CHAPTER 2
FORECASTS

An important factor when planning the future needs of an airport involves a definition of aviation demand that may reasonably be expected to occur in the near term (5 years), intermediate term (10 years), and long term (20 years). Aviation demand forecasting for Sawyer County Airport (HYR) will primarily consider based aircraft, aircraft operations, peak activity periods, and the critical aircraft.

The Federal Aviation Administration (FAA) has oversight responsibility to review and approve aviation forecasts developed in conjunction with airport planning studies. The FAA will review individual airport forecasts with the objective of comparing them to its *Terminal Area Forecasts* (TAF) and the *National Plan of Integrated Airport Systems* (NPIAS). Even though the TAF is updated annually, there has almost always been a disparity between the TAF and master planning forecasts in the past, primarily because the TAF forecasts are the result of a top-down model that does not consider local conditions or recent trends. While the TAF forecasts are a point of comparison for master plan forecasts, they serve other purposes, such as asset allocation by the FAA.

When reviewing a sponsor's forecast (from the master plan), the FAA must ensure that the forecast is based on reasonable planning assumptions, uses current data, and is developed using appropriate forecast methods. According to the FAA, forecasts should be:

- Realistic;
- Based on the latest available data;
- Reflective of current conditions at the airport (as a baseline);
- Supported by information in the study; and
- Able to provide adequate justification for airport planning and development.

The forecast process for an airport master plan consists of a series of basic steps which vary in complexity depending on the issues to be addressed and the level of effort required. The steps include a review of previous forecasts; determination of data needs; identification of data sources; collection of data; selection of forecast methods; preparation of the forecasts; and documentation and evaluation of the results. FAA Advisory Circular (AC) 150/5070-6B, *Airport Master Plans*, outlines seven standard steps involved in the forecast process:

1) **Identify Aviation Activity Measures:** Determine the level and type of aviation activities likely to impact facility needs. For general aviation (GA), this typically includes based aircraft and operations.
2) **Review Previous Airport Forecasts:** May include the FAA's *Terminal Area Forecast*, state or regional system plans, and previous master plans.
3) **Gather Data**: Determine what data are required to prepare the forecasts, identify data sources, and collect historical and forecast data.
4) **Select Forecast Methods:** Several appropriate methodologies and techniques are available, including regression analysis; trend analysis; market share or ratio analysis; exponential smoothing; econometric modeling; comparison with other airports; survey techniques; cohort analysis; choice and distribution models; range projections; and professional judgment.
5) **Apply Forecast Methods and Evaluate Results:** Prepare the actual forecasts and evaluate them for reasonableness.
6) **Summarize and Document Results:** Provide supporting text and tables, as necessary.
7) **Compare Forecast Results with the FAA's TAF:** Based aircraft and total operations are considered consistent with the TAF if they meet the following criteria:
    - Forecasts differ by less than 10 percent in the five-year forecast period and less than 15 percent in the 10-year forecast period;
    - 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, *Field Formulation of the National Plan of Integrated Airport Systems (NPIAS) and the Airports Capital Improvement Plan (ACIP)*.

Aviation activity can be affected by many influences on the local, regional, and national levels, making it virtually impossible to predict year-to-year fluctuations of activity over 20 years with absolute certainty. Therefore, it is important to remember that forecasts are only meant to serve as guidelines, and planning must remain flexible enough to respond to a range of unforeseen developments.

The following forecast analysis for the airport was produced following these basic guidelines. Existing forecasts are examined and compared against current and historical activity. Historical aviation activity is then examined, along with other factors and trends that can affect demand. The intent is to provide an updated set of aviation demand projections for the airport that will permit airport management to make planning adjustments as necessary to maintain a viable, efficient, and cost-effective facility.

The forecasts for this master plan will utilize a base year of 2023 with a long-range forecast out to 2043.

NATIONAL AVIATION TRENDS

Each year, the FAA updates and publishes a national aviation forecast. Included in this publication are forecasts for large air carriers, regional/commuter air carriers, general aviation, and FAA workload measures. The forecasts are prepared to meet the budget and planning needs of the FAA and provide information that can be used by state and local authorities, the aviation industry, and the general public. The current edition upon preparation of this chapter was *FAA Aerospace Forecast – Fiscal Years 2023-2043*, published in May 2023. The FAA primarily uses the economic performance of the United States as an indicator of future aviation industry growth. Similar economic analyses are applied to the outlook for aviation growth in international markets. The following discussion is summarized from the *FAA Aerospace Forecast*.

Since its deregulation in 1978 and the great recession of 2007-2009, the U.S. commercial air carrier industry has been characterized by boom-to-bust cycles. The volatility associated with these cycles was thought by many to be a structural feature of an industry that was capital intensive but cash poor; however, the great recession of 2007-2009 marked a fundamental change in the operations and finances of U.S. airlines. Since the end of the recession in 2009, U.S. airlines have revamped their business models to minimize losses by lowering operating costs, eliminating unprofitable routes, and grounding older, less fuel-efficient aircraft. To increase operating revenues, carriers initiated new services that customers were willing to purchase and started charging separately for services that were historically bundled in the price of a ticket. The industry experienced an unprecedented period of consolidation, with three major mergers occurring within five years. The results of these efforts were impressive: 2019 marked the eleventh consecutive year of profitability for the U.S. airline industry.

The COVID-19 pandemic in 2020 effectively ended those boom years, with airline activity and profitability plummeting almost overnight. In response, airlines cut capacity and costs, and most were able to weather the storm. Some small regional carriers ceased operations as a result of the pandemic, but no mainline carriers did. Some segments of aviation were less impacted: cargo activity surged, boosted by consumer purchases, and general aviation generally maintained pre-pandemic levels of activity. By the middle of 2021, with the introduction of vaccines and the lifting of some local restrictions, leisure travel began to rebound. Two new low-cost carriers were formed, and one regional carrier that had ceased operations in 2020 was revived. By the third quarter of 2021, industry profitability neared the breakeven point, and by the end of 2022, U.S. airlines reported that business demand had recovered to 70-80 percent of pre-pandemic levels. Higher fares accompanied the strong rebound in leisure demand, leading to positive financial results. The top nine U.S. passenger carriers posted operating and net profits, proving strong success for the new business models air carriers have been utilizing to weather the pandemic.

The business changes airlines implemented due to the pandemic will shape the industry long after recovery is complete. Airlines retired older, less fuel-efficient aircraft and encouraged voluntary employee separations. This has led to airlines seeking newer aircraft investments while meeting the current demand for the rebuilding of business and international travel, which has lagged behind leisure traffic during the recovery. There is confidence that U.S. airlines can generate solid returns on capital and sustained profits; however, over the long term, aviation demand will be driven by economic activity as the growing U.S. and world economies provide the basis for aviation to grow.

ECONOMIC ENVIRONMENT

According to the FAA forecast, the annual gross domestic product (GDP) of the U.S. is expected to increase by 1.8 percent over the next 20 years. U.S. carriers posted an unexpected profit in 2022, and the FAA expects carriers to remain profitable over the next few years as demand rises, despite higher fares, which offset the raised labor and fuel costs. As yields stabilize and carriers return to levels of capacity consistent with their fixed costs and shed excess debt, consistent profitability should continue. Over the long term, we see a competitive and profitable aviation industry characterized by increasing demand for air travel, and airfares growing more slowly than overall inflation, reflecting growing U.S. and global economies.

Prior to the COVID-19 pandemic, the U.S. economy was recovering from the most serious economic downturn and slow recovery since the Great Depression. Fundamentally, demand for aviation is driven by economic activity. As economic growth picks up, so will growth in aviation activity. Overall, the FAA forecast calls for annual passenger growth over the next 20 years to average 2.7 percent. Oil prices surged to $93 per barrel in 2022 – largely due to the Russian invasion of Ukraine – after averaging $55 per barrel over the five-year period from 2016 to 2021. Prices are expected to ease over the next two years before slowly climbing to $113 per barrel by the end of the forecast period in 2043.

FAA GENERAL AVIATION FORECASTS

The long-term outlook for general aviation is promising, as growth at the high end of the segment offsets continuing retirements at the traditional low end. The active general aviation fleet is forecast to remain relatively stable between 2023 and 2043, increasing by just 0.2 percent. While steady growth in both GDP and corporate profits results in continued growth of the turbine and rotorcraft fleets, the largest segment of the fleet – fixed-wing piston aircraft – continues to shrink over the forecast period.

The FAA forecasts the fleet mix and hours flown for single-engine piston (SEP) aircraft, multi-engine piston (MEP) aircraft, turboprops, business jets, piston and turbine helicopters, light sport, experimental, and other aircraft (e.g., gliders and balloons). The FAA forecasts active aircraft, not total aircraft. An active aircraft is one that is flown at least one hour during the year. From 2010 through 2013, the FAA undertook an effort to have all aircraft owners re-register their aircraft. This effort resulted in a 10.5 percent decrease in the number of active general aviation aircraft, mostly in the piston category. **Table 2A** shows the primary general aviation demand indicators as forecast by the FAA.

TABLE 2A | FAA General Aviation Forecast

Demand Indicator	2023	2043	CAGR
GENERAL AVIATION FLEET			
Total Fixed-Wing Piston	136,290	118,975	-0.7%
Total Fixed-Wing Turbine	26,645	39,740	2.0%
Total Helicopters	10,320	13,870	1.5%
Total Other (experimental, light sport, etc.)	35,840	43,810	1.0%
Total GA Fleet	**209,095**	**216,395**	**0.2%**
GENERAL AVIATION OPERATIONS			
Local	14,801,816	16,622,293	0.6%
Itinerant	15,077,947	16,704,132	0.5%
Total General Aviation Operations	**29,879,763**	**33,326,425**	**0.5%**
CAGR = compound annual growth rate (2023-2043)			

Source: FAA Aerospace Forecast – FY 2023-2043

General Aviation Aircraft Fleet Mix | For 2023, the FAA estimates there are 136,290 piston-powered, fixed-wing aircraft in the national fleet. That number is forecast to decline by 0.7 percent by 2043, resulting in 118,975 aircraft. This includes a decline of 0.7 percent in SEP aircraft and a decline of 0.2 percent in MEP aircraft.

Total turbine aircraft are forecast to grow at an annual rate of 2.0 percent through 2043. The FAA estimates there are 26,645 fixed-wing turbine-powered aircraft in the national fleet in 2023, and there will be 39,740 by 2043. Turboprops are forecast to grow by 0.8 percent annually, while business jets are projected to grow by 2.7 percent annually through 2043.

Total helicopters are projected to grow by 1.5 percent annually in the forecast period. There are an estimated 10,320 total helicopters in the national fleet in 2023, and that number is expected to grow to a total of 13,870 by 2043. This includes annual growth rates of 0.5 percent for piston helicopters and 1.8 percent for turbine helicopters.

The FAA also forecasts experimental aircraft, light sport aircraft (LSA), and others. Combined, there are an estimated 35,840 other aircraft in 2023 that are forecast to grow to 43,810 by 2043, for an annual growth rate of 1.0 percent.

General Aviation Operations | The FAA also forecasts total operations based on activity at control towers across the United States. Operations are categorized as air carrier, air taxi/commuter, general aviation, and military. While the fleet size remains relatively level, the number of general aviation operations at towered airports is projected to increase from 29.9 million in 2023 to 33.3 million in 2043, with an average increase of 0.5 percent per year as growth in turbine, rotorcraft, and experimental hours offset a decline in fixed-wing piston hours. This includes annual growth rates of 0.6 percent for local general aviation operations and 0.5 percent for itinerant general aviation operations. **Exhibit 2A** presents the historical and forecast U.S. active general aviation aircraft and operations.

General Aviation Aircraft Shipments and Revenue | On an annual basis, the General Aviation Manufacturers Association (GAMA) publishes an aviation industry outlook that documents past and current trends and provides an assessment of the future condition of the general aviation industry. **Table 2B** presents historical data related to general aviation aircraft shipments.

TABLE 2B | Annual General Aviation Airplane Shipments Manufactured Worldwide and Factory Net Billings

Year	Total	SEP	MEP	TP	J	Net Billings ($millions)
2002	2,677	1,591	130	280	676	11,778
2003	2,686	1,825	71	272	518	9,998
2004	2,962	1,999	52	319	592	12,093
2005	3,590	2,326	139	375	750	15,156
2006	4,054	2,513	242	412	887	18,815
2007	4,277	2,417	258	465	1,137	21,837
2008	3,974	1,943	176	538	1,317	24,846
2009	2,283	893	70	446	874	19,474
2010	2,024	781	108	368	767	19,715
2011	2,120	761	137	526	696	19,042
2012	2,164	817	91	584	672	18,895
2013	2,353	908	122	645	678	23,450
2014	2,454	986	143	603	722	24,499
2015	2,331	946	110	557	718	24,129
2016	2,268	890	129	582	667	21,092
2017	2,324	936	149	563	676	20,197
2018	2,441	952	185	601	703	20,515
2019	2,658	1,111	213	525	809	23,515
2020	2,408	1,164	157	443	644	20,048
2021	2,646	1,261	148	527	710	21,603
2022	2,818	1,366	158	582	712	22,866

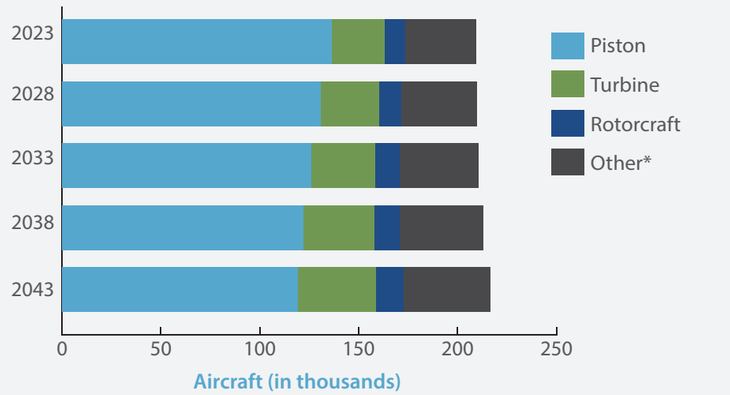
SEP = single-engine piston
MEP = multi-engine piston
TP = turboprop
J = turbofan/turbojet

Source: General Aviation Manufacturers Association, 2022 Annual Report

Worldwide shipments of general aviation airplanes increased in the year 2022, with a total of 2,818 units delivered around the globe, compared to 2,646 units in 2021 – the second year in a row to experience an increase after the drop during 2020, when only 2,408 units were delivered. Worldwide general aviation billings were the highest in 2014. In 2022, an increase in new aircraft shipments generated more than $22 billion, compared to $21.6 billion in the previous year. North America continues to be the largest market for general aviation aircraft and leads the way in the manufacturing of piston, turboprop, and jet aircraft. The Asia-Pacific region is the second largest market for piston-powered aircraft, while Latin America is the second leading in the turboprop market, and Europe leads in business jet deliveries.

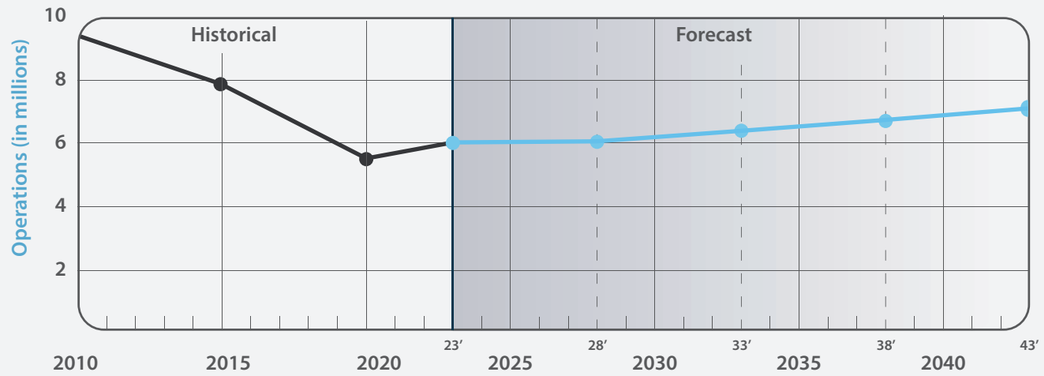
Business Jets | Business jet deliveries increased from 710 units in 2021 to 712 units in 2022. The North American market accounted for 67.6 percent of business jet deliveries, which is a 1.7 percent increase in market share compared to 2021.

U.S. Active General Aviation Aircraft

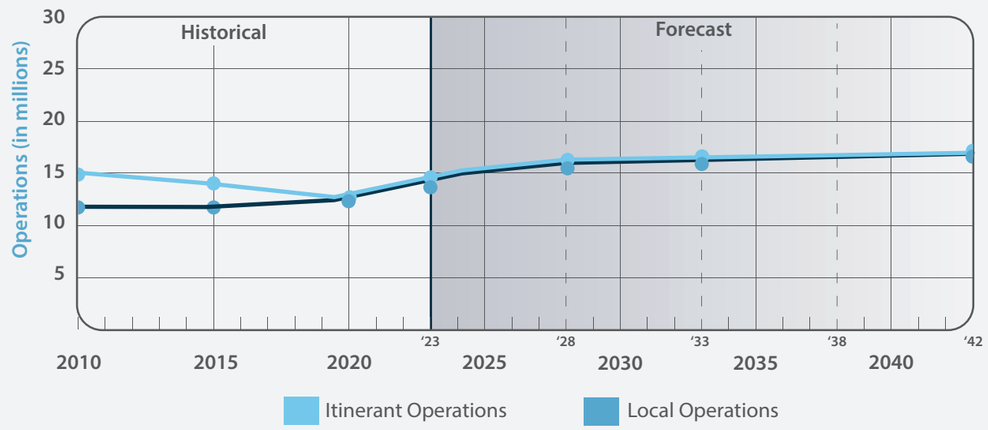


*Other includes Experimental and LSA aircraft

U.S. Air Taxi Operations



U.S. General Aviation Operations



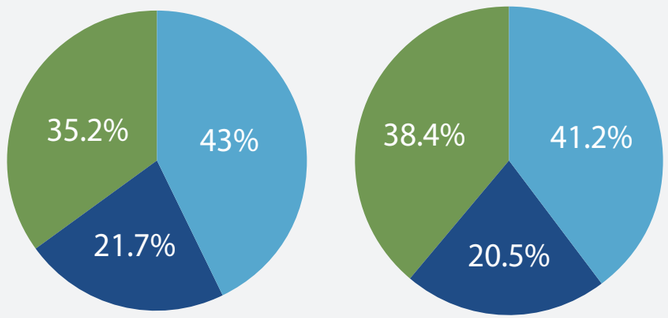
Active Pilots By Certificate

2023

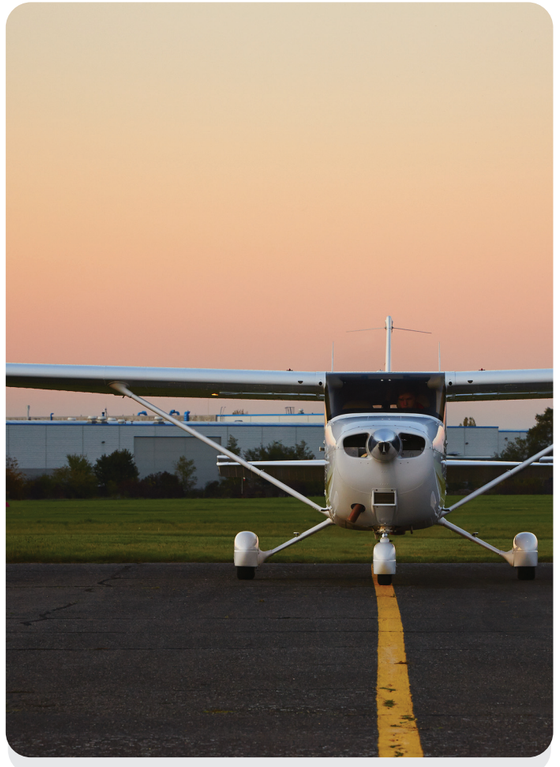
Total Active Pilots: **482,025***

2043

Total Active Pilots: **510,670**



**Excludes Student Pilot Certificates*



Source: FAA Aerospace Forecasts FY2023-2043

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Turboprops | Turboprop shipments were up from 527 in 2021 to 582 in 2022. North America's market share of turboprop aircraft increased by 3.1 percent in the last year. The European, Middle East and Africa, and Asia-Pacific market shares decreased, while Latin American markets increased their market share.

Pistons | In 2022, piston airplane shipments increased to 1,524 units, compared to 1,409 units in the prior year. North America's market share of piston aircraft deliveries rose 1.2 percent from the year 2021. The European, Latin American, and Middle East and Africa regions experienced a positive rate in market shares during the past year, while the Asia-Pacific market saw a decline.

U.S. PILOT POPULATION

There were 476,346 active pilots certificated by the FAA at the end of 2022, with 482,025 active pilots projected in 2023. All pilot categories, except for private and recreational-only certificates, are expected to continue to increase for the forecast length. Excluding student pilots, the number of active pilots is projected to increase by about 28,645 (up 0.3 percent annually) between 2023 and 2043. The airline transport pilot (ATP) category is forecast to increase by 26,200 (up 0.7 percent annually). Sport pilots are predicted to increase by 2.5 percent and commercial pilots will remain steady over the forecast period, while private pilot certificates are projected to decrease at an average annual rate of 0.2 percent through 2043. The FAA has currently suspended the student pilot forecast.

RISKS TO THE FORECAST

While the FAA is confident that its forecasts for aviation demand and activity can be reached, this is dependent on several factors, including the strength of the global economy, security (including the threat of international terrorism), and oil prices. Higher oil prices could lead to further shifts in consumer spending away from aviation, dampening a recovery in air transport demand. The COVID-19 pandemic introduced a new risk, and although the industry has rebounded, the threat of future global health emergencies and potential economic fallout remains.

AIRPORT SERVICE AREA

The initial step in determining the aviation demand for an airport is to define its generalized service area for various segments of aviation. The service area is determined primarily by evaluating the location of competing airports, as well as their capabilities, services, and relative attraction and convenience. In determining the aviation demand for an airport, it is necessary to identify the role of the airport and the specific areas of aviation demand the airport is intended to serve.

Sawyer County Airport is classified as a local general aviation airport within the NPIAS, meaning that its primary role is to provide the community with access to local and regional markets. General aviation (GA), which includes all segments of the aviation industry except commercial air carriers and the military,

is the largest component of the national aviation system and includes activities such as emergency services, recreational flying, and the use of sophisticated turboprop and jet aircraft for business and charter services. It is important to note Sawyer County's unique role in the summer months as its aircraft traffic increases significantly by operations of jet aircraft typically seen at regional and national GA airports.

The service area for an airport is a geographic region from which that airport can expect to attract the largest share of its activity. Defining the service area is useful as it can be used to identify other factors that influence aviation demand at the airport, such as socioeconomic and demographic trends. Aviation demand will be impacted by the proximity of competing airports in or near the limits of the service area; the sufficiency of the surface transportation network; and the strength of GA services provided by the airport, especially in relation to those at nearby competing airports.

As in any business enterprise, the more attractive the facility is in terms of service and capabilities, the more competitive it will be in the market. If an airport's attractiveness increases in relation to nearby airports, so will the size of its service area. If facilities and services are adequate and/or competitive, some level of aviation activity might be attracted to an airport from more distant locales.

As a local GA airport, Sawyer County Airport's service area is driven by aircraft owners/operators and where they choose to base their aircraft. The primary consideration of aircraft owners/operators when choosing where to base their aircraft is convenience (i.e., easy access and proximity of the airport to residence or workplace). In addition to proximity, owners/operators must also choose an airport based on capabilities and services that support their aircraft and their missions. Airport elements – such as runway length, aircraft storage, fuel type and availability, and approach minimums – are significant deciding factors for more demanding aircraft, such as turboprops and jets. Proximity and level of aviation services are largely defining factors when describing the GA service area.

A description of nearby airports was previously completed in Chapter One, as presented on **Exhibit 1H**. There are three public-use airports within 30 nautical miles (nm) of HYR. All three are basic category airports with runways measuring less than 3,800 feet, and none of them provide Jet A fuel. Beyond 30 nm, there are three more public-use airports that are local category airports with runways longer than 5,000 feet and which do provide services for turboprops and jet aircraft. For airports with capabilities similar to HYR's – including support for larger turboprop and jet aircraft – the service area likely extends beyond Sawyer County into three additional counties in the northwest corner of Wisconsin: Bayfield County, Douglas County, and Washburn County.

When discussing the GA service area, two primary demand segments need to be addressed. The first component is the airport's ability to attract based aircraft. In this case, the most effective method of defining the airport's service area is by examining the number of registered aircraft owners in proximity to the airport. As previously mentioned, aircraft owners typically choose to base at airports near their homes or businesses. Based on the current registered aircraft data, there are 155 registered aircraft in the four-county service area, 89 of which are registered aircraft within 30 nm of Sawyer County Airport.

Exhibit 2B depicts the service area and nearby airports. According to official FAA records, there are 29 aircraft based at HYR, and an additional four part-time aircraft. Most of the aircraft registration addresses for based aircraft at HYR are located within 10 nm of the airport. **Table 2C** shows the number of registered aircraft in the four-county service area and within 30 nm of the airport.

TABLE 2C | Aircraft Registered in the Service Area Counties Within 30 nm of HYR

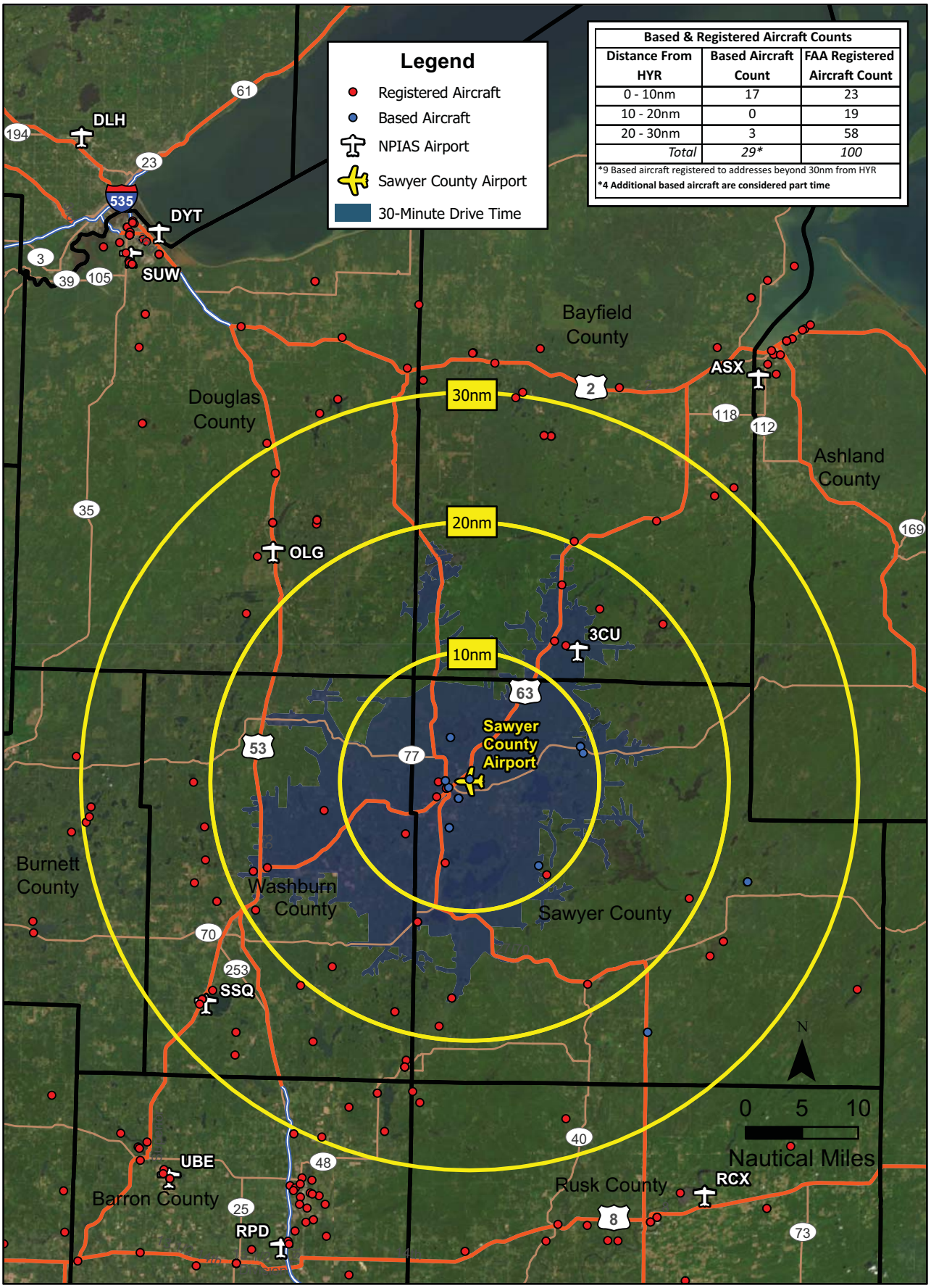
County	No. of Aircraft
Sawyer County	36
Washburn County	30
Bayfield County	14
Douglas County	9
Total	**89**

Source: FAA Aircraft Registration Database, Coffman Associates Analysis

When considering Sawyer County Airport's competition in attracting based aircraft from the pool of registered aircraft in the service area, attention to the aircraft type is critical. Owners/operators of small SEP and MEP aircraft, as well as LSA and experimental aircraft, may base at basic airports with shorter runways and fuel types suited only for piston aircraft. There are three basic airports located in the four-county service area; however, competitive airports that support larger turboprop and jet aircraft, provide longer runways, and offer Jet A fuel are located beyond 30 nm. Therefore, Sawyer County Airport has an advantage in attracting larger turboprop and jet aircraft within its service area due to the lack of competing airports nearby that provide services and infrastructure for these more demanding aircraft.

The second demand segment to consider is itinerant aircraft operations. In most instances, a pilot will opt to utilize an airport nearer their intended destination; however, this is also dependent on the airport's capabilities in accommodating the aircraft operator. As a result, airports offering better services and facilities are more likely to attract itinerant operators in the region.

With few competing airports in the region, Sawyer County Airport's primary service area is defined by its convenience to its users and its ability to compete for based aircraft, particularly turboprop and jet aircraft. The nearest airports to Sawyer County Airport are Cable Union Airport in Bayfield County; Solon Springs Municipal Airport in Douglas County; and Shell Lake Municipal Airport in Washburn County. As previously mentioned, these airports are categorized as basic GA airports and are designed to serve smaller piston aircraft. Beyond 30 nm and providing services for more demanding aircraft – including turboprops and jets – are John F. Kennedy Memorial Airport (ASX), which borders Bayfield and Ashland Counties; Rice Lake Regional Airport (RPD) in Barron County; and Richard I. Bong Airport (SUW) in the far northwest corner of Douglas County. These airports are described in more detail on **Exhibit 1H**. Sawyer County Airport is also located close to where the four counties meet, giving the airport a central location relative to its service area. This centrality in the northwest corner of Wisconsin provides a central hub location for itinerant aircraft to reach recreational destinations surrounding the four-county area. HYR is generally well situated to serve demand within 30 miles and will likely continue to draw demand from points beyond, especially turboprop and jet aircraft. As distance increases and proximity to other regional airports narrows, HYR will be less likely to attract a majority of those operations, making the more distant areas a secondary service area.


Legend
Registered Aircraft
Based Aircraft
NPIAS Airport
Sawyer County Airport
30-Minute Drive Time
Based & Registered Aircraft Counts
Distance From HYR | Based Aircraft Count | FAA Registered Aircraft Count
0 - 10nm | 17 | 23
10 - 20nm | 0 | 19
20 - 30nm | 3 | 58
Total | 29* | 100
*9 Based aircraft registered to addresses beyond 30nm from HYR
*4 Additional based aircraft are considered part time
30nm
20nm
10nm
DLH
DYT
SUW
OLG
3CU
ASX
SSQ
UBE
RPD
RCX
Sawyer County Airport
Douglas County
Bayfield County
Ashland County
Burnett County
Washburn County
Sawyer County
Barron County
Rusk County
N
0 5 10
Nautical Miles

FORECASTING APPROACH

The development of aviation forecasts proceeds through both analytical and judgmental processes. A series of mathematical relationships is tested to establish statistical logic and rationale for projected growth. However, the judgment of the forecast analyst – based on professional experience, knowledge of the aviation industry, and assessment of the local situation – is important in the final determination of the preferred forecast. The most reliable approach to estimating aviation demand is through the utilization of more than one analytical technique. Methodologies frequently considered include trend line/time-series projections, correlation/regression analysis, and market share analysis. The forecast analyst may elect not to use certain techniques depending on the reasonableness of the forecasts produced using other techniques.

Trend line/time-series projections are probably the simplest and most familiar of the forecasting techniques. By fitting growth curves to historical data and then extending them into the future, a basic trend line projection is produced. A basic assumption of this technique is that outside factors will continue to affect aviation demand in much the same manner as in the past. As broad as this assumption may be, the trend line projection does serve as a reliable benchmark for comparing other projections.

Correlation analysis provides a measure of the direct relationship between two separate sets of historical data. If there is a reasonable correlation between the data sets, further evaluation using regression analysis may be employed.

Regression analysis measures statistical relationships between dependent and independent variables, yielding a correlation coefficient. The correlation coefficient (Pearson's r) measures association between the changes in the dependent variable and the independent variable(s). An r^2 value (coefficient determination) greater than 0.95 indicates good predictive reliability. A value less than 0.95 may be used, but with the understanding that the predictive reliability is lower.

Market share analysis involves a historical review of the airport activity as a percentage – or share – of a larger regional, state, or national aviation market. A historical market share trend is determined, providing an expected market share for the future. These shares are then multiplied by the forecasts of the larger geographical area to produce a market share projection. This method has the same limitations as trend line projections but can provide a useful check on the validity of other forecasting techniques.

Forecasts will age, and the farther a forecast is from the base year, the less reliable it may become, particularly due to changing local and national conditions. Nevertheless, the FAA requires that a 20-year forecast be developed for long-range airport planning. Facility and financial planning usually require at least a 10-year view because it often takes more than five years to complete a major facility development program; however, it is important to use forecasts that do not overestimate revenue-generating capabilities or understate demand for facilities needed to meet public (user) needs.

A wide range of factors is known to influence the aviation industry, with significant impacts on the extent and nature of aviation activity in both the local and national markets. Historically, the nature and trend of the national economy have had a direct impact on the level of national aviation activity. Recessionary

periods have been closely followed by declines in aviation activity. Nevertheless, trends emerge over time and provide the basis for airport planning.

Future facility requirements, such as hangar, apron, and terminal needs, are derived from projections of various aviation demand indicators. Using a broad spectrum of local, regional, and national socioeconomic and aviation information, and analyzing the most current aviation trends, forecasts are presented for the following aviation demand indicators:

- Based Aircraft
- Based Aircraft Fleet Mix
- General Aviation Operations
- Air Taxi and Military Operations
- Operational Peaks

EXISTING FORECASTS

Consideration is given to any forecasts of aviation demand for the airport that have been completed in the recent past. For HYR, the previous forecasts reviewed are those in the FAA TAF and the 2010 *Wisconsin State Aviation System Plan 2030* (SASP).

FAA TERMINAL AREA FORECAST

On an annual basis, the FAA publishes the TAF for each airport included in the NPIAS. The TAF is a generalized forecast of airport activity that is used by the FAA primarily for internal planning purposes. It is available to airports and consultants to use as a baseline projection and is an important point of comparison when developing local forecasts. The current TAF was published in March 2023 and is based on the federal fiscal year (October-September).

As presented in **Table 2D**, the TAF projects GA activity at the airport to increase over the next 20 years. Given that there is currently no commercial service activity at HYR, the TAF does not reflect any existing and/or forecast air carrier operations; however, the TAF does reflect 2,000 current and future air taxi operations estimated over the forecast period. Operations are projected to be dominated by local and itinerant GA operations, which are estimated to account for approximately 35 percent and 65 percent of total operations, respectively, over the planning period. Military operations are projected to account for 1.5 percent of total operations, with 100 projected for each of the plan years. Based aircraft are projected to increase over the next 20 years from 18 to 38 aircraft. The TAF depicts only 18 based aircraft at HYR for 2023; however, the validated based aircraft count from basedaircraft.com is 29, as of October 2023. A master plan's approved forecasts may be entered into future TAF datasets.

TABLE 2D | 2023 FAA Terminal Area Forecast – HYR

	2023	2028	2033	2043	CAGR 2023-2043
ANNUAL OPERATIONS					
Itinerant					
Air Carrier	0	0	0	0	0.00%
Air Taxi	2,000	2,000	2,000	2,000	0.00%
General Aviation	6,201	6,742	7,343	8,714	1.72%
Military	100	100	100	100	0.00%
Total Itinerant	**8,301**	**8,842**	**9,443**	**10,814**	**1.33%**
Local					
General Aviation	3,622	3,949	4,310	5,147	1.77%
Military	0	0	0	0	0.00%
Total Local	**3,622**	**3,949**	**4,310**	**5,147**	**1.77%**
Total Operations	**11,923**	**12,791**	**13,753**	**15,961**	**1.47%**
BASED AIRCRAFT	**18**	**23**	**28**	**38**	**3.81%**

Source: FAA Terminal Area Forecast, March 2023

PREVIOUS FORECASTS

Forecasts of aviation activity at HYR were previously prepared within the 2030 SASP. **Table 2E** summarizes the forecasts of operations and based aircraft at HYR that were prepared for these studies. The SASP forecasted operations to decline five years and 10 years out before increasing in year 20. Based aircraft remained the same over the forecast period, only gaining one aircraft by year 20. In terms of based aircraft, the airport has exceeded these projections, as it currently has 29 based aircraft, not including four part-time aircraft. In 2023 alone, HYR has gained two additional based aircraft. Operationally, the SASP base year estimate and long-term projection are roughly in line with what the FAA TAF and Form 5010, *Airport Master Record*, reflect. Based on recent activity trends at HYR and the time that has passed since the preparation of these previous forecasts, it is necessary to develop new forecasts utilizing the most current information available.

TABLE 2E | Previous Forecasts – HYR

Year	Total Operations	Based Aircraft
2010	10,300	19
2015	10,220	19
2020	10,140	19
2030	10,620	20

Source: Wisconsin State Aviation System Plan 2030 (2010 Base Year)

GENERAL AVIATION FORECASTS

General aviation (GA) encompasses all portions of civil aviation except commercial service and military operations. To determine the types and sizes of facilities that should be planned to accommodate GA activity at the airport, certain elements of this activity must be forecast. These indicators of GA demand include based aircraft, aircraft fleet mix, operations, and annual operations.

The number of based aircraft is the most basic indicator of GA demand. By first developing a forecast of based aircraft for the airport, other demand indicators can be projected. Additionally, understanding the types of aircraft based now and in the future is instrumental in defining the airport's critical aircraft,

which will determine the FAA design standards that should be met on both the airside and the landside. (The critical aircraft for Sawyer County Airport will be discussed in a later section of this chapter.)

The process of developing forecasts of based aircraft begins with an analysis of aircraft ownership in the primary GA service area through a review of historical aircraft registrations. An initial forecast of registered aircraft is developed and will be used as one data point to arrive at a based aircraft forecast for the airport.

REGISTERED AIRCRAFT FORECAST

Historically registered aircraft for Sawyer, Bayfield, Douglas, and Washburn Counties since 2003 are included in **Table 2F**. Aircraft registrations have declined from 175 in 2003 to 155 registrations reported in 2023. The historical peak was reached in 2010, and again in 2016, with 186 aircraft registered in the service area. Aircraft registrations declined over the next seven years, likely due in part to the FAA's requirement that aircraft owners re-register their aircraft to retain U.S. civil aircraft status. As a result, previously registered aircraft that may have been sold, scrapped/destroyed, or registered to multiple addresses were dropped from the database.

TABLE 2F | Service Area Registered Aircraft – Sawyer County Service Area

Year	Single-Engine Piston	Multi-Engine Piston	Turboprop	Jet	Helicopter	Other	Total
2003	154	7	5	1	3	5	**175**
2004	153	7	5	1	2	5	**173**
2005	158	6	5	1	3	5	**178**
2006	154	6	1	1	4	17	**183**
2007	147	7	1	1	3	26	**185**
2008	164	9	1	1	2	8	**185**
2009	156	8	0	1	3	10	**178**
2010	162	8	0	3	3	10	**186**
2011	157	8	0	4	4	11	**184**
2012	151	9	1	5	4	10	**180**
2013	149	8	0	5	4	10	**176**
2014	145	8	0	4	4	10	**171**
2015	154	9	1	4	3	10	**181**
2016	159	10	2	3	3	9	**186**
2017	160	8	2	3	3	7	**183**
2018	141	8	2	4	4	5	**164**
2019	145	7	2	3	3	4	**164**
2020	153	7	2	3	3	4	**172**
2021	145	6	2	2	3	3	**161**
2022	140	5	2	2	3	3	**155**
2023	136	6	3	3	3	4	**155**

Source: FAA Registered Aircraft

Most registered aircraft in the county fall within the SEP category. In 2023, 136 of the 155 registered aircraft were SEP, accounting for 88 percent of the total registered aircraft. MEP aircraft made up the next largest segment with six registrations, followed by four "other" aircraft. Three helicopters, three turboprops, and three jets are registered in the county.

Different forecasting strategies were used to determine registered aircraft projections, including market share analysis and ratio projection methods. Several regression forecasts were also considered, including single- and multi-variable regressions examining the correlation of registered aircraft with the service area population, employment, income, and gross regional product, as well as with U.S. active general aviation aircraft. None of the regressions produced a strong correlation (r^2 value over 0.95); therefore, the regression forecasts were not considered further.

Table 2G shows several projections of registered aircraft for the service area, with a goal of presenting a planning envelope that shows a range of projections based on historical trends. The first set of forecasts are based on market share, which considers the relationship between registered aircraft located in the service area and active aircraft within the United States. The next set of projections is based on a ratio of the number of aircraft per 1,000 residents, and the final forecast is based on the historical growth rate of registered aircraft.

TABLE 2G | Registered Aircraft Projections – Sawyer County Airport

Year	Service Area Registrations[1]	U.S. Active Aircraft[2]	Market Share of U.S. Aircraft	Service Area Population[3]	Aircraft per 1,000 Residents
2003	175	209,606	0.0835%	91,603	1.91
2004	173	219,319	0.0789%	91,675	1.89
2005	178	224,257	0.0794%	91,784	1.94
2006	183	221,942	0.0825%	91,709	2.00
2007	185	231,606	0.0799%	91,677	2.02
2008	185	228,664	0.0809%	91,643	2.02
2009	178	223,876	0.0795%	91,485	1.95
2010	186	223,370	0.0833%	91,618	2.03
2011	184	220,453	0.0835%	91,798	2.00
2012	180	209,034	0.0861%	91,964	1.96
2013	176	199,927	0.0880%	92,197	1.91
2014	171	204,408	0.0837%	92,220	1.85
2015	181	210,031	0.0862%	92,273	1.96
2016	186	211,794	0.0878%	92,622	2.01
2017	183	211,757	0.0864%	93,267	1.96
2018	164	211,749	0.0775%	93,801	1.75
2019	164	210,981	0.0777%	94,449	1.74
2020	172	204,140	0.0843%	95,208	1.81
2021	161	209,194	0.0770%	95,570	1.68
2022	155	209,140	0.0741%	95,657	1.62
2023	155	209,095	0.0741%	95,733	1.62
Constant Market Share of U.S. Active Aircraft – Low Range (CAGR 0.17%)					
2028	155	209,510	0.0741%	96,055	1.62
2033	156	210,455	0.0741%	96,242	1.62
2043	160	216,395	0.0741%	96,193	1.67
Increasing Market Share of U.S. Active Aircraft – High Range (CAGR 1.04%)					
2028	163	209,510	0.0776%	96,055	1.69
2033	171	210,455	0.0811%	96,242	1.77
2043	190	216,395	0.0880%	96,193	1.98
Increasing Market Share of U.S. Active Aircraft – Mid Range (CAGR 0.60%) – Selected Forecast					
2028	160	209,510	0.0762%	96,055	1.66
2033	165	210,455	0.0782%	96,242	1.71
2043	175	216,395	0.0808%	96,193	1.82
Constant Ratio Projection per 1,000 County Residents – Low Range (CAGR 0.02%)					
2028	156	209,510	0.0742%	96,055	1.62
2033	156	210,455	0.0740%	96,242	1.62
2043	156	216,395	0.0720%	96,193	1.62
Increasing Ratio Projection per 1,000 County Residents – High Range (CAGR 1.16%)					
2028	165	209,510	0.0789%	96,055	1.72
2033	176	210,455	0.0834%	96,242	1.82
2043	195	216,395	0.0902%	96,193	2.03
Increasing Ratio Projection per 1,000 County Residents – Mid Range (CAGR 0.79%)					
2028	162	209,510	0.0773%	96,055	1.69
2033	169	210,455	0.0802%	96,242	1.75
2043	181	216,395	0.0839%	96,193	1.89
10-Year Historical Registered Aircraft Growth Rate (CAGR -0.98%)					
2028	148	209,510	0.0704%	96,055	1.54
2033	140	210,455	0.0668%	96,242	1.46
2043	127	216,395	0.0589%	96,193	1.32

Sources: [1]FAA Aircraft Registration Database; [2]FAA Aerospace Forecast – FY 2023-2043; [3]Woods & Poole 2022

Market Share Projections

- *Constant Market Share* | The low range market share forecast maintains the 2023 market share of registrations (0.0741 percent) at a constant throughout the planning period. The result is minimal growth in registrations over the 20-year planning period, with just five additional aircraft registrations in the service area by 2043, reflective of a 0.17 percent compound annual growth rate (CAGR).

- *Increasing Market Share* | Two increasing market share forecasts were also considered. The first evaluated a high range scenario based on the service area's historical high market share, which was 0.0880 percent in 2013. A return to this produces stronger growth, with 190 registered aircraft projected by the end of the planning period (1.04 percent CAGR). The mid range market share forecast considered a less aggressive growth rate of 0.60 percent, which produced a forecast of 175 registered aircraft in the service area by 2043.

Population Ratio Projections

- *Constant Ratio* | In 2023, there were 1.62 registered aircraft per 1,000 service area residents. Carrying this ratio forward through the plan years results in a flat CAGR of 0.02 percent, or 156 aircraft by 2043, as the service area's population is expected to grow slowly over the next 20 years.

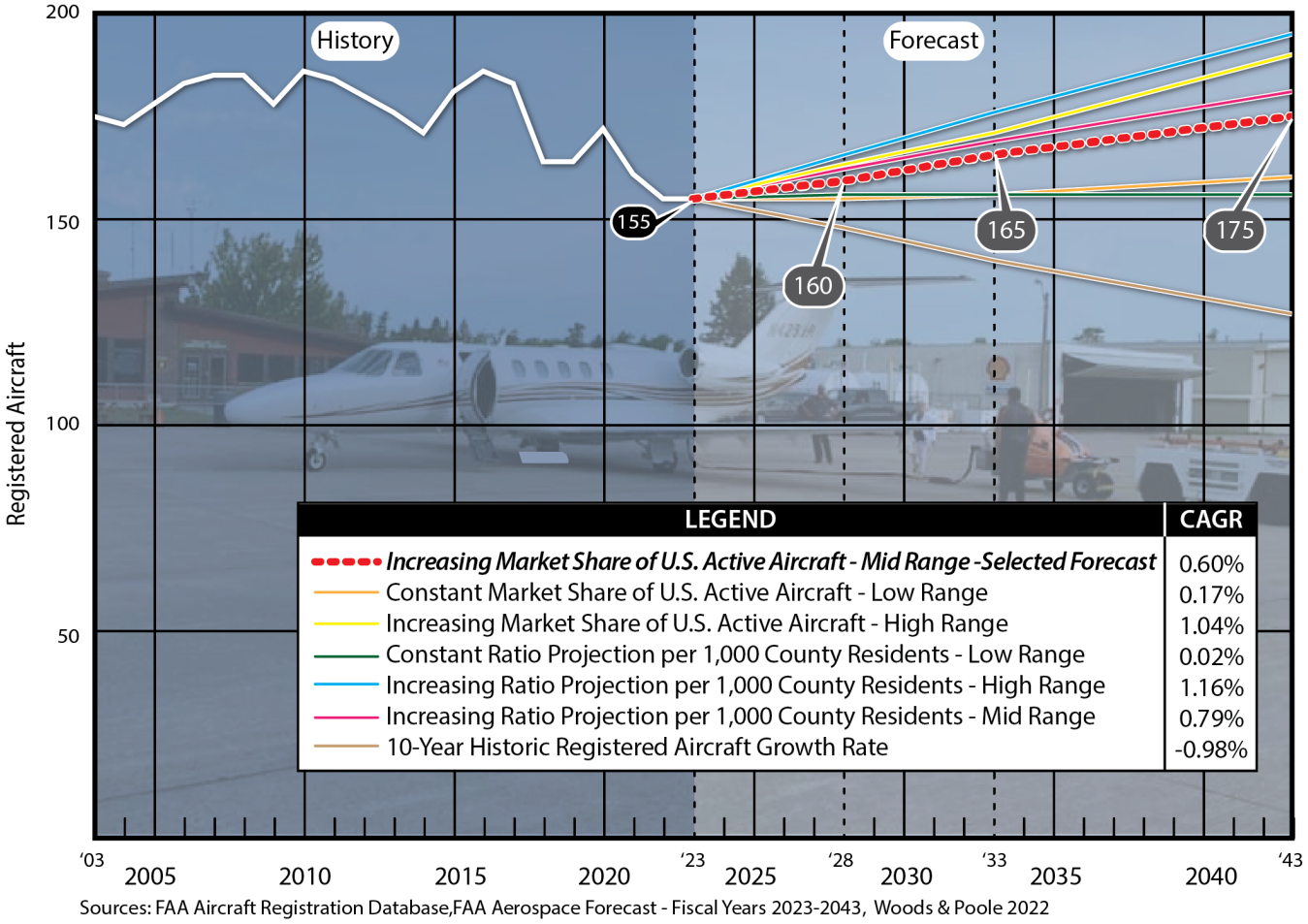
- *Increasing Ratio* | Two increasing ratio scenarios were also considered. This first is based on the historical high ratio of aircraft to service area residents and results in the most significant growth, with 195 projected aircraft registrations by 2043. This equates to a CAGR of 1.16 percent and represents the high end of the planning envelope. A projection was also made based on the 20-year average ratio, which was 1.89 aircraft per 1,000 residents. Applying this ratio to the last year of the planning period produced a CAGR of 0.79 percent, or 181 aircraft registered in the service area by 2043.

Historical Registered Aircraft Growth Rate | It was also deemed prudent to consider the growth rate that has occurred over the last 10 years. Registered aircraft in the service area increased from 2013 to 2018; however, registrations have declined since 2020 and reflect a CAGR of -0.98 percent. When this is applied to the forecast years, the number of aircraft registrations falls to 127 by the end of the planning period. It should be noted that the FAA required a complete update of all aircraft registrations in 2012 and found approximately one third of previously registered aircraft in error. The decrease experienced in the service area is likely due, at least in part, to the re-registration reductions.

A comparison of each projection is shown in graph form on **Exhibit 2C**. The registered aircraft projections result in a range between 127 and 195 registered aircraft in the service area by 2043, with the 10-year historical growth rate projection representing the low end and the high range increasing ratio projection representing the high end of the forecasts. Each has been evaluated for reasonableness. The low range market share and low range constant ratio forecasts show very slow growth in service area registered aircraft, which is deemed unlikely based on the historical levels of registered aircraft. The high range market share projection and mid range increasing ratio produced a more significant growth rate, but this

likely overstates the growth potential for registered aircraft in the service area. The same is true for the high range increasing ratio projection, which resulted in the most significant growth scenario of all. The 10-year historical growth rate forecast was the only one that considered a decline in aircraft registrations. Based on the continued growth in county population and in the national aircraft fleet, a decrease in registrations over the next 20 years is not anticipated to occur; therefore, each of the above forecasts has been determined to be improbable.

The remaining projection, which resulted in 175 registered aircraft (0.60 percent CAGR), is considered to be the most reasonable forecast for registered aircraft in the service area over the next 20 years. This forecast represents a moderate level of growth, in line with national and regional trends. As such, the **mid range increasing market share forecast** is considered the most likely scenario and will be carried forward as the selected forecast for service area registered aircraft. This projection shows an increase from 155 registered aircraft in 2023 to 160 in 2028, 165 in 2033, and 175 in 2043.



Sources: FAA Aircraft Registration Database,FAA Aerospace Forecast - Fiscal Years 2023-2043, Woods & Poole 2022

Exhibit 2C | Registered Aircraft Projections

BASED AIRCRAFT FORECAST

Forecasts of based aircraft may directly influence needed facilities and the applicable design standards. The needed facilities may include hangars, aprons, taxilanes, etc. The applicable design standards may include separation distances and object clearing surfaces. The size and type of based aircraft are also an important consideration. The addition of numerous small aircraft may have no effect on design standards, while the addition of a few larger business jets can have a substantial impact on applicable design standards.

Because of the numerous variables known to influence aviation demand, several separate forecasts of based aircraft are developed. Each of the forecasts is then examined for reasonableness, and any outliers are discarded or given less weight. The remaining forecasts will collectively create a planning envelope. A single planning forecast is then selected for use in developing facility needs for the airport. The selected forecast of based aircraft can be one of the several forecasts developed, or it can be a blend of the forecasts, based on the experience and judgement of the forecaster.

Determining the number of based aircraft at an airport can be a challenging task. Aircraft storage can be somewhat transient in nature, meaning that aircraft owners can and do move their aircraft. Some aircraft owners may store their aircraft at an airport for only part of the year. At HYR, determining an accurate based aircraft count is further complicated by seasonal airport users.

For many years, the FAA did not require airports to report their based aircraft counts, nor did they validate based aircraft at airports; however, this has changed in recent years, and now the FAA mandates that airports report and validate their based aircraft levels. These counts are recorded in the National Based Aircraft Inventory program and are maintained and validated by the FAA to ensure accuracy.

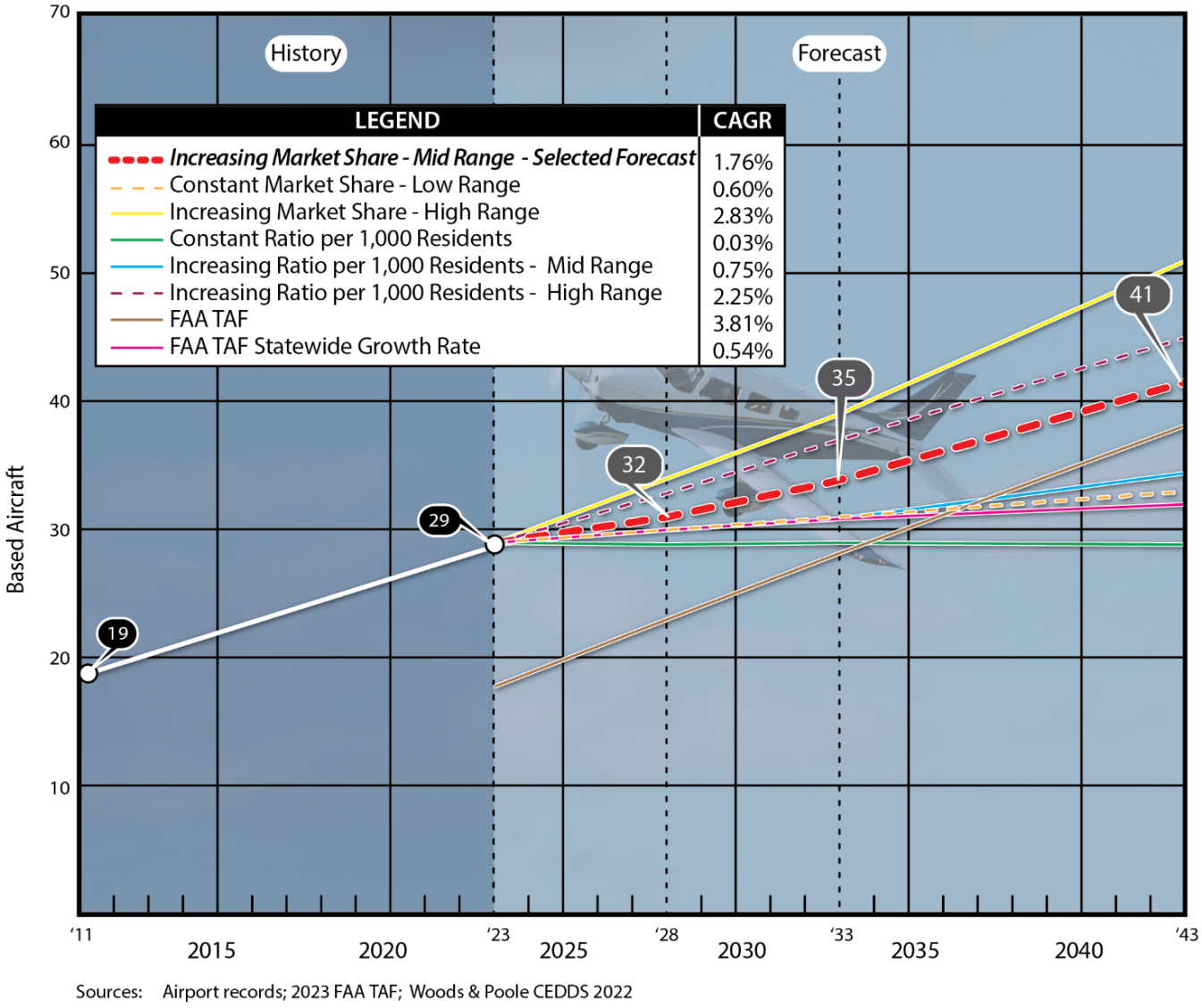
According to the FAA's database, HYR has 29 based aircraft, a count which was last validated on June 9, 2023. Four additional aircraft are considered part-time. As previously mentioned, it is important to note that the FAA TAF only shows 18 based aircraft at HYR, 11 fewer than the validated count. For forecasting purposes, the 29 validated based aircraft will serve as the base year count. The FAA requires the use of validated based aircraft counts; however, part-time aircraft will be factored into the facility requirements because those seasonally based aircraft still utilize the airport facilities.

As detailed in **Table 2H**, historical records sourced from the SASP were available and included a count of 19 based aircraft in 2011. Like the registered aircraft forecasts, two types of projections have been made for based aircraft at Sawyer County Airport: market share and ratio projections. The market share is based on the airport's percentage of based aircraft as compared to registered aircraft in the service area, while the ratio projection is based on the number of based aircraft per 1,000 service area residents. The results of these analyses are detailed in **Table 2H** and depicted graphically on **Exhibit 2D**.

TABLE 2H | Based Aircraft Forecasts – Sawyer County Airport

Year	HYR Based Aircraft	Service Area Registrations	Market Share	Service Area Population	Aircraft Per 1,000 Residents
2011	19	184	10.3%	91,798	0.21
2023	29	155	18.7%	95,657	0.30
Constant Market Share – Low Range (CAGR 0.60%)					
2028	30	160	18.7%	96,055	0.31
2033	31	165	18.7%	96,242	0.32
2043	33	175	18.7%	96,193	0.34
Increasing Market Share – Mid Range (CAGR 1.76%) – Selected Forecast					
2028	32	160	19.9%	96,055	0.33
2033	35	165	21.1%	96,242	0.36
2043	41	175	23.5%	96,193	0.43
Increasing Market Share – High Range (CAGR 2.83%)					
2028	34	160	21.3%	96,055	0.35
2033	39	165	23.9%	96,242	0.41
2043	51	175	29.0%	96,193	0.53
Constant Ratio per 1,000 Residents (CAGR 0.03%)					
2028	29	160	18.2%	96,055	0.30
2033	29	165	17.7%	96,242	0.30
2043	29	175	16.7%	96,193	0.30
Increasing Ratio per 1,000 Residents – Mid Range (CAGR 0.75%)					
2028	30	160	18.9%	96,055	0.31
2033	31	165	19.1%	96,242	0.33
2043	34	175	19.3%	96,193	0.35
Increasing Ratio per 1,000 Residents – High Range (CAGR 2.25%)					
2028	33	160	20.7%	96,055	0.34
2033	37	165	22.6%	96,242	0.39
2043	45	175	25.9%	96,193	0.47
FAA TAF (CAGR 3.81%)					
2028	23	160	14.4%	96,055	0.24
2033	28	165	17.0%	96,242	0.29
2043	38	175	21.7%	96,193	0.40
FAA TAF Statewide Growth Rate (CAGR 0.54%)					
2028	30	160	18.7%	96,055	0.31
2033	31	165	18.6%	96,242	0.32
2043	32	175	18.5%	96,193	0.34

Sources: Sawyer County Airport records; 2023 FAA TAF; Woods & Poole CEDDS 2022



Sources: Airport records; 2023 FAA TAF; Woods & Poole CEDDS 2022

Exhibit 2D | Based Aircraft Projections

Market Share Projections

- *Constant Market Share* | In 2023, the airport had 29 based aircraft, which equates to 18.7 percent of the market share of registered aircraft in the service area. Carrying this percentage throughout the plan years results in an increase in based aircraft, reflective of a 0.60 percent CAGR. This projection yielded 33 based aircraft by 2043, which serves as the low range market share projection.

- *Increasing Market Share* | Two increasing market share forecasts were also evaluated. The mid range scenario is based on Sawyer County holding 23.5% of the market share by 2043 and resulted in an increase in based aircraft to 41 for a 1.76 percent CAGR by the end of the planning period. The high range market share forecast evaluated a stronger growth scenario that considered HYR

holding 29 percent of the market share by the end of the planning period. This resulted in 51 based aircraft by 2043 for a CAGR of 2.83 percent, which is the most significant growth scenario evaluated.

Ratio Projections

- *Constant Ratio* | In 2023, the ratio of based aircraft per 1,000 service area residents stood at 0.30. Maintaining this at a constant through 2043 resulted in a growth rate of 0.03 percent, equivalent to the current 29 based aircraft.

- *Increasing Ratio* | Mid and high range growth scenarios were also evaluated. The mid range scenario is based on a median ratio of 0.35 based aircraft per 1,000 residents. Applying this figure to the end of the planning period results in 34 based aircraft at the airport by 2043, at a CAGR of 0.75 percent. The high range scenario considers a ratio difference between 2011 and 2023 applied to the middle forecast year. This resulted in the 2043 projected ratio of 0.47, 45 based aircraft, and a CAGR of 2.25 percent.

As a point of comparison, the FAA TAF projections for based aircraft at HYR are included. The TAF does show growth in based aircraft by the end of the forecast period, but it begins with 18 based aircraft as its base year. The growth at the end of the planning period projects 38 aircraft in 2043, resulting in a 3.81 percent growth rate. The TAF for the State of Wisconsin was also examined, and the statewide growth rate for based aircraft of 0.54 percent was applied. This resulted in 32 based aircraft at HYR by the end of the planning period.

The forecasts produce a planning envelope ranging from 29 to 51 based aircraft at the airport by 2043. As of May 2023, all hangars are privately owned. It is noted, however, that there is local interest and desire to build new hangars to accommodate smaller piston aircraft, as well as larger turboprop and jet aircraft. Sawyer County Airport has been considered in discussions for basing both an air ambulance and a seasonal charter operation.

This anticipated growth in aircraft registrations and national increase in turboprop, jet, and other aircraft with local interest in basing at HYR lead to reasonable anticipation of moderate based aircraft growth. Therefore, the **mid range increasing market share forecast** has been selected as the preferred projection. With a CAGR of 1.76 percent, this forecast projects an increase of 12 based aircraft by the end of the planning period, for a total of 41 based aircraft at HYR by 2043.

BASED AIRCRAFT FLEET MIX FORECAST

The fleet mix of based aircraft is often more important to airport planning and design than the total number of aircraft. For example, the presence of one or a few large business jets can have a greater impact on design standards for the runway and taxiway system than a larger number of smaller SEP aircraft.

As depicted in **Table 2J**, the selected based aircraft count with fleet mix projections has been developed based on the FAA's estimates of how the national fleet mix will evolve over the same period. Local factors, such as the potential for increased turboprops and jets, are also considered.

In 2023, most based aircraft (86 percent) at HYR fall into the SEP category. This is projected to remain the majority category over the planning period, with a slow and steady decline in the number of SEP aircraft based at the airport by 2043. Nationally, the single- and multi-engine piston aircraft fleets are declining due to age, minimal new production, and the increased costs of maintenance and operation for the recreational flyer. The next largest aircraft type is jet aircraft, with two jets based at the airport in 2023 and five forecasted by 2043. Sawyer County is uniquely positioned in its region to support more demanding aircraft, such as turboprops and jets. Nationally, turboprops, jets, and helicopters are all anticipated to increase. Emerging categories, such as experimental, LSA, and others, are also projected to increase. Nationally, these "other" type aircraft are replacing SEP for recreational use due to lower costs. At HYR, the long range forecast for fleet mix includes the addition of four "other" aircraft by 2043.

TABLE 2J | Based Aircraft Fleet Mix – Sawyer County Airport

	EXISTING		FORECAST					
Aircraft Type	**2023**	**%**	**2028**	**%**	**2033**	**%**	**2043**	**%**
Single-Engine Piston	25	87%	24	75%	25	71%	26	63%
Multi-Engine Piston	1	3%	1	3%	1	3%	1	2%
Turboprop	0	0%	1	3%	2	6%	3	7%
Jet	2	7%	4	13%	4	11%	5	12%
Helicopter	1	3%	1	3%	1	3%	2	5%
Other (LSA, Experimental)	0	0%	1	3%	2	6%	4	10%
Totals	**29**	**100%**	**32**	**100%**	**35**	**100%**	**41**	**100%**

Source: Sawyer County Airport records; Coffman Associates analysis

OPERATIONS FORECASTS

Operations at HYR are classified as either GA, air taxi, or military. GA operations include a wide range of activity, from recreational use and flight training to business and corporate uses. Air taxi operations are those conducted by aircraft operating under Title 14 Code of Federal Regulations (14 CFR) Part 135, otherwise known as for-hire or on-demand activity. Military operations include those operations conducted by various branches of the U.S. military.

Aircraft operations are further classified as local and itinerant. A local operation is a takeoff or landing performed by an aircraft operating within sight of an airport, or which executes simulated approaches or touch-and-go operations at an airport. Generally, local operations are characterized by training activity and certificate recurrency requirements. Itinerant operations are those performed by aircraft with a specific origin or destination away from an airport. Typically, itinerant operations increase with business and commercial use because business aircraft are used primarily to transport passengers from one location to another.

Because HYR is not equipped with an airport traffic control tower (ATCT), precise operational (takeoff and landing) counts are not available. Sources for estimated operational activity at the airport include

FAA Form 5010, *Airport Master Record*; the FAA TAF; the SASP; the FAA *Traffic Flow Management System Counts* (TFMSC); and Airport IQ information. The 2023 FAA TAF indicates a total of 11,923 operations estimated in 2023, while Form 5010 for the 12-month period ending September 23, 2021, estimates 11,600. In the TAF estimate, the majority of operations (69.6 percent) are itinerant, with 30.4 percent recorded as local operations. Air taxi and military operations are estimated at 17 percent and 0.9 percent of the total, respectively.

In summary, the following estimates of annual operations, as derived from various sources, are:

- FAA Form 5010 (2021) – 11,600 annual operations
- 2023 FAA TAF (estimated) – 11,923 annual operations

Based on activity levels in the region and at similar airports, the baseline figure that will be utilized for GA operations forecasts is the 2023 TAF estimate for GA local and itinerant annual operations. Information from Airport IQ is used for the base annual air taxi operations.

- 6,201 annual itinerant GA operations
- 3,622annual local GA operations
- 252 annual air taxi operations
- 100 annual military operations

Itinerant General Aviation Operations Forecast | Table 2K presents several forecasts for itinerant GA operations. Three forecasts are based on the airport's market share of total U.S. itinerant GA operations, and the FAA TAF for HYR is also included for comparison purposes. Based operational data are sourced from the FAA TAF.

TABLE 2K | Itinerant General Aviation Operations Forecasts – Sawyer County Airport

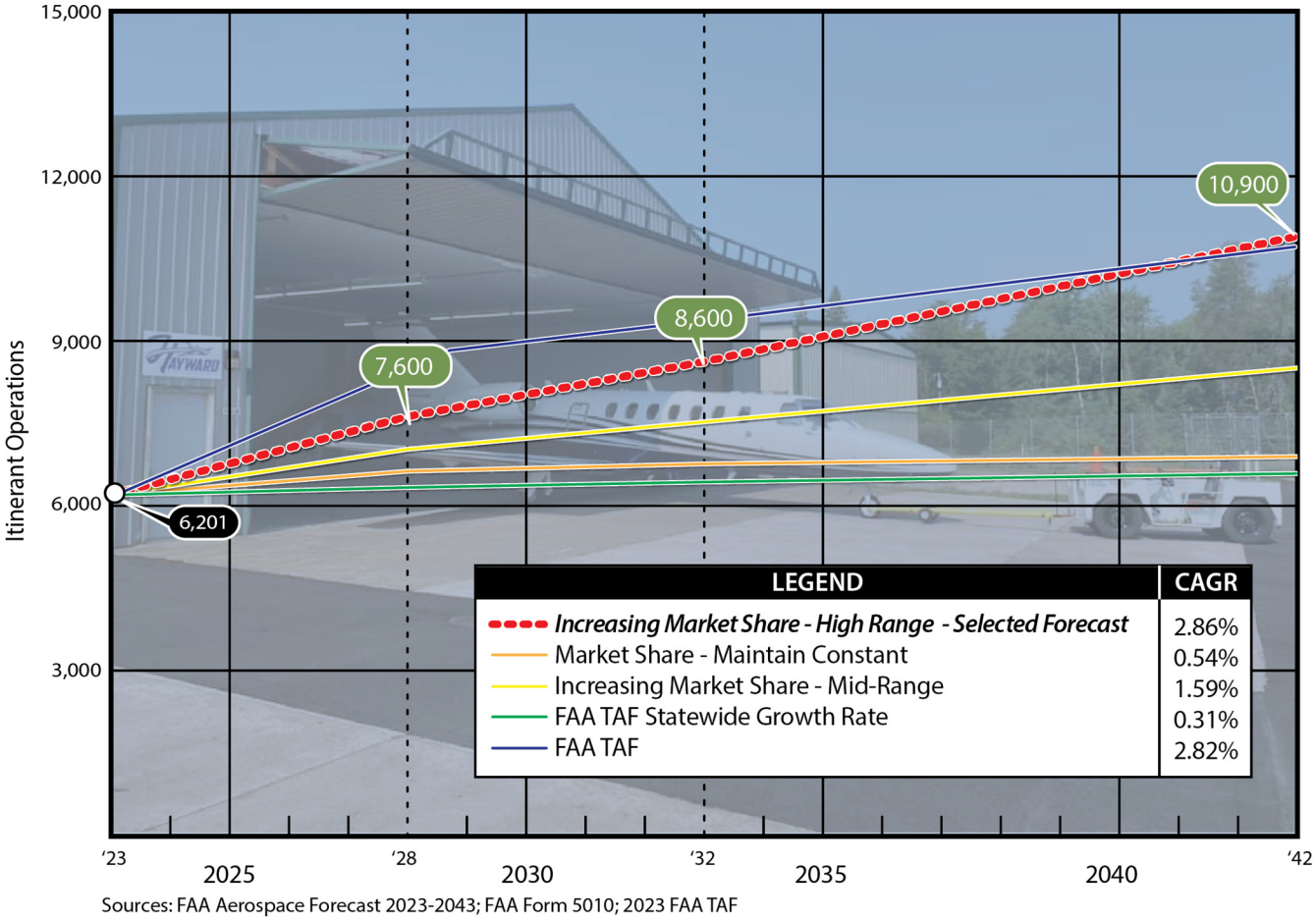
Year	HYR Itinerant Operations	U.S. ATCT Itinerant GA Operations	HYR Share %
2023	6,201	15,077,947	0.0411%
Market Share – Maintain Constant (CAGR 0.54%)			
2028	6,600	16,067,702	0.0411%
2033	6,700	16,274,397	0.0411%
2043	6,900	16,704,132	0.0411%
Increasing Market Share – Mid Range (CAGR 1.59%)			
2028	7,000	16,067,702	0.0436%
2033	7,500	16,274,397	0.0461%
2043	8,500	16,704,132	0.0510%
Increasing Market Share – High Range (CAGR 2.86%) – Selected Forecast			
2028	7,600	16,067,702	0.0471%
2033	8,600	16,274,397	0.0531%
2043	10,900	16,704,132	0.0650%
FAA TAF Statewide Growth Rate (CAGR 0.31%)			
2028	6,300	16,067,702	0.0392%
2033	6,400	16,274,397	0.0393%
2043	6,600	16,704,132	0.0395%
FAA TAF (CAGR 2.82%)			
2028	8,842	16,067,702	0.0550%
2033	9,443	16,274,397	0.0580%
2043	10,814	16,704,132	0.0647%

Sources: FAA Aerospace Forecast – FY 2023-2043; FAA Form 5010; 2023 FAA TAF

Market Share Projections | In 2023, the airport held 0.0411 percent of the market share of national itinerant operations. The first forecast carries this figure forward as a constant through the planning period, resulting in 6,900 itinerant operations by 2043 for a CAGR of 0.54 percent. Next, the mid range increasing market share of 0.0510 percent was considered. By the end of the planning period, 8,500 annual itinerant operations are projected, reflecting a 1.56 percent CAGR. The last market share analysis considered a high range scenario based on the airport holding 0.0650 percent of the national market share for itinerant operations. This produced a CAGR of 2.86 percent, or 10,900 general aviation annual itinerant operations by 2043.

Other Projections | Lastly, projections presented in the FAA TAF were considered, primarily for comparison purposes. The TAF estimates growth to 10,814 itinerant operations at HYR over the course of the planning period, which is reflective of a 2.82 percent CAGR. The statewide TAF growth rate for itinerant operations is estimated at 0.31 percent, which results in 6,600 itinerant operations at HYR by 2043 when applied to the base year count.

Exhibit 2E presents a graph of the itinerant GA operation projections. Combined, the forecasts present a planning envelope ranging from 6,600 (FAA TAF statewide forecast) to 10,900 (high range increasing market share) itinerant operations. With growth in itinerant operations anticipated both nationally and regionally, it is reasonable to assume a moderate increase in this type of traffic over the next 20 years. As such, the **high range increasing market share forecast** is the selected projection. While this is representative of the top end of the forecast envelope, the growth remains moderate, with a gradual increase of roughly 1,000 additional itinerant operations for each five-year forecast horizon.



Sources: FAA Aerospace Forecast 2023-2043; FAA Form 5010; 2023 FAA TAF

Exhibit 2E | Itinerant GA Operations Projections

Local General Aviation Operations Forecast | Local operations, or those that stay within the traffic pattern or are executing touch-and-go operations, have also been forecast. This type of operation comprises a smaller share of the total operations occurring at HYR, with 3,622 local operations estimated in 2023. **Table 2L** details local operations at the airport, utilizing the estimate from the FAA TAF as the base. The base year of 2023 represents a market share of 0.0245 percent when compared to total U.S. local operations. Like the itinerant forecasts, several market share projections were made, as well as a comparison to the TAF projections for HYR.

TABLE 2L | Local General Aviation Operations Forecasts – Sawyer County Airport

Year	HYR Local Operations	U.S. ATCT Local GA Operations	HYR Share %
2023	3,622	14,801,816	0.0245%
Market Share – Maintain Constant (CAGR 0.62%)			
2028	3,900	15,767,731	0.0259%
2033	3,900	16,043,229	0.0259%
2043	4,100	16,622,293	0.0259%
Increasing Market Share – Mid Range (CAGR 1.31%)			
2028	4,000	15,767,731	0.0254%
2033	4,200	16,043,229	0.0262%
2043	4,700	16,622,293	0.0280%
Increasing Market Share – High Range (CAGR 2.11%) – Selected Forecast			
2028	4,200	15,767,731	0.0266%
2033	4,600	16,043,229	0.0287%
2043	5,500	16,622,293	0.0330%
FAA TAF Statewide Growth Rate (CAGR 0.24%)			
2028	3,700	15,767,731	0.0235%
2033	3,700	16,043,229	0.0231%
2043	3,800	16,622,293	0.0229%
FAA TAF (CAGR 1.77%)			
2028	3,949	15,767,731	0.0250%
2033	4,310	16,043,229	0.0269%
2043	5,147	16,622,293	0.0310%

Sources: FAA Aerospace Forecast – FY 2023-2043; FAA Form 5010; 2023 FAA TAF

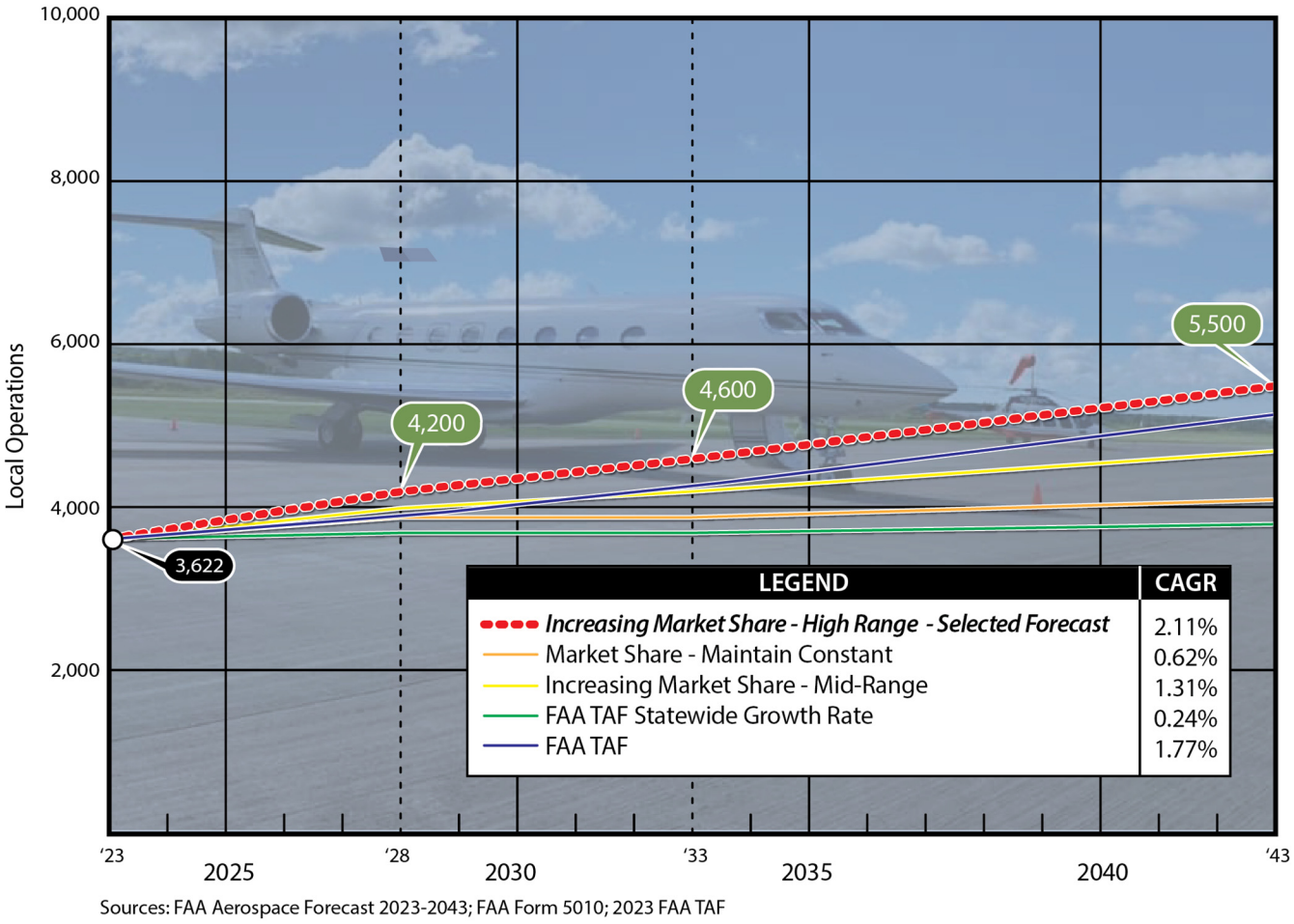
Market Share Projections | In the first forecast, the constant market share of 0.0245 percent was carried through the plan years. This resulted in 4,100 operations by 2043 for a CAGR of 0.62 percent.

The next two forecasts evaluated increasing market share scenarios, with the mid range projection considering an increase to 0.0280 percent of the market share and resulting in a 1.31 percent CAGR, or 4,700 local operations by 2043. A second increasing market share forecast considered a more aggressive growth scenario, in which HYR held 0.0330 percent of the market share. In this scenario, growth in local operations is projected to reach 5,500 operations by 2043, which is reflective of a 2.11 percent CAGR.

Other Projections | As mentioned, the TAF forecasts have also been included for comparison. The TAF estimates an increase in local operations to 5,147 by the end of the planning period, which equates to a 1.77 percent CAGR; however, when forecasting local operations across the state, the TAF reflects a 0.24 percent growth rate. When this is applied to the base year local operational count at HYR, the result is 3,800 annual local operations by 2043.

Exhibit 2F presents a graph of the local GA operation projections that have been developed. The planning envelope that results from these forecasts ranges from 3,800 to 5,500 local operations. Like the itinerant forecasts, the most reasonable forecast is reflected at the top end of the forecast envelope. While the selected forecast predicts a stronger growth rate for HYR than what the TAF projects for the airport, the

projection is considered reasonable due to local and regional trends, as well as the long-term trend toward more cost-efficient experimental and LSA aircraft, which would contribute toward local operations.



Sources: FAA Aerospace Forecast 2023-2043; FAA Form 5010; 2023 FAA TAF

Exhibit 2F | Local GA Operations Projections

Air Taxi Operations Forecast | The air taxi category, which is a subset of the itinerant operations category, is comprised of operations that are conducted by aircraft operating under 14 CFR Part 135. Part 135 operations are for-hire or on-demand and include charter and commuter flights, air ambulance, and fractional ownership aircraft operations. The FAA projects a constant 2,000 air taxi operations between 2023 and 2043, compared to the 252 recorded air taxi operations from Airport IQ. The primary reason for this significant difference is that the FAA TAF estimates are based on the continued national growth in the business jet segment of the air taxi category and do not reflect local trends.

As previously mentioned, the base year air taxi estimate of 252 operations is derived from Airport IQ, which records Part 135 operations. Nationally, HYR holds 0.0042 percent of the market share of air taxi operations. Market share and growth rate projections have been prepared, with the FAA TAF estimates included for comparison.

Market Share Projections | As presented in **Table 2M**, three market share projections were developed for air taxi operations at HYR. Carrying 2023's market share of 0.0042 percent results in slow growth throughout the planning period. At a CAGR of 0.88 percent, the constant market share projection produces 300 air taxi operations by 2043.

TABLE 2M | Air Taxi Operations – Sawyer County Airport

Year	HYR Air Taxi Operations	U.S. ATCT Air Taxi Operations	HYR Share %
2023	252	6,039,538	0.0042%
Constant Market Share (CAGR 0.88%)			
2028	250	6,073,202	0.0042%
2033	270	6,401,328	0.0042%
2043	300	7,105,068	0.0042%
Increasing Market Share – Mid Range (CAGR 1.94%)			
2028	270	6,073,202	0.0044%
2033	300	6,401,328	0.0047%
2043	370	7,105,068	0.0052%
Increasing Market Share – High Range (CAGR 3.27%) – Selected Forecast			
2028	290	6,073,202	0.0048%
2033	350	6,401,328	0.0054%
2043	480	7,105,068	0.0067%
FAA TAF Statewide Growth Rate (CAGR -0.04%)			
2028	250	6,073,202	0.0041%
2033	250	6,401,328	0.0039%
2043	250	7,105,068	0.0035%
FAA TAF (CAGR 0.00%)			
2028	2,000	6,073,202	0.0329%
2033	2,000	6,401,328	0.0312%
2043	2,000	7,105,068	0.0281%

Sources: FAA Aerospace Forecast – FY 2023-2043; FAA Form 5010; 2023 FAA TAF

Stronger growth scenarios based on market share were also evaluated. The mid range scenario considered HYR holding 0.0052 percent of the national market share by 2043, which translated to 370 air taxi operations by the end of the planning period. This is reflective of a 1.94 percent CAGR. A high range projection was also prepared, which assessed a 0.0067 percent market share by 2043. This produced a CAGR of 3.27 percent, or 480 air taxi operations.

Other Projections | Like the previous forecasts, the TAF projections were used as additional comparison points. The TAF projects air taxi operations at HYR to remain at 2,000 annually throughout the plan years, which equates to a 0.00 percent CAGR. The FAA TAF statewide growth rate shows almost no growth in air taxi operations in the state of Wisconsin and results in a CAGR of -0.04 percent.

Exhibit 2G presents a graph of the new air taxi operation projections. The air taxi forecasts range between a low of 250 operations (based on the FAA TAF statewide forecast) and a peak of 2,000 operations (based on the TAF). The FAA TAF is not shown on the graph due to it projecting a flat no growth scenario well above the actual air taxi operations. Sawyer County and the surrounding north woods are a popular

destination, and local discussion of air taxi service based out of HYR to support tourism is being analyzed; therefore, strong growth is anticipated for this operational segment, and the **high range increasing market share forecast** will be carried forward as the selected forecast, with 480 air taxi operations projected by 2043.

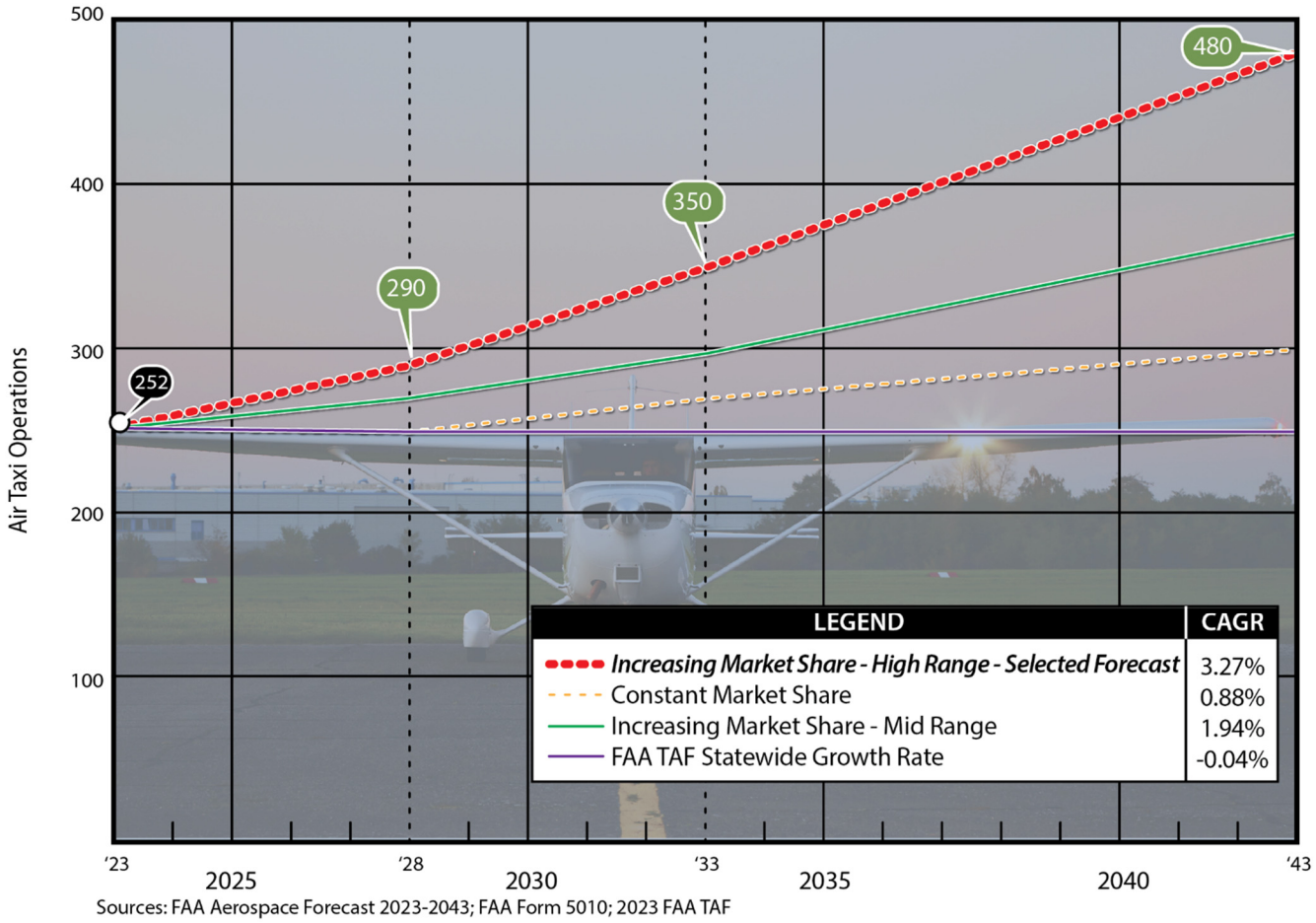


Exhibit 2G | Air Taxi Operations Projections

Military Operations Forecast | Military aircraft can and do utilize civilian airports across the country, including HYR; however, it is inherently difficult to project future military operations due to their national security nature and the fact that missions can change without notice. Thus, it is typical for the FAA to use a flat-line number for military operations. For this planning study, military operations at HYR are projected to stay constant through the plan years at 100 itinerant operations and will likely constitute helicopter activity.

Annual Instrument Approaches | An instrument approach, as defined by the FAA, is "an approach to an airport with the intent to land by an aircraft in accordance with an Instrument Flight Rule (IFR) flight plan, when visibility is less than three miles and/or when the ceiling is at or below the minimum initial approach altitude." To qualify as an instrument approach, aircraft must land at the airport after following one of the published instrument approach procedures in less than visual conditions. Forecasts of annual

instrument approaches (AIAs) provide guidance in determining an airport's requirements for navigational aid facilities, such as an instrument landing system. It should be noted that practice or training approaches do not count as AIAs, and neither do instrument approaches conducted in visual conditions.

During poor weather conditions, pilots are less likely to fly and rarely would perform training operations. As a result, an estimate of the total number of AIAs can be made based on a percentage of itinerant operations, regardless of the frequency of poor weather conditions. An estimate of 11.8 percent of total itinerant (GA and air taxi) operations is utilized to forecast AIAs at HYR, as presented in **Table 2N**. This percentage is derived from the amount of time that IFR conditions or poor visibility conditions (PVC) are present at the airport, based on 10 years of data as collected from the airport's automated surface observing system (ASOS).

TABLE 2N | Annual Instrument Approaches

Year	Annual Instrument Approaches	Itinerant Operations	Ratio
2023	730	6,201	11.8%
2028	895	7,600	11.8%
2033	1,013	8,600	11.8%
2043	1,284	10,900	11.8%

Source: FAA Form 5010; Coffman Associates analysis

PEAK PERIOD FORECASTS

Peaking characteristics play an important role in determining airport capacity and facility requirements. Because HYR does not have a control tower, the generalized peaking characteristics of other non-towered GA airports have been used for the purposes of this study. The peaking periods used to develop the capacity analysis and facility requirements are described below.

- Peak month – the calendar month in which traffic activity is the highest
- Design day – the average day in the peak month, derived by dividing the peak month by the number of days in the month
- Design hour – the average hour within the design day
- Busy day – the busiest day of a typical week in the peak month

For the purposes of this study, the peak month for total operations was estimated at 10 percent of the annual operations. By 2043, the estimated peak month is projected to reach 1,700 operations. The design day is estimated by dividing the peak month by the number of days in a month (31), and the busy day is calculated at 1.25 times the design day. The design hour is then calculated at 15 percent of the design day. These projections are included in **Table 2P**.

TABLE 2P | Peak Period Forecasts

	2023	2028	2033	2043
Annual	10,175	12,200	13,700	17,000
Peak Month	1,018	1,220	1,370	1,700
Design Day	33	39	44	55
Design Hour	5	6	7	8
Busy Day	41	49	54	66

Source: Coffman Associates analysis

Forecast Summary and Comparison to the FAA TAF | Demand-based forecasts of aviation activity at Sawyer County Airport over the next 20 years have been developed. An attempt has been made to define the projections in terms of short (1-5 years), intermediate (6-10 years), and long (11-20 years) term planning horizons. **Exhibit 2H** presents a 20-year forecast summary. Elements such as local socioeconomic indicators, anticipated regional development, historical aviation data, and national aviation trends were all considered when determining future conditions.

Forecasts are submitted to the FAA for evaluation and comparison to the TAF. The FAA prefers that forecasts differ by less than 10 percent in the 5-year period and less than 15 percent in the 10-year period. Where the forecasts differ, supporting documentation is necessary to justify the difference.

Table 2Q presents a summary of the selected forecasts and a comparison to the FAA TAF. The direct comparison between the master plan forecasts and the TAF is presented at the bottom of the table. The operations forecast is within the TAF tolerance for both the 5-year and 10-year periods, at 4.7 percent for the 5-year period and 0.39 percent for the 10-year period.

TABLE 2Q | Comparison of Master Plan Forecast to FAA TAF

	2023	2028	2033	2043	CAGR
Total Operations					
Master Plan Forecast	10,175	12,200	13,700	17,000	2.6%
TAF	11,923	12,791	13,753	15,724	1.4%
% Difference	**15.8%**	**4.7%**	**0.39%**	**7.8%**	
Based Aircraft					
Master Plan Forecast	29	32	35	41	1.7%
TAF	18	23	28	38	3.8%
% Difference	**46.8%**	**32.7%**	**22.2%**	**7.6%**	

Source: 2023 FAA TAF, Coffman Associates analysis

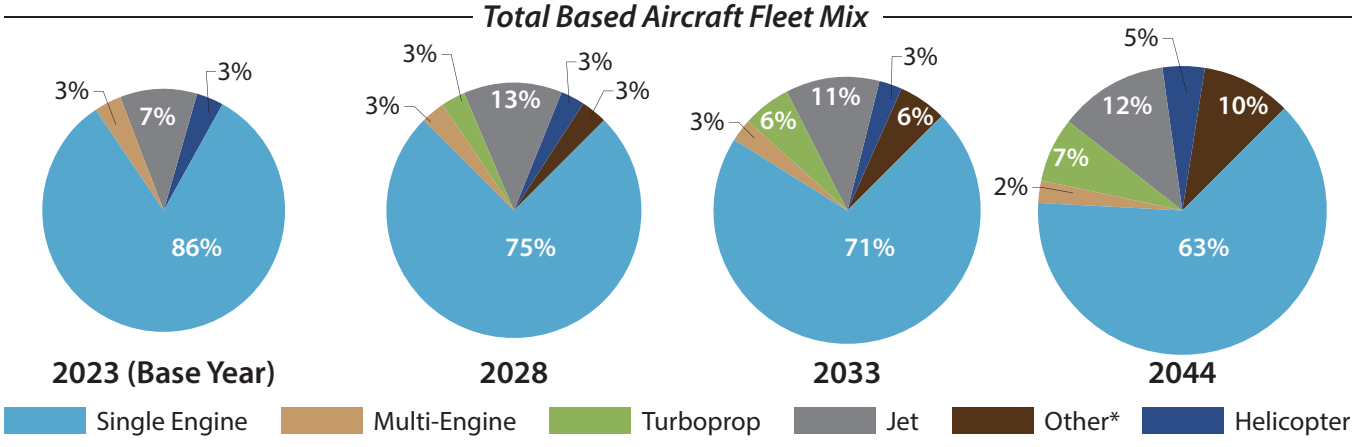
In terms of based aircraft, the master plan forecast is well outside the TAF tolerance for both the 5- and 10-year periods. This is due to the previously mentioned discrepancy between the master plan and the TAF in the 2023 count of based aircraft. While the validated based aircraft count is 29, the TAF only reports 18, further contributing to the larger percentage outside tolerance.

AIRCRAFT/AIRPORT/RUNWAY CLASSIFICATION

The FAA has established several aircraft classification systems which group aircraft types based on their performance (approach speed in landing configuration) and design characteristics (wingspan and landing gear configuration). These classification systems are used to determine the appropriate airport design standards for specific airport elements, such as runways, taxiways, taxilanes, and aprons.

	BASE YEAR	2028	2033	2043
ANNUAL OPERATIONS				
Itinerant				
Air Carrier	-	-	-	-
Other Air Taxi	252	290	350	480
General Aviation	6,201	7,600	8,600	10,900
Military	100	100	100	100
Total Itinerant	6,553	8,000	9,100	11,500
Local				
General Aviation	3,622	4,200	4,600	5,500
Military	-	-	-	-
Total Local Operations	***3,622***	***4,200***	***4,600***	***5,500***
Total Annual Operations	***10,175***	***12,200***	***13,700***	***17,000***
AIAs	**730**	**895**	**1,013**	**1,284**
PEAKING				
Total Annual Operations	10,175	12,200	13,700	17,000
Peak Month	1,018	1,220	1,370	1,700
Design Day	33	39	44	55
Design Hour	5	6	7	8
Busy Day	41	49	54	66
BASED AIRCRAFT				
Single Engine	25	24	25	26
Multi-Engine	1	1	1	1
Turboprop	0	1	2	3
Jet	2	4	4	5
Helicopter	1	1	1	2
Other	0	1	2	4
Total HYR Based Aircraft	***29***	***32***	***35***	***41***

Total Based Aircraft Fleet Mix



*Other includes LSA and Experimental Aircraft
Source: Airport records; Coffman Associates analysis

AIRCRAFT CLASSIFICATION

The selection of appropriate FAA design standards for the development and location of airport facilities is primarily based on the characteristics of the aircraft that are currently using, or are expected to use, an airport. The critical aircraft is used to define the design parameters for an airport. The critical aircraft may be a single aircraft type or a composite aircraft representing a collection of aircraft with similar characteristics. The critical aircraft is classified by three parameters: aircraft approach category (AAC), airplane design group (ADG), and taxiway design group (TDG). FAA AC 150/5300-13B, *Airport Design*, describes the following airplane classification systems, the parameters of which are presented on **Exhibit 2J**.

Aircraft Approach Category (AAC) | The AAC is a grouping of aircraft based on a reference landing speed (V_{REF}), if specified, or 1.3 times stall speed (V_{SO}) at the maximum certificated landing weight if V_{REF} is not specified,. V_{REF}, V_{SO}, and the maximum certificated landing weight are the values established for the aircraft by the certification authority of the country of registry.

The AAC generally refers to the approach speed of an aircraft in landing configuration (operational characteristics). The higher the approach speed, the more restrictive the applicable design standards. The AAC, depicted by a letter (A through E), generally applies to runways and runway-related facilities, such as the runway width; runway safety area (RSA); runway object free area (ROFA); runway protection zone (RPZ); and separation standards.

Airplane Design Group (ADG) | The ADG, depicted by a Roman numeral (I through VI), is a classification of aircraft related to aircraft wingspan or tail height (physical characteristics). When the aircraft wingspan and tail height fall within different groups, the higher group is used. The ADG influences design standards for the taxiway safety area; taxiway object free area; taxilane object free area; apron wingtip clearance; and various separation distances.

Taxiway Design Group (TDG) | The TDG is a classification of airplanes based on outer-to-outer main gear width (MGW) and cockpit to main gear (CMG) distance. The TDG relates to the undercarriage dimensions of the critical aircraft. The TDG is classified by an alphanumeric system (1A, 1B, 2A, 2B, 3, 4, 5, 6, and 7). The taxiway design elements determined by the application of the TDG include the taxiway width; taxiway edge safety margin; taxiway shoulder width; taxiway fillet dimensions; and, in some cases, the separation distance between parallel taxiways/taxilanes. Other taxiway elements – such as the taxiway safety area; taxiway/taxilane object free area (TOFA); taxiway/taxilane separation to parallel taxiway/taxilanes or fixed or movable objects; and taxiway/taxilane wingtip clearances – are determined solely based on the wingspan/ADG of the critical aircraft utilizing those surfaces. It is appropriate for taxiways to be planned and built to different TDG standards based on expected use.

The reverse side of **Exhibit 2J** summarizes the classifications of the most common aircraft in operation today. Recreational and business piston and turboprop aircraft generally fall in AAC A and B, and ADG I and II. Business jets typically fall in AAC B and C, while larger business jets and commercial aircraft fall in AAC C and D.

AIRCRAFT APPROACH CATEGORY (AAC)

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

AIRPLANE DESIGN GROUP (ADG)

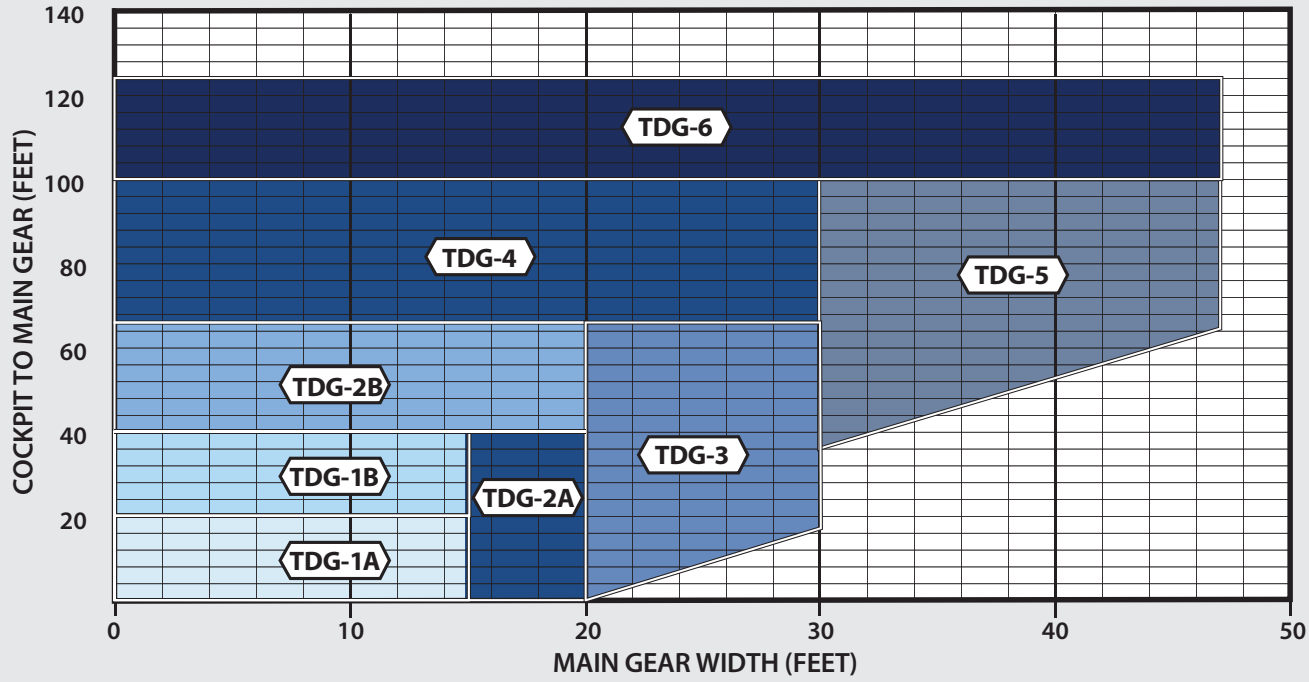
Group #	Tail Height (ft)	Wingspan (ft)
I	<20	<49
II	20-<30	49-<79
III	30-<45	79-<118
IV	45-<60	118-<171
V	60-<66	171-<214
VI	66-<80	214-<262

VISIBILITY MINIMUMS

RVR* (ft)	Flight Visibility Category (statute miles)
VIS	3-mile or greater visibility minimums
5,000	Not lower than 1-mile
4,000	Lower than 1-mile but not lower than ¾-mile
2,400	Lower than ¾-mile but not lower than ½-mile
1,600	Lower than ½-mile but not lower than ¼-mile
1,200	Lower than ¼-mile

***RVR**: Runway Visual Range

TAXIWAY DESIGN GROUP (TDG)

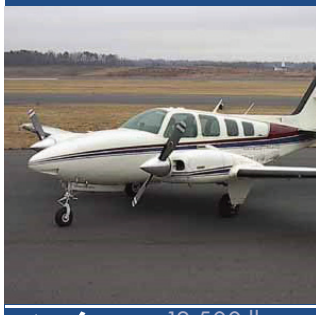


Source: FAA AC 150/5300-13B, Airport Design

A-I

Aircraft	TDG
• Beech Baron 55	1A
• **Beech Bonanza**	**1A**
• Cessna 150, 172	1A
• Eclipse 500	1A
• Piper Archer, Seneca	1A

B-I



Aircraft	TDG
• **Beech Baron 58**	**1A**
• Beech King Air 90	1A
• Cessna 421	1A
• Cessna Citation CJ1	1A
• Cessna Citation 1	2A
• Embraer Phenom 100	1B

A/B-II 12,500 lbs. or less

Aircraft	TDG
• **Beech Super King Air 200**	**2A**
• Cessna 441 Conquest	1A
• Cessna Citation CJ2	2A
• Pilatus PC-12	1A

B-II over 12,500 lbs.

Aircraft	TDG
• Beech Super King Air 350	2A
• Cessna Citation CJ3,V	2A
• Cessna Citation Bravo	1A
• **Cessna Citation CJ4**	**1B**
• Cessna Citation Latitude/Longitude	1B
• Embraer Phenom 300	1B
• Falcon 10, 20, 50	1B
• Falcon 900, 2000	2A
• Hawker 800/850, 4000	1B
• Pilatus PC-24	1B

A/B-III

Aircraft	TDG
• Bombardier Dash 8	3
• **Bombardier Global 5000, 6000, 7000, 8000**	**2B**
• Falcon 6X, 7X, 8X	2B

C/D-I

Aircraft	TDG
• **Lear** 25, 31, 45, 55, **60**	**1B**
• Learjet 35, 36 (D-I)	1B

C/D-II

Aircraft	TDG
• Challenger 600/604	1B
• Cessna Citation VII, X+	1B
• Embraer Legacy 450/500	1B
• **Gulfstream** 350, 450 (D-II)	2A
• Gulfstream G200/G280	1B
• Lear 70, 75	1B
• Bombardier CRJ-200, -700	1B/2B
• Embraer ERJ-135, -140, -145	2B

C/D-III less than 150,000 lbs.

Aircraft	TDG
• Gulfstream V	2A
• **Gulfstream** 550,**650 (D-III)**	**2B**
• Bombardier CRJ-900, -1000	2B
• Embraer E-170, -175, -190	3

C/D-III over 150,000 lbs.

Aircraft	TDG
• Airbus A319-100, -200	3
• **Boeing 737-800**, -900, BBJ (D-III)	**3**
• MD-83, -88 (D-III)	4

C/D-IV

Aircraft	TDG
• Airbus A300-100, -200, -600	5
• Boeing 757-200	4
• **Boeing 767**-300, **-400**	**5**
• MD-11	6

D-V

Aircraft	TDG
• Airbus A330-200, -300	5
• Airbus A340-500, -600	6
• Boeing 747-100, -400	5
• Boeing 777-300	6
• **Boeing 787-8**, -9	**5**

TDG: Taxiway Design Group

Note: Aircraft pictured is identified in bold type.

AIRPORT AND RUNWAY CLASSIFICATIONS

Airport and runway classifications – along with the previously defined aircraft classifications – are used to determine the appropriate FAA design standards to which the airfield facilities should be designed and built.

Runway Design Code (RDC) | The RDC signifies the design standards to which the runway is to be built. The RDC is based on planned development and has no operational component.

The AAC, ADG, and runway visual range (RVR) are combined to form the RDC of a runway. The RDC provides the information needed to determine certain applicable design standards. The first component, depicted by a letter, is the AAC and relates to aircraft approach speed (operational characteristics). The second component, depicted by a Roman numeral, is the ADG and relates to either the aircraft wingspan or tail height (physical characteristics), whichever is most restrictive. The third component relates to the available instrument approach visibility minimums expressed by RVR values in feet: 1,200 (⅛ mile), 1,600 (¼ mile), 2,400 (½ mile), 4,000 (¾ mile), and 5,000 (1 mile). The RVR values approximate standard visibility minimums for instrument approaches to the runways. The third component is labeled "VIS" for runways designed for visual approach use only.

Approach Reference Code (APRC) | The APRC signifies the current operational capabilities of a runway and associated parallel taxiway with regard to landing operations. The APRC is comprised of the same three components as the RDC: AAC, ADG, and RVR. While the RDC is based on planned development with no operational component, the APRC describes the current operational capabilities of a runway under particular meteorological conditions in which no special operating procedures are necessary. The APRC for a runway is established based on the minimum runway-to-taxiway centerline separation.

Departure Reference Code (DPRC) | The DPRC signifies the current operational capabilities of a runway and associated parallel taxiway with regard to takeoff operations. The DPRC represents those aircraft that can take off from a runway while any aircraft are present on adjacent taxiways, under particular meteorological conditions with no special operating conditions. The DPRC is similar to the APRC but has two components: AAC and ADG. A runway may have more than one DPRC, depending on the parallel taxiway separation distance.

Airport Reference Code (ARC) | The ARC is an airport designation that signifies the airport's highest RDC, minus the third (visibility) component of the RDC. The ARC is used for planning and design only and does not limit the aircraft that may be able to operate safely at an airport. The 2007 airport layout plan for HYR identifies the existing and future ARC as B-II for Runway 3-21 and A-I(S) for Runway 16-34.

CRITICAL AIRCRAFT

The selection of appropriate FAA design standards for the development and location of airport facilities is based primarily upon the characteristics of the aircraft that are currently using, or are expected to use, an airport. The critical aircraft is used to define the design parameters for an airport. The critical aircraft

may be a single aircraft or a composite aircraft representing a collection of aircraft classified by the three parameters: AAC, ADG, and TDG.

The first consideration is the safe operation of aircraft likely to use an airport. Any operation of an aircraft which exceeds the design criteria of an airport may result in a lower safety margin; however, it is not the usual practice to base the airport design on an aircraft that uses the airport infrequently.

The critical aircraft is defined as the most demanding aircraft type, or grouping of aircraft with similar characteristics, that makes regular use of the airport. Regular use is 500 annual operations, excluding touch-and-go operations. Planning for future aircraft use is of importance since the design standards are used to plan separation distances between facilities. These future standards must be considered now to ensure that short-term development does not preclude the reasonable long-range potential needs of the airport.

According to FAA AC 150/5300-13B, *Airport Design*, "airport designs based only on aircraft currently using the airport can severely limit the airport's ability to accommodate future operations of more demanding aircraft. Conversely, it is not practical or economical to base airport design on aircraft that will not realistically use the airport." Selection of the current and future critical aircraft must be realistic in nature and supported by current data and realistic projections.

AIRPORT CRITICAL AIRCRAFT

AAC, ADG, and TDG are the three elements used for classifying the airport's critical aircraft. The AAC and ADG are examined first, followed by the TDG.

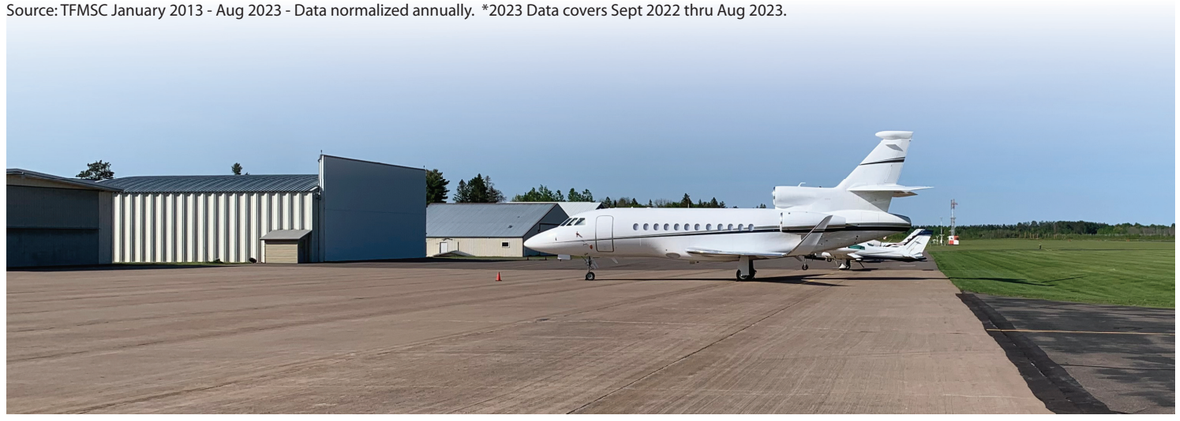
The FAA's TFMSC database captures an operation when a pilot files a flight plan and/or when a flight is detected by the National Airspace System, usually via radar. The database includes documentation of commercial (air carrier and air taxi), GA, and military air traffic. Due to certain factors – such as incomplete flight plans, limited radar coverage, and VFR operations – TFMSC data do not account for all aircraft activity at an airport by a given aircraft type; however, the TFMSC does provide an accurate reflection of IFR activity. Operators of high-performance aircraft, such as turboprops and jets, tend to file flight plans at a high rate.

Exhibit 2K presents the TFMSC operational mix at the airport for turbine aircraft operations for the last 10 years, including the most recent 12 months of operations (September 2022 to August 2023). As shown on the exhibit, the airport experiences activity by a wide range of business jets; however, no single aircraft has conducted 500 or more operations at the airport in recent years. In the last 12 months, the greatest number of operations in any single design family was 430 in category B-II, which accounted for approximately 40 percent of logged turbine aircraft activity. Over the 10-year period, the B-II design category has averaged approximately 542 annual operations, as reported by the TFMSC. Representative aircraft in this category include the Citation CJ2/CJ3/CJ4, the Falcon 900, and the Beechcraft King Air 200/300/350. The next largest number of operations was conducted by the C-II family of aircraft, which includes aircraft such as the Challenger 350/3500, the Hawker 800, and the Learjet 70. These and other

ARC	Aircraft	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023*
A-I	CCessna 206/207/210	0	0	4	0	2	0	0	0	0	0	0
	Cirrus Vision Jet	0	0	0	2	4	2	10	8	6	6	4
	Eclipse 400/500	0	2	6	6	0	0	0	0	4	0	2
	Kodiak Quest	0	0	0	0	0	0	0	6	0	14	2
	Lancair Evolution/Legacy	0	0	0	8	0	0	0	0	0	0	0
	Piper Malibu/Meridian	2	0	2	6	4	6	2	2	6	2	2
	Socata TBM 7/850/900	20	16	18	26	20	22	32	8	24	12	10
	Total	22	18	30	48	30	30	44	24	40	34	20
A-II	Cessna Caravan	0	4	8	6	2	2	4	4	4	2	0
	De Havilland Twin Otter	0	2	2	0	0	4	0	0	0	0	0
	Pilatus PC-12	14	14	34	26	18	36	26	34	62	44	66
	Total	14	20	44	32	20	42	30	38	66	46	66
B-I	Beechjet 400	66	40	44	20	14	10	16	32	26	20	12
	Cessna 425 Corsair	18	12	16	0	0	0	0	0	0	0	0
	Citation CJ1	14	16	14	2	12	6	16	8	18	6	12
	Citation I/SP	12	2	4	4	2	0	0	0	18	12	8
	Citation M2	0	0	0	0	2	2	4	0	0	2	0
	Citation Mustang	140	130	174	148	108	98	94	48	14	0	0
	Falcon 10	2	0	0	6	0	0	0	0	0	0	2
	Hawker 1000	2	0	2	0	0	0	0	0	0	0	0
	Honda Jet	0	0	0	0	0	0	0	0	2	0	4
	King Air 90/100	40	64	44	56	36	30	14	10	10	10	2
	Mitsubishi MU-2	0	0	0	0	0	2	0	0	0	0	6
	Phenom 100	10	18	26	22	20	14	0	0	6	4	6
	Piaggio Avanti	14	0	0	4	0	0	0	0	0	0	20
	Piper Cheyenne	8	4	14	18	2	4	0	0	0	0	2
	Premier 1	0	2	0	0	0	8	6	8	10	16	22
	Total	326	288	338	280	196	174	150	106	104	70	96
B-II	Beech 1900	8	4	4	0	0	0	0	0	0	0	0
	Cessna Conquest	4	0	14	12	2	6	8	8	10	0	2
	Citation CJ2/CJ3/CJ4	14	12	22	112	106	88	94	106	134	126	78
	Citation II/SP/Latitude	144	96	110	28	26	36	34	46	46	38	48
	Citation Longitude	0	0	0	0	0	0	0	0	8	8	4
	Citation V/Sovereign	52	56	44	46	74	54	44	22	40	32	38
	Citation X	34	22	16	22	14	20	18	4	12	0	0
	Citation XLS	40	28	50	36	26	56	44	42	60	48	28
	Dornier 328	2	4	6	0	0	0	0	0	0	0	0
	Embraer EMB-110/120	0	2	0	0	0	2	0	0	0	0	0
	Falcon 20/50	4	4	28	100	88	104	84	2	6	2	0
	Falcon 2000	24	28	20	46	32	42	36	26	26	34	22
	Falcon 900	104	86	68	100	96	64	14	134	74	78	62
	Hawker 4000	0	0	2	0	6	2	8	4	2	6	8
	King Air 200/300/350	120	116	102	108	88	98	118	78	128	90	88
	Phenom 300	8	12	26	32	40	24	50	32	44	34	50
	Pilatus PC-24	0	0	0	0	0	0	4	2	2	0	2
	Swearingen merlin	0	0	2	0	0	0	0	0	0	0	0
	Total	558	470	514	642	598	596	556	506	592	496	430

ARC	Aircraft	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023*
B-III	Bombardier Global 5000	0	0	14	10	2	4	6	20	22	2	40
	Bombardier Global Express	2	0	2	12	0	8	4	12	4	0	0
	Falcon 7X/8X	2	0	0	0	0	2	66	50	36	52	72
	Total	4	0	16	22	2	14	76	82	62	54	112
C-I	Learjet 31	0	10	0	2	0	2	0	0	0	0	0
	Learjet 40 Series	52	46	36	40	26	88	86	16	24	34	34
	Learjet 50 Series	0	0	8	0	0	0	0	0	0	0	0
	Learjet 60 Series	2	2	0	4	2	2	4	2	6	2	0
	Westwind II	2	2	2	4	2	2	0	0	0	0	0
	Total	56	60	46	50	30	94	90	18	30	36	34
C-II	Challenger 300/350/3500	68	50	60	58	64	100	76	94	108	80	158
	Challenger 600/604	8	6	4	8	24	14	4	12	10	14	8
	Citation III/VI	66	84	84	16	6	8	0	14	10	0	4
	Embraer 500/450 Legacy	0	0	0	2	0	2	4	4	14	0	6
	Embraer ERJ-135/140/145	4	2	8	6	4	2	0	0	0	0	0
	Gulfstream 100/150	12	6	14	4	0	0	0	0	0	4	0
	Gulfstream 280	0	0	0	2	0	0	0	4	0	0	14
	Hawker 800 (Formerly Bae-125-800)	30	14	6	26	26	22	50	42	40	54	36
	Learjet 70 Series	0	10	18	36	56	30	56	40	26	56	22
	Total	188	172	194	158	180	178	190	210	208	208	248
C-IV	Boeing C-17	0	2	0	0	0	0	0	0	0	0	0
	C-130 Hercules	0	0	0	0	0	0	0	2	0	0	0
	Total	0	2	0	0	0	0	0	2	0	0	0
D-I	Learjet 35/36	8	2	2	4	8	0	0	0	2	0	0
	Total	8	2	2	4	8	0	0	0	2	0	0
D-II	Gulfstream 200	8	4	4	0	0	4	8	2	8	18	20
	Gulfstream 450	12	14	0	12	8	0	8	10	10	0	2
	Total	20	18	4	12	8	4	16	12	18	18	22
D-III	Gulfstream 500/600	0	0	2	0	2	4	0	2	6	0	0
	Total	0	0	2	0	2	4	0	2	6	0	0
E-I	F-16 Falcon/Viper	2	0	0	0	0	0	0	0	4	0	0
	Total	2	0	0	0	0	0	0	0	4	0	0

Source: TFMSC January 2013 - Aug 2023 - Data normalized annually. *2023 Data covers Sept 2022 thru Aug 2023.



AIRPORT REFERENCE CODE (ARC) SUMMARY

ARC	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023*
A-I	22	18	30	48	30	30	44	24	40	34	20
A-II	14	20	44	32	20	42	30	38	66	46	66
B-I	326	288	338	280	196	174	150	106	104	70	96
B-II	558	470	514	642	598	596	556	506	592	496	430
B-III	4	0	16	22	2	14	76	82	62	54	112
C-I	56	60	46	50	30	94	90	18	30	36	34
C-II	188	172	194	158	180	178	190	210	208	208	248
C-IV	0	2	0	0	0	0	0	2	0	0	0
D-I	8	2	2	4	8	0	0	0	2	0	0
D-II	20	18	4	12	8	4	16	12	18	18	22
D-III	0	0	2	0	2	4	0	2	6	0	0
E-I	2	0	0	0	0	0	0	0	4	0	0
TOTAL	1,198	1,050	1,190	1,248	1,074	1,136	1,152	1,000	1,132	962	1,028

APPROACH CATEGORY

AC	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023*
A	36	38	74	80	50	72	74	62	106	80	86
B	888	758	868	944	796	784	782	694	758	620	638
C	244	234	240	208	210	272	280	230	238	244	282
D	28	20	8	16	18	8	16	14	26	18	22
E	2	0	0	0	0	0	0	0	4	0	0
TOTAL	1,198	1,050	1,190	1,248	1,074	1,136	1,152	1,000	1,132	962	1,028

DESIGN GROUP

DG	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023*
I	414	368	416	382	264	298	284	148	180	140	150
II	780	680	756	844	806	820	792	766	884	768	766
III	4	0	18	22	4	18	76	84	68	54	112
IV	0	2	0	0	0	0	0	2	0	0	0
TOTAL	1,198	1,050	1,190	1,248	1,074	1,136	1,152	1,000	1,132	962	1,028

C-II aircraft conducted an average of 194 operations annually over the last 10 years and comprised approximately 24 percent of logged turbine operations within the last 12 months.

When planning for future facilities at HYR, it is necessary to consider the types of aircraft operating most frequently at the airport in order to identify the existing, future, and ultimate critical aircraft. With the B-II family reaching almost 500 aircraft operations in the last 12 months, it is reasonable to identify B-II as the existing critical aircraft.

When considering the future and ultimate critical aircraft, it is necessary to analyze the trends and operators utilizing the airport. Based on the trends from TFMSC data, operations within the approach categories C and D have been increasing within the last five years. AAC C aircraft operations have increased 0.72 percent over the last five years, while AAC D operations have increased 22 percent, reflective of an increase in faster, more demanding aircraft operations. Design group III aircraft operations have increased by 44 percent over the last five years, showing a significant shift toward larger aircraft. These trends toward larger and faster aircraft operations at HYR are further justified by the recent acquisition of larger and faster jet aircraft by frequent users. A based jet operator at Sawyer County Airport has replaced its Cessna CJ4 with a Challenger 3500: an increase from B-II to C-II operations. This operator plans to increase the number of operations of its two Challenger 350/3500 aircraft from 120 annual operations in 2023 to 160 annual operations by 2025. Another frequent user previously operated a Falcon 900EX (a B-II aircraft) with approximately 100 annual operations to and from HYR. As of fall 2023, this operator has replaced its Falcon with a Gulfstream G500 (a D-III aircraft).

Airport Critical Aircraft Summary | Based on these trends and airport users' fleets, the critical aircraft at Sawyer County Airport is anticipated to change from B-II to an interim future critical aircraft group of C-II, and finally an ultimate critical aircraft group of D-III. With the based operator currently utilizing two C-II jet aircraft and the positive trend of C-II operations, it is forecast that the total group of C-II operations will meet the minimum of 500 annual operations by 2033. As positive trends in D-III aircraft operations continue, it is anticipated that the total group of D-III operations will meet the minimum of 500 annual operations by the forecast year 2043.

RUNWAY DESIGN CODE

The RDC relates to specific FAA design standards that should be met in relation to a runway. The RDC takes into consideration the AAC, ADG, and the RVR. In most cases, the critical aircraft will also be the RDC for the primary runway.

Runway 3-21, which is 5,002 feet long and 100 feet wide, should be designed to accommodate the overall airport critical aircraft. The critical aircraft has been identified as a future C-II and ultimate D-III. Runway 3-21 has an instrument landing system (ILS) precision instrument approach with visibility minimums as low as ¾ mile. Based on the current activity and instrument approach capability, the existing and ultimate RDC is D-III-4000.

APPROACH AND DEPARTURE REFERENCE CODES

The APRC and DPRC describe the current operational capabilities of each runway and the adjacent parallel taxiways, where no special operating procedures are necessary. Essentially, the APRC and DPRC describe the current conditions at an airport in runway classification terms when considering the parallel taxiway.

The parallel taxiway for Runway 3-21 is located 300 feet from the runway (centerline to centerline). Based on this separation distance and the lowest visibility minimums associated with the runway, the APRC for Runway 3-21 is B/III/4000, D/II/4000, and its DPRC is B/III, D/II.

AIRPORT AND RUNWAY CLASSIFICATION SUMMARY

Table 2R summarizes the current and future airport and runway classifications for Runway 3-21. The critical aircraft is now defined by those aircraft in ARC C-II (future) and D-III (ultimate).

TABLE 2R | Airport and Runway Classifications for Runway 3-21

	RUNWAY 3-21		
	Existing	Future	Ultimate
Airport Reference Code (ARC)	B-II	C-II	D-III
Airport Critical Aircraft	B-II	C-II	D-III
Critical Aircraft (Typ.)	Citation CJ2/CJ3/CJ4	Challenger 350/3500	G500
Runway Design Code (RDC)	B-II-4000	C-II-4000	D-III-4000
Approach Reference Code (APRC)	B/III/4000, D/III/4000	B/III/4000, D/III/4000	B/III/4000, D/III/4000
Departure Reference Code (DPRC)	B/III, DIII	B/III, DIII	B/III, DIII
Taxiway Design Group (TDG)	2A*	2A*	2B
*Based on the King Air 200/300/350			

Source: FAA AC 150/5300-13B, Airport Design

Table 2S summarizes the current and future airport and runway classifications for Runway 16-34. The critical aircraft is defined by those aircraft in ARC A-I(S) and is expected to remain this classification throughout the planning period.

TABLE 2S | Airport and Runway Classifications for Runway 16-34

	Runway 16-34 Existing and Ultimate
Airport Reference Code (ARC)	A-I(S)
Airport Critical Aircraft	A-I(S)
Critical Aircraft (Typ.)	Cessna 182
Runway Design Code (RDC)	A-I(S)-VIS
Approach Reference Code (APRC)	N/A
Departure Reference Code (DPRC)	N/A
Taxiway Design Group (TDG)	N/A
N/A = not applicable	

Source: FAA AC 150/5300-13B, Airport Design

SUMMARY

This chapter has outlined the various activity levels that might reasonably be anticipated over the planning period, as well as the critical aircraft for the airport. Total based aircraft are forecast to grow from 29 in 2023 to 41 by 2043. Operations are forecast to grow from an estimated 10,175 in 2023 to 17,000 by 2043. The projected growth is driven by the FAA's positive outlook for general activity nationwide, as well as positive outlooks for socioeconomic growth (population, employment, and income) in Sawyer County and the region.

The critical aircraft for the airport was determined by examining the FAA's TFMSC database of flight plans. The current, future, and ultimate critical aircraft is anticipated to change from the current B-II category to a future condition of C-II, represented by the Challenger 350/3500, and an ultimate condition of D-III, represented by the Gulfstream G500.

The next step in the planning process is to assess the capabilities of the existing facilities to determine what upgrades may be necessary to meet future demands. The range of forecasts developed here will be carried forward in the next chapter as planning horizon activity levels that will serve as milestones or activity benchmarks in evaluating facility requirements.