39	0.37%	13,050	13,243	13,438	13,838	0.29%
4D8	Milford	Fuller	15	15	15	16	0.16%	3,850	3,907	3,965	4,083	0.29%
7C3	Monona	Monona Municipal	10	10	10	10	-0.21%	1,500	1,522	1,545	1,591	0.29%
7C5	Montezuma	Sig Field	3	3	3	3	-0.17%	500	507	515	530	0.29%
MXO	Monticello	Monticello Municipal	36	36	36	36	0.04%	10,150	10,300	10,452	10,763	0.29%
MPZ	Mount Pleasant	Mount Pleasant Municipal	22	22	22	22	-0.02%	6,000	6,089	6,179	6,362	0.29%
1Y3	Mt. Ayr	Judge Lewis Field Mount Ayr Municipal	4	4	4	4	-0.34%	1,000	1,015	1,030	1,060	0.29%
MUT	Muscatine	Muscatine Municipal	27	27	28	28	0.15%	13,903	14,108	14,317	14,743	0.29%
1Y5	New Hampton	New Hampton Municipal	4	4	4	4	-0.39%	500	507	515	530	0.29%
TNU	Newton	Newton Municipal	24	24	24	24	-0.08%	8,332	8,455	8,580	8,835	0.29%
5D2	Northwood	Northwood Municipal	5	5	5	5	-0.26%	1,750	1,776	1,802	1,856	0.29%
OLZ	Oelwein	Oelwein Municipal	17	17	17	16	-0.22%	4,000	4,059	4,119	4,242	0.29%
D02	Osage	Osage Municipal	10	10	10	10	-0.13%	1,500	1,522	1,545	1,591	0.29%
I75	Osceola	Osceola Municipal	33	33	33	34	0.09%	5,750	5,835	5,921	6,097	0.29%

ID	Associated City	Airport Name	Based Aircraft					General Aviation Operations				
			2019 Actual	2024	2029	2039	CAGR 2019-2039	2019 Actual	2024	2029	2039	CAGR 2019-2039
OOA	Oskaloosa	Oskaloosa Municipal	17	17	17	17	-0.07%	7,855	7,971	8,089	8,330	0.29%
OTM	Ottumwa	Ottumwa Industrial	28	28	28	27	-0.17%	16,450	16,693	16,940	17,444	0.29%
1Y9	Paullina	Paullina Municipal	6	6	6	6	-0.42%	1,750	1,776	1,802	1,856	0.00%
PEA	Pella	Pella Municipal	32	32	32	32	0.06%	13,950	14,156	14,365	14,793	0.29%
PRO	Perry	Perry Municipal	27	30	33	41	2.11%	4,644	4,713	4,782	4,925	0.29%
POH	Pocahontas	Pocahontas Municipal	14	13	13	12	-0.87%	4,500	4,566	4,634	4,772	0.29%
RDK	Red Oak	Red Oak Municipal	33	32	32	30	-0.45%	11,550	11,721	11,894	12,248	0.29%
8Y8	Ringsted	Peltz Field	1	1	1	1	-0.55%	-	-	-	-	0.00%
RRQ	Rock Rapids	Rock Rapids Municipal	16	16	16	16	-0.11%	3,500	3,552	3,604	3,711	0.29%
2Y4	Rockwell City	Rockwell City Municipal	10	10	10	10	-0.19%	3,000	3,044	3,089	3,181	0.29%
SKI	Sac City	Sac City Municipal	11	11	11	11	-0.11%	2,500	2,537	2,574	2,651	0.29%
SHL	Sheldon	Sheldon Municipal	17	17	16	16	-0.42%	8,017	8,135	8,256	8,501	0.29%
SDA	Shenandoah	Shenandoah Municipal	16	16	15	14	-0.57%	3,500	3,552	3,604	3,711	0.29%
ISB	Sibley	Sibley Municipal	11	11	10	10	-0.60%	2,750	2,791	2,832	2,916	0.29%
SPW	Spencer	Spencer Municipal	35	35	34	33	-0.25%	11,420	11,589	11,760	12,110	0.29%
0F3	Spirit Lake	Spirit Lake Municipal	19	19	19	20	0.16%	4,200	4,262	4,325	4,454	0.29%
SLB	Storm Lake	Storm Lake Municipal	20	20	20	20	-0.07%	19,600	19,890	20,183	20,784	0.29%
8C2	Sully	Sully Municipal	0	0	0	0	-0.08%	600	609	618	636	0.29%
8C4	Tipton	Mathews Memorial	12	12	12	12	0.06%	1,980	2,009	2,039	2,100	0.29%
8C5	Toledo	Toledo Municipal	4	4	4	4	-0.28%	990	1,005	1,019	1,050	0.29%
8C6	Traer	Traer Municipal	8	8	8	8	-0.28%	2,250	2,283	2,317	2,386	0.29%
VTI	Vinton	Vinton Veterans Memorial Airpark	23	23	23	23	0.07%	4,750	4,820	4,891	5,037	0.29%

ID	Associated City	Airport Name	Based Aircraft					General Aviation Operations				
			2019 Actual	2024	2029	2039	CAGR 2019-2039	2019 Actual	2024	2029	2039	CAGR 2019-2039
AWG	Washington	Washington Municipal	20	20	21	21	0.22%	13,074	13,267	13,463	13,864	0.29%
Y01	Waukon	Waukon Municipal	5	5	5	5	-0.17%	1,000	1,015	1,030	1,060	0.29%
C25	Waverly	Waverly Municipal	13	13	13	14	0.18%	7,872	7,988	8,106	8,348	0.29%
EBS	Webster City	Webster City Municipal	12	12	12	11	-0.27%	11,084	11,248	11,414	11,754	0.29%
3Y2	West Union	George L. Scott Municipal	9	9	9	9	-0.22%	2,250	2,283	2,317	2,386	0.29%
3Y3	Winterset	Winterset-Madison County	26	27	27	29	0.47%	4,750	4,820	4,891	5,037	0.29%
3Y4	Woodbine	Woodbine Municipal	3	3	3	3	-0.29%	500	507	515	530	0.29%
State Total			2,520	2,540	2,550	2,570	0.10%	905,150	918,520	932,090	959,830	0.29%

Source: Marr Arnold Planning

Notes: CAGR = compound annual growth rate

Based aircraft figures have been rounded to the nearest whole number.

Totals may not sum due to rounding.