Williston Basin International Airport Master Plan

3 Aviation Forecasts

3.1 Introduction

The Aviation Forecasts chapter of the Airport Master Plan analyzes current and future airport activity at the Williston Basin International Airport (XWA). Forecasting provides an airport with a general idea of the magnitude of likely growth, as well as fluctuations in activity that may be anticipated over a 20-year forecast period. Forecasts assist the airport in determining existing and planned future facility needs based on airport activity level estimates and projections.

The forecasts developed for the airport will be important to adequately plan, size, and sequence development of facilities to meet future projected growth.

3.2 Forecast Rationale

Forecasts of based aircraft, enplanements, and airport operations allow an airport to examine its ability to satisfy the needs of the aircraft and people it serves and to determine the approximate timing of necessary improvements by projecting airport activity levels.

Forecasts developed for airport master plans and/or federal grants must be approved by the Federal Aviation Administration (FAA). It is the FAA's policy, listed in Advisory Circular 150/5070-6B, *Airport Master Plans*, that FAA approval of forecasts at non-hub airports with commercial service should be consistent with the Terminal Area Forecasts (TAF). Master plan forecasts for operations, based aircraft and enplanements are consistent with the TAF if:

- Forecasts differ by less than 10% in the five-year forecast and by less than 15% in the 10-year period, or
- Forecasts do not affect the timing or scale of an airport project, or
- Forecasts do not affect the role of the airport as defined in the current version of FAA Order 5090.5, *Formulation of the National Plan of Integrated Airport Systems (NPIAS) and the Airports Capital Improvement Plan (ACIP)*.

Furthermore, FAA Order 5090.5 states forecasts should be:

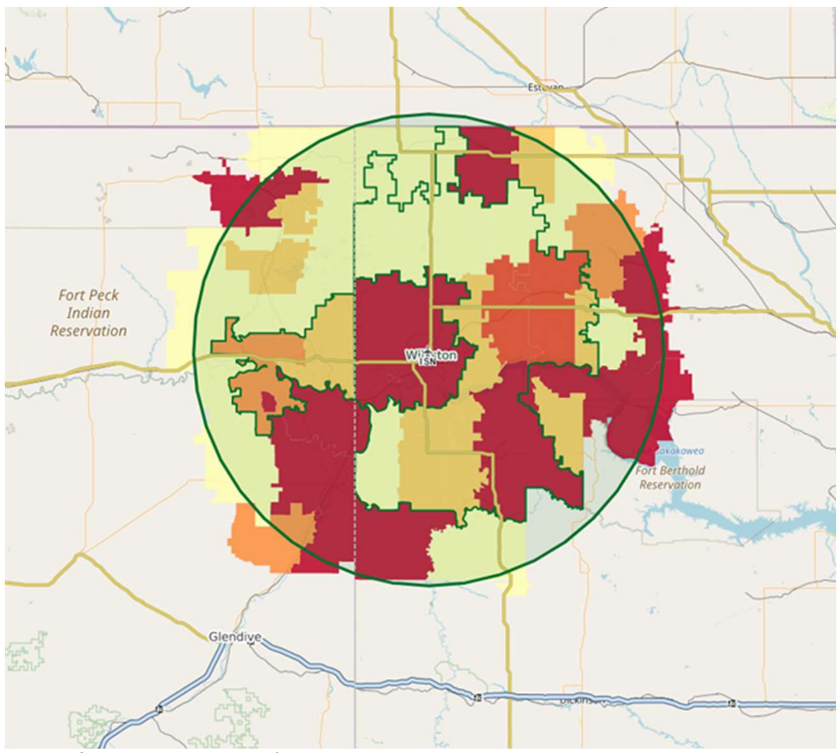
1. Realistic
2. Based on the latest available data
3. Reflect the current conditions at the airport
4. Supported by information in the study
5. Provide an adequate justification for the airport planning and development

6. The TAF model used for this report is from the 2021 FAA TAF available in May 2021. This was latest data available when the forecasting effort began for this airport master plan.

To thoroughly analyze and develop a probable aviation forecast, a technical review has been completed using several methods to help quantify the potential aviation activity over the next 20 years. For this review, air service area will be defined as the combined counties of Williams, Burke, McKenzie, Divide and Mountrail from North Dakota, and Sheridan, Roosevelt, and Richland from Montana. This area represents the region in closest proximity to XWA and from which the majority of air travel demand for XWA will come from. The estimated population base from this area was approximately 93,766 in 2020. This area is illustrated below in **Exhibit 3-1.**

While this area is XWA's primary air service area, XWA also competes for air travelers from a broader area that includes the southern half of Saskatchewan, Canada. XWA is the closest commercial U.S. airport in the region to the Canadian border. The population base from this broader region is closer to 200,000 people. Should XWA recruit ultra-low-cost carrier (ULCC) service, this carrier could compete for air travelers from this broader area.

Exhibit 3-1 – XWA Air Service Area



Source: Diio Mi, Catchment Mapper for XWA, 60 Miles; colors on map denote population density

XWA could potentially even draw traffic from Saskatchewan's largest city, Regina, where well over 200,000 people reside and is a 3+ hour drive to XWA. Despite its size, Regina has very limited air service today, including no service on U.S. airlines. Because of this, it is realistic that people would drive to XWA (from Regina), should attractive air fares to popular destinations exist. This would be particularly true should the U.S. Dollar weaken over time as compared the Canadian Dollar creating more favorable exchange rates.

3.3 Economic Base for Air Traffic

Air travel demand is typically correlated with a region's demographic and economic characteristics. The economic strength of the air service area has a major impact on aviation activity at the airport. This section provides a review of economic trends and conditions in the XWA air service area and presents data indicative of the air service area's capability to generate growing demand for air transportation throughout the forecast period.

Historically, North Dakota in general, and western North Dakota specifically, have been highly dependent upon agriculture. Currently, agriculture ranks as the 2nd largest industry within the state. The state of North Dakota was also the 11th largest state in the U.S. in 2021 in terms of the value of agricultural products sold. The state generated approximately $7.4 billion in cash receipts from agriculture. Soybeans are the state's top agricultural commodity generating $1.9 billion in cash receipts, wheat was #2 at $1.46 billion, corn was #3 at $1.0 billion, with livestock (cattle & calves) #4 at $897 million.

Tourism, especially fishing and hunting (4th largest industry in North Dakota), also ranks among North Dakota's top industries. Fishing for paddlefish in the spring is particularly popular in the Williston area. Other activities supporting tourism include Lewis & Clark expeditions, the Fort Buford state historic park, the Fort Union Trading Post, a new casino in New Town and finally, nationally recognized golf course, The Links.

But today, the oil industry is far and away the region's top industry. XWA is in the middle of the Bakken formation. The Bakken is an oil and gas-bearing rock that underlies North Dakota, Montana, and Saskatchewan. As oil prices skyrocketed in the late 2000s, oil exploration/fracking exploded shortly thereafter. The barrels of oil produced from the State of North Dakota increased from about 4 million barrels annually in 2007 to 20 million barrels in 2012. In 2021, over 400 million barrels of oil were produced annually from the state of North Dakota. Most of this oil exploration takes place in Williams and McKenzie counties in North Dakota, which surround XWA. While oil exploration has slowed somewhat, North Dakota is still the #3 oil producer in the U.S., behind only New Mexico and Texas. The oil industry is still the primary industry in the region, with jobs more focused upon maintenance and ongoing production, relative to the "go-go" days of early last decade, when Williston was transitioning from a small town to a small city. Currently the oil industry regionally is a much more stable, still growing industry.

While the oil industry is still the region's primary economic engine, Williston's economy is starting to diversify. The Atlas Power Data Center near Williston is currently being built by FX Solutions. It is valued at $1.9 billion. Atlas is an operator of high-density facilities serving northwest North Dakota. The region is well positioned for this sector, due to the vast availability of cheap natural gas, in addition to colder weather that naturally keeps the facility cool. The first phase of this multi-year project started in January 2022.

Cerilon Gas-To-Liquids (GTL) recently announced the development of a gas-to-liquids plant near Williston. This $2.8 billion project will be the first of its kind in North America and have the lowest carbon footprint of any other GTL plant in the world. The primary outputs of the Phase I GTL facility will consist of 24,000 barrels per day of ultra-low sulfur diesel and other specialty products, including jet fuel. Construction begins in early 2023.

Sanford Hospital will be breaking ground on a new location in mid-2022, with an anticipated opening planned for 2023. The need for growing medical care facilities has been driven by the significant population growth that has taken place from the region over the past decade.

Finally, Williston Square, an 800-acre development on the former airport site includes plans for a Civic Center, shopping, restaurants and new residential homes and apartment buildings.

The unmanned and aerial industry is another sector primed for growth in the region. North Dakota will be the first state in the U.S. with a state-wide drone network that allows pilots to fly unmanned aircraft systems beyond their visual line of site. Infrastructure for the $28 million project is already being installed in Williams and McKenzie counties. Phase II of this project will expand the network to other parts of North Dakota.

Tied to the unmanned and aerial industry development is the Northern Plains UAS Test Site (NPUASTS). This is one of seven Federal Aviation Administration (FAA) unmanned aircraft system (UAS) test sites in the nation. The mission of the NPUASTS is to collaborate with FAA and industry partners to develop systems, rules, and procedures to safely integrate unmanned aircraft into the National Airspace System without negatively impacting existing general or commercial aviation.

The following sections are a closer look at the Williston air service area economy.

3.3.1 Socio-Economic Overview

Data for population, income, and gross regional product for the air service area are discussed below. Parallel data for the United States is shown to provide a basis of comparison. Where available, historical data will be presented for the 2010-2020 period, which is representative of a longer-term trend and the most recent 10 years of historical data available. Where available, forecast data will be presented through 2040. This is done to be consistent with air traffic forecasts presented later in this chapter.

Historical and Forecast Population

Population is a significant source of demand for air travel. **Table 3-1** includes 2010 and 2020 population data and provides population trends for both the air service area and the U.S. forecasts through 2040. Data in **Table 3-1** illustrates that between 2010 and 2020, the air service area population increased from 64,330 to 93,766 or 45.8% (4.3% Compound Annual Growth Rate (CAGR)). During that same period, the U.S. population increased by 7.9% (0.8% CAGR). In other words, the air service area grew about 5 1/2 times faster than the U.S.

Table 3-1 – Historical and Forecast Population (2010-2040)

Area	Historical Population		Forecast Population 2040	Percent Change 2010-20	CAGR[1]	
	2010	2020			2010-2020	2020-2040
Williams County	22,588	36,677	51,021	62.4%	5.0%	1.7%
Air service area	64,330	93,766	121,979	45.8%	4.3%	1.3%
United States	304,094	328,094	372,691	7.9%	0.8%	0.7%

[1] Compound annual growth rate; U.S. Population in 000's

Source: Woods & Poole Economics

Population growth data is based on estimates of the air service area's birth rate, death rate, and net in-migration. As shown in **Table 3-1**, the forecasted population increase in the air service area for the period 2020 to 2040 reflects a CAGR of 1.3% which is almost 2x the forecasted U.S.

population CAGR of 0.7%. The increase in new residents in the air service area estimates 28,000 between 2020 and 2040 and is expected to generate additional demand for air service.

Household Income

Table 3-2 includes estimated 2021 and forecasted 2040 median household income data for the City of Williston, air service area and the U.S. **Table 3-2** shows in 2021, the air service area's median household income of $85,426 was 18.0% above that of the U.S. ($72,353). Forecasts for 2040 show that the air service area is expected to reach an average household income level of $103,204 by 2040.

The percentage of higher income households, defined as those earning $100,000 or more annually, within the air service area is another key indicator of potential demand for air travel services. In 2020, approximately 6,413 air service area households had an income of $100,000 or more. This is equal to approximately 20.7% of all air service area households. According to Consumer Expenditure Survey data from the U.S. Bureau of Labor Statistics, 54% of airline fare expenditures are made by households with an annual income of $100,000 or more. Data in **Table 3-3** shows that between 2020 and 2040, the air service area will gain an additional 5,119 households with annual income greater than $100,000.

Table 3-2 – Median Household Income and Income Distribution (2020-2040)

	Williams County	Air Service Area	United States
2020 Median Household Income	87,161[1]	$85,426	$72,353
2040 Median Household Income	486,381[1]	$103,204	$89,566

[1] Mean Household Income

Table 3-3 – Median Household Income and Income Distribution (2020-2040)

Households with Income of $100,000 and Above	Williams County[1]	Air Service Area[2]	United States[2]
2020 Estimate	2,924	6,413	28,823,960
2040 Forecast	5,473	11,532	47,576,400
Increase in households with income of $100,000 and above	87.2%	79.8%	65.1%
CAGR[3] 2020-2040	3.2%	3.0%	2.5%
% of Households with Income of $100,000 and Above			
2020 Estimate	23.9%	20.7%	22.3%
2040 Forecast	31.1%	28.6%	32.4%

[1] In 2009 dollars; [2] in 2012 dollars; [3] compound annual growth rate

Source: Woods & Poole Economics

Gross Regional Product / Gross Domestic Product

Gross domestic product (national level) and gross regional product (state- and county-level) are measures of the value of all final goods and services produced within a geographic area. These measures are general indicators of the economic health of a geographic area and, consequently, of the area's potential demand for air transportation services.

Table 3-4 shows the CAGR for the air service area's gross regional product and gross domestic product for the U.S. **Table 3-4** indicates that gross regional product for the air service area has increased at a CAGR of 5.3% between 2010 and 2020, which was almost three times faster as compared to the U.S. CAGR of 1.9%.

Forecasts for 2040 in **Table 3-4** show the gross regional product for the air service area is forecast to increase at a CAGR of 2.7%, while not as fast as the past decade, is still well above the forecasted CAGR of the U.S. (2.2%) between 2020 and 2040.

Table 3-4 – Historical and Forecasted Gross Regional and Gross Domestic Product (2010-40)

CAGR[1]	Gross Regional & Domestic Product Growth	
	Air service area	United States
2010-2020	5.3%	1.9%
2020-2040	2.7%	2.2%

[1] Compound annual growth rate; in 2012 dollars

Source: Woods & Poole Economics

3.3.2 Labor Market Trends

Civilian labor force data, unemployment rates, and employment for the air service area are discussed below and are presented in **Table 2-5**. Parallel data for the U.S. is also shown to provide a basis of comparison for trends in the air service area.

2010 – 2020 Non-Farm Payrolls and Unemployment Rate

Table 3-5 includes annual civilian labor force and unemployment data from 2000 through 2020 for the air service area and the U.S. Data in **Table 3-5** shows that between 2000 and 2020, the air service area labor force increased at a 2.9% CAGR, while the U.S. increased at a 0.4% CAGR. From 2010 to 2020, the air service area's labor force increased at a 4.0% CAGR while the U.S. labor force grew at a CAGR of 1.0% during this same period of time.

Table 3-5 – Historical and Forecast Non-Farm Payrolls and Unemployment Rate (2000-2020)

Year	Non-Farm Payrolls (Labor Force)		Year	Unemployment Rate	
	Air Service Area	United States		Air Service Area	United States
2000	28,582	132,018	2000	4.3%	4.0%
2001	28,275	132,080	2001	3.6%	4.7%
2002	28,218	130,637	2002	4.1%	5.8%
2003	28,308	130,328	2003	4.0%	6.0%
2004	28,818	131,757	2004	3.8%	5.5%
2005	29,299	134,022	2005	3.6%	5.1%
2006	30,204	136,434	2006	3.1%	4.6%
2007	31,102	137,978	2007	2.9%	4.6%
2008	33,348	137,225	2008	2.9%	5.8%
2009	33,921	131,289	2009	3.8%	9.3%
2010	36,866	130,337	2010	3.1%	9.6%
2011	45,032	131,922	2011	2.4%	8.9%
2012	55,361	134,157	2012	1.9%	8.1%
2013	59,886	136,356	2013	1.9%	7.4%
2014	65,109	138,922	2014	1.7%	6.2%
2015	60,513	141,804	2015	2.7%	5.3%
2016	51,633	144,333	2016	4.3%	4.9%
2017	51,433	146,595	2017	2.8%	4.4%
2018	53,291	148,893	2018	2.2%	3.9%
2019	55,921	150,900	2019	2.0%	3.7%
2020	52,427	142,252	2020	7.7%	8.1%
CAGR[1]					
2010-2020	4.0%	1.0%			
2000-2020	2.9%	0.4%			

Notes: United States Non-Farm Payroll in 000s
[1] Compound annual growth rate; in 2012 dollars

Source: Bureau of Labor Statistics, U.S. Department of Labor; U.S. non-farm payrolls in 000s

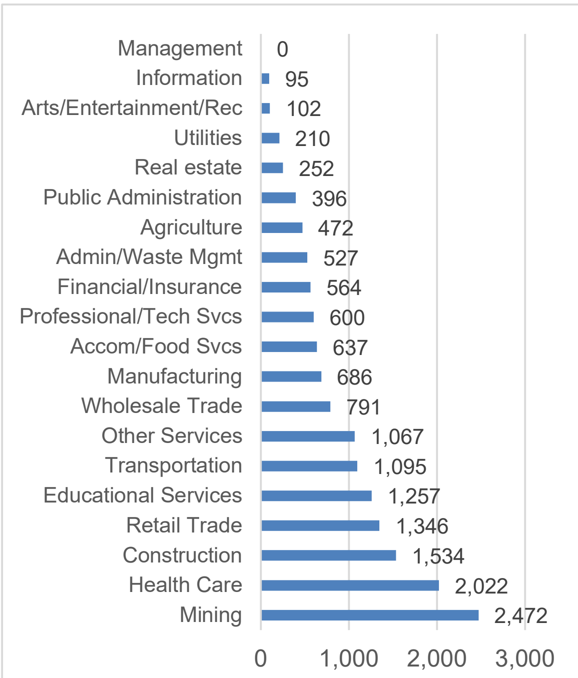
Major Industries and Employers in the air service area

Major industries and employers in the air service area are shown in **Chart 3-1** and **Table 3-6**. As will be seen, while the oil and gas industry drives population growth, it is the accompanying industries that are supporting that population growth. It is expected that a shift in jobs over time will occur, with a heavier emphasis of jobs in support industries taking place, while oil industry job growth is steady, but at slower rates of growth than has historically been the case.

Mining is the top employing industry in the region. As defined, the mining category includes laborers in the oil and gas industry. The second largest employer is the healthcare industry. As indicated earlier, Williston is the hub for healthcare in northwest North Dakota and has been adding healthcare capacity as the region continues growing. Construction is the third largest industry in the region, being driven by the rapidly increasing population base in and near Williston and the general need for housing. Similar stories hold for the retail trade and education/school districts.

The largest employers in the region have similar employment numbers. Schools are the number one employer regionally, while oil-related companies make up five of the region's top ten employers. Also within the list is a large retail employer (Wal-Mart) in addition to other support entities, including the City of Williston and Jomax Construction Company.

Chart 3-1 – Employment by Industry



Source: nd.gov (Labor Market Information)

Table 3-6 – Major Industries and Air Service Area Employers

Company
Williston Public School District
Halliburton Energy Services
Walmart
Nabors Drilling USA
City of Williston
Steel Energy Services
Jomax Construction
Key Energy Services
Calfrac Well Services Corp
Cash Wise Foods

3.3.3 Economic Outlook

To summarize this section, Williston's air service area has been growing much faster than the broader U.S. over the past decade. The past decade's relative economic growth from the air service area was initially driven by explosive growth during the first half of the decade, followed by slower, more stable growth. While the next 20 years are forecasted to be a relatively slower growth period as compared to the prior decade, the air service area is still expected to experience population growth almost two times the rate of the U.S. These economic variables are illustrated in **Table 3-7**.

Table 3-7 – Passenger Demand Forecast Variables (2020-2040)

	2020	2040	CAGR
Air service area Population	93,766	121,979	1.3%
U.S. Population (000s)	329,937,600	374,697,100	0.7%
Air service area Total Employment	69,561	113,484	2.5%
U.S. Total Employment	191,619,500	260,220,200	1.5%
Air service area Gross Regional Product ($ billion)	$9.9	$16.9	2.7%
U.S. Gross Domestic Product ($ billion)	$18,729.0	$29,096.7	2.2%
Air service area Per Capita Personal Income	$53,402	$74,853	1.7%
U.S. Per Capita Personal Income	$52,504	$ 71,345	1.5%

Source: Woods & Poole Economics, Inc., Data Profiles for MSA, state, and U.S.

3.3.3.2 Key Industry Trends

There are key industry trends in place that will influence this forecast. At a high level, these are reviewed below. These trends will be a continuation of trends that were in place before the COVID-19 pandemic but could be magnified going forward. There are four primary trends expected to drive industry air service over the next twenty years:

1. **Limited network airline capacity growth (American, Delta, United, Southwest).** Where growth does occur, it will be focused in areas of faster economic growth (east/west coast and international). In general, large network airlines typically target overall capacity growth closely to U.S. Gross Domestic Product (GDP) growth. Hence, system capacity growth is typically in the 2%-3% range for large, network airlines over extended periods of time.

2. **Relatively faster growth by Ultra Low-Cost Carriers (ULCCs) (Allegiant, Spirit, Frontier, Sun Country).** These airlines will continue growing much faster, with annual growth rates likely in the 10%-20% range. With the proposed merger, the combined Spirit/Frontier airline will be in a better position to grow, in-part due to access to larger, constrained airports. In addition, while Allegiant has a large presence in smaller airports, going forward, Allegiant will likely focus their growth at relatively larger markets, a trend that started in 2014. Finally, expect this sector to start growing faster into international markets, particularly to the Caribbean and Mexico.

3. **Use of larger aircraft.** This trend has been firmly in place since the end of the 2007-2009 recession and will likely continue. While taking place across entire carrier fleets, smaller markets will experience this trend primarily in the form of less 50-seat regional jet flying and more 76-seat jet flying. With the current pilot shortages that are expected to continue into 2023 and possibly 2024, this trend could possibly be quickened. In addition, over time, more 100-115 seat aircraft flying could enter the mix (in the form of Airbus 220 and similar-sized aircraft). Bombardier, the largest manufacturer of regional jets in the world, expects larger regional jet aircraft (64-90 seats) to more than double, from 3,300 aircraft today to 6,950 by 2038. In addition, they expect aircraft in the 90-150 seat range to grow from 3,600 aircraft today to 7,300 aircraft in 2038. In total, Bombardier forecasts aircraft in the 60-to 150-seat segment will double (worldwide) by 2038. Finally, Bombardier expects the small regional jet

segment (≤ 50 seats) to shrink from 2,500 aircraft today to only 390 by 2036. Furthermore, regionally, most of these remaining 50-seat aircraft are expected to be operated in third world countries, primarily in the continent of Africa. This forecast is consistent with other aircraft manufacturers, including Boeing, Airbus and Embraer.

4. **Larger airports will continue to outpace smaller airports.** This has been occurring since the end of the 2007-2009 U.S. recession and will likely continue. Larger metropolitan areas, particularly those on the east/west coast are generating higher economic growth that is translating into additional air travel demand. While it could be argued that in the post-COVID world there has been a shift to less urban areas, most of the growth has been to the southern half of the U.S. and mountain regions – in many cases, to relatively larger metropolitan areas (although not in major cities like Chicago or New York City).

What will now follow is a summary of the existing FAA Forecast (2020-2040). As will be seen, the FAA Forecast has similar expectations as noted directly above, although with the COVID pandemic, this longer-term growth forecast will likely be delayed until the return to normalcy and follow the trend thereafter. Most industry forecasts put this “return to normalcy” by 2024 or 2025. This will be reviewed further in **Section 3.4.5.**

3.3.3.3 FAA Forecast Summary: 2020-2040

As for the preparation of this FAA forecast, the virus and its economic impacts were just emerging, and the range of possible outcomes were too wide to include meaningfully in the forecast. At this juncture, it is assumed that these general trends will occur with the return to 2019 levels that are estimated to begin in the 2024-2025 time period. Besides the trends outlined on the prior page, the FAA is forecasting the following in their 2020-2040 National Aerospace Forecast:

- Domestic enplanements are forecasted to grow at a 2.0% CAGR (see **Table 3-8**).
- Domestic capacity available seat miles (ASMs) is forecasted to grow at a CAGR of 2.2%, with departures growing at a 1.3% annual rate. The difference ties to expected usage of larger aircraft.
- Baseline nominal yields are forecast to grow at a 1.7% CAGR (essentially flat when considering inflation forecasts). Ancillary revenue growth is expected to continue at a higher growth rate. This indirectly assumes a growing share of ULCC service.

Table 3-8 – U.S. Historic and Forecasted Domestic Enplaned Passengers

Fiscal Year	Enplaned Passengers	Fiscal Year	Enplaned Passengers
Historic (in 000's)		Forecast (in 000's)	
2000	641,200	2020	794,000
2001	625,000	2021	805,000
2002	626,800	2022	815,000
2003	574,500	2023	826,000
2004	628,500	2024	838,000
2005	669,500	2025	851,000
2006	668,400	2026	863,000
2007	690,100	2027	877,000
2008	680,700	2028	892,000
2009	630,800	2029	907,000
2010	635,200	2030	921,000
2011	650,100	2031	937,000
2012	653,800	2032	953,000
2013	654,300	2033	968,000
2014	669,000	2034	985,000
2015	696,000	2035	1,002,000
2016	726,000	2036	1,019,000
2017	744,000	2037	1,037,000
2018	781,000	2038	1,090,000
2019	813,300	2039	1,120,000
		2040	1,271,000
CAGR 2000-2019	**1.3%**		
CAGR 2010-2019	**3.1%**		
CAGR 2020-2040	**2.0%**		

Source: FAA Aerospace Forecast (2020-2040); passenger figures are in 000s

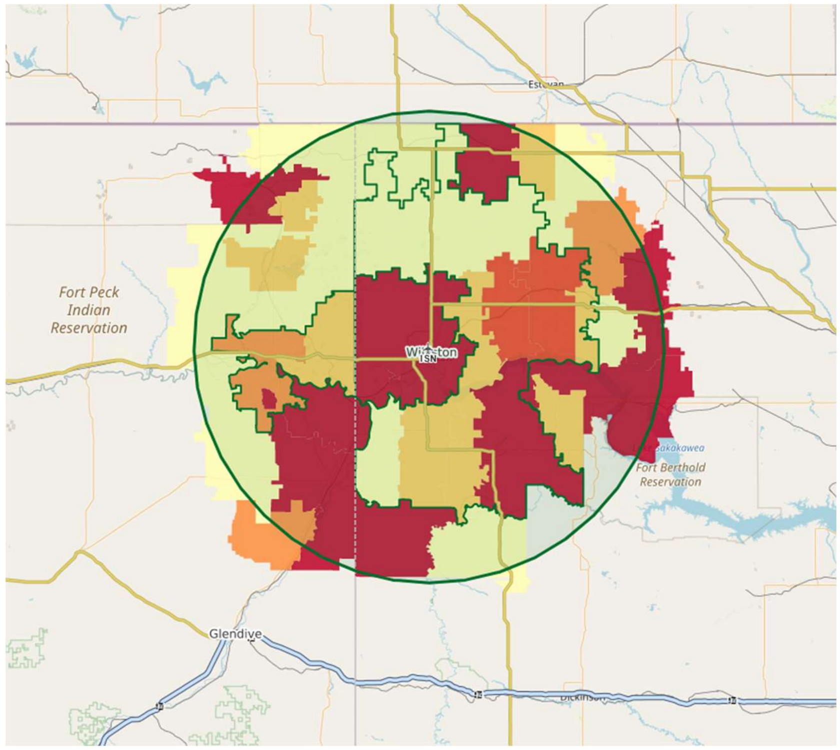
3.4 XWA Air Service and Traffic Analysis

This section evaluates and describes the current state of air service at the Williston Basin International Airport, analyzes historical trends in air traffic, and identifies key factors that generally affect demand for air travel.

3.4.1 Regional Role and Catchment Area Analysis Overview

XWA is the primary airport for northwest North Dakota, the northeastern half of Montana and to some degree the southern half of Saskatchewan. XWA's air service area includes the counties of Williams, Burke, McKenzie, Divide and Mountrail from North Dakota, and Sheridan, Roosevelt, and Richland from Montana. **Exhibit 3-2** illustrates a 60-mile catchment area for XWA, which is a proxy, although it does not tie exactly to XWA's air service area that was illustrated earlier. This is done, as point-of-sale tools are built based upon mileage levels to airports. This section will analyze bookings from the catchment area in **Exhibit 3-2**, illustrating where bookings are made for travelers using XWA, in addition to other regional airports ("leakage").

Exhibit 3-2 – XWA Catchment Area

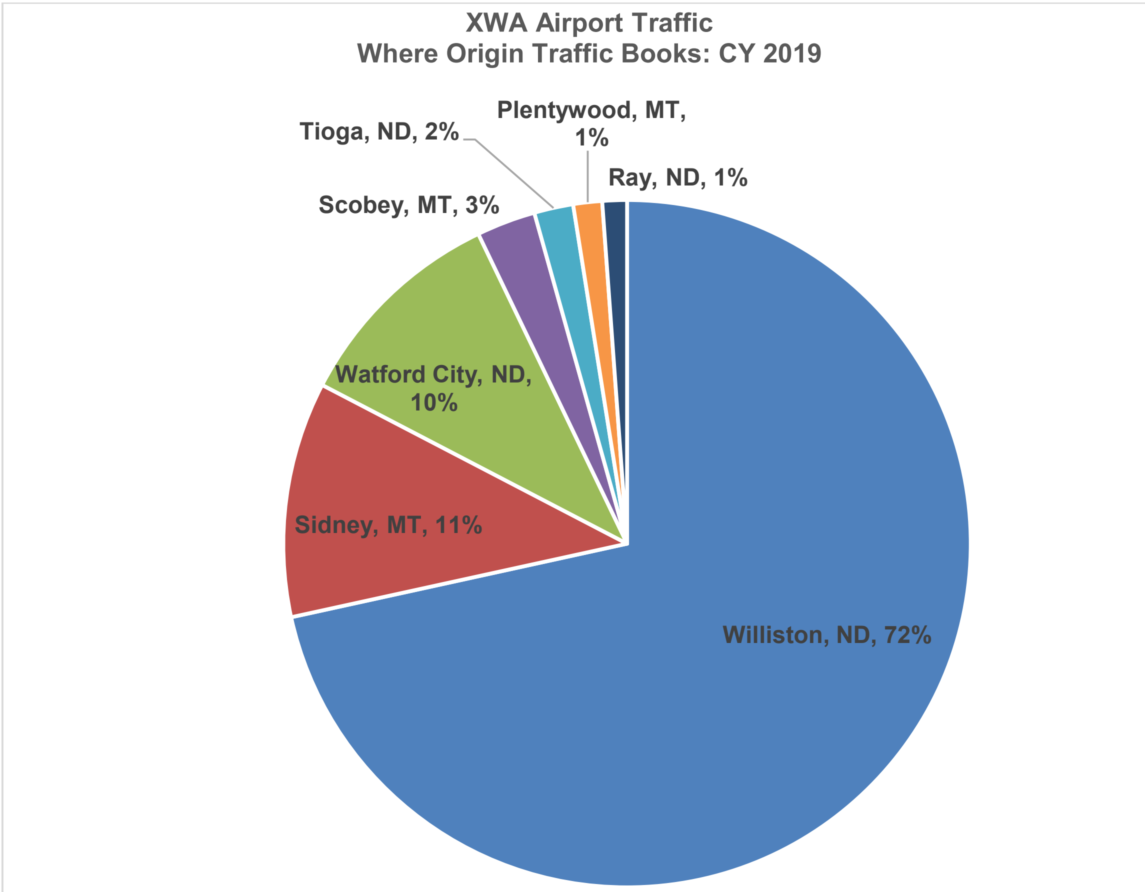


Source: Diio Mi, Catchment Mapper for XWA, 60 Miles; colors on map denote population density

There are approximately 93,766 people that reside within XWA's primary air service area. XWA is the closest commercial airport to this population base, although there are three other commercial service airports in the region: Dickinson Theodore Roosevelt Regional Airport (DIK – 110-mile drive), Minot International Airport (MOT – 114-mile drive) and the Bismarck International Airport (BIS – 220-mile drive). MOT and particularly BIS have more commercial air service passengers, and it is these airports XWA competes with for air service passengers. When including XWA's secondary catchment areas, this population base climbs closer to 200,000 people when including the eastern half of Montana and the noted area in southern Saskatchewan. The drive time between Sidney, MT and Williston is roughly 45 minutes. The population base in/near Sidney is roughly 13,000 people. Sidney (and eastern Montana) has very limited air service today with only 9-seat aircraft operating to Billings (BIL) on Cape Air – this results in most of eastern Montana traffic driving to XWA for their air service (both today and into the future). It is estimated that roughly 11% of XWA's traffic comes from the Sidney, MT region.

As can be seen on **Chart 3-2**, XWA draws traffic from across northwestern North Dakota and eastern Montana. As shown, the majority (72%) of traffic reserves flights from in/near Williston, with 15% coming from points in eastern Montana and the remaining 13% coming from smaller towns in western North Dakota. It should be noted that this dataset does not include bookings made from Canada. This data is taken from the credit card zip code of travel being purchased. Hence, for transient workers in the region, the booking would show up from where that person billing address is located. Finally, ULCC bookings are limited, as those bookings primarily/exclusively take place from those carrier websites.

Chart 3-2 – Where XWA Origin Passengers Come From: % of Bookings by Locale

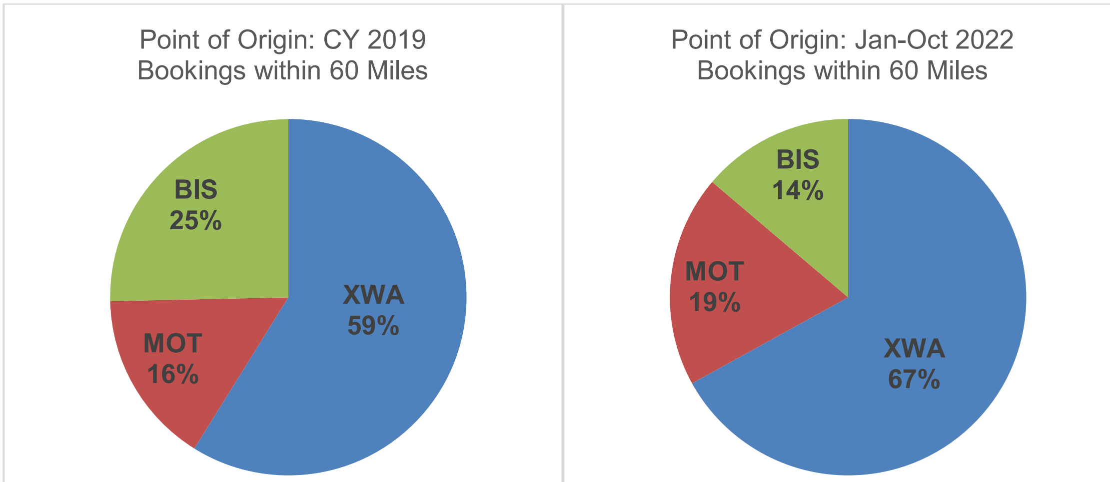


Source: Agency Reporting Corporation (Calendar Year 2019)

As noted earlier, XWA competes regionally with both MOT and BIS for air traffic. The drive times from XWA to these competing airports varies seasonally, but during normal driving conditions these drive times range from roughly 2 hours to MOT, up to 3 – 4 plus hours to BIS. In some parts of the U.S. the drive time to BIS would be considered a very long drive for air travelers to "leak" to another airport. But longer drive times are more normal and accepted in western North Dakota. In addition, historically BIS has significantly more air service options than MOT or XWA, hence travelers will be able to find more nonstop service at BIS and generally at lower air fares. Sometimes these air fare differences can be significant. **Chart 3-3** illustrates both XWA's current retention in 2019 and the most current retention for CY to-date through October 2022.

The chart includes 2019, as 2019 will likely be a better indicator of future travel trends. The more recent data reflects a time period when carriers are still operating well below planned levels due to pilot shortages. Additionally, more recent travel patterns have a higher mix of leisure travel as leisure travel has bounced back much more quickly during the post-COVID period, and business travel while improving, is still well below pre-COVID levels. Finally, XWA leakage has varied widely over the past two years, largely due to constant changes in capacity largely driven by pilot shortages.

Chart 3-3 – Airport of Origin Trends: Passengers Booked from the XWA Catchment Area



Source: Agency Reporting Corporation (ARC), pulled November 2022

These trends are dictated by changes in XWA's air service along with changes in service at BIS and MOT. While not shown, XWA's "leakage" worsened considerably in 2020 and 2021, as XWA experienced significant reductions in air service due to the pandemic and subsequently resulted in more passengers driving to MOT and BIS. This was particularly evident after XWA lost all MSP service on Delta (DL) starting in July 2020 which did not return until June 2021. XWA was also impacted by leisure travel demand bouncing back more quickly relative to business travel, which resulted in more potential passengers driving to both MOT and BIS to capture low air fares to leisure destinations on Allegiant Airlines. In 2022 to-date, XWA has benefited from BIS's 25.4% decline in scheduled departing seats, while XWA's is down 21.4%. Also, with the initiation of low-fared service at XWA, relative air fare gaps also likely improved (most current fare data is only through 2Q22). Still, 2019 is shown in this study as it is expected this will be most representative of longer-term trends as COVID-related travel trends normalize.

XWA has historically captured about 60%-65% of bookings from its primary catchment area as defined earlier. XWA's retention peaked in 2016 at 68%, but subsequently declined to 59% in 2019, with BIS capturing most of this increased "leakage". These declines were dictated by relative air service changes at BIS. BIS seat capacity was up 16% between 2016 and 2019, including new service to Chicago O'Hare (ORD) on both American Airlines (AA) and United Airlines (UA). The new ORD service resulted in lower air fares to the eastern half of the U.S. Previously, most of this traffic connected at the Minneapolis-St. Paul International Airport (MSP) on DL at relatively high air fares.

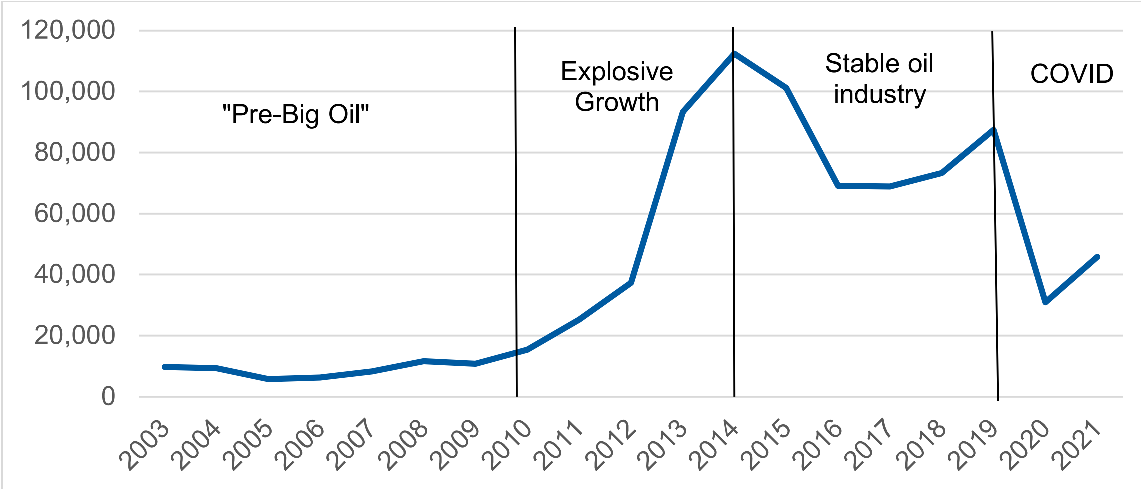
As is the case with many smaller and mid-sized airports, XWA will likely always experience a degree of "leakage" due to relative air service and fares at other regional airports. Air fares at XWA will likely always be relatively higher, driven by the oil industry whose air travel is notoriously late booking and price inelastic. Because of this, airlines will manage seat inventory to account for this later booking, higher yielding (more profitable) travel segment. Still, as XWA is successful in recruiting new air service, particularly ULCC service, the percentage of traffic originating out of XWA could increase over time.

3.4.2 Passenger Air Service at the Airport

The following sections evaluate current air service capacity and operating performance for the primary passenger airlines serving the airport. Airline performance will be evaluated from an economic perspective, evaluating carrier revenue, yield and load factor results. The airport's overall origin and destination (O&D) market will also be assessed at the market level.

Chart 3-4 shows long-term enplaned passenger trends at XWA for the past eighteen years. XWA had historically been an Essential Air Service (EAS) airport until oil prices spiked and western North Dakota became the fastest growing oil region in the world starting in the late 2000s. Between 2010 and 2015, XWA enplaned passengers increased almost 9-fold, increasing from 12,789 in 2010 to 113,770 in 2015. During this time, XWA experienced significant capacity growth to Denver (DEN) on UA, starting with turbo-prop service and growing to 50-seat regional jet service, with DL adding significantly more capacity to MSP starting in 2013. UA also started nonstop service to Houston (IAH) in 2014 to accommodate oil industry demand. There was also selective company-specific charter service. During this peak period, XWA's runway was limited to serving 50-seat regional jets. Flying larger jets could not be granted, despite significant interest from other airlines, including ULCCs.

Chart 3-4– XWA Enplaned Passengers (Calendar Years)



Source: Diio Mi

XWA's explosive growth trajectory through 2015 coincided with the region's oil exploration growth phase and the "land grab" taking place among numerous oil companies, including but not limited to Continental Resources, Hess Corporation, Marathon Oil and Exxon Mobil. During this time, oil companies needed to regularly bring in transient employees for oil exploration. This resulted in significant air travel demand needs as exploration continued. But long-term, this was not sustainable. With the drop in oil prices starting in 2016, oil exploration slowed.

Between 2016 and into early 2020, the region was transitioning from oil exploration to more of an ongoing oil production industry. Pumping oil and gas was the focus as opposed to exploring for new oil. This transition, while still driving air travel demand, was well below the earlier period when exploration was driving the regional oil industry. But this transition was sustainable. In 2016 UA discontinued IAH service, but from 2016 to 2019, UA increased DEN seat capacity by 23.1%, while DL increased MSP seat capacity by 13.3%. Combined these two airlines added almost 17,000 (annual) departing seats, more than offsetting the loss of IAH service. Basically, the region was transitioning from an "all-oil economy" to a region that was more diversified, which was reflected in air service changes. The economy's transition has become more pronounced, which was summarized earlier in this chapter.

During 2019 and early 2020, UA offered four daily trips during most of the year, reducing frequency to three times a day during the seasonally slower November-February period. This service was primarily on 50-seat Embraer 145 (ERJ) aircraft, although starting in October 2019, selected flights were upgraded to 76-seat Embraer-175 (E-175) aircraft. This coincided with the opening of the new Williston Basin International Airport on October 10, 2019.

In 2019 and early 2020, DL offered three daily trips during the seasonally peak period (June-August), while flying twice a day the remainder of the year. Beginning in November 2019, DL had upgraded one of the two flights to a CRJ-700 aircraft. As with UA, this was because of the new airport opening and the ability to accommodate larger jets. This was a trend that was expected to continue before COVID-19.

Table 3-9 – Overview of Carrier Traffic & Loads (Calendar Year 2019)

XWA Air Service Overview: CY 2019					
		Departures			Load
Airline	Market	Annual	Daily	Onboards	Factor
DL	MSP	777	2.1	33,677	84
UA	DEN	1,264	3.5	53,661	83
	Total	2,041	5.6	87,337	84

Source: Diio Mi

As shown in **Table 3-9**, both UA and DL generated strong load factors at XWA in 2019. DL generated an annual 84% load factor on their MSP route, while UA's DEN load factor was 83%. Seasonally, both carriers generated load factors greater than 90%. In addition, both carriers generated mileage adjusted RASMs (Revenue per Available Seat Mile) well above system averages, indicating that these XWA routes were well above system profitability. Based upon discussions with both airlines, it was indicated that both routes had the potential for additional capacity before COVID. Aircraft upgrades to larger 76-seat regional jets (CRJ 900 and E-175) were deemed to be the most likely growth vehicle.

Table 3-10 is a summary of XWA's top 20 O&D markets for calendar year (CY) 2019 and 2Q22 (most current available). Typically, top O&D markets consist heavily of the most populated cities in the U.S. (New York City, Chicago, etc.), in addition to top vacation/destination points (Orlando, Las Vegas). XWA is different, in that many of the top O&D markets are markets with a heavy oil industry emphasis. This includes markets like Oklahoma City, Tulsa, Midland and Pittsburgh. In addition, cities like Dallas-Fort Worth, Salt Lake City, San Antonio, Austin, and Boise are cities that have good exposure to oil industry employee bases. These O&D markets typically respond to changes in the oil industry. Going forward, it is expected that XWA's O&D mix will evolve to more normalized travel markets, although there will likely always be a heavier "oil-centric" mix of markets.

The other factor that stands out on **Table 3-10** is the average fare paid. As shown, in total for XWA, the average one-way fare paid in 2019 (net of taxes & fees) was $337. On a round-trip basis, the average paid round-trip air fare when including taxes & fees would be near $800. XWA was the highest fared airport in the U.S. in 2019, with the average paid air fare more than 50% higher than for the U.S. It is these relatively high air fares that drive XWA's high yields, which in conjunction with high load factors is indicative of profitable air service.

Table 3-10 – Top XWA O&D Markets (2Q22 vs CY 2019)

Rank	Destination	2Q22			CY 2019		% Change vs 2019	
		O&D Psgrs	Avg Fare ($)		O&D Psgrs	Avg Fare (S$)	Pax	Fare
1	Denver, CO	14	292		31	255	(55%)	15%
2	Houston-Intercontinental, TX (IAH)	12	470		19	447	(39%)	5%
3	Minneapolis-St. Paul, MN	10	212		12	237	(13%)	(11%)
4	Dallas-Fort Worth, TX (DFW)	7	414		10	361	(31%)	15%
5	Oklahoma City, OK	6	468		7	380	(17%)	23%
6	Phoenix, AZ (PHX)	5	325		5	320	5%	1%
7	Atlanta, GA	4	382		5	316	(17%)	21%
8	Midland, TX	3	447		4	382	(7%)	17%
9	San Antonio, TX	3	367		5	354	(27%)	4%
10	Las Vegas, NV	3	278		4	320	(19%)	(13%)
11	Orlando, FL (MCO)	3	294		3	301	(17%)	(2%)
12	Los Angeles, CA	3	312		4	298	(24%)	5%
13	Chicago-O'Hare, IL (ORD)	2	355		2	311	19%	14%
14	Salt Lake City, UT	2	388		5	353	(47%)	10%
15	San Diego, CA	2	378		2	317	19%	19%
16	Pittsburg, PA	2	393		3	376	(35%)	5%
17	Raleigh-Durham, NC	2	325		1	290	118%	12%
18	Portland, OR	2	426		3	349	(22%)	22%
19	Tampa, FL	2	325		2	365	14%	(11%)
20	Boise, ID	2	311		3	300	(39%)	4%
Total All Markets		**162**	**376**		**240**	**337**	**(35%)**	**11%**

Source: Diio Mi; passengers & revenue figures are daily/directional; avg fare paid is one-way

The analysis above has focused upon 2019 results at XWA. This was done because 2019 is expected to be the baseline once the industry returns to normalcy. Below, is a brief review of what has occurred at XWA during the COVID pandemic.

XWA's air service was initially hit hard by COVID, with both DL and UA sharply reducing service in March and April 2020. By July 2020 Delta had discontinued XWA service. Delta would finally return to XWA in June 2021, with a single daily trip, increasing to service two times a day in October 2021. UA had reduced XWA service to less than daily service in June 2020, increasing to a single daily trip in July 2021 and increased up to three daily trips during the summer of 2021. But with pilot shortages UA reduced capacity back to 2x daily service through year-end 2021 (but is currently scheduled at 3x daily service, including an upgrade to a larger regional jet in the summer of 2022). When COVID initially hit, XWA, like most U.S. commercial service airports, saw a significant decline in air travel. DL's 2020 load factors hovered around 25% before they exited the market. But UA's load factors were better, with May at 42%, June at 64% and July at 70%. With DL's exit, UA's August 2020 load factor was 83%. Even with the COVID surge in late 2020, UA load factors at XWA were consistently in the 70% range.

Throughout 2021, even with increased service, UA has operated at very high load factors, with the annual load factor greater than 80%, including December 2021 which operated at a 92% load factor. While DL's load factors weren't quite as strong, they still averaged over 70%. As with many communities, as COVID's impact lessened throughout 2021, the bigger issue was labor shortages, particularly pilot shortages at regional airlines. As XWA relies heavily on regional airlines (historically Trans States Airlines flies most of the UA routes, while DL utilizes regional airline partner SkyWest), XWA has been heavily impacted by these labor shortages.

Despite the challenges of 2021, XWA was successful in recruiting their first ULCC service, with Sun Country Airlines (SY) starting service in September, with twice weekly service to Las Vegas

(LAS) on a 737-800 186-seat aircraft. The service, as planned, operated through November, with improving load factors each month. Currently, the plan is to re-introduce the service in 2022, with the possibility of extending the season to include April and May. Additionally, XWA was awarded a $500,000 Small Community Air Service Development grant in 2022 to attract low-cost service to the Phoenix area.

SY targets vacation travelers with low fares to popular vacation destinations such as LAS, Phoenix (PHX), Orlando (MCO) and many more. While SY also targeted vacation travelers with XWA-LAS service, this route was unique for SY in that it also accommodated many VFR (visit family and friends) travelers. This is due to the high percentage of Williston's population (particularly those in the oil industry) are either "transplants" or transient workers. It was reported that a relatively high percentage of travelers using this flight were flying to LAS and then driving to their final destination – in many cases Utah and California. As the Williston region continues to experience good population growth, over time this segment of the traveling public could generate relatively high travel demand on a carrier like SY.

2Q22 results as shown in **Table 3-10** illustrate a few recent events. First, while XWA's average fare paid is still well above most U.S. airports, the rate of increase (11%) versus 2019 was well below most other airports. As an example, BIS' average fare paid was up 18%, FAR 19% and GFK's 24%. While MOT's was also only up 11%, MOT has a much heavier presence of ULCC Allegiant Airlines. Second, note the relative traffic decline in most top O&D markets. Most of these markets were business oriented and hence demand is still well below 2019 levels. In addition, XWA was also impacted by relative capacity cuts which would obviously have impacted traffic, particularly given the high load factors experienced by XWA during much of 2022. Finally, also note the increased demand versus 2019 in more leisure-oriented markets like Phoenix (PHX), San Diego (SAN) and Tampa (TPA). XWA's PHX traffic was up 5% versus 2019 while SAN was up 19%% and TPA was up 14%. These trends of relative growth have been common across the industry during the post-COVID period.

3.4.3 Commercial Air Traffic Activity Trends

Table 3-11 below presents the most current XWA TAF (May 2021), illustrating historical enplaned passenger trends at the airport and for the U.S. This data is on a fiscal year basis (years ending September 30) for 2000 through 2019 and presents the airport's share of overall U.S. activity.

Table 3-11 – Historical Commercial Service Operations and Enplaned Passenger Trends at the Airport and the U.S.

Fiscal Year	Air Carrier	XWA Air Taxi & Commuter	XWA Enplaned Passengers	XWA % Change	Federal Fiscal Year	U.S. Domestic Enplaned Passengers	U.S. Domestic % Change	Airport Share of U.S. Domestic
2000	0	4,851	4,851		2000	641,200	-	0.001%
2001	0	4,552	4,552	(6.2%)	2001	625,000	(2.5%)	0.001%
2002	0	4,130	4,130	(9.3%)	2002	626,800	0.3%	0.001%
2003	0	4,776	4,776	15.6%	2003	574,500	(8.3%)	0.001%
2004	0	6,001	6,001	25.6%	2004	628,500	9.4%	0.001%
2005	0	5,715	5,715	(4.8%)	2005	669,500	6.5%	0.001%
2006	0	6,329	6,329	10.7%	2006	668,400	(0.2%)	0.001%
2007	0	7,800	7,800	23.2%	2007	690,100	3.2%	0.001%
2008	0	10,894	10,894	39.7%	2008	680,700	(1.4%)	0.002%
2009	0	11,415	11,415	4.8%	2009	630,800	(7.3%)	0.002%
2010	0	14,732	14,732	29.1%	2010	635,200	0.7%	0.002%
2011	0	23,908	23,908	62.3%	2011	650,100	2.3%	0.004%
2012	0	31,776	31,776	32.9%	2012	653,800	0.6%	0.005%
2013	0	81,367	81,367	156.1%	2013	654,300	0.1%	0.012%
2014	0	109,184	109,184	34.2%	2014	669,000	2.2%	0.016%
2015	0	111,876	111,876	2.5%	2015	696,000	4.0%	0.016%
2016	0	74,054	74,054	(33.8%)	2016	726,000	4.3%	0.010%
2017	0	68,548	68,548	(7.4%)	2017	744,000	2.5%	0.009%
2018	0	73,936	73,936	7.9%	2018	781,000	5.0%	0.009%
2019	0	86,359	86,359	16.8%	2019	813,000	4.1%	0.011%
CAGR[1]					**CAGR[1]**			
2000-19	15.62%				2000-19	1.19%		
2000-02	(5.22%)				2000-02	(1.13%)		
2002-08	14.86%				2002-08	1.38%		
2008-10	10.58%				2008-10	(3.40%)		
2010-15	40.2%				2010-15	1.85%		
2015-19	(5.05%)				2015-19	3.16%		

[1]CAGR = Compounded annual growth rate; U.S. Passenger Figures are in 000's

Source: FAA TAF, FAA Aerospace Forecasts

3.4.4 Commercial Aircraft Operations

As shown in **Table 3-12**, commercial operations at the airport have generally followed passenger activity trends that were discussed earlier and were following oil industry-related trends. The air taxi & commuter category below primarily consists of passenger and air cargo aircraft operations. Each will be studied separately in the subsequent sections.

Table 3-12 – Historical Commercial Aircraft Operations at the Airport

Fiscal Year	Air Carrier	Air Taxi & Commuter	Total	% Change
2011	0	3,474	3,474	(68.7%)
2012	0	4,307	4,307	24.0%
2013	0	6,120	6,120	42.1%
2014	0	7,300	7,300	19.3%
2015	6	6,758	6,764	(7.3%)
2016	0	4,682	4,682	(30.8%)
2017	0	4,086	4,086	(12.7%)
2018	0	4,232	4,232	3.6%
2019	2	4,752	4,754	12.3%

Source: May 2021 XWA Terminal Area Forecast (TAF)

3.4.4.2 Passenger Aircraft Operations

Table 3-13 is a summary of passenger aircraft operations at XWA, for the Fiscal Years 2011 through 2021. This illustrates the transition from a small, EAS market through 1994, to a smaller market served by Great Lakes Aviation with turboprop aircraft then transitioning to a larger market served with regional jets as the oil industry took off regionally. Specifically, XWA was operated with mostly turboprop (EMB-120 & B-1900) aircraft in the 2000s, transitioning to a larger market served by 50-seat regional aircraft in the early 2010s and, with the new airport opening, to larger 76-seat regional jets (E-175, CRJ-900 and CRJ-700 aircraft) beginning in 2019.

Table 3-13 – Historical Passenger Aircraft Operations at the Airport

	ERJ & CRJ-200	E-175	CRJ-900	CRJ-700	EMB-120	B-1900	All Other	Total
2011	0	0	0	0	2,725	69	0	2,794
2012	0	0	0	0	3,467	67	0	3,534
2013	3,507	0	0	0	1,564	0	0	5,071
2014	5,200	0	0	0	440	0	0	5,640
2015	6,094	0	0	0	0	0	0	6,094
2016	4,017	0	0	0	0	0	39	4,056
2017	3,448	0	0	0	0	0	25	3,473
2018	3,549	0	0	0	0	0	69	3,618
2019	4,079	0	0	0	0	0	42	4,121
2020	1,464	236	239	297	0	0	0	2,236
2021	1,828	0	0	0	0	0	0	1,828

Source: Diio Mi for Fiscal Years (Year-ending September). Includes charter operations which are in all other (mostly Cessna aircraft). Does not include Sun Country operations in Sept 2021.

3.4.5 Industry Recovery Scenarios: Return to 2019 Levels of Demand

Several industry sources have made predictions as to the length of recovery of air traffic to levels prior to the COVID-19 pandemic. **Table 3-14** presents summaries of various scenarios. As shown, the general consensus is that air traffic will not recover to 2019 levels until 2024. It should be noted these are for the overall U.S. airline passenger travel and not market specific. Throughout the pandemic, specific markets such as those in Florida, the general mountain region of the U.S., and the South Carolina coastline have experienced much higher traffic demand as compared to large cities on the west and particularly the east coast. The Midwest in general also did relatively well.

Table 3-14 – Summary of Industry Estimate of Return to 2019 Passenger Traffic levels

Source Company/ Agency	Expected Recovery Period	Citation	Source
International Air Transport Association (IATA)	CY 2024	*"We assume a vaccine(s) is deployed in the second half of 2021, but it looks likely that there will be production and distribution challenges that mean it will only be in late 2021 and in 2022 when air travel rises back substantially. On this basis we don't expect 2019 levels to be regained until around 2024.*	*"Deep Losses Continue Into 2021"*, November 24, 2020. https://www.iata.org/en/pressroom/pr/2020-11-24-01/
Fitch Ratings	CY 2024	*"Unlike past disruptive events in aviation where recoveries were speedy, the coronavirus pandemic illustrates that a long trough in air travel is possible. Scenarios for recovery remain wide given the unknowns about future treatments and vaccines. Air traffic in 2021 will likely remain depressed but 2021 volumes are expected to rise above the nadir of 2020. Multiple uncertainties ranging from airline scheduling to government-imposed restrictions could lead to rapid shifts in passenger traffic over the next 12 months. Fitch's rating and severe downside case scenarios, at 35% and 60%, respectively, below 2019 levels, highlight the forecasting uncertainty for airports. Full recoveries are not expected until 2024…"*	*"Fitch Ratings 2021 Outlook: U.S. Transportation Infrastructure"*, December 2, 2020 https://www.fitchratings.com/research/us-public-finance/fitch-ratings-2021-outlook-us-transportation-infrastructure-02-12-2020
Moody's Investor Service	CY 2024	*"Enplanement levels have divorced from traditional GDP correlations because of unpredictable consumer behavior and local and international restrictions on travel or onerous quarantine requirements. Enplanement levels depend on the perceived spread of the virus, but we expect enplanements to be 25% to 45% of 2019 volumes in the first half of 2021 before recovering with warmer weather and expected adoption of a vaccine."*	*"2021 outlook negative with high degree of traffic uncertainty, airline financial health"*, December 1, 2020. https://www.moodys.com/research/Moodys-2021-outlook-for-US-airports-remains-negative-amid-ongoing--PBC_1255600?cid=7QFRKQSZE021
Standard & Poor's (S&P)	CY 2024	*"We have updated our global air passenger traffic forecasts and now expect traffic to fall by as much as 60%-70% in 2020 versus 2019. This is weaker than the 50%-55% drop we forecast at the end of May. We now expect 2021 air passenger traffic to decline 30%-40% compared with the 2019 base and foresee a more gradual recovery to pre-COVID-19 levels by 2024."*	"From Bad to Worse: Global Air Traffic to Drop 60%-70% in 2020". August 12, 2020. https://www.spglobal.com/ratings/en/research/articles/200812-from-bad-to-worse-global-air-traffic-to-drop-60-70-in-2020-11610389

In summary as noted in **Table 3-14**, industry sources estimate a return to 2019 traffic levels in 2024 or 2025. UA, DL and AA are more pessimistic, due to current pilot shortages.

3.5 Passenger Air Traffic Activity Forecasts

Landrum & Brown reviewed past activity and related forecasts for XWA. The upcoming section forecasts XWA enplaned passenger activity for the 5, 10 and 20-year time periods. First, this forecast will assume that XWA returns to 2019 levels in 2025. This is a bit longer than forecasts for the entire industry (2024). The relative difference can be explained by the fact that XWA has trended below industry rates of growth during the pandemic and this trend is assumed to continue over the next 2-3 years (tied largely to pilot shortages).

Subsequent to 2025, the forecast will utilize a variety of forecast methodologies:

- Historical growth rate trends, utilizing passenger & economic growth trends. It should be noted that longer-term passenger growth trends will not be utilized given the nature of the explosive growth that took place after 2010 and that is not likely to be repeated,
- FAA Forecasts,
- XWA market shares of industry projections
- Regression analysis of the air service area's economic metrics.

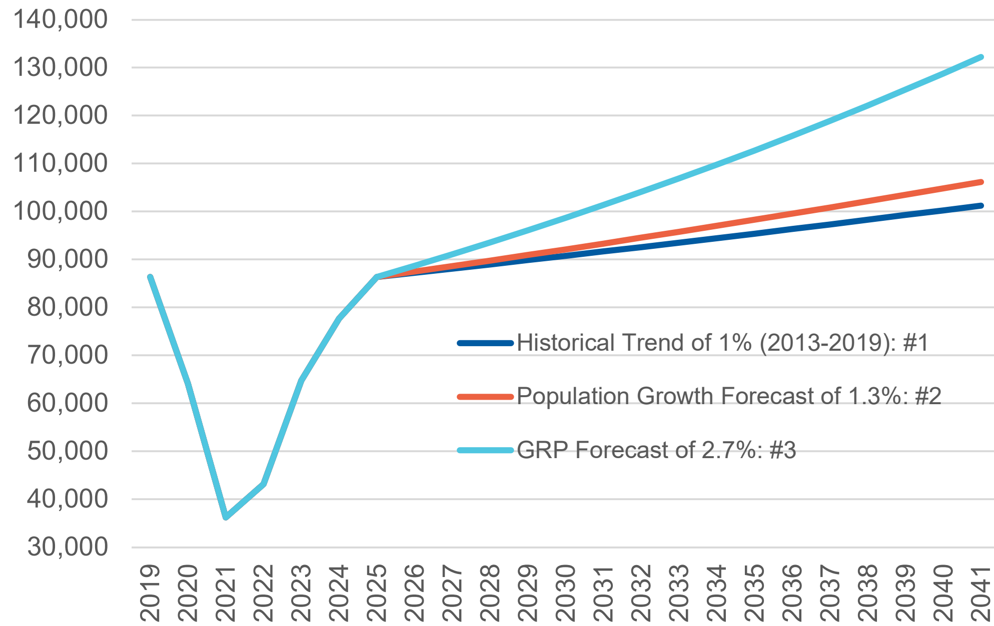
3.5.1.1 Historical Trend Analysis

Three historical trends (growth rates) have been considered for future projections. These are as follows:

1. Intermediate-term passenger trend: The first historical trend emulates the enplaned passenger growth rate at XWA over the years from 2013 to 2019, then applies this growth rate to the 2025 (2019) enplaned passengers as the baseline. This period and the corresponding growth rate reflect a period during which XWA's (and the oil industry's) explosive growth was initially taking place, working its way through to a more stable, slower growing economy. Over the entire six-year period was when the area saw overall moderate economic growth. The CAGR in enplaned passenger traffic during this six-year period was 1.0%. This is **Historical Trend Scenario #1**.
2. Population Growth Rate Trend: The second trend is based upon forecasted population growth between 2020 and 2040. The CAGR for population growth for the air service area over the next 20 years is 1.3%. This growth rate was applied to the 2025 (2019) baseline forecasted passengers. The air service area's forecasted population growth was illustrated earlier in this chapter (see **Section 3.3.1**). This is **Historical Trend Scenario #2**.
3. Gross Regional Product (GRP) Growth Rate Trend. The third trend is based upon the forecasted rate of growth for the air service area's GRP or basically economic growth. The CAGR for the air service area's GRP over the next 20 years is 2.7%. This growth rate was applied to the 2025 (2019) baseline forecasted passengers. The historical and forecasted GRP over the next 20 years was discussed earlier in this chapter (see **Section 3.3.1**). **This is Historical Trend Scenario #3.**

Chart 3-5 illustrates the results of applying these trends to 2025 (2019) estimate of 86,359 passenger enplanements.

Chart 3-5 – XWA Enplanement Projections (Historical Trends Methodology)



Source: Landrum & Brown Analysis

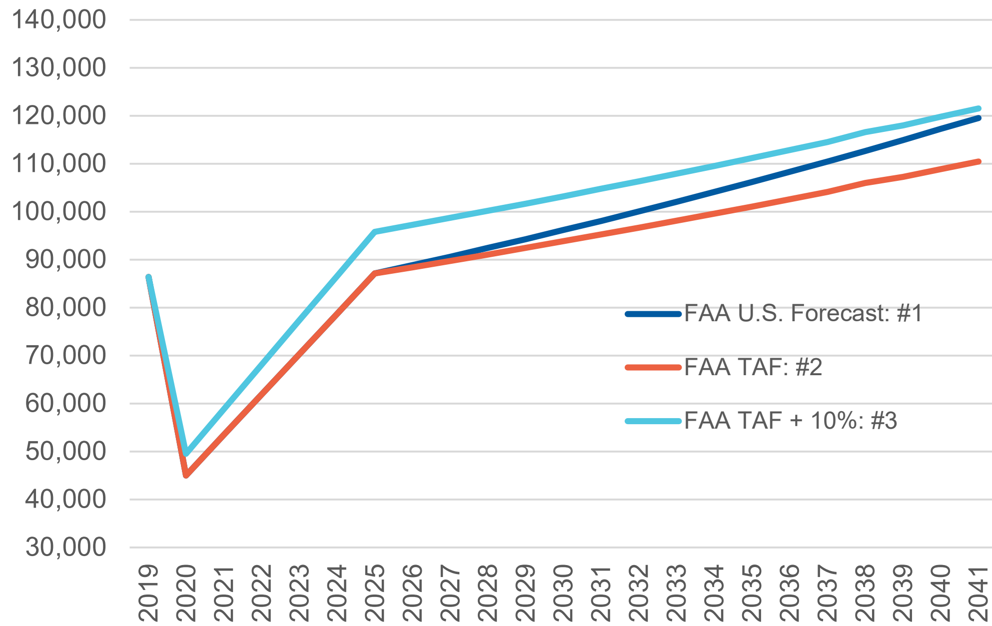
3.5.1.2 FAA Forecast Sources and Scenarios

The FAA presents aviation activity forecasts in several different sources, including the following sources to be utilized in this forecast analysis:

1. FAA Aerospace Forecasts (2020-2040). This document provides growth projections for the entire aviation industry in fiscal years, as described earlier. In this document, the FAA predicts that annual total enplanements for U.S. domestic air carriers will increase at a CAGR of approximately of 2.0% annually between 2020 and 2040. This growth rate, applied to the 2025 (2019) baseline XWA enplanements, will serve as the basis for **FAA Forecast Scenario #1.**
2. 2021 FAA Terminal Area Forecast (TAF)**.** The TAF utilizes national growth trends, coupled with historical local growth trends, to develop airport-specific activity forecasts on a fiscal year basis (October-September). The most recent TAF enplanement projections include a CAGR of approximately 1.1% annually for XWA between 2019 and 2040 (versus 1.5% for 2025). This will serve as the basis for **FAA Forecast Scenario #2** (using baseline enplaned passengers of 86,359 for 2019/2025).
3. 2021 FAA Terminal Area Forecast (TAF) + 10%. An enplanement level at 10% above the TAF for the forecast period (typically viewed by the FAA as the level of variation from the TAF that is deemed acceptable before additional justification is required to support higher forecasted activity levels). This is **FAA Forecast Scenario #3.**

Chart 3-6 illustrates the results of applying these scenarios based upon FAA Forecast documentation to the baseline 2025 (2019) estimate of 86,359 enplanements.

Chart 3-6 – XWA Enplanement Projections (FAA Forecast Methodology)



Source: Landrum & Brown Analysis

3.5.1.3 Market Share Analysis

Market share analysis for airports can provide a valid benchmark from which to access future activity. This approach compares activity at a specific airport with a larger aviation market, such as total U.S. domestic enplanements, to develop a ratio of activity.

Applied to historical national enplanements as reported in the FAA TAF, XWA's annual market share between 2000 and 2019 ranged between a low of 0.001% of national enplanements in the early 2000s when XWA was an EAS airport to a high of 0.016% of national enplanements during the years of 2014-16 at the height of the Bakken oil boom. Since 2016, XWA's share of national enplanements has stabilized to a more normal range of .009%-.011%. **Table 3-15** below illustrates XWA's historical market share of national enplanements between 2000 and 2019.

Table 3-15 – XWA Historical Enplanement Market Share of U.S. Enplanements

Fiscal Year	Enplaned Passengers	U.S. Domestic Enplaned Passengers (000s)	Airport Share of U.S. Domestic
2000	4,851	641,200	0.001%
2001	4,552	625000	0.001%
2002	4,130	626800	0.001%
2003	4,776	574500	0.001%
2004	6,001	628,500	0.001%
2005	5,715	669,500	0.001%
2006	6,329	668,400	0.001%
2007	7,800	690,100	0.001%
2008	10,894	680,700	0.002%
2009	11,415	630,800	0.002%
2010	14,732	635,200	0.002%
2011	23,908	650,100	0.004%
2012	31,776	653,800	0.005%
2013	81,367	654,300	0.012%
2014	109,184	669,000	0.016%
2015	111,876	696,000	0.016%
2016	74,054	726,000	0.010%
2017	68,548	744,000	0.009%
2018	73,936	781,000	0.009%
2019	86,359	813,000	0.011%

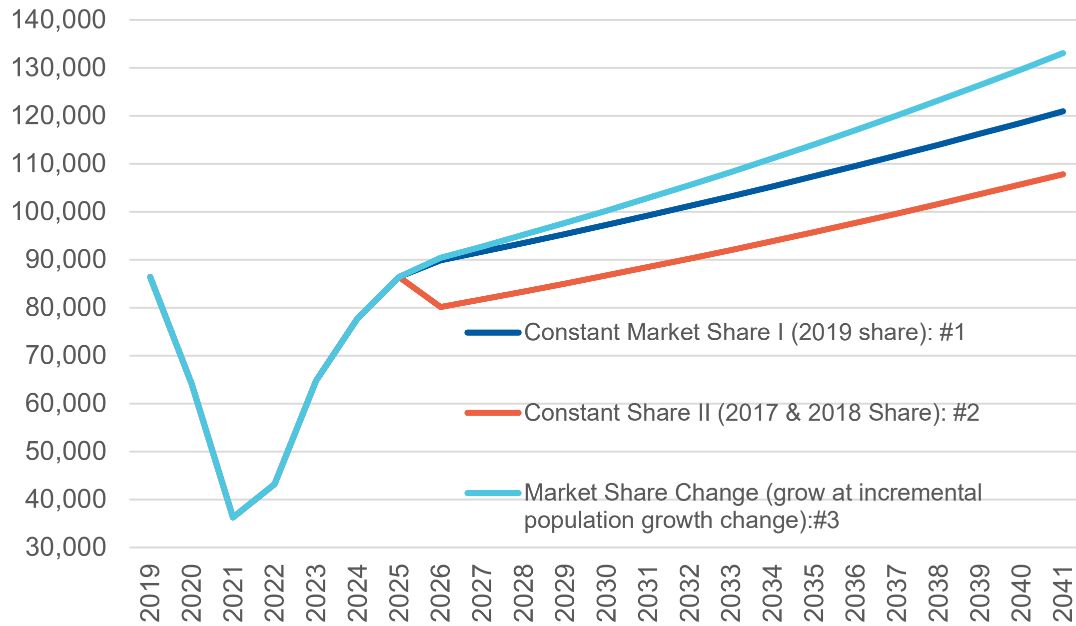
Source: FAA May 2021 TAF

Projections of future enplanement activity based upon market share analysis were conducted using the following scenarios:

1. Constant Market Share I: XWA market share will remain constant at 2019 level of 0.011% of national enplanements through 2041 (using FAA's TAF of national enplaned passengers). This projection will serve as the basis for **Market Share Scenario #1**.
2. Constant Market Share II: XWA market share will remain constant at the 2017 and 2018 level of 0.009% of national enplanements through 2041 (using FAA's TAF of national enplaned passengers). This projection will serve as the basis for **Market Share Scenario #2**.
3. Market Share Change: XWA market share will increase at a CAGR of 0.6% versus today's market share. This is the rate of growth difference between the air service area's population growth over the next 20 years (1.3%) as compared to the U.S. CAGR of 0.7%. This projection will service as the basis for **Market Share Scenario #3.**

Chart 3-7 illustrates the results of applying these scenarios based upon FAA forecast documentation to the baseline 2025 (2019) estimate of 86,359 enplanements.

Chart 3-7 – XWA Enplanement Projections (Market Share Methodology)



Source: Landrum & Brown Analysis

3.5.1.4 Regression Analysis Projections

Regression analysis, which projects values for a dependent variable on the basis of establishing a statistical relationship between one or more other independent variables, was utilized to determine if a statistically reliable relationship exists between historical passenger enplanements at XWA (dependent variable) and several local socioeconomic indicators (independent variable(s)).

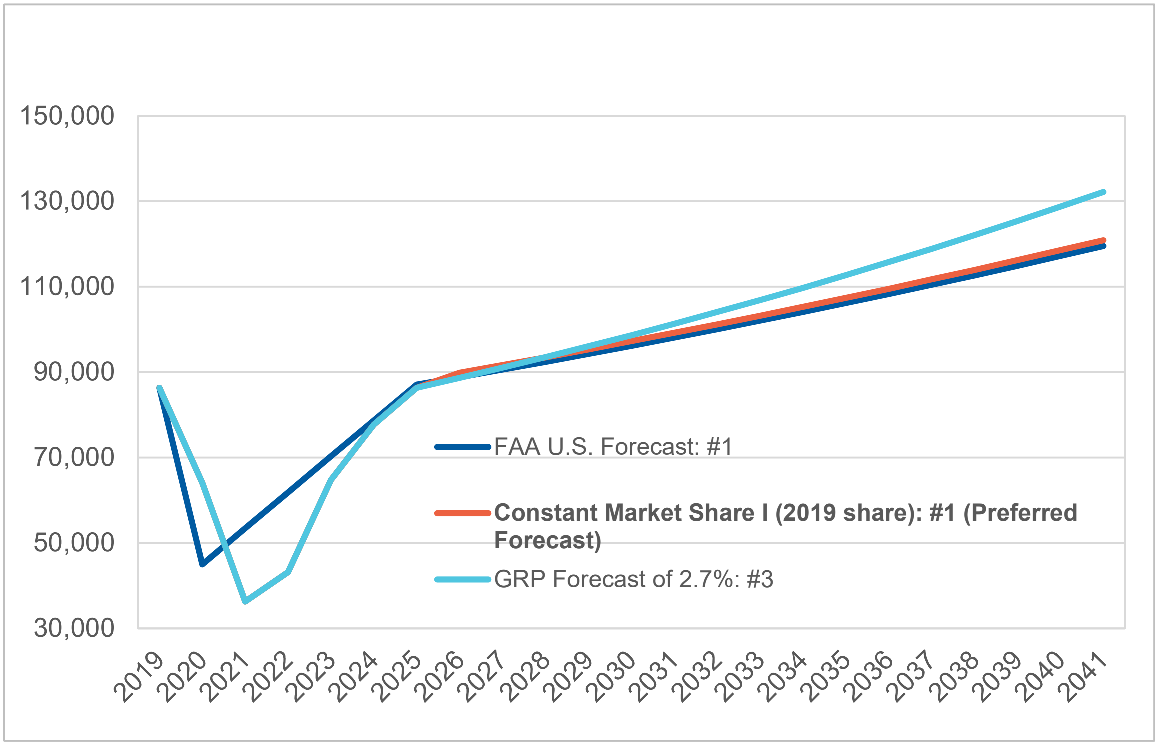
The socioeconomic indicators that were evaluated as independent variables in the projection of future passenger enplanements at XWA include Metropolitan statistical areas (MSA) population, per capita personal income, total earnings, gross regional product, retail sales, median household income and non-farm payrolls. Finally, a multiple-regression analysis was performed combining all seven independent variables.

The statistical reliability of projections made to the dependent variable through a regression analysis is evaluated using the coefficient of determination, or R-squared value. Technically, the R-squared value explains the relative accuracy of the association between the dependent and independent variables. An R-squared value of 1.0 indicates a perfect correlation between variables; R-square values of less than 0.70 typically indicate there is less correlation. An R-squared value of 0.90 is generally used as a threshold to depict a high level of statistical reliability. None of the studied socioeconomic factors resulted in an R-squared greater than 0.25, indicating little correlation between historical enplaned passenger volume and socioeconomic factors. Hence, these should not be considered reasonably reliable for planning/forecasting purposes.

3.5.1.5 Selection of the Preferred Forecast Range

The preceding sections have presented enplanement projections from several analytical sources. From these sources, a range of potential future enplanement activity can be established. Those are shown below in **Chart 3-8**.

Chart 3-8 – XWA Preferred Passenger Enplanement Forecast Range



Source: Landrum & Brown Analysis

For the 20-year forecast period, the preferred forecast method selected was Constant Market Share I (2019 share) 120,923 enplaned passengers in 2041. The CAGR is 1.5% (compared to 2019 enplaned passengers). When compared to the baseline year of 2025, the CAGR is 2.1%. This compares to the FAA's U.S. CAGR of 2.0% for all U.S. airports.

The preferred 5-year forecast (2026) result is for 89,484 enplaned passengers, 1.6% above the TAF, while the 10-year forecast of 99,199 enplaned passengers is 4.2% above the TAF and the 20-year forecast of 120,923 enplaned passengers is 9.4% above the TAF.

As a check, a review of population versus passenger volumes was conducted. The U.S. generated an estimated 320 million O&D passengers in 2019 (source: Diio Mi), on an estimated population base of 330 million people. This translates to almost 1 trip per capita (O&D passengers were used to factor out connecting passengers at hubs). Pre-COVID, most years the U.S. was very close to 1.0 trips per capita. In 2019, Williston's air service area population was estimated at approximately 93,000, with enplanements at 86,359 (per capita travel of 0.92 – close to the U.S. average). For the 2041 forecast, the baseline forecast is 120,923 enplaned passengers, while the forecasted air service area population is 121,979. Hence, current forecasted passenger activity at XWA is close to historical XWA per capita activity and U.S. historical results.

3.5.2 Alternative, Unconstrained Enplaned Passenger Forecast(s)

The above forecasts are considered the most likely as it pertains to the Master Plan Forecast. These forecasts generally assume the XWA future traffic growth will be in-line with general economic growth from the region.

The proposed Master Plan Forecast could be exceeded based on a few fronts. First, the assumption that XWA doesn't return to 2019 levels of activity until 2025 could easily be exceeded. Should XWA return to 2019 levels in 2023 and assuming the same CAGR results in XWA generating approximately 126,000 enplaned passengers by 2041, or roughly 6,000 more passengers as compared to the current baseline forecast. Should XWA return to 2019 levels in 2024, the forecast is closer to 123,000 enplaned passengers by 2041.

Second, potential traffic upside exists with additional service on Sun Country Airlines (that isn't included in the baseline forecast above). Sun Country (SY) offered seasonal service to Las Vegas (LAS) this past fall, offering twice weekly 737-800 service from September through November. Additionally, based upon recent communications it is believed that SY will return to the market in September, offering similar service levels as were offered in 2021. Furthermore, SY is receptive to bringing back service in April/May of 2022 and is supporting the Williston community's Small Community Air Service Development Grant (SCASDG) application in the pursuit of Phoenix (PHX) service. Given the current interest in the market, three additional scenarios are included as alternative forecast scenarios. These scenarios are summarized below and illustrated on **Table 3-16**.

1. **Alternative Scenario 1:** Seasonal service to Las Vegas, similar to what was offered in 2021 (twice weekly 737-800 service).
2. **Alternative Scenario 2:** In addition to LAS service in Scenario 1, seasonal service to PHX is also included during this same period.
3. **Alternative Scenario 3:** Scenario 3 assumes LAS is served year-round, operating twice weekly 737-800 service, while PHX is served seasonally, from mid-November to mid-April (a more normalized seasonal service pattern, as opposed to the 2021 schedule which was more exploratory).

As shown below, Scenario 1 results in an increase to 125,459 enplaned passengers by 2041. This is basically assuming that SY flies similar seasonal capacity as was flown in 2021. Scenario 2 results in a forecast of 129,995 enplaned passengers by 2041. This assumes seasonal service on SY to LAS and PHX. Scenario 3 assumes that SY would fly LAS year-round (2x daily) and PHX seasonally. This scenario results in 140,201 enplaned passengers, or just under 20,000 more enplaned passengers than the baseline forecast estimates.

Finally, while an alternative forecast wasn't developed for potential Houston (IAH) service, it should be noted that UA flew this route from August 2014 through March 2016. Given the oil ties between the two markets, service on this route is certainly a possibility. But given ongoing pilot shortages, particularly regarding regional airlines (the most likely to fly this route), it was determined that an additional forecast incorporating this route would not be included. Still, the possibility of XWA eventually recruiting IAH service is a possibility.

Table 3-16 – Alternative Passenger Forecast Summary

Passenger Forecast Summary With Forecast Alernatives at XWA	2026	2031	2041
Baseline Enplaned Passenger Forecast	89,848	99,199	120,923
Alternative 1: Seasonal LAS Service*			
Enplaned Passengers	3,402	4,536	4,536
Load Factor	75%	75%	75%
Annual Departing Seats	4,536	6,048	6,048
Annual Departures	24	32	32
Alternative 2: Seasonal LAS & PHX Service**			
Enplaned Passengers	6,804	9,072	9,072
Load Factor	75%	75%	75%
Annual Departing Seats	9,072	12,096	12,096
Annual Departures	48	64	64
Alternative 3: Year-round LAS and seasonal PHX service***			
Enplaned Passengers	9,072	19,278	19,278
Load Factor	75%	75%	75%
Annual Departing Seats	12,096	25,704	25,704
Annual Departures	64	136	136
Baseline Forecast + Alternative 1	93,250	103,735	125,459
Baseline Forecast + Alternative 2	96,652	108,271	129,995
Baseline Forecast + Alternative 3	98,920	118,477	140,201

* Alternative 1 assumptions: 2026 runs 2x weekly service from September to mid-November in 2026, extending to mid-December from 2031-2041

** Alternative 2 assumptions: Same as Alternative 1, except that PHX is also served with identical

*** Alternative 3 assumptions: For 2026, Same as Alternative 2 assumptions for 2031 (both PHX & LAS operated seasonally, mid-September-mid December), then LAS going year-round startin in 2031.

3.6 Passenger Aircraft Operations & Fleet Mix Forecast

Below are forecasts which pertain to passenger aircraft operations and fleet mix. This forecast was done at a macro-level and ties to baseline enplaned passenger forecasts. It follows expected industry trends, of less 50-seat regional jet flying and increased larger regional jet flying (64-76 seat jets).

3.6.1 Passenger Airline Fleet Mix

The type of passenger service aircraft that utilize the airport defines the operations needed to serve the forecasted enplanements. Flight schedules for calendar year 2019 were reviewed to develop an annual schedule and current aircraft fleet mix. Projected fleet mix is developed based on known industry trends. The eventual phase-out of the 50-seat regional jet is significant to the overall fleet mix at XWA as this has historically been the primary aircraft type for XWA.

The 50-seat Embraer/Canadair regional jets are assumed to be partially phased out by 2031 and entirely phased out by 2041. While Canadair CRJ-700/900 (or comparable 76-seat jet) will backfill for these reductions. The net result will be that passenger aircraft operations are relatively flat during the forecast period, although with the larger aircraft gauge, seat capacity will grow in-line with forecasted passenger growth. The aircraft fleet forecast is shown below in **Table 3-17.**

Table 3-17 – Passenger Airline Fleet Mix

Seating	2019	2026	2031	2041
Less Than 40 Seats	-	-	-	-
40-60 Seats	100.0%	42.9%	61.9%	-
61-99 Seats	-	57.1%	38.1%	100.0%
100-120 Seats	-	-	-	-

Source: Diio for Fiscal Year 2019 (YE September); Landrum & Brown analysis

Table 3-18 illustrates the passenger aircraft detail forecast: Operations, operating seats per departure, enplanements per departure and load factor detail for 2019 and 2026 through 2041. As indicated earlier, there will be an overall trend toward larger aircraft, little change in passenger aircraft operations and moderate overall seat capacity growth during the forecast period.

Table 3-18 – Passenger & Departure Forecast by Aircraft Type

Seating Capacity	2019	2026	2031	2041
Regional (<60 seats)				
Average Seats Per Departure	50.0	50.0	50.0	-
Average Load Factor	84.2%	76.7%	78.3%	-
Enplanements Per Departure	42.1	38.3	39.2	-
Air Carrier (60+ seats)				
Average Seats Per Departure	-	76.0	76.0	76.0
Average Load Factor	-	76.7%	78.3%	79.3%
Enplanements Per Departure	-	58.3	59.5	60.2
Total				
Average Seats Per Departure	50.0	61.1	66.1	76.0
Average Load Factor	84.2%	76.7%	78.3%	79.3%
Enplanements Per Departure	42.1	46.9	51.8	60.2

Source: Landrum and Brown Analysis, Diio (2019)

3.6.2 Passenger Airline Aircraft Operations

Passenger airline operations are determined from the fleet mix and departures by aircraft mix determinations. An operation is considered an aircraft takeoff or landing. Forecasted operations for passenger airlines are shown in **Table 3-19**.

Table 3-19 – Passenger Airline Operations

Metric	2019	2026	2031	2041
Departures				
Regional (< 60 Seats)	2,023	1,095	730	-
Air Carrier (> 60 Seats)	-	821	1,186	2,008
Operations				
Regional (< 60 Seats)	4,046	2,190	1,460	-
Air Carrier (> 60 Seats)	-	1,643	2,373	4,015
Total Operations	**4,046**	**3,833**	**3,833**	**4,015**

Source: Landrum and Brown Analysis, Diio (2019 – for YE September)

During the forecast period, passenger aircraft operations will be roughly unchanged, with the larger 76-seat jets replacing 50-seat regional jets during the forecast period. Seat capacity will increase about 51% during the forecast period or at a 2.6% CAGR as compared to 2025 (baseline year) or 1.9% when compared to 2019.

3.6.3 Summary: Passenger Activity & Operations Forecast

A summary of the preferred passenger aviation forecast is provided in **Table 3-20**. As noted earlier, it is expected that operations will basically be unchanged during the forecast period as larger aircraft replace 50-seat regional jets. Seat capacity is forecasted to grow moderately over the next 20 years.

It should be noted that the selected forecast below pertains to the baseline forecast and does not include the passenger forecast alternatives noted earlier.

Table 3-20 – Preferred Passenger Airline Forecast Summary

Metric	2019	2026	2031	2041
Enplanements				
Regional (< 60 Seats)	86,359	41,985	28,588	-
Air Carrier (> 60 Seats)	-	47,863	70,611	120,923
Total Enplaned Passengers	**86,359**	**89,848**	**99,199**	**120,923**
Avg. Seats/Departure	50.0	61.1	66.1	76.0
Avg. Load Factor	84.2%	76.7%	78.3%	79.3%
Operations				
Regional (< 60 Seats)	4,046	2,190	1,460	-
Air Carrier (> 60 Seats)	-	1,643	2,373	4,015
Total Operations	**4,046**	**3,833**	**3,833**	**4,015**

Source: Landrum and Brown Analysis

3.7 Cargo Activity and Forecast

XWA is served by both Federal Express (FX) and United Parcel Service (UPS). The FX flights are currently operated by Corporate Air, while the UPS flights are currently operated by Encore Air Cargo.

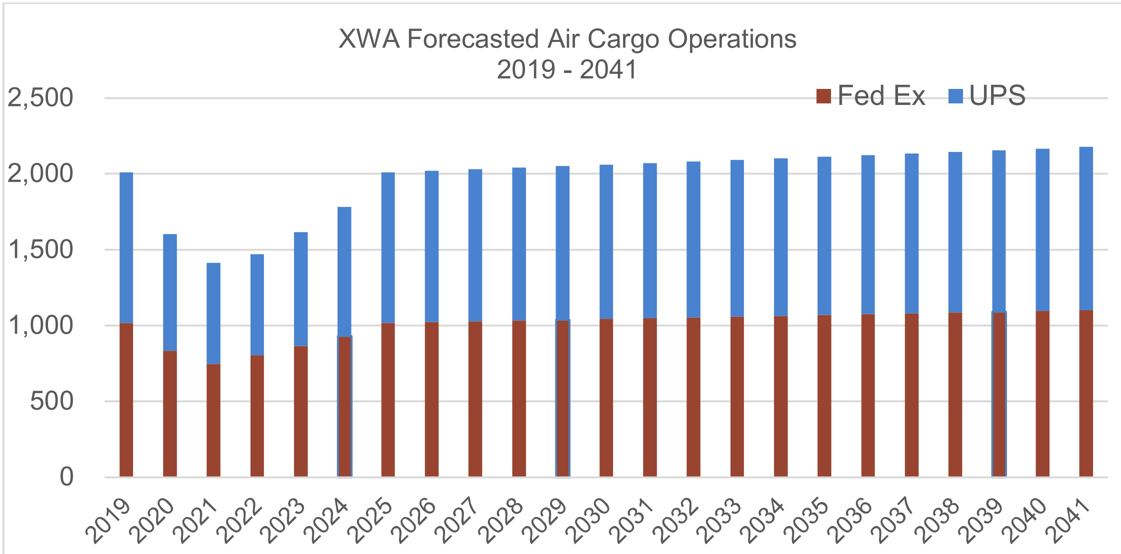
FX has served XWA for at least 20 years, often offering Cessna 208 Caravan service. FX currently operates five days per week with service Tuesday-Saturday with a minimum of one aircraft but often with two Caravans per day frequently as demand warrants. Currently this service (mostly) flies to Fargo (FAR). Recently, FX operations peaked at 1,017 operations in 2019, but has been declining throughout COVID, dropping to 746 operations in 2021, but is up sharply in 2022 through September (sources: USDOT Report T-100 and XWA Statistics).

UPS currently offers service four times per week, operating Swearingen Merlin Metro aircraft. As with FX, UPS' XWA flights fly to FAR. UPS supplements their operations with additional Brasilia or Beech 1900 aircraft when demand warrants throughout the year, serving XWA with two aircraft per day during peak season. For 2021, UPS' share of cargo poundage carried at XWA was 46.1%, compared to Federal Express at 53.9% (source: XWA). UPS' operations were estimated at 993 in 2019, declining to 666 in 2020 and is flat versus 2021 YTD through September 2022. (source: XWA Statistics and FAA TFMSC).

XWA's air freight serves most industry located in the air service area, particularly the oil, healthcare, and construction industries. It is estimated that air freight will return to 2019 levels by 2025 (the same as assumed for the passenger-side), then grow at 0.5% per year during the forecast period, or at roughly ½ the level of population growth and well below expected GRP growth. **Chart 3-9** below illustrates annual cargo operations at XWA (by airline) from 2019 through the forecast period of 2041.

It is anticipated the current fleet of aircraft operating at XWA (Cessna 208 Caravan and Swearingen Merlin Metro aircraft) will continue to operate at XWA in the future and that both Federal Express and UPS will grow at similar rates of growth. Combined, air freight operations at the airport are forecasted to be flat at 2,021 operations in 2025 (same as 2019), growing to 2,177 by 2041. By 2041, it is forecasted that roughly 1/3 of XWA's commercial activity will be on air cargo aircraft.

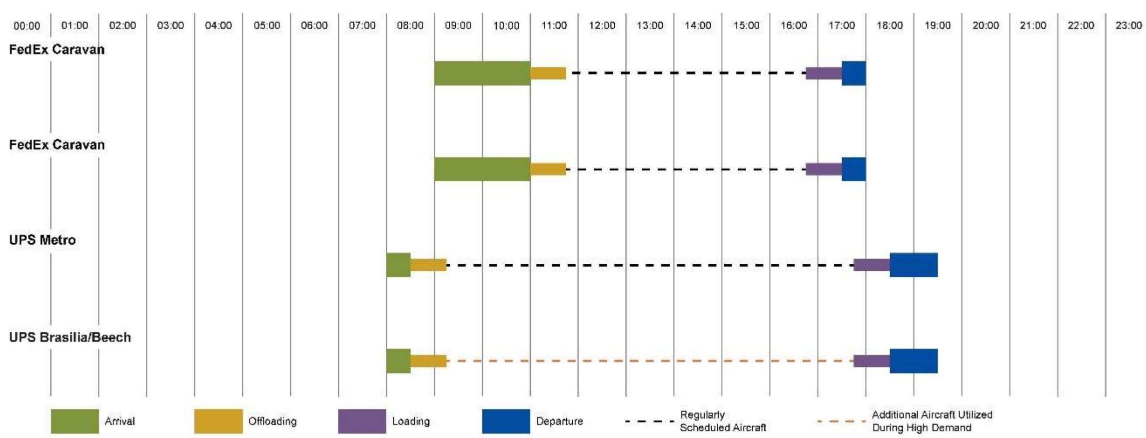
Chart 3-9 – XWA Forecasted Cargo Aircraft Operations



Source: Landrum and Brown Analysis

Inbound and outbound cargo schedule needs of both carriers result in aircraft operations occurring at similar times of day. **Exhibit 3-3** depicts the typical aircraft arrival and on-ramp active processing time as reported by the FBO. Additional discussion on ramp needs and cargo activity is included in **Chapter 4**.

Exhibit 3-3 Typical Air Cargo Schedule (2022)



3.8 Commercial Forecast Summary

A summary of the commercial aviation forecasts is shown **Table 3-21**.

Table 3-21– Commercial Forecast Summary

	Metric	2019	2026	2031	2041
Enplanements	Air Carrier	-	47,863	70,611	120,923
	Commuter/Regional	86,359	41,985	28,588	-
	Total Enplanements	**86,359**	**89,848**	**99,199**	**120,923**
Operations	Air Carrier	-	1,643	2,373	4,015
	Commuter/Regional	4,046	2,190	1,460	-
	Air Cargo	2,020	2,020	2,071	2,177
	Other Air Taxi	-	-	-	-
	Total Commercial Operations	6,066	5,853	5,904	6,192
Passenger Metrics	Avg. Seats/Operation	50.0	61.1	66.1	76.0
	Average Load Factor	84.2%	76.7%	78.3%	79.3%

Source: Williston Airport, FAA TAF and Landrum & Brown Analysis

Note: The changes from Commuter/Regional reflects a shift from 50-seat to 76-seat regional jets.

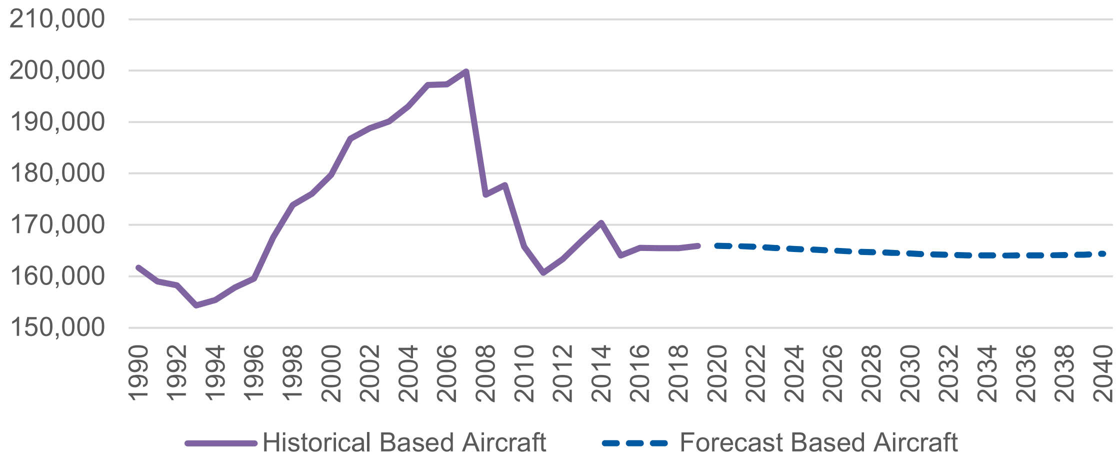
3.9 Based Aircraft Forecasts

3.9.1 Based Aircraft at the National Level

The preceding sections focused heavily on the commercial service forecasts for XWA. The steady growth of enplaned passengers and use of larger regional jet aircraft within the planning horizon exemplifies the need to continue to plan for future enhancements to the facilities directly related to air service operations. However, the commercial service forecasts only partially represent the forecasted facility needs for the airport. As such, another helpful forecast for airports to consider is the based aircraft forecast.

The FAA's definition of a based aircraft is an aircraft that is operational and airworthy, which is based at a specific facility for a majority of the year. Based aircraft can include any airworthy type of aircraft, such as gliders or ultralights; however, the FAA is mainly interested in aircraft of the following types: single-engine piston, multi-engine piston, jet (including turboprop), and helicopters, or SMJH as sometimes referred to by the FAA. A based aircraft forecast is used to estimate the amount and types of aircraft an airport can expect to regularly use all components of the airfield, and therefore are an important aspect of planning for future development at the airport. For example, based aircraft can drive the need for hangars, additional parking apron, and design standards of the airfield. Development of the based aircraft forecast for XWA includes the review of historical, existing, and forecasted data from the FAA, State, and airport management records. **Chart 3-10** illustrates historical and forecasted based U.S. aircraft nationwide.

Chart 3-10 – U.S. Based Aircraft: 1990 – 2040F



Source: FAA Forecast: 2020-2040

The FAA uses estimates of fleet size, hours flown, and utilization rates from the General Aviation and Part 135 Activity Survey (GA Survey) as baseline figures to forecast the GA fleet and activity. Since the survey is conducted on a calendar year (CY) basis and the records are collected by CY, the GA forecast is done by CY. Beginning in 2004, significant improvements were made to the methodology of the GA survey to ensure a more accurate count of based aircraft across the system. This caused large changes in both the number of aircraft and hours in many of the categories. The FAA believes the methodology improvements resulted in more accurate estimates relative to those in the past.

Forecasts of new aircraft deliveries, which use the data from General Aviation Manufacturers Association (GAMA), together with assumptions of retirement rates, produce growth rates of the fleet by aircraft categories, which are applied to the GA Survey fleet estimates. The forecasts are carried out for "active aircraft," not total aircraft. The FAA's general aviation forecasts also rely on discussions with the industry experts conducted at industry meetings, including Transportation Research Board (TRB) meetings of Business Aviation and Civil Helicopter Subcommittees conducted twice a year in January and June.

The results of the 2019 GA Survey, the latest available, were consistent with the results of surveys conducted since 2004 improvements to the survey methodology. The active GA fleet was estimated to be 211,749 aircraft in 2019 (0.0% change from 2017), as increases in fixed wing piston, fixed wing turbine, and experimental aircraft were offset by declines in rotorcraft and other aircraft (gliders and lighter than air). Total hours flown were estimated to be 25.5 million, up 1.2% from 2017. Increases in fixed wing piston and fixed wing turbine aircraft more than offset sharp declines in rotorcraft and experimental aircraft.

In 2019, deliveries of the general aviation aircraft manufactured in the U.S. increased slightly to 1,771, 1.4% higher than in CY 2019. Deliveries of single-engine piston aircraft were up 7.0% while multi-engine piston deliveries were flat. Business jet deliveries were up by 6.3%, but turboprop deliveries were down by 13.3%. Overall piston deliveries were up 6.5% while turbine shipments were down by 3.2%. Based on figures released by GAMA, they amounted to $14.0 billion in factory net billings, a record for the U.S. industry.

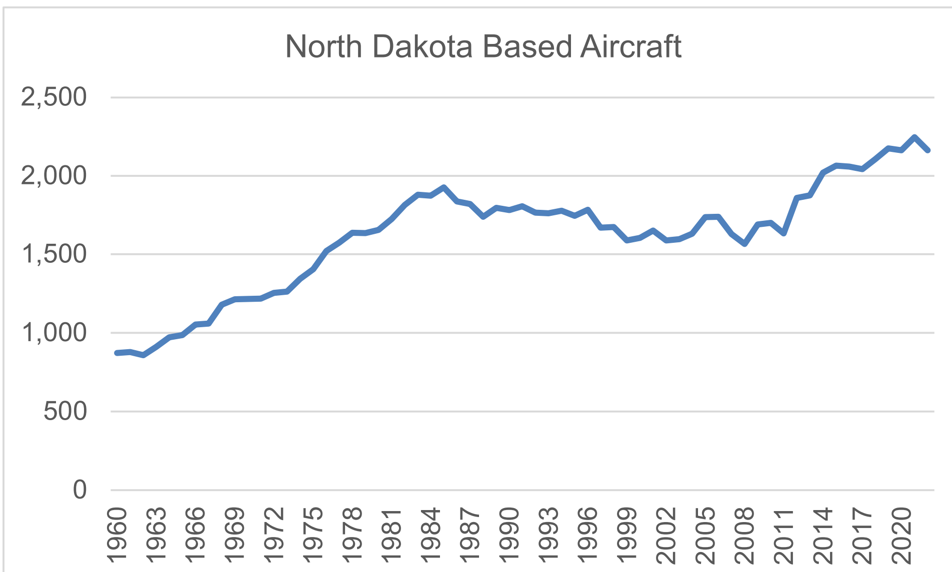
Against these current conditions, the long- term outlook for general aviation, driven by turbine aircraft activity, remains stable. The active general aviation fleet is projected to decrease slightly from its current level, as the declines in the fixed-wing piston fleet remain just above the increases in the turbine, experimental, and light sport fleets. The total active general aviation fleet changes from an estimated 212,335 in 2019 to 210,380 aircraft by 2040 (a small decline of 0.9%).

3.9.2 Based Aircraft at the State Level

All aircraft based in the State of North Dakota for more than 30 days in a calendar year are required to be registered with the North Dakota Aeronautics Commission. Aircraft registration information has been recorded in the state since 1960. This includes all airworthy aircraft.

Chart 3-11 depicts the historical based aircraft growth in the State of North Dakota. There has been significant growth from 1,860 aircraft in 2012 to 2,163 aircraft in 2022. The reported based aircraft includes historic growth in fleet owned by the University of North Dakota.

Chart 3-11 – State of North Dakota Historic Based Aircraft (1960 - 2022)

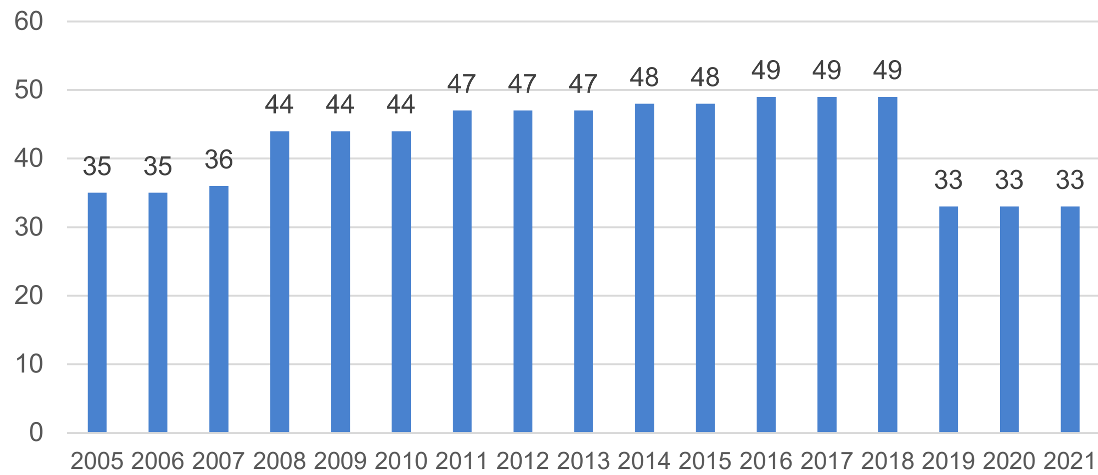


Source: North Dakota Aeronautics Commission

3.9.3 Based Aircraft at Sloulin Field (ISN) and Williston Basin International Airport (XWA)

Prior to determining the forecasted based aircraft at XWA within the 20-year planning horizon, a review of historical and existing based aircraft data was necessary. Evaluating historical trends at an airport can be useful when projecting future aviation activity levels by providing insight as to what may be expected. **Chart 3-12** depicts the historic based aircraft in Williston, reflecting historic levels at the previous Sloulin Field as well as historic levels at XWA since the airport opened. The drop in based aircraft in 2019 reflects aircraft that elected to not relocate to XWA when the airport opened. Some of these aircraft were not airworthy and some elected to relocate to another public airport or private airfield or farmstead. All active aircraft from ISN elected to relocate to XWA.

Chart 3-12 – Williston Historic Based Aircraft (ISN & XWA)



Source: FAA Terminal Area Forecast (May 2021), NDAC Aircraft Registration Records

Sources examined for the historical and existing based aircraft figures included the FAA *Terminal Area Forecast* (TAF) and the FAA Form 5010-1, *Airport Master Record* (5010). The TAF is considered the official forecast of aviation activity for U.S. airports and is often used for planning and budgeting for the implementation of capital projects. It also is a reference for historical data, as it is updated on an annual basis.

In 2019, there were 33 XWA based aircraft according to NDAC Based Aircraft records, which reflect aircraft registration data. Although the base forecast year is 2019, it is important to note that by 2022 the based aircraft has grown to 35. Availability for hangar space is low in the area and this will likely limit growth in the future. The forecast below will focus upon GA-based aircraft.

3.9.4 XWA Based Aircraft Forecast Methodologies and Analysis

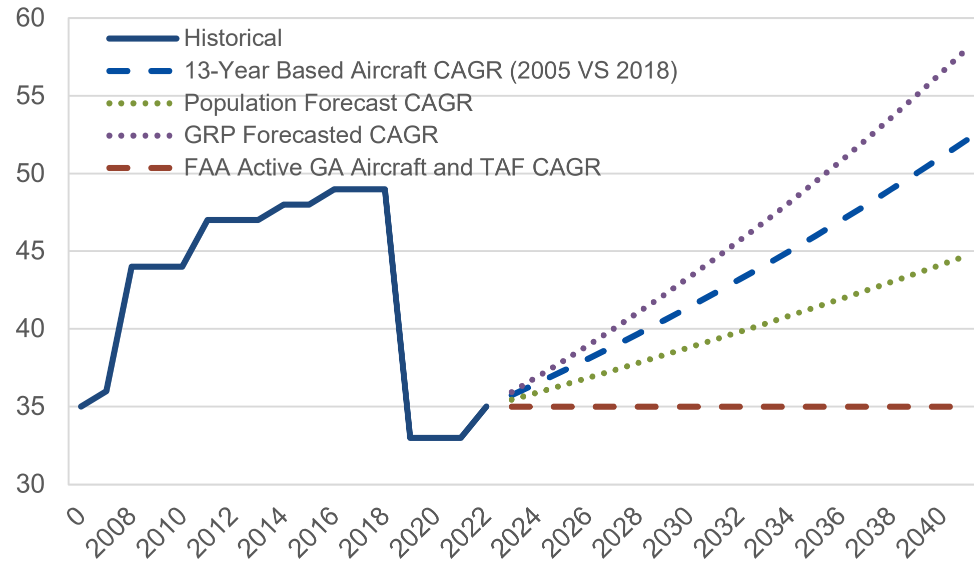
Typical forecast methodologies used to predict based aircraft at airports are very similar to those utilized in the earlier passenger forecast. These include time series (trend), economic variables, regression, and market share analyses. These methods incorporate data from the FAA TAF and Aerospace Forecasts, airport management records, as well as other demographic and socioeconomic data. The specific forecasting methods applied to estimate based aircraft at XWA for the next 20 years included the following:

- Population growth (CAGR) from the air service area
- 13-year XWA based aircraft CAGR (average growth rate from 13 years leading up to airport relocation)
- GRP growth (CAGR) from the air service area
- FAA Active GA Aircraft Forecasted CAGR

The outcomes produced by the forecasting methodologies listed are depicted in **Chart 3-13.** For comparative purposes, the historical and forecasted FAA TAF based aircraft are also included;

the 2021 TAF published forecasts 0% growth in based aircraft. It appears that possibly the TAF has not been updated for some time as it pertains to based aircraft.

Chart 3-13 – XWA Based Aircraft Forecast Methods



Note: Chart includes growth built off a 2022 based aircraft count of 35

Source: Landrum and Brown Analysis; FAA TAF

Discussions with the FBO and Airport Management documented an increase in flight training from residents in the region. This indicates an increased interest in general aviation and likely future GA aircraft ownership. In addition, the FBO has indicated an overall increase in flight training. These factors lean towards selection of a forecast with positive growth in based aircraft. The population forecast methodology was selected as the based aircraft forecast. It is summarized in **Table 3-22**.

Table 3-22 – Based Aircraft Forecast at the Airport

Metric	2019	2022	2026	2031	2041	CAGR
Total Based Aircraft	33	35	37	39	45	1.3%

Note: 2022 is actual based aircraft count reported by the airport.

Source: Landrum & Brown Analysis

3.9.5 XWA Based Aircraft Mix

The estimate of based aircraft over the 20-year planning horizon at an airport can be further broken down into an aircraft fleet mix, or the types of aircraft, expected to be based at the airport during period. The existing breakdown of the types of aircraft based at the airport is reviewed, and then typically the preferred based aircraft forecast growth rate is applied to the forecasted based aircraft within each planning period, which in turn determines the forecasted fleet mix of based aircraft at the airport. The results of the based aircraft fleet mix are then utilized to determine if the airport's existing facilities will be able to meet the forecasted demand. This will be addressed in the subsequent facility requirements portion of the report.

Again, for context, the FAA *Aerospace Forecast, Fiscal Years (FY) 2020-2040*, includes the following fleet mix projections at the national level as well as the following local considerations.

- **Fixed-wing piston** powered aircraft are projected to decline at an average annual rate of 1.8% over the next 20 years. Although these will decrease at the national level, it is expected that the local recreational pilot may be most likely to begin aircraft ownership in this category of aircraft.
- **Turbine-powered piston (turboprop)** and rotorcraft fleets are projected to increase at an average annual rate of 2.0%. This is the most likely business type aircraft to base at XWA.
- **Turbine jet aircraft** are projected to increase at an average annual rate of 2.2%. After turboprop aircraft, turbine jet aircraft are the next most likely to be a new based aircraft serving business users in the region. Additionally, personal jets such as the Cirrus Jet are growing in the market and may be likely to serve personal/recreational as well as business needs in the XWA area.

The forecasted based aircraft are broken out by aircraft type in **Table 3-23**.

Table 3-23 – Mix of Based Aircraft Forecast at the Airport

Year	Piston Single Engine	Turbine Single Engine	Piston Multi Engine	Turbine Multi Engine	Jet	Rotorcraft	Total
2019 (Existing baseline)	25	2	4	0	0	2	33
2022[1]	27	2	3	0	0	3	35
2026	27	2	4	1	0	3	37
2031	29	2	4	0	1	3	39
2041	36	2	3	0	1	3	45

[1]Note: 2022 is actual based aircraft count reported by the airport.

Source: FAA Report 5010, Landrum and Brown Analysis

Stakeholder activity may drive a stronger than forecasted activity in based aircraft. This could include expansion of the flight training program at the FBO, which would result in additional based aircraft to meet flight training activity levels. The airport should continue to monitor demand for hangars and based aircraft. Additionally, actions taken by the airport or hangar developers, such as construction of a multi-aircraft hangar (T-hangar) may attract based aircraft to the airport and result in higher levels of future based aircraft.

The facility recommendations and alternatives will consider scenarios that include hangar development for alternative higher forecasts of based aircraft. This will ensure that the airport has the planning in place to accommodate changing demand in based aircraft.

3.10 General Aviation Operations Forecast

To understand total activity levels at XWA, general aviation annual operations forecasts were also developed for the 20-year planning period. General aviation operations include all aircraft operations other than the commercial service and air taxi operations described earlier in this chapter, as well as military operations. Furthermore, these operations can be broken into either itinerant or local operations.

Like the based aircraft forecast, general aviation operations forecasts provide airports with information that can be useful for future development planning. For context, a brief discussion on general aviation operational trends at the national level is also provided.

3.10.1 General Aviation Operations at the National Level

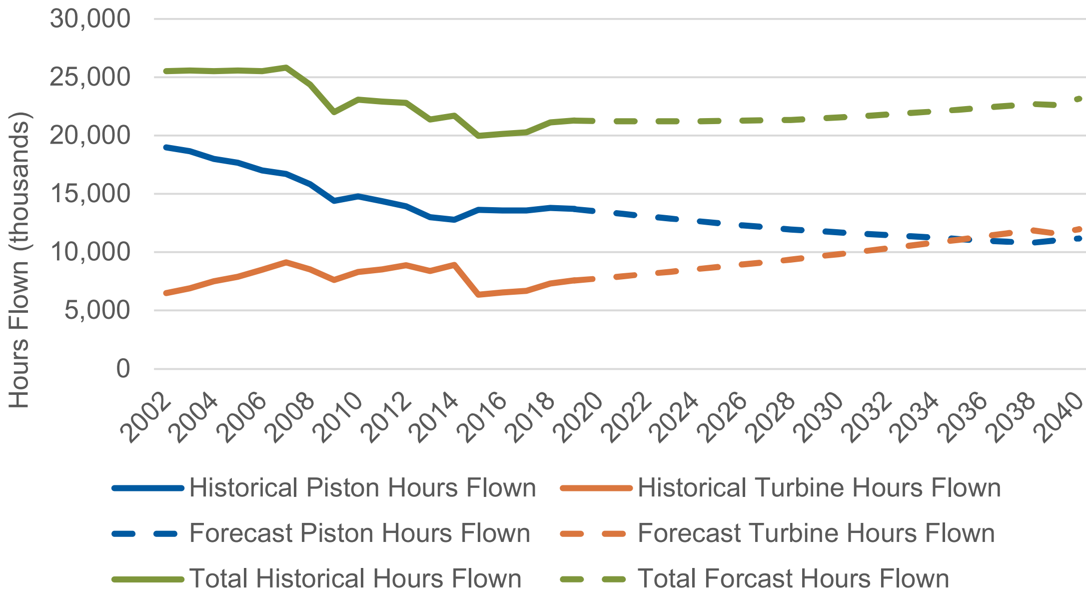
Although the total active general aviation fleet is projected to marginally decline, the number of general aviation hours flown is forecast to increase an average of 0.7% per year through 2040, as the newer aircraft fly more hours each year. Fixed wing piston hours are forecast to decrease by 1.0%, the same rate as the fleet decline. Countering this trend, hours flown by turbine aircraft (including rotorcraft) are forecast to increase 2.2% yearly between 2019 and 2040. Jet aircraft are expected to account for most of the increase, with hours flown increasing at an average annual rate of 2.7% over the forecast period. The large increases in jet hours result mainly from the increasing size of the business jet fleet.

Historically, the number of general aviation (GA) and air taxi (AT) hours flown nationally has decreased by 11% since 2001. This decline can be attributed to the economic downturn of the early 2000s, the recession of the late 2000s, and increasing operating costs driven by fuel prices. But total GA and AT hours have been steadily increasing since 2012, and ultimately could reach slightly just above the flight hours flown in 2002 by 2040.

Within the overall GA and AT activity category, piston-powered and turbine-powered aircraft have seen a reversal in their activity starting in 2001. Since this time, there has been increased demand for the use of turbine-powered aircraft, and as such, active turbine hours have increased steadily since 2001 (excluding the economic recession years from 2008-2011). These aircraft include turboprop and turbojet aircraft primarily used for corporate business travel. More corporate and business operators, large and small, are using GA aircraft for their transportation needs to save time and reduce costs. The number of turbine aircraft hours flown has increased an average of 3.1% annually. Helicopters, which are also used by corporations, have also seen steady increases in hours flown. Conversely, the number of piston-powered aircraft hours flown has decreased 0.89% annually. Although these types of aircraft still comprise the majority of general aviation aircraft in the U.S., they are used primarily for recreational and flight training purposes. Decreases can be attributed to higher ownership costs, increased fuel prices, economic downturn, and a decreasing pilot population. Multi-engine piston aircraft have particularly seen a reduction with decreases of 2.0% annually. These aircraft types are being replaced by newer, more efficient turboprop aircraft for business travel.

The trend of strong growth in corporate aircraft, and steady or decreased use of piston aircraft, is expected to continue over the planning period. The number of turbine aircraft hours flown (including rotorcraft) is expected to increase 2.4% annually. The largest segment of the turbine aircraft increase in flight hours will be attributed to jet aircraft, particularly the larger corporate GA aircraft types; hours flown are anticipated to increase at 3% annually. Piston aircraft hours flown are expected to decrease at a rate of 0.8% annually (similar to the fleet reduction rate). Again, this decrease can be attributed in part to upgrades to newer turbine-powered aircraft types, but also in part due to the increased cost of flying and activity sensitivity to economic conditions. The historical and projected general aviation and air taxi active hours flown at the national level are depicted in **Chart 3-14**.

Chart 3-14 – U.S. General Aviation and Air Taxi Hours Flown

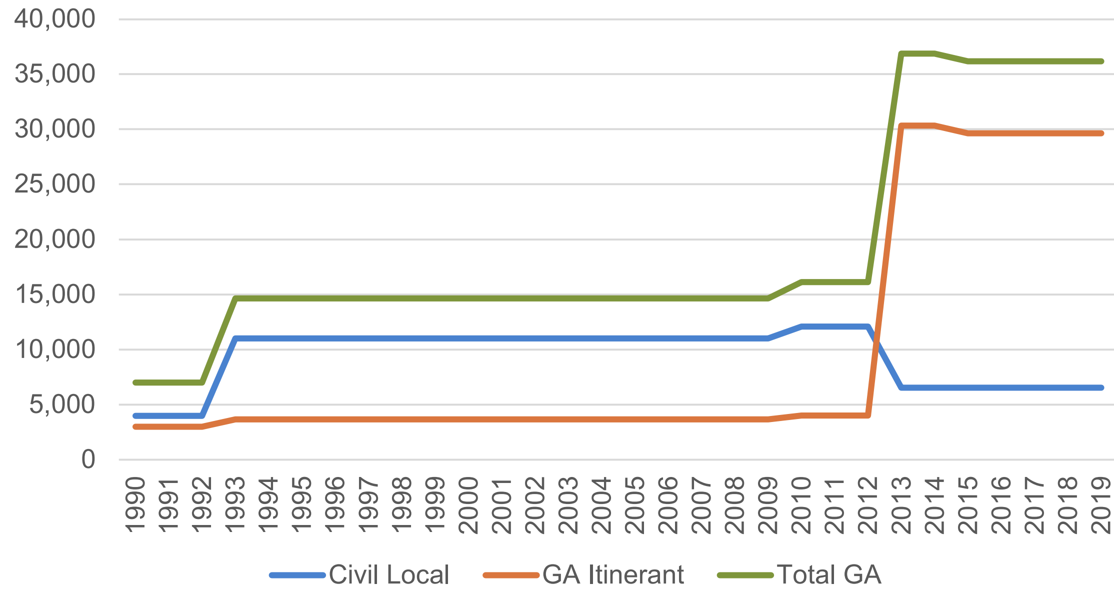


Source: FAA Aerospace Forecast (2020-2040)

3.10.2 General Aviation Annual Operations at XWA

As previously mentioned in the preceding sections, many factors have the potential to affect general aviation activity at airports, most notably those related to local and regional socioeconomic and demographic factors. Furthermore, GA activities at an airport vary depending on its pilot base, geographic location, and services offered, just to name a few. Historical operations for XWA from 1990-2019 are illustrated in **Chart 3-15**. It appears that the XWA TAF has not been updated for some time, as total GA operations are relatively unchanged since 2013.

Chart 3-15 – Williston General Aviation Operations (Itinerant & Local)



Source: XWA May 2021 TAF

Because there is no air traffic control tower at XWA, estimating the total number of aircraft operations can be challenging. The 2019 total operations were estimated to be 36,179. For aircraft that have filed flight plans and operate under Instrument Flight Rules (IFR), the FAA compiles records of flights at an airport which are reported on the FAA's Traffic Flow Management System (TFMSC). The total 2019 operations documented in TFMSC for both ISN and XWA are 10,087. Many GA operators may not operate under IFR conditions. This includes a significant amount of the flight training operations, a majority of agricultural operations, recreational flights and some business flights.

Data from Automatic Dependent Surveillance-Broadcast (ADS-B) transponders recently became available from the FAA at some airports. This data reports flight activity including location and altitude by aircraft with specific types of transponders. Beginning in 2020, aircraft flying is certain types of controlled airspace are required by FAA to have ADS-B transponders installed on their aircraft. ADS-B provides traffic alerts, weather, and flight information services to aircraft, improving safety and efficiency. Some aircraft operating at XWA likely do not enter controlled airspace that requires ADS-B and may not be required to have this particular type of transponder (example: some small GA aircraft and agricultural aircraft). Although the data is not completely inclusive of all aircraft operations, it can be a valuable data set to help determine aircraft activity.

In 2019, there were 1,107 total departures and 1,129 arrivals, totaling 2,236 total reported operations that were counted using ADS-B records. Because the 2019 data set only includes XWA operations and not ISN, 2020 operations were also evaluated. The 2020 operations included 3,240 departures and 3,299 arrivals, totaling 6,539 total reported operations. At airports with high amounts of recreational GA and agricultural operations similar to XWA, aircraft often do not have the transponder that will report this data. Additionally, there appear to be gaps in the reported data. For example, in 2019 there were 361 C-II arrivals; however, there were 1,378 C-II departures. Based on observations of gaps in the reported data, this data set is not considered an accurate report of activity from aircraft with equipped with ADS-B. Therefore, this data set, similar to TFMSC, is only a snapshot of current activity levels and cannot be used as the sole count of GA operations. As more aircraft transition to Mode C transponders utilizing ADS-B, this data set will become more accurate for XWA and should be consulted for future master planning or forecasting efforts.

For the purposes of this forecast document the total operations are estimated to be **36,179**.

The majority of XWA's GA activity comes from regional medical, selected business (including heavy use by the oil and gas industry) and local GA entities. The heaviest GA users (source: FlightAware) are Richland Aviation (Cessna 340 aircraft), Medevac Executive Air (King Air 200s), North Dakota Game & Fish (Cessna T182s), Executive Air Taxi (King Air 200s), Lynch Flying Service (King Air 200s), Bismarck Air Medical (King Air 200s), Dakota Cross Winds (Cirrus SR-22 aircraft) and Hauger's Hangar. Several of these users are based out of Bismarck or Montana (Sidney or Glasgow). Historically, the biggest industry drivers of GA activity came from both the construction and particularly the oil industry. A significant increase in GA itinerant operations was reported beginning in 2012 with the increase in oil industry activity in the region.

GA flight activity throughout a 24-hour period can vary greatly, although based upon recent activity (source: FlightAware) it appears that there is a heavy emphasis during the early-to-mid morning hours, with a focus between the hours of approximately 6am to 10 am. **Table 3-24** is a recent snapshot of activity that includes commercial activity.

Table 3-24 – XWA Arrivals & Departures Snapshot

XWA Arrivals				XWA Departures			
Identifier	Aircraft Type	From	Arrival Time	Identifier	Aircraft Type	From	Departure Time
N2075Q	C77R	Minot Intl (KMOT)	05:13p CST	Executive Air	BE20	Minot Intl (MOT)	04:07p CST
N963DM	SR22	Minot Intl (KMOT)	11:50a CST	N93AM	BE9T	Bismarck Muni (KBIS)	02:04p CST
SkyWest	CRJ2	Denver Intl (DEN)	11:03a CST	N799GF	C82S	Bismarck Muni (KBIS)	01:40p CST
Corporate Air	C208	Hector Intl (KFAR)	10:30a CST	SkyWest	CRJ2	Denver Intl (DEN)	11:52a CST
N799GF	C82S	Bismarck Muni (KBIS)	09:13a CST	N2075Q	C77R	Bismarck Muni (KBIS)	10:49a CST
Lynch Flying Serv.	BE20	Billings Logan Intl (KBIL)	09:02a CST	Encore Air Cargo	SW4	Hector Intl (KFAR)	09:22a CST
N93AM	BE9T	Minot Intl (KMOT)	08:49a CST	N963DM	SR22	Minot Intl (MOT)	09:06a CST
Encore Air Cargo	SW4	Hector Intl (KFAR)	08:35a CST	WIS101	C310	Bismarck Muni (KBIS)	06:52a CST
N901BA	BE20	Bismarck Muni (KBIS)	08:13a CST	Richland Av.	C340	Sidney-Richland Rgnl (KSDY)	05:44a CST
Encore Air Cargo	SW4	Hector Intl (KFAR)	08:01a CST	Corporate Air	C208	Hector Intl (KFAR)	05:25a CST
Dakota Cross Winds	SR22	Bismarck Muni (KBIS)	07:45a CST	Encore Air Cargo	SW4	Hector Intl (KFAR)	04:10a CST
WIS101	C310	Hector Intl (KFAR)	06:34a CST	SkyWest	CRJ2	Denver Intl (DEN)	09:42p CST
Richland Av.	C340	Bismarck Muni (KBIS)	05:32a CST	SkyWest	CRJ2	Minneapolis/St Paul Intil (MSP)	06:39p CST
Executive Air	BE20	Minot Intl (KMOT)	03:27a CST	Medevac	BE20	Minot Intl (MOT)	06:00p CST
SkyWest	CRJ2	Denver Intl (DEN)	09:00p CST	C-FVCC	BE20	Provo Muni (KPVU)	05:58p CST
SkyWest	CRJ2	Minneapolis/St Paul Intil (MSP)	05:54p CST				

3.10.3 XWA General Aviation Operations Forecasts

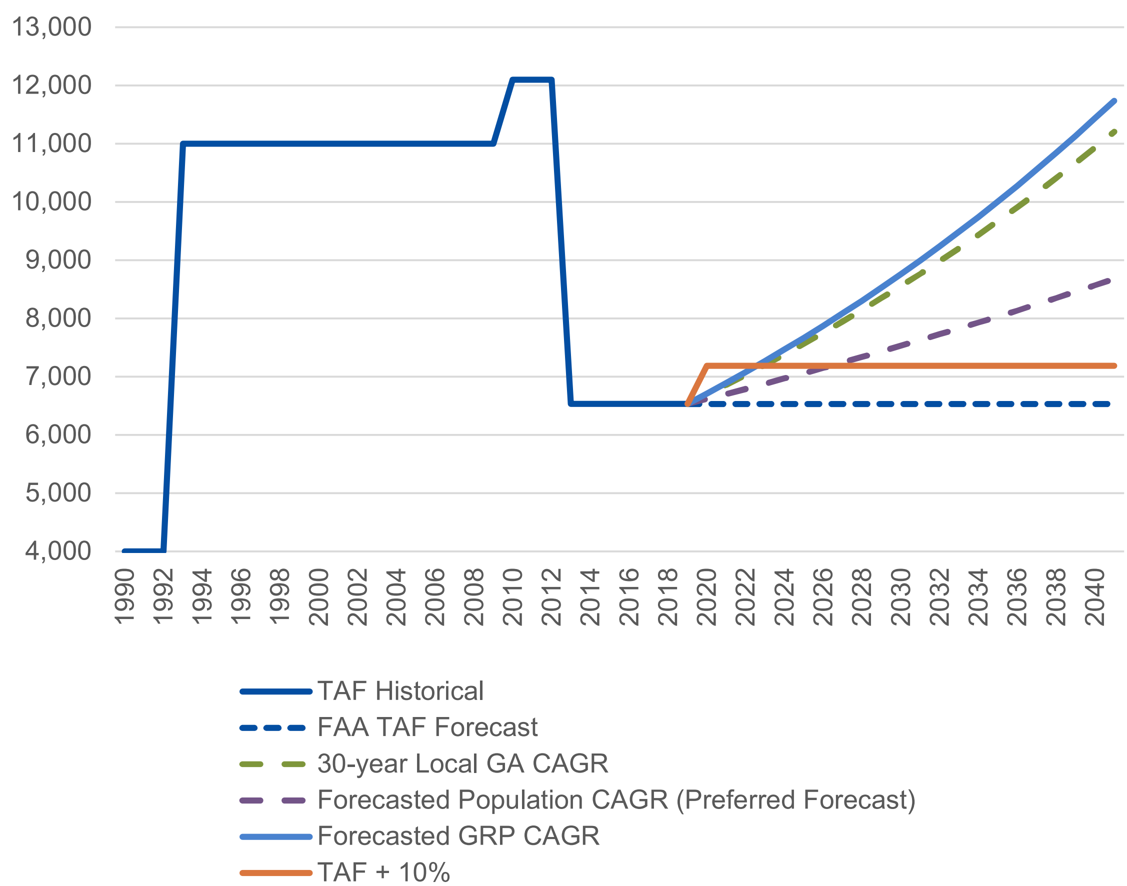
3.10.3.1 Local (GA Civil) Operations Forecast

A local operation is defined as operations that are performed by aircraft that remain within the local traffic pattern, generally within 20 miles of XWA (departing from and returning back to XWA). These operations typically include practice landings, touch-and-go's, practice approaches and maneuvering in the local area. GA local operations are usually conducted by recreational and flight training aircraft.

Chart 3-16 illustrates both long-term trends and various forecasts methodologies for local civil operations. Tied in part to historical trends, specific forecasting methods were applied to estimate local civil operations at XWA for the next 20 years. This included the following:

1. FAA TAF Forecast (no growth).
2. 30-year Local GA operations CAGR of 2.48%
3. Forecasted Air service area population CAGR of 1.3%
4. Forecasted Air service area GRP CAGR of 2.7%
5. FAA TAF Forecast +10% = 0.5% CAGR (preferred forecast).

Chart 3-16 – XWA Civil Local Operations Forecast Methods



Source: FAA Terminal Area Forecast, Landrum and Brown Analysis

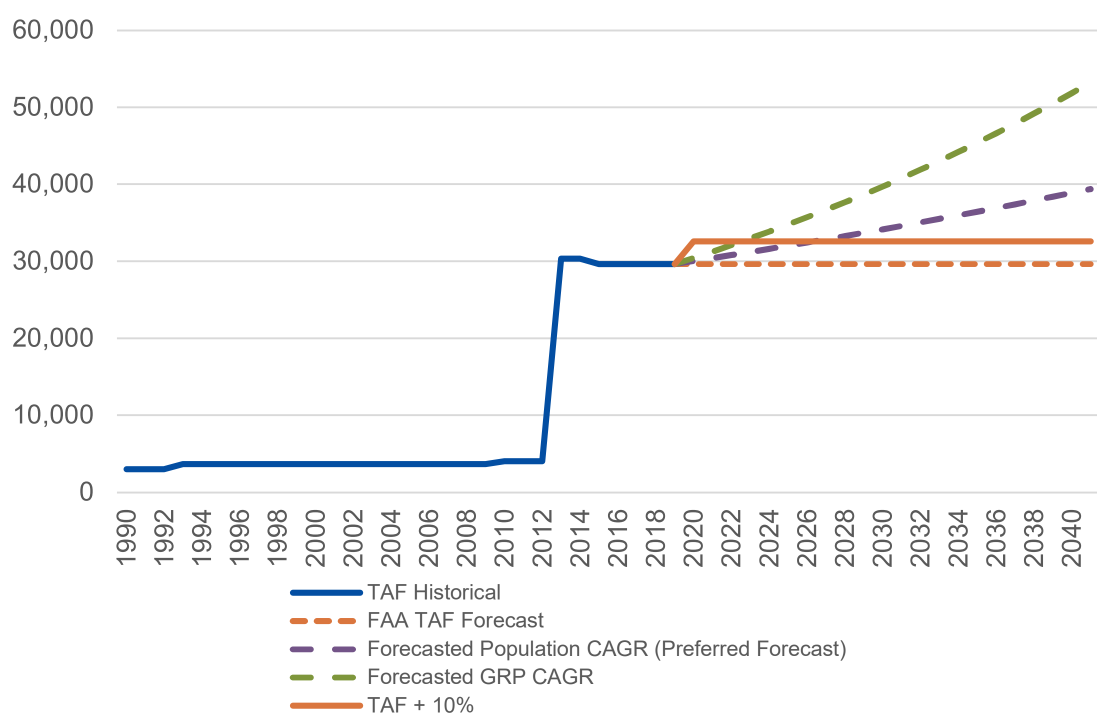
The TAF appears as to not haven been updated for some time, and the TAF projects no growth throughout the forecast period. Given the expected economic and population growth in the region, this seems extremely pessimistic. The population growth methodology was used, which equates to 1.3% CAGR. This equates to 8,680 forecasted local GA operations through the forecast period.

3.10.3.2 Itinerant Operations Forecast

An itinerant operation is defined as a landing or departure from another airport, typically in excess of 20 miles from XWA. GA itinerant operations are conducted by all types of aircraft. Again, there are several categories of itinerant operations that the FAA records; itinerant operations by air carrier, air taxi, and commuter aircraft were captured within the commercial service forecast section, and itinerant military operations are also included in a subsequent section. The forecast presented here only reflects itinerant operations projections for GA aircraft at XWA. **Chart 3-17** illustrates both long-term trends and various forecasts for GA itinerant operations. Tied in part to historical trends, specific forecasting methods were applied to estimate itinerant GA operations at XWA for the next 20 years. This included the following:

1. FAA TAF Forecast (no growth).
2. 30-year GA itinerant operations CAGR of 2.48%
3. Forecasted Air service area population CAGR of 1.3% (preferred forecast).
4. Forecasted Air service area GRP CAGR of 2.7%
5. FAA TAF Forecast +10% = 0.5% CAGR

Chart 3-17 – Williston General Aviation Itinerant Operations Forecast Methods



Source: FAA Terminal Area Forecast, Landrum & Brown Aviation Analysis

Again, the TAF appears as to not haven been updated for some time, and the TAF projects no growth throughout the forecast period. Given the expected economic and population growth in the region, this seems extremely pessimistic. Hence, again population growth will be relied on as the best methodology in forecasting itinerant operations during the forecast period. This results in a 1.3% CAGR for the forecast period. This equates to 39,389 forecasted local GA operations through the forecast period.

3.10.3.3 General Aviation Operations Forecast Summary

A summary of the local civil and itinerant GA operations forecasts for XWA are shown below. It is expected that overall GA operations will grow at a 0.7% CAGR over the next 20 years. This is below expected economic growth from the region. Because a higher growth rate may occur depending on actual future economic and population conditions, the facility recommendation and alternatives discussed later in this master plan will consider more aggressive operations forecast scenarios to ensure the airport has the appropriate planning in place to meet activity levels that surpass the selected forecast.

Key drivers for increased GA activity will be continued population and economic growth, including the oil and construction industries, but also by newer industries that have recently added facilities into the air service area as discussed earlier in this chapter. **Table 3-25** summarizes the preferred GA forecasts.

Table 3-25 – General Aviation Forecast Summary

Metric	2019	2026	2031	2041	CAGR
Local Operations	6,533	7,151	7,628	8,680	1.3%
Itinerant Operations	29,646	32,451	34,616	39,389	1.3%
Total Operations	**36,179**	**39,602**	**40,244**	**48,069**	**1.3%**
Local Share	18%	18%	18%	18%	
Itinerant Share	82%	82%	81%	79%	

Source: Landrum and Brown Analysis

3.11 Military Operations

There is limited military activity in the region. It is assumed that 50 annual operations shown in the TAF will be used for this forecast throughout the forecast period.

3.12 XWA Aircraft Operations Mix: 2019 and 2041 Forecast

The TFMSC provides a great deal of information about each aircraft performing an operation, such as its aircraft approach category (AAC) and aircraft design group (ADG); however, it only provides data for aircraft that file an Instrument Flight Rules (IFR) flight plan to or from an airport, and thus represent only a small percentage of the airport's total operations. Tied to this, IFR data will be biased toward relatively larger aircraft, particularly aircraft used for commercial purposes. Still, because the data provides the aircraft's make and model, and other information such as the Airplane Approach Category ACC (A-E) and Airplane Design Group ADG (I-VI), it is useful data for planning purposes to use in determining the common types of aircraft that utilize the Airport and how often. A review of that data was completed for the Fiscal Year 2019. That summary is below, including an updated forecast of 2041 activity by aircraft type. That is shown in **Table 3-26** below.

Table 3-26 Operations by Common Aircraft Type (IFR Only)

Estimated Operations by Aircraft Type: FY 2019 vs 2041 Forecast

Aircraft Type	FY 2019 Operations	Comments	2041 Operations
E145 - Embraer ERJ-145	2,174	Pax Aircraft	0
CRJ2 - Bombardier CRJ-200	1,802	Pax Aircraft	0
C208 - Cessna 208 Caravan	1,050	Fed Ex Aircraft	1,050
SW4 - Swearingen Merlin 4/4A Metro2	1,025	UPS Aircraft	1,025
E-175/CR9 - Larger, 76-seat RJs	0	Pax Aircraft	4,015
BE20 - Beech 200 Super King	703		773
BE9L - Beech King Air 90	482		530
PC12 - Pilatus PC-12	306		337
J328 - Fairchild Dornier 328 Jet	298		328
C56X - Cessna Excel/XLS	227		250
E45X - Embraer ERJ 145 EX	179	Pax Aircraft	0
B190 - Beech 1900/C-12J	152		167
P46T - Piper Malibu Meridian	102		112
E120 - Embraer Brasilia EMB 120	100		110
C560 - Cessna Citation V/Ultra/Encore	90		99
E55P - Embraer Phenom 300	84		92
B350 - Beech Super King Air 350	82		90
C402 - Cessna 401/402	68		75
SR22 - Cirrus SR 22	68		75
LJ45 - Bombardier Learjet 45	65		72
C525 - Cessna CitationJet/CJ1	63		69
Sub-Total	9,120		9,269
All Other	924		1,016
Total	10,044		10,285

** Source: FAA Traffic Flow Management System Counts (TFMSC), Landrum and Brown Analysis*

3.13 Critical Aircraft Design

The critical design aircraft is the most demanding aircraft type, or grouping of aircraft with similar characteristics, that make regular use of the airport. FAA defines regular use as 500 annual operations.

Table 3-27 2019 TFMSC Activity by Aircraft Grouping

Airplane Design Group	2019 Operations		Airplane Approach Category	2019 Operations
I	1,285		A	726
II	**8,619**		B	4,927
III	130		**C**	**4,360**
IV	3		D	24

Source: FAA Traffic Flow Management System Counts (TFMSC)

Table 2-27 summarizes the existing and forecast critical aircraft. The mid and long-term critical aircraft is a C-III which is represented by the ERJ E-175 which is the forecasted commercial aircraft. Although C-III is the forecasted critical aircraft (most demanding aircraft with at least 500 operations), it is expected that Airplane Design Group III operations (3 in 2019) and Airplane

Approach Category D operations (24 in 2019) will continue to increase. These larger aircraft are likely to be used to meet itinerant user needs such as those from the oil and gas industry. Additionally, the FBO is forecasting an increase in international traffic utilizing the airport for Tech Stops. These operations are likely to include some ADG IV and AAC D aircraft. It should also be noted that Sun Country Airlines generated 52 operations in 2021 and has 60 operations scheduled for all of 2022, using the 186-seat 737-800 aircraft (D-III). While increased use of this aircraft is possible going forward, it isn't likely that use of this aircraft will meet the critical threshold of 500 annual operations in any of the forecast scenarios.

Table 3-28 – Critical Design Aircraft

Period	Aircraft	RDC	Operations				
			2019	2022[1]	2026	2031	2041
Existing	CRJ 200 or CRJ 700	C-II	4,046	2,805	2,190	1,460	-
Mid & Long-Term	E-175 or CRJ 900	C-III	-	156	1,643	2,373	4,015
MTOW = Maximum Takeoff Weight (pounds), RDC = FAA Runway Design Code							
[1]*Note: 2022 is actual operations through Sept. 30, 2022 and estimated operations through the end of the calendar year.*							

** Source: Landrum and Brown Analysis*

3.14 Peak Activity

Peak periods evaluated include the peak month, design day and design hour characteristics for passenger enplanements and airport operations. The results of the peak activity forecasts will be used to determine the airport facility requirements. The methodology developed is derived from **Airports Cooperative Research Program (ACRP) Report 25: *Airport Passenger Terminal Planning and Design***, which emphasizes the use of design periods to forecast use patterns rather than individual absolute peak periods.

Peak Month

The peak month of passenger airline activity was determined by reviewing the prior year of monthly passenger enplanement figures for the airport. This method evaluates historic patterns of passenger activity to identify the peak month. The peak month was determined to be July 2019 with 9.69% of the annual enplanements for Calendar Year 2019, which is generally consistent with other calendar years reviewed.

Table 3-29 Peak – Month Passenger & Operations Activity Forecast

Metric	2019	2026	2031	2041
Annual Enplanements	**86,359**	**89,848**	**99,199**	**120,923**
Peak Month Enplanements (9.69%)	8,368	8,706	9,612	11,717
Annual Operations (commercial and GA combined)	42,350	45,765	45,818	46,109
Peak Month Operations (9.72%)	4,116	4,448	4,454	4,482

Source: Landrum and Brown Analysis, BTS Report T100, and Innovata (via Diio)

The peak month of airport operations was determined by reviewing the last full year prior to COVID (2019) of monthly passenger aircraft operations and assuming that General Aviation followed similar peaking. This method evaluates historic patterns of airport operations activity to identify the peak month. The peak month was determined to be July 2019 with 9.72% of operations. This is summarized in **Table 2-29**.

<u>Design Day</u>

The average peak weekday during the peak month is considered the design day. Design day activity is determined by evaluating actual flight schedules rather than using a pure average or an individual daily peak. Reviewing the average day during the peak month allows for planning for a peaking period rather than a single event which may cause overestimating. Peak days occur on weekdays for the sample periods at XWA.

To estimate design day passenger volume, scheduled passenger departing seat schedules were analyzed. For the peak enplaned passenger month (July 2019), there were 10,050 departing seats scheduled on passenger airlines during the month. The average week during this peak month was 2,269 departing seats. The peak day during this month was 350 departing seats. The peak design day is calculated at 15.4% of the average week.

The enplanements and operations forecast for the design day is summarized in **Table 2-30**.

Table 3-30 – Design Day Passenger & Operations Activity Forecast

Metric	2018	2023	2028	2038
Peak Month Enplanements	8,368	8,706	9,612	11,717
Avg. Week Peak Month Enplanements	1,890	1,966	2,170	2,646
Design Day (16.0%) Enplanements	302	314	347	423
Peak Month Operations	4,116	4,428	4,454	4,482
Avg. Week Peak Month Operations	953	1,026	1,027	1,034
Design Day (15.4%) Operations	147	158	158	159

Source: Landrum and Brown Analysis

Design Hour

The design hour is based on the flight schedules during a design day. Using the terminal planning guidance from **ACRP Report 25**, peak hour assumes passengers arrive to the airport 60 minutes prior to departure and remain at the airport up to 60 minutes after arrival. The July 2019 flight schedule was used to review a rolling peak in 10-minute intervals. The Design Hour forecast is shown in **Table 2-31**.

Table 3-31 Design Hour Passenger Airline Activity

Metric	2018	2023	2028	2038
Peak Month Design Day Enplanements	302	314	347	423
Design Hour Enplanements (17.3%)	52	54	60	73
Design Hour Deplanements (17.3%)	52	54	60	73
Design Day Operations	147	158	158	159
Design Hour Operations (11.4%)	17	18	18	18

Source: Landrum and Brown Analysis

3.15 Forecast Summary

The FAA templates to compare the proposed forecasts to the 2021 published FAA Terminal Area Forecast follow. The Aviation Forecasts were approved by the FAA on January 23, 2023, for use in this master planning effort.

Table 3-32 – Airport Master Plan Forecast Summary

Williston Basin International Airport: Master Plan Forecast

					CAGR (vs 2019)		
	2019	2026	2031	2041	2026	2031	2041
Passenger Enplanements							
Air Carrier	-	47,863	70,611	120,923	N/A	N/A	N/A
Commuter	86,359	41,985	28,588	-	-13.4%	-10.5%	-
Total	86,359	89,848	99,199	120,923	0.6%	1.2%	1.5%
Operations							
Itinerant							
Air Carrier	-	1,643	2,373	4,015	N/A	N/A	N/A
Commuter	4,046	2,190	1,460	-	-8.4%	-8.1%	N/A
Air Cargo	2,020	2,020	2,071	2,177	0.1%	0.2%	0.3%
Air Taxi	-	-	-	-	N/A	N/A	N/A
Total Commercial	6,121	5,918	5,971	6,262	-0.5%	-0.2%	0.1%
General Aviation	29,646	32,451	34,616	39,389	1.3%	1.3%	1.3%
Total Itinerant	35,712	38,304	40,520	45,581	1.0%	1.1%	1.1%
Local							
General Aviation	6,533	7,151	7,628	8,680	1.3%	1.3%	1.3%
Military	50	50	50	50	0.0%	0.0%	0.0%
Total Operations	42,295	45,505	48,918	54,311	1.1%	1.1%	1.1%
Peak Hour Operations	17	18	18	18	1.1%	0.6%	0.3%
Enplaned Air Freight (Tons)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Based Aircraft	33	37	39	45	1.3%	1.3%	1.3%
Operational Factors							
Average Aircraft Size							
Air Carrier	76	76	76	76	0.0%	0.0%	0.0%
Commuter	50	50	50	50	0.0%	0.0%	-
Total	50	61	66	76	4.1%	2.8%	2.1%
Enplaned Load Factor							
Air Carrier	-	76.7%	78.3%	79.3%	N/A	N/A	N/A
Commuter	84.8%	76.7%	78.3%	-	-2.0%	-0.8%	-
Total	84.2%	76.7%	78.3%	79.3%	-1.8%	-0.7%	-0.3%

* Source: Landrum and Brown Analysis; 2019: May 2021 XWA TAF and for air cargo operations, airport statistics

Table 3-33– Airport Master Plan Forecast Comparison

Williston Basin International Airport (XWA)
Airport Planning versus FAA TAF Forecast

	Year	Airport Forecast	2021 FAA Terminal Area Forecast (TAF)	AF/TAF % Difference
Passenger Enplanements				
Base Yr.	2019	86,359	86,359	0.0%
Base Yr. +5 Years	2026	89,848	88,406	1.6%
Base Yr. +10 Years	2031	99,199	95,326	4.1%
Base Yr. +20 Years	2041	120,923	110,519	9.4%
Total Operations				
Base Yr.	2019	42,295	40,983	3.2%
Base Yr. +5 Years	2026	45,505	41,871	8.7%
Base Yr. +10 Years	2031	48,198	42,141	14.4%
Base Yr. +20 Years	2041	54,311	42,778	27.0%
Based Aircraft				
Base Yr.	2019	33	49	
Base Yr. +5 Years	2026	37	49	
Base Yr. +10 Years	2031	39	49	
Base Yr. +20 Years	2041	45	49	