CHAPTER TWO: FORECASTS

2.1 Introduction

The first step in planning for future facilities is to define the level of demand that can reasonably be expected to occur over the planning period. In the airport master planning process, this involves preparing forecasts of key aviation activity indicators that define the level of airport demand. Forecasts of commercial service and general aviation are used as the basis for facility planning, financial projections and environmental analysis.

The forecasts will be applied to several phases of the Airport Master Plan. Initially, they will be used to identify individual segments of future activity. They will then be used in the evaluation of airfield capacity, and the facility requirements of the airfield and the terminal area. From these evaluations, the need for new or improved facilities within the twenty year planning period can be determined.

Aviation activity and the demand for aviation services can be affected by a variety of unforeseeable and unpredictable influences such as competition; local, regional, national and global economies; fuel supply volatility and pricing; and the implementation of effective airport sales and marketing programs. Planning and projecting aviation activities for a twenty year planning period with absolute certainty is unrealistic. Therefore, it is important to remember that forecasts are to serve only as guidelines. Planning and development of improvements must remain a dynamic process, flexible enough to respond to unforeseen facility needs and service demands. Reviewing the airport's activity on a regular basis to determine if changes to the guidelines are necessary is a way to stay current with changing conditions and demands.

The following forecast analysis examines recent developments, historical information, and current aviation trends for the Yellowstone Regional Airport to provide an updated set of passenger and operational projections. The intent of the Master Plan is to assist the Joint Powers Board in making the adjustments necessary to ensure that the facility meets projected demands in an efficient and cost effective manner.

2.2 National Aviation Trends

The Federal Aviation Administration (FAA) publishes its national aviation forecast each year which includes forecasts for major air carriers, regional/commuters and general aviation. The forecast uses the economic performance of the United States as an indicator of future aviation industry growth. The current edition at the time of this chapter's preparation was FAA Aerospace Forecast Fiscal Years 2018-2038.

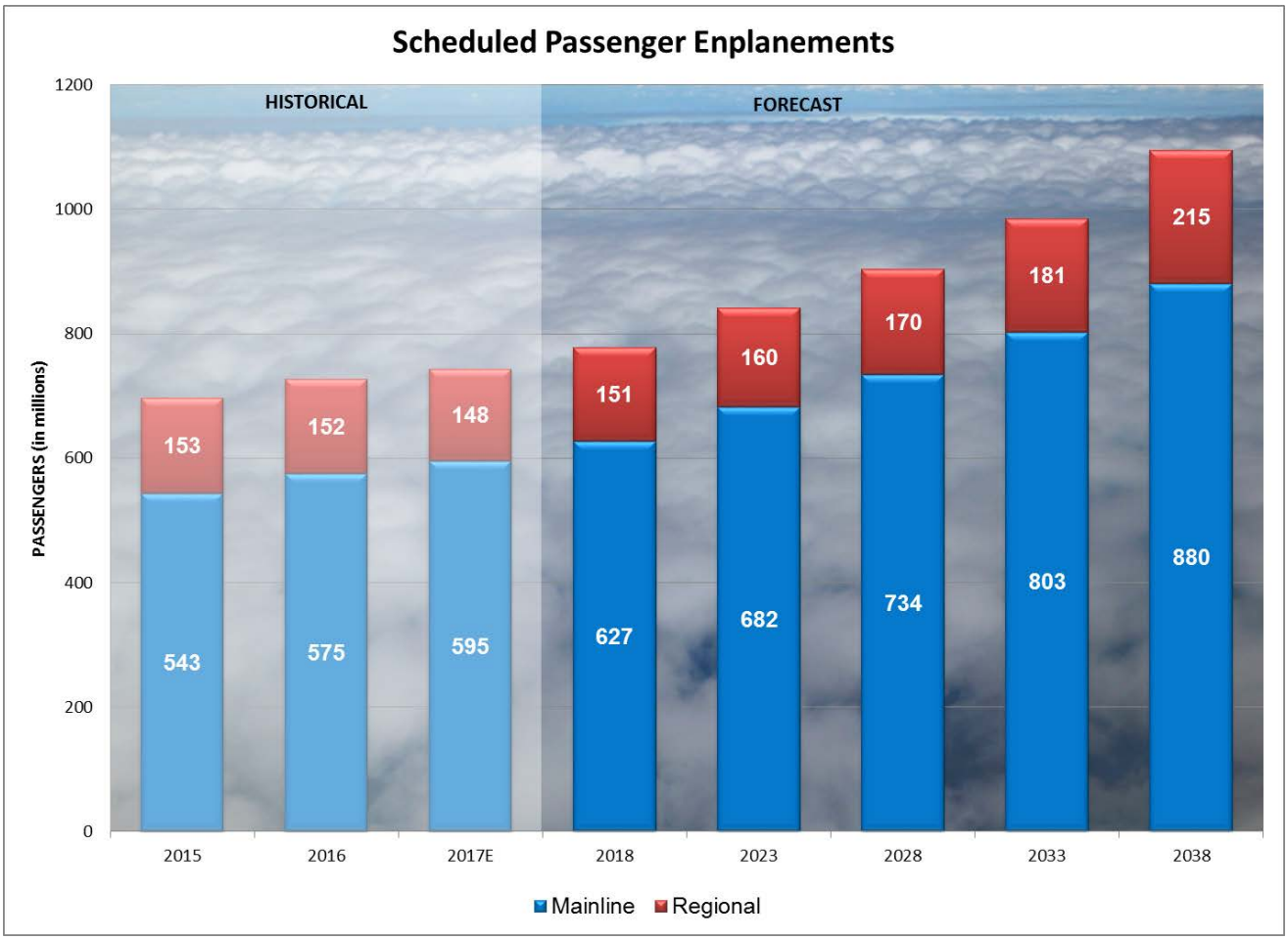
The FAA forecast notes that the U.S. airline industry underwent considerable restructuring since the 2007-2009 recession. Air carriers adopted a strategy of "capacity discipline", fine-tuning their business models to minimize losses by lowering operating costs, eliminating unprofitable routes, and grounding 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 also experienced an unprecedented period of consolidation with four major mergers in five years.

The strategy, of capacity discipline has eased in recent years. Since 2014, the number of Available Seat Miles (ASMs), or the number of seats available multiplied by the number of miles flown, has increased at a rate of 4.4% per year. ASM growth has risen due to a variety of factors including upgauging of aircraft and the expansion of ultra-low-cost carriers and the competitive response by major carriers. This has been driven in a large part by low fuel prices. The FAA expects this trend of easing capacity discipline to continue as some carriers have indicated plans to add new routes.

Regional carriers have experienced this trend to a lesser extent as they compete for fewer contracts with the remaining dominant carriers. This has meant slower growth in enplanements and yields than in the mainline carriers.

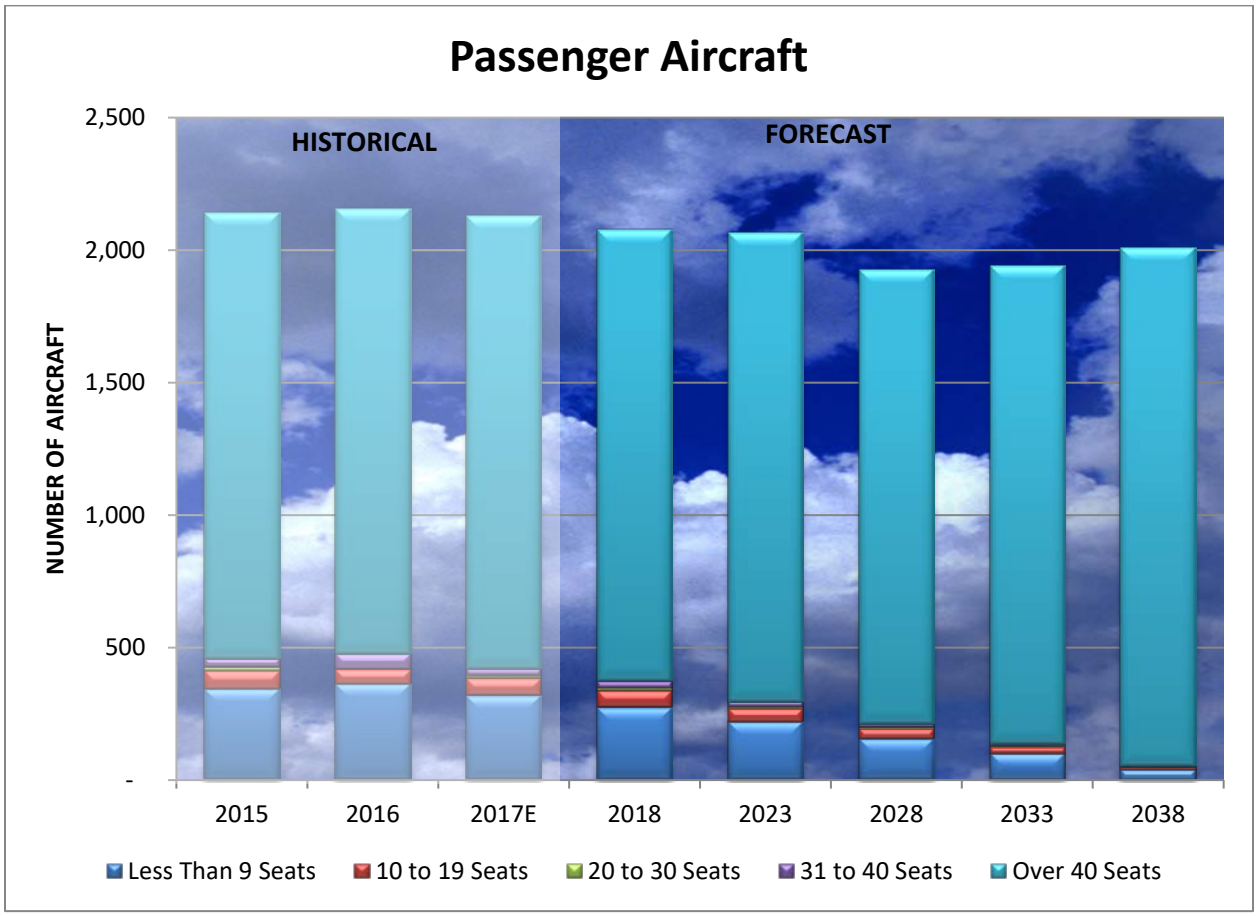
As noted in the FAA forecast, regional carriers have less leverage with the mainline carriers than they have had in the past as the mainline carriers have negotiated contracts that are more favorable to their operational and financial bottom line. Furthermore, the regional airlines are facing pilot shortages and tighter regulations regarding pilot training. Their labor costs are increasing as they raise wages to combat the pilot shortage while their capital costs have increased in the short-term as they continue to replace their 50 seat regional jets with more fuel-efficient 70 seat jets. The move to the larger aircraft will prove beneficial in the long term, however, since their unit costs are lower.

The FAA forecasts that as the airlines continue easing the capacity discipline following the great recession, aviation will continue to grow over the long term. The 2018 FAA forecast calls for mainline U.S. carrier passenger growth over the next 20 years to average 1.7 percent per year with regional carriers growing at an average 1.6 percent per year. Regional carrier aircraft size is projected to continue to grow with 70-90 seat regional jet aircraft entering the fleet with reductions in the 50 seat and under jet fleet. The changing aircraft fleet mix is narrowing the gap between the size and aircraft types operated by the mainline and regional carriers. **Figure 2-1** depicts passenger forecasts and **Figure 2-2** depicts fleet mix forecasts for Regional/Commuter Airlines.



Source: FAA Aerospace Forecast, FY 2018-2038, 2017 Estimated

Figure 2-1 U.S. Regional / Commuter Enplanements Forecasts

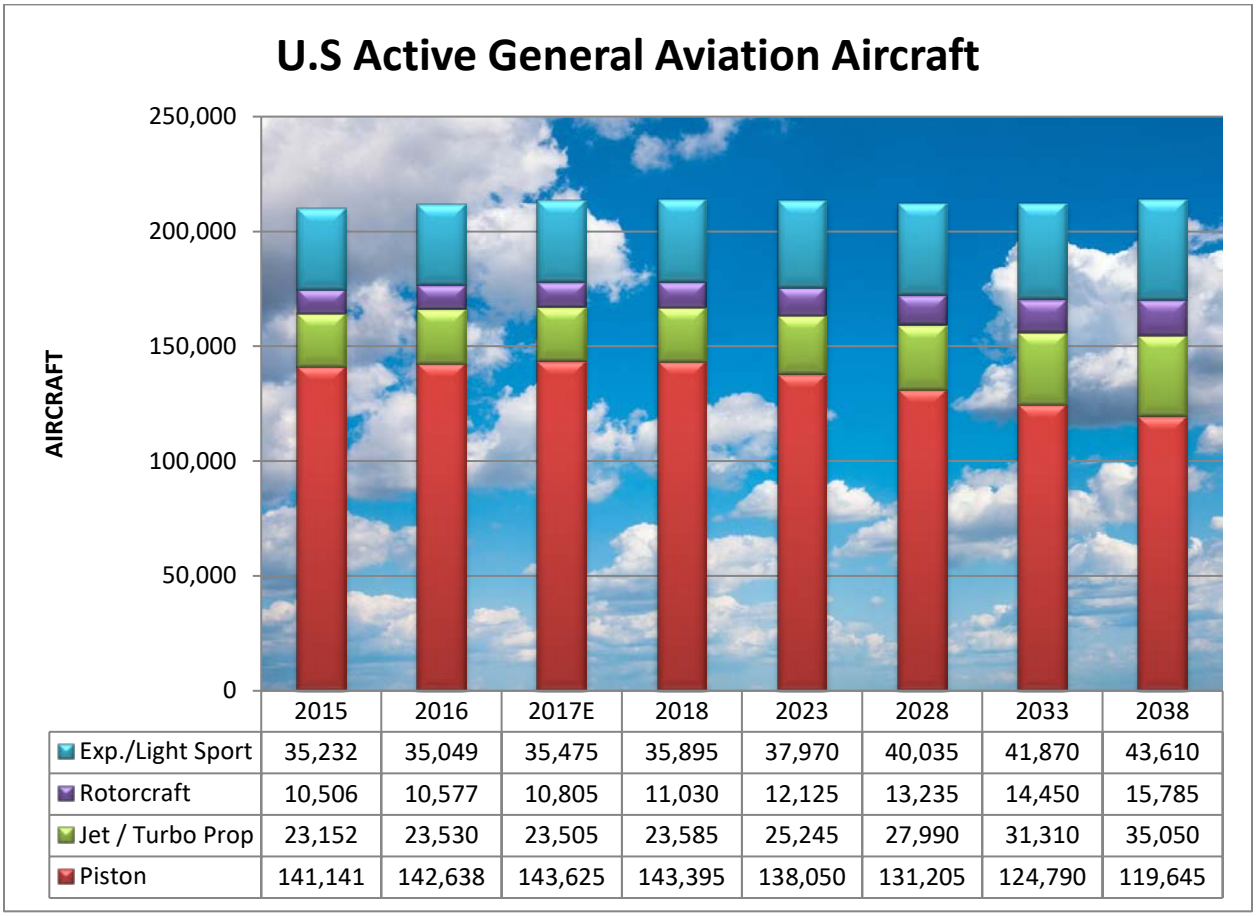


Source: FAA Aerospace Forecast, FY 2018-2038, 2017 Estimated

Figure 2-2 U.S. Regional / Commuter Aircraft Forecasts

Figure 2-3 depicts the FAA forecast for active general aviation aircraft in the United States. The FAA forecasts general aviation active aircraft to remain around its current level over the next 20 years. Declines in the fixed-wing piston fleet are anticipated to be offset by increases in the turbine, experimental and light sport fleets. The more expensive and sophisticated turbine-powered fleet (including rotorcraft) is projected to grow at an average rate of 2.0 percent per year over the forecast period, with the turbojet fleet increasing 2.2 percent per year.

As indicated in the FAA forecast, the growth in U.S. Gross Domestic Product (GDP) and corporate profits are catalysts for the growth in the general aviation turbine fleet. The largest segment of the fleet, fixed wing piston aircraft, is predicted to shrink over the forecast period by 22,350 aircraft (an average annual rate of -0.8 percent). Unfavorable pilot demographics, overall increasing cost of aircraft ownership, coupled with new aircraft deliveries not keeping pace with retirements of the aging fleet are the drivers of the decline. On the other hand, the smallest category, light-sport-aircraft, (created in 2005), is forecast to grow by 3.6 percent annually, adding about 2,850 new aircraft by 2038, more than doubling its 2016 fleet size.

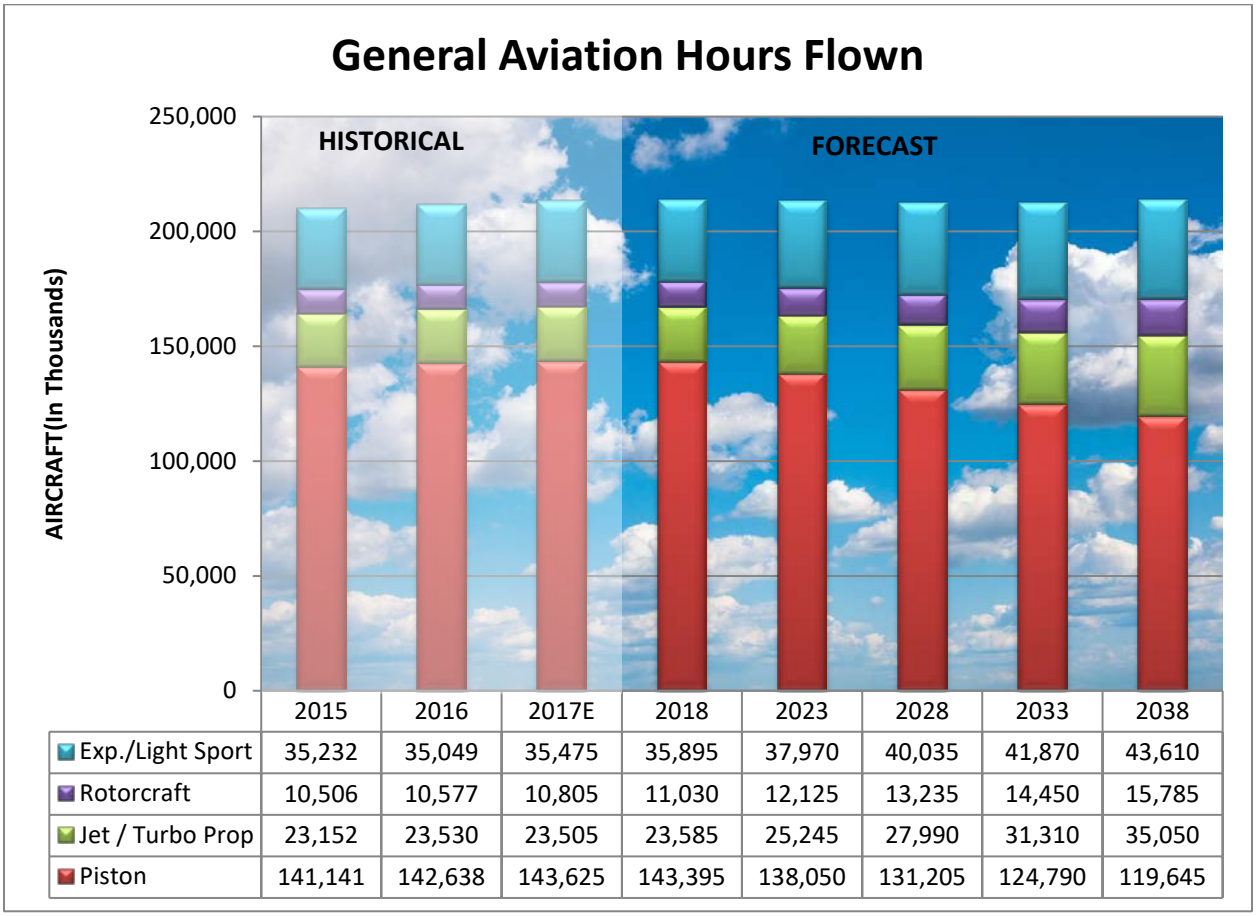


	2015	2016	2017E	2018	2023	2028	2033	2038
Exp./Light Sport	35,232	35,049	35,475	35,895	37,970	40,035	41,870	43,610
Rotorcraft	10,506	10,577	10,805	11,030	12,125	13,235	14,450	15,785
Jet / Turbo Prop	23,152	23,530	23,505	23,585	25,245	27,990	31,310	35,050
Piston	141,141	142,638	143,625	143,395	138,050	131,205	124,790	119,645

Source: FAA Aerospace Forecast, FY 2018-2038, 2017 Estimated

Figure 2-3 U.S. General Aviation Aircraft Forecasts

Although the total active general aviation fleet is projected to remain stable, the number of general aviation hours flown is forecast to increase an average of 0.8 percent per year to 30.2 million through 2038 from 24.8 million in 2016, as the newer aircraft fly more hours each year. Fixed wing piston hours are forecast to decrease by 1.0 percent, slightly faster than the fleet decline of 0.9 percent. Countering this trend, hours flown by turbine aircraft (including rotorcraft) are forecast to increase 2.4 percent yearly over the forecast period. Jet aircraft are expected to account for most of the increase, with hours flown increasing at an average annual rate of 2.7 percent over the forecast period. The large increases in jet hours result mainly from the increasing size of the business jet fleet, along with estimated increases in utilization rates.



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Piston	141,141	142,638	143,625	143,395	138,050	131,205	124,790	119,645

Source: FAA Aerospace Forecast, FY 2018-2038, 2017 Estimated

Figure 2-4 U.S. General Aviation Hours Flown

The significance of these national trends is that they point to a general, but modest, growth within all sectors of the aviation industry and provide the basis for forecasting growth at the Yellowstone Regional Airport.

2.3 Airport Service Area

The airport service area is generally defined by the proximity of other airports providing similar services. In practice, airport service areas are difficult to define. The airport service area may be different for passengers considering Yellowstone Regional Airport for a short-haul flight to Denver compared to the airport service area boundary for passengers wishing to fly to Boston or San Francisco. For general aviation, the service area is generally more closely defined around the airport but will depend on the level of service and facilities needed by the specific user such as longer runways, air traffic control services and instrument capability.

The analysis of the airport service area contained within this chapter focuses on the commercial service aspects. Cody's service area is shaped by competing airports in the region. Billings, Montana is 2 hours travel time from Cody and provides service to major hubs by Alaska, Allegiant, Delta, and United, as well as service to five eastern Montana communities by Cape Air. Alaska provides service to Seattle and Portland; Allegiant provides service to Phoenix and Las Vegas; Delta provides service to Minneapolis and Salt Lake City; United provides service to Denver and Cape Air provides service to Wolf Point, Havre, Glasgow, Glendive and Sidney. Riverton, 2 ½ hours away and Sheridan, 3 hours away have airports that serve their local communities with service to Denver. Casper and Jackson, WY, within a 3 ½ hours drive time, are served by Delta, United and American (Jackson only) airlines.

The airport service area has been defined to include Park, Hot Springs, Washakie and Big Horn County. While the passenger service area may extend outside the boundaries of the defined service area, these four counties provide the source for the majority of locally originating passengers.

Beyond geography, community initiatives can influence the level of market demand and growth at an airport. Yellowstone Regional Airport is involved in the state of Wyoming's Small Community Air Service Enhancement Program, which provides revenue guarantees to airlines at four of the state's commercial airports. In addition, the airport is included in the US Department of Transportation's Essential Air Service Program, which subsidizes commercial flights to rural communities across the United States. Cody only requires a subsidy for commercial flights during winter months when the tourism industry slows. These contract guarantees reduce the risk to airlines and can result in improved passenger retention, air fares, and load factors.

Local Population and Economy

Table 2-2 shows the Wyoming Department of Administration & Information Economic Analysis Division Population Projections for the Yellowstone Regional Airport Service Area. The projections reflect U.S. Census estimates and were obtained from the Wyoming Department of Administration & Information Economic Analysis Division website. In 2010 the U.S. Census reported the population of Park County at 28,205 persons, and that of Hot Spring County, Washakie County and Big Horn County at 4,812, 8,533 and 11,668 respectively. In 2017, the population estimates for the airport service area were:

Table 2-1 Yellowstone Regional Airport Service Area Population Project for 2017

County	Population (2017)
Park County	29,568
Hot Springs County	4,696
Washakie County	8,064
Big Horn County	11,906
Service Area Population	**54,234**

Projections provided by the Wyoming Department of Administration & Information Economic Analysis Division reflect a population for the Airport Service Area of about 58,170 in the year 2038. This represents an average annual growth rate of 0.4 percent over the planning period.

Table 2-2 Yellowstone Regional Airport Service Area Population Projections

	Actual			Projected		
County	1990	2000	2010	2020	2030	2040
Park	23,178	25,786	28,205	29960	31640	32910
Hot Springs	4,809	4,882	4,812	4640	4650	4600
Washakie	8,388	8,289	8,533	8130	8040	7970
Big Horn	10,525	11,461	11,668	12,140	12,590	12,840
TOTAL	**46,900**	**50,418**	**53,218**	**54,870**	**56,920**	**58,320**
% Change Between Census Years		8%	6%	3%	4%	2%
State of Wyoming	453,588	493,782	563,626	596,390	632,600	661,070
% Change Between Census Years		8%	6%	3%	4%	2%

Sources: U.S. Bureau of Census Estimates, Wyoming Department of Administration & Information Economic Analysis Division

Cody is located in close proximity to the east entrance to Yellowstone National Park. As a gateway community to Yellowstone, as well as a number of other outdoor recreation destinations, Cody's economy has historically been dominated by tourist activity, which is typically seasonal in nature.

As noted in the 2014 Cody Master Plan, new and growing industries have chosen to locate in the community in recent years, diversifying the local economy and providing consistent employment opportunities. The medical industry, biotechnology, and online-based businesses are emerging industries that show great promise in Cody.

Cody is well-positioned for economic growth. While the city is not easily accessible from an interstate, it does offer daily regional air service, a thriving downtown core, and quality of life amenities that make it hospitable to new businesses.

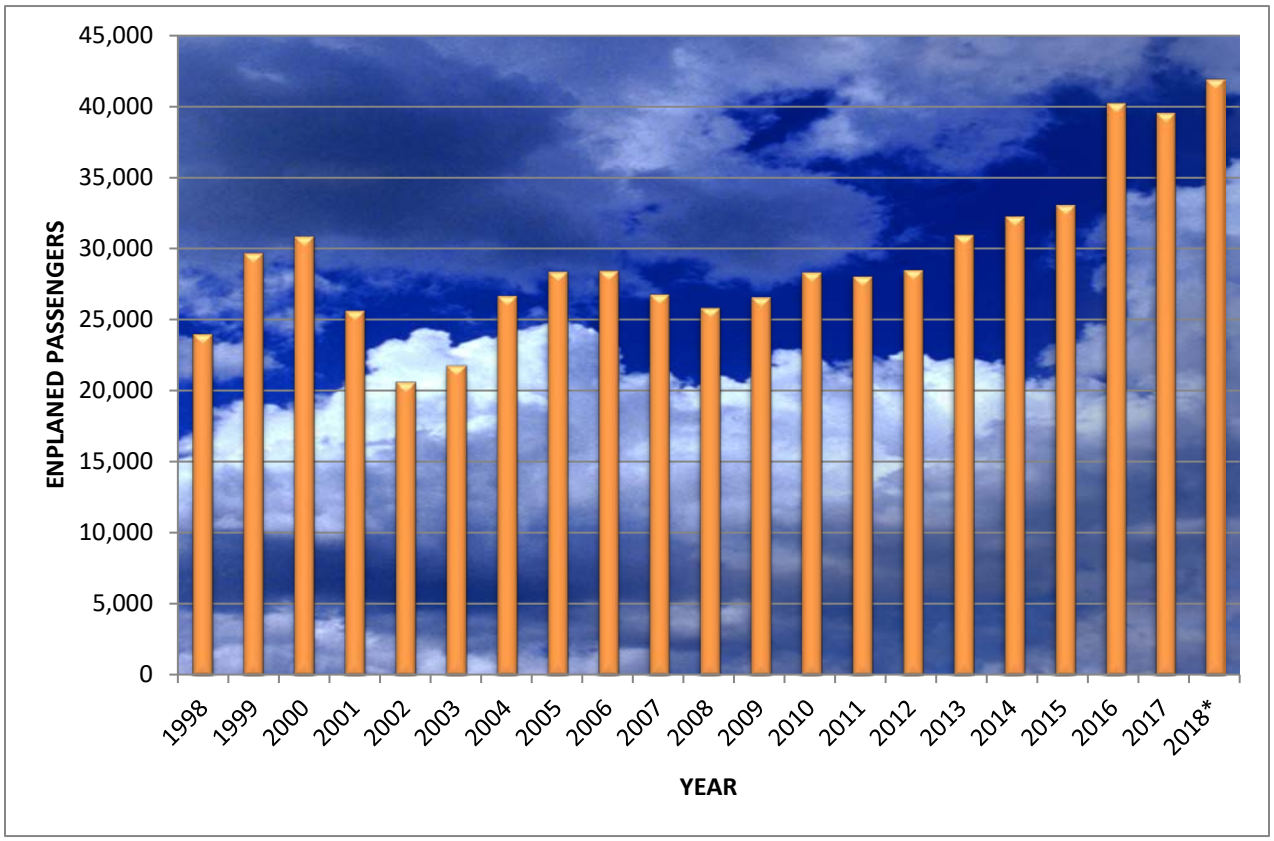
2.4 Historical Enplaned Passengers

Figure 2-5 shows the historical enplaned passengers at the Yellowstone Regional

Airport for the last twenty years, from 1998, when the airlines enplaned 24,013 passengers, through 2017, when an estimated 39,579 passengers were enplaned.

The two decades have been characterized by a decade of steady growth following a period of volatility in the previous decade. The erratic growth and decline in enplanements between 1998 and 2008 coincided with dramatic economic shocks and booms. A decline of -0.4 percent in 2001 followed the Y2K travel slump and a decline of -17.0 percent in 2002 followed the terrorist attacks of September 11, 2001. The years between 2002 and 2005 saw a dramatic increase in enplanements of an average 9.0 percent coinciding with a period of dramatic economic growth. This was followed by a decrease in the "Great Recession" years between 2005 and 2007 averaging -3.0 percent per year. The years of 2008 through 2017 have seen growth on the order of an average of 6.0 percent annually. A dramatic 25.0 percent increase between 2015 and 2016, was sustained in 2017. As of mid-year, 2018 is on track to outpace 2017 by 6.0 percent.[1]

As noted in the introduction, there are many variables when making projections, and the history of the past twenty years shows how external factors affect projections.



*2018 Enplanements estimated based on January – June data
Sources: Airport Records / FAA Terminal Area Forecast, FY 2017-2045

Figure 2-5 Historical Enplaned Passengers

[1] Estimated based on airport records through June, 2018

2.5 Enplanement Forecasts

Several analytical techniques have been used to examine trends in passenger growth. These have included time-series "linear trend" extrapolation, regression analysis, and market share analysis. While the potential timeframes used for time-series can be rather extensive, the past twenty year period was considered to be a good reflection of recent trends.

Time-Series Linear Trend Extrapolation

The acceptability of time-series projections is based upon the correlation between the data. The correlation coefficient (Pearson's "r") measures the association between changes in the dependent and independent variables. If the r-squared value (coefficient of determination) is greater than 0.95, it indicates good predictive reliability, with an r-squared value of 0.90 generally identified as a threshold of statistical reliability. Values lower than that become increasingly unreliable. Because the last decade of enplanements has been characterized by high volatility tied to unprecedented system shocks, lower r-squared values, which reduce statistical reliability, are expected. This proved to be the case.

Initially, a linear time-series regression analysis was performed on historical enplanement data for the 1998-2017 time period. This yielded an r-squared value of 0.87.

A regression analysis was also performed on enplanements vs. population (for the four county area). This provided a very low correlation (r-squared = 0.49) and, as a result, was not carried forward for further consideration.

A regression analysis performed on U.S. GDP vs. enplanements provided an r-squared value of 0.88.

Adding population to the GDP regression improved the correlation to an r-squared value of 0.89. While not in the optimal range, the population combined with GDP based analysis proved to be the best correlation.

Market Share Analysis

A market share projection was also developed using a static share of Yellowstone Regional Airport's historical share of the national regional/commuter market.

Historical passenger enplanements, US regional/commuter passenger enplanements and local market share have been summarized in **Table 2-3** for the period beginning in 1998 and extending through 2017. The airport's highest market share in this period was 0.041percent in 1999. More recently, the market share has increased from a low of 0.016 percent in 2008 to a high of 0.026 percent in 2016-2018.

Table 2-3 Historical Passenger Enplanements and Market Shares

Year	COD Passenger Enplanements	U.S. Regional / Commuter Passenger Enplanements	COD Share of U.S Enplanements
1998	24,013	64,600,000	0.037%
1999	29,724	72,300,000	0.041%
2000	29,942	82,800,000	0.037%
2001	24,522	83,600,000	0.031%
2002	27,905	91,500,000	0.023%
2003	20,216	108,600,000	0.020%
2004	26,896	130,000,000	0.021%
2005	28,483	149,700,000	0.019%
2006	28,559	155,700,000	0.018%
2007	26,857	159,700,000	0.017%
2008	25,863	162,600,000	0.016%
2009	26,631	156,600,000	0.017%
2010	28,454	164,389,154	0.017%
2011	28,019	164,083,263	0.017%
2012	28,551	162,084,540	0.018%
2013	31,140	158,375,106	0.020%
2014	32,317	156,999,012	0.021%
2015	33,278	156,073,085	0.021%
2016	40,340	155,114,983	0.026%
2017	39,578	151,788,482	0.026%
2018*	41,953	154,814,818	0.026%

*2018 Enplanements estimated based on January – June data

Sources: FAA Air Carrier Activity Information System (ACAIS)
2017 FAA Terminal Area Forecast
FAA Aerospace Forecast, FY 2018-2038
Airport Records

The most current market share of 0.026 percent was used, along with FAA projections for national regional /commuter traffic to develop a market share projection.

FAA Terminal Area Forecast & Wyoming State Aviation System Plan (SASP):

FAA's Terminal Area Forecast and Wyoming's State Aviation System Plan (SASP) provided comparative forecasts, and have been included in the summary of enplanement forecasts presented in in **Figure 2-6** and in **Table 2-4**.

2.6 Enplanement Forecast Summary

Figure 2-6 clearly shows the spread, or envelope, created by the different forecasting methods. The spread between the high and low forecasts is a reasonable window within which actual enplanement numbers may fall in the future, based upon a number of factors: number of local airlines, frequency, equipment, fares, non-stop destinations, and the local economy.

For planning purposes, a mid-range forecast is generally chosen, if it provides a reasonable growth rate. When all of the forecasting methods are compared, as shown in **Figure 2-6**, the Regression Analysis Forecast based on population and GDP represents the mid-range forecast, and the forecast with the greatest statistical reliability for Yellowstone Regional Airport. This mid-range forecast is consistent with FAA's national forecast assumption that regional/commuter carriers will continue to exhibit strong growth in the future.

Table 2-4 Summary of Passenger Enplanement Forecasts

	2023	2028	2033	2038
Linear Trend	47,797	55,621	63,444	71,267
Market Share	43,404	46,675	51,038	55,930
Regression - GDP	46,947	52,336	58,455	65,330
Regression - Population & GDP	45,988	50,144	55,205	61,846
FAA Terminal Area Forecast	43,789	48,060	52,747	57,883
Wyoming SASP	34,695	35,727	36,790	37,884

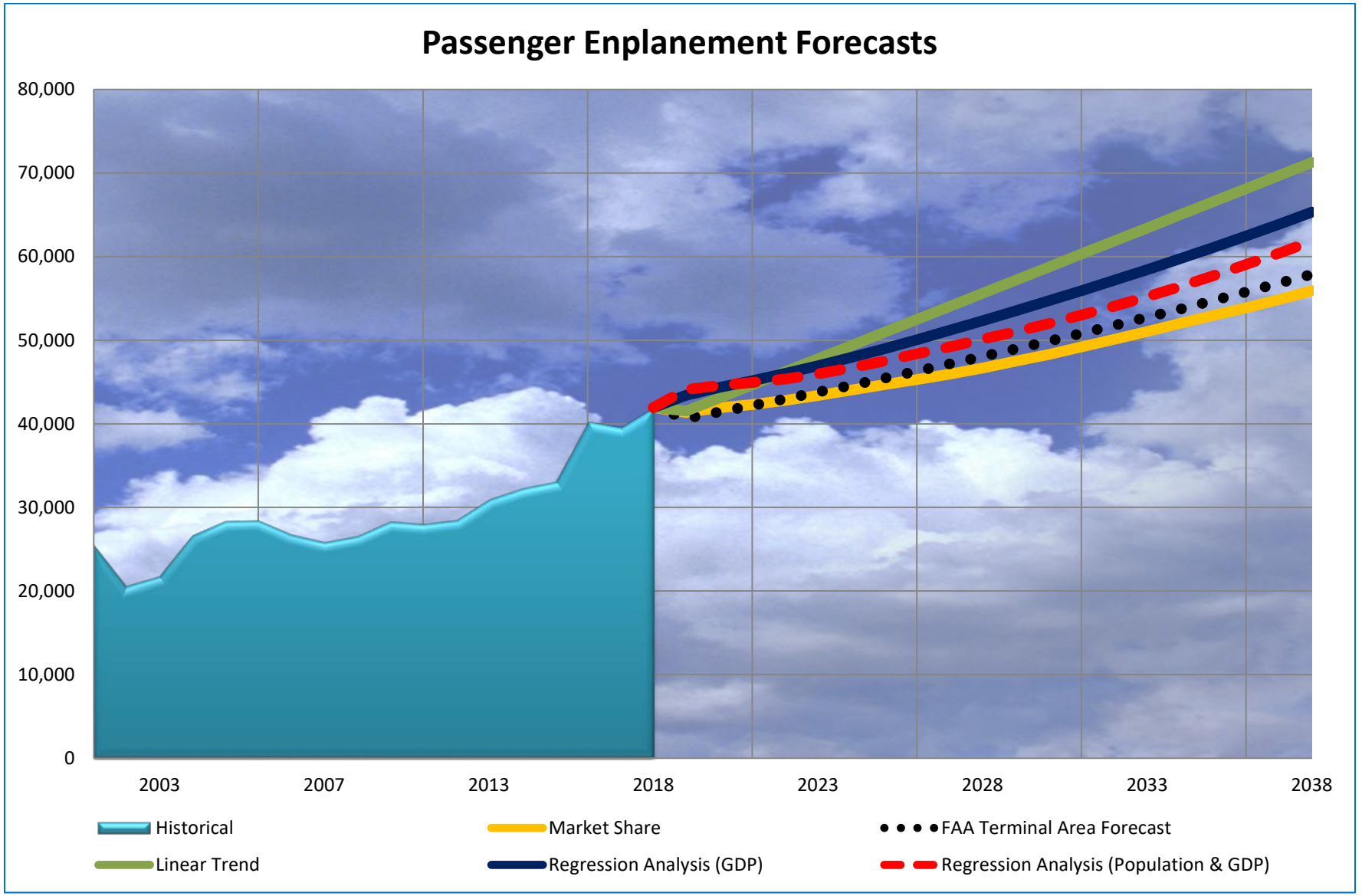


Figure 2-6 Passenger Enplanement Forecasts

2.7 Based Aircraft Forecasts

The number of general aviation aircraft which can be expected to base at an airport facility is dependent on several factors, such as airport communication practices, available facilities, airport operator's services, airport proximity and access, and similar considerations.

Table 2-5 presents the based aircraft at the Yellowstone Regional Airport between 1985 and 2017 by category based on FAA 5010 report data as recorded in the FAA's Terminal Area Forecast. The historical counts show that based aircraft counts have fluctuated from a low of 44 in 1989 to a high of 84 in 2017. The last 10 years have seen based aircraft counts rise from 63 to 84, representing an average annual growth rate of 3.57 percent. In the last five years based aircraft counts have increased from 78 to 84, an average annual growth rate of 1.54 percent.

Table 2-5: Historic Based Aircraft

	Single Engine	Jet	Multi	Helicopter	Other	TOTAL
ACTUAL						
1985	46	0	4	1	0	**51**
1986	46	0	4	1	0	**51**
1987	56	1	5	0	0	**62**
1988	56	0	5	0	0	**61**
1989	38	0	5	0	1	**44**
1990	48	0	4	0	0	**52**
1991	47	0	4	0	0	**51**
1992	47	0	6	0	0	**53**
1993	47	0	6	0	0	**53**
1994	47	0	6	0	0	**53**
1995	60	0	10	0	0	**70**
***1996**	60	0	10	0	0	**70**
1997	60	0	10	0	0	**70**
1998	60	0	10	0	0	**70**
1999	55	0	3	0	0	**58**
2000	55	0	3	0	0	**58**
2001	55	0	3	0	0	**58**
2002	55	0	3	0	0	**58**
2003	55	0	3	0	0	**58**
2004	55	0	3	0	0	**58**
2005	56	2	3	1	0	**62**
2006	56	2	3	2	0	**63**
2007	56	2	3	2	0	**63**
2008	56	2	3	2	0	**63**
2009	56	5	4	2	1	**68**
2010	57	5	4	2	0	**68**
2011	64	5	5	3	0	**77**
2012	64	5	5	2	2	**78**
2013	64	5	5	2	2	**78**
2014	64	5	5	2	2	**78**
2015	64	6	5	2	0	**77**
2016	64	6	5	2	2	**79**
****2017**	68	6	6	2	2	**84**
****2018**	68	6	6	2	2	**84**

Source: FAA 2017 Terminal Area Forecast

* 1996 data missing in TAF. 1995 data carried forward

** 2017 & 2018 Data Source FAA 5010 Form

The FAA's Terminal Area Forecast (TAF) for Yellowstone Regional Airport is presented in **Table 2-6**. Adjustment has been made to account for 2017 based aircraft which were not reflected in the 2017 TAF. The TAF forecasts an average growth rate of 0.24 percent for the twenty year planning period, however, all based aircraft growth in the TAF is shown in the first five years of the forecast. No growth in based aircraft is shown in the TAF after 2023.

Table 2-7 presents a based aircraft forecast using a time series regression for the ten year period from 2008 to 2017. This period saw an average annual increase of 3.57% based aircraft per year.

A regression analysis of based aircraft as compared to US GDP was also conducted. **Table 2-8** presents a based aircraft forecast as correlated to past and forecasted US GDP.

A regression analysis was also performed using the combined variables of population of the Yellowstone Regional Airport service area (Park, Hot Springs, Washakie and Big Horn Counties) and US GDP. **Table 2-9** presents a based aircraft forecast based on population and US GDP forecasts.

The mid-range based aircraft forecast (**Table 2-8)** based on US GDP forecasts has been selected as the preferred forecast.

Table 2-6 FAA Terminal Area Forecast*

	Based Aircraft
Base Year	
2018	**84**
Forecast	
2023	**88**
2028	**88**
2033	**88**
2038	**88**

* Adjusted to reflect FAA 5010 data for 2017

Table 2-7 Based Aircraft Projections Based on 2008 to 2017 Linear Trend

	Based Aircraft
Base Year	
2018	84
Forecast	
2023	94
2028	103
2033	113
2038	122

Table 2-8 Based Aircraft Projections Based on Forecast US Gross Domestic Product

	Based Aircraft
Base Year	
2018	84
Forecast	
2023	91
2028	97
2033	104
2038	111

Source: Organization for Economic Cooperation and Development (OCED)

Table 2-9 Based Aircraft Projections Based on Forecast Population Growth & US GDP

	Based Aircraft
Base Year	
2018	84
Forecast	
2023	90
2028	95
2033	101
2038	106

Source: Wyoming Department of Administration & Information, Economic Analysis Division

2.8 Operations Forecasts

Table 2-10 summarizes fleet mix and operations projections for commercial service airlines at Yellowstone Regional Airport. The fleet mix projections have been used to calculate the average seats per departure, which (after applying a load factor) were used to project annual departures. The two airlines currently operating at the airport are United Express (operated by Trans States Airlines and Skywest) and Delta Connection (also operated by Sky West). Skywest flights operating for both airlines are currently utilizing 50 seat Canadair Regional Jets. Trans States flights serving United Express flights are currently utilizing 50 seat Embrear 145 aircraft. In accordance with national trends, it is expected that the airport will see an increase in average seats per departure as carriers replace the 50 seat CRJ-200 with the 70 seat EMB 175, the 70 seat CRJ-700 and the 90 seat CRJ-900 over the planning period.

As noted earlier in this chapter, regional carriers nationwide are in the process of phasing out smaller regional jets like the CRJ 200 in favor of larger, more fuel efficient and technologically advanced aircraft. While the exact timing is unknown, SkyWest plans to replace its fleet of CRJ 200s with larger Embrear 175 (reference code C-III), CRJ-700 (reference code C-II) and CRJ-900 (reference code C-III) regional jets. Discussions with airline personnel suggest that the 50 seat CRJ-200 aircraft will likely be 80% phased out within the 10 year horizon and 100% phased out within the 15 year horizon with the Embrear 175 slated to become the "backbone" of the SkyWest fleet.

Table 2-10 Scheduled Airline Fleet Mix and Operations Forecast

			Forecast			
Fleet Mix Seating Capacity	**2017 (1)**	**2018 (Est.)**	**2023**	**2028**	**2033**	**2038**
< 40			--	--	--	--
40 - 59	100%	100%	90%	20%	10%	10%
60-99	0	0	10%	80%	90%	90%
>100	--	--	--	--	--	--
Average Seats Per Departure (2)	50	50	53	66	68	68
Boarding Load Factor (1)	72%	72%	70%	70%	70%	70%
Enplanements Per Departure	36	36	37	46	48	48
Annual Enplanements	33,367	41,953	46,947	52,336	58,455	65,330
Annual Departures	1,095	1,161	1,277	1,133	1,228	1,372
Annual Operations	2,190	2,321	2,555	2,266	2,456	2,745

(1) Bureau of Transportation Statistics
(2) Increasing seats per departure reflects anticipated transition by regional carriers from 50 seat to 70 and 90 seat aircraft. See Table 2-21.

Tables 2-11, 2-12 and **2-13** present aircraft operations forecasts for the low-growth, mid-range and high-growth scenarios.

Airline operations are carried forward in all three scenarios from the above analysis. FAA tracking and forecasting methods split commercial air service into two designations, "Air Carrier" and "Air Taxi". Air Carrier operations are defined by FAA as operations by aircraft with seating capacity over 60 seats while Air Taxi operations represent activity by commercial aircraft with seating capacity of 60 seats or less. As 50 seat regional jets are replaced with larger aircraft over the forecast period, it is anticipated that commercial "Air Carrier" operations will displace commercial "Air Taxi" operations.

General aviation local operations projected under the all growth scenarios assume an Operations Per Based Aircraft (OPBA) of 435 which is comparable to what exists today at the airport. (Operations per based aircraft are derived by dividing the number of local operations cited in the FAA Terminal Area Forecast by the number of based aircraft). The projection of local operations under the low growth scenario utilizes the low growth based aircraft forecast, the mid-range operations forecast utilizes the mid-range based aircraft forecast and the high growth scenario utilizes the high based aircraft forecast.

The projection of itinerant general aviation operations for the low-growth and the high-growth scenarios utilize the growth rate (0.59%) forecast for aircraft operations in the Wyoming State Aviation System Plan.

Overall, the total annual operations at the airport are projected to increase over the forecast period under the low, mid-range and high forecasts at average annual growth rates of 1.1 percent, 1.2 percent and 2.1 percent respectively. Because it represents a balanced view of growth in airport activity, the mid-range forecast will be carried forward as the preferred forecast.

Table 2-11 Operations Scenario 1: Low Forecast

			Itinerant Operations					Local Operations			
	Based Aircraft	OPBA	Air Carrier	Air Taxi / Commuter	GA	Military	Total Itinerant	GA	Military	Total Local	Total Ops
2023	90	435	255	2,299	18,628	43	21,226	39,127	0	39,127	60,353
2028	95	435	1,813	453	19,184	43	21,493	41,406	0	41,406	62,899
2033	101	435	2,210	246	19,757	43	22,256	43,827	0	43,827	66,083
2038	106	435	2,470	274	20,346	43	23,134	46,087	0	46,087	69,222

Table 2-12 Operations Scenario 2: Mid-Range Forecast

			Itinerant Operations					Local Operations			
	Based Aircraft	OPBA	Air Carrier	Air Taxi / Commuter	GA	Military	Total Itinerant	GA	Military	Total Local	Total Ops
2023	91	435	255	2,299	18,628	43	21,226	39,640	0	39,640	60,866
2028	97	435	1,813	453	19,184	43	21,493	42,166	0	42,166	63,658
2033	104	435	2,210	246	19,757	43	22,256	45,033	0	45,033	67,288
2038	111	435	2,470	274	20,346	43	23,134	48,254	0	48,254	71,389

Table 2-13 Operations Scenario 3: High Forecast

			Itinerant Operations					Local Operations			
	Based Aircraft	OPBA	Air Carrier	Air Taxi / Commuter	GA	Military	Total Itinerant	GA	Military	Total Local	Total Ops
2023	94	435	255	2,299	19,709	43	22,307	40,683	0	40,683	62,990
2028	103	435	1,813	453	21,274	43	23,583	44,823	0	44,823	68,405
2033	113	435	2,210	246	22,963	43	25,462	48,962	0	48,962	74,425
2038	122	435	2,470	274	24,787	43	27,575	53,102	0	53,102	80,677

2.9 Peaking Characteristics

Most facility planning relates to levels of peak activity. The following planning definitions apply to the peak periods:

- **Peak Month:** The calendar month when peak passenger enplanements or aircraft operations occur.
- **Design Day:** The average day in the peak month.
- **Busy Day:** The busy day of a typical week in the peak month.
- **Design Hour:** The peak hour within the design day.

The design day is normally derived by dividing the peak month operations or enplanements by the number of days in the month. However, since commercial activity is heavier on weekends at the Yellowstone Regional Airport, a 10 percent adjustment has been applied to the average day figures to reflect the peak weekend day activity.

It is important to recognize that only the peak month is an absolute peak within a given year. All of the others will be exceeded at various times during the year. However, they represent reasonable planning standards that can be applied to future facility needs.

The peak month for passenger enplanements in 2017 was July with 14.9 percent of the annual total. This percentage has been applied to the forecasts of annual enplanements. The design day has been calculated at 10 percent above the average day figures.

The design hour enplanements were estimated at 24 percent of design day after reviewing the peak hourly departures, aircraft seating capacity and average load factors.

Peak monthly airline operations were projected at 14.9 percent of annual operations based on a review of historic airline operations data. Design hour operations were calculated upon review of current schedules.

Peak Month percentages at airports such as the Eureka Airport are typically 10 percent busier than an average month of the year. Peak month operations were calculated at 10 percent above average monthly figures. The forecast of busy day operations was calculated as 1.25 times design day activity. Design hour operations were estimated at 15 percent of design day operations. **Table 2-14** summarizes peak activity forecasts for the Yellowstone Regional Airport.

Table 2-14 Yellowstone Regional Airport Peaking Characteristics

		Forecasts			
	2018*	2023	2028	2033	2038
Airline Enplanements					
Annual	41,953	45,988	50,144	55,205	61,846
Peak Month (14.9%)	6,274	6,877	7,499	8,256	9,249
Design Day	223	244	266	293	328
Design Hour	53	59	64	70	79
Airline Operations					
Annual	2,321	2,555	2,266	2,456	2,745
Peak Month	232	255	227	246	274
Design Day	8	9	8	9	10
Design Hour	2	3	2	3	4
General Aviation Operations					
Annual	54,632	58,268	61,350	64,789	68,601
Peak Month (10.2%)	5,008	5,341	5,624	5,939	6,288
Design Day	167	178	187	198	210
Busy Day	209	223	234	247	262
Design Hour	25	27	28	30	31

* 2018 counts estimated using Airport data for January – June, 2018

2.10 Forecast Summary

This chapter has outlined the key aviation demand levels anticipated over the planning period. Long term growth at the Yellowstone Regional Airport will be sustained by local promotion of the airport trends experienced at the national level. The next step in the master planning process will be to assess the capacity of existing facilities, their ability to meet forecast demand, and to identify changes to the airfield or landside facilities which will create a more functional facility. The preferred aviation forecasts have been summarized in **Table 2-15**.

Table 2-15 Aviation Demand Forecast Summary

	2018	2023	2028	2033	2038
Enplanements	**41,953**	**45,988**	**50,144**	**55,205**	**61,846**
Based Aircraft	**84**	**91**	**97**	**104**	**111**
Annual Operations					
Airline	-	255	1,813	2,210	2,470
Air Taxi	2,321	2,299	453	246	274
Military	43	43	43	43	43
General Aviation					
Itinerant	36,544	39,640	42,166	45,033	48,254
Local	18,088	18,628	19,184	19,757	20,346
Total Operations	**56,996**	**60,866**	**63,658**	**67,288**	**71,389**

* 2018 counts estimated using airport data for January – June, 2018

2.11 Comparison with the TAF

The FAA annually updates a Terminal Area Forecast (TAF), which forecasts enplanements, based aircraft and operations. The 2017 TAF was the version available at the time of the preparation of this forecast. The FAA requires that forecasts be consistent with the TAF or include sufficient documentation to explain the difference.

The FAA generally considers a forecast consistent with the TAF if it differs by less than 10 percent in the five year forecast and less than 15 percent in the ten year forecast.

Table 2-16 compares the preferred Master Plan forecasts with the TAF as recommended in Appendix C of the FAA document, Forecasting Aviation Activity by Airport. Master Plan forecasts for Enplanements, Operations and Based Aircraft.

Table 2-16 Comparison of Master Plan and TAF Forecasts

	Year	Airport Forecast (AF)	TAF	AF/TAF (% Difference)
Passenger Enplanements				
Base yr.	2018	41,953	39,908	5.1%
Base yr. + 5yrs.	2023	45,988	43,789	5.0%
Base yr. + 10yrs.	2028	50,144	48,060	4.3%
Base yr. + 15yrs.	2033	55,205	52,747	4.7%
Total Operations				
Base yr.	2018	56,996	56,823	0.3%
Base yr. + 5yrs.	2023	60,866	59,766	1.8%
Base yr. + 10yrs.	2028	63,658	62,887	1.2%
Base yr. + 15yrs.	2033	67,288	66,191	1.7%
Based Aircraft				
Base yr.	2018	84	84	0.0%
Base yr. + 5yrs.	2023	91	88	3.5%
Base yr. + 10yrs.	2028	97	88	10.1%
Base yr. + 15yrs.	2033	104	88	17.6%

Note: 2018 counts estimated using airport data for January – June, 2018
TAF Data is on a U.S. Government fiscal year basis (October through September)
TAF Data for Based Aircraft adjusted for consistency with current counts as shown in FAA 5010

2.12 Critical Aircraft and Airport Reference Code

Federal Aviation Administration (FAA) Advisory Circular AC150-5325-4B, *Runway Length Requirements for Airport Design*, indicates that critical aircraft, upon which runway design is based, are required for federally funded projects to "have at least 500 or more annual itinerant operations at the airport (landings and takeoffs are considered as separate operations) for an individual airplane or a family grouping of airplanes." The AC also states that adjustments may be made to the 500 total annual itinerant operations threshold after considering the circumstances of a particular airport.

The FAA has established aircraft classification systems that group aircraft types based on their performance and geometric characteristics. These classification systems, described and illustrated in **Table 2-17**, are used to determine the appropriate airport design standards for specific runway, taxiway, apron, or other facilities, as described in FAA AC 150/5300-13A *Airport Design*. The Aircraft Approach Category (AAC) represents a grouping of aircraft based on approach reference speed, typically 1.3

times the aerodynamic stall speed. Approach speed drives the dimensions and size of runway safety and object free areas. The Airplane Design Group (ADG) classification of aircraft is based on wingspan and tail height. The ADG drives the dimensions of taxiway and apron object free areas, as well as apron and parking configurations.

Table 2-17 Airfield Classification Systems

Aircraft Approach Category (AAC)		
AAC	**Approach Speed (1.3 X Stall 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)		
ADG	**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'

Aircraft weight criteria is considered in airport capacity and runway length calculations. FAA AC 150/5060-5 *Airport Capacity and Delay* classification of aircraft is shown in **Table 2-18** below.

Table 2-18 Aircraft Weight Classifications

Aircraft Classification	Maximum Takeoff Weight (MTOW)	Number of Engines	Wake Turbulence
A	< 12,500 lbs,	Single	Small (S)
B		Multi	Small (S)
C	12,500-300,000 lbs.	Multi	Large (L)
D	>300,000 lbs	Multi	Heavy (H)

In order to gain an understanding of the most demanding aircraft utilizing the airport, existing air traffic data was analyzed to determine the approximate makeup of aviation traffic. Data was retrieved from the FAA's Traffic Flow Management System Counts (TFMSC) database. TFMSC data provide specific air traffic movement details including aircraft type, date and occurrence for flights for which a plan had been filed, and that are radar-detectable. TFMSC data are built largely upon flight plan filings, in

addition to data provided by aircraft with radar-detectable equipment. General aviation operators frequently do not have the equipment necessary to be captured by the NAS, and commonly opt not to file flight plans. Additionally, flight plans do not capture practice operations, such as touch-and-go's, that are likely to be performed by GA and military operators. Therefore, GA operations are under-represented in the TFMSC database.

Table 2-19 depicts a representation of aircraft types observed at the airport over the course of calendar year 2017. The data presented in **Table 2-20** represents a summary of TFMSC operations counts by Aircraft Approach Category and Airplane Design Group.

Table 2-19 Aircraft Filing Instrument Flight Plans – Yellowstone Regional Airport

Aircraft Type	AAC	ADG	Operations
C152 - Cessna 152	A	I	1
C172 - Cessna Skyhawk 172/Cutlass	A	I	37
C182 - Cessna Skylane 182	A	I	9
C210 - Cessna 210 Centurion	A	I	16
C310 - Cessna 310	A	I	13
C82R - Cessna Skylane RG	A	I	2
COL3 - Lancair LC-40 Columbia 400	A	I	2
COL4 - Lancair LC-41 Columbia 400	A	I	3
DA42 - Diamond Twin Star	A	I	1
E550 - Eclipse 550	A	I	2
EVOT - Lancair Evolution Turbine	A	I	2
KODI - Quest Kodiak	A	I	4
M20P - Mooney M-20C Ranger	A	I	4
M20T - Turbo Mooney M20K	A	I	7
P210 - Riley Super P210	A	I	3
P28A - Piper Cherokee	A	I	15
P32R - Piper 32	A	I	1
PA44 - Piper Seminole	A	I	2
S22T - Cirrus SR-22 Turbo	A	I	7
SR20 - Cirrus SR-20	A	I	1
SR22 - Cirrus SR 22	A	I	174
T210 - Cessna T210M	A	I	2
TBM9 - Socata TBM	A	I	3
EA50 - Eclipse 500	A	I	3
P28B - Piper Turbo Dakota	A	I	2
P46T - Piper Malibu Meridian	A	I	316
PA31 - Piper Navajo PA-31	A	I	2
PA32 - Piper Cherokee Six	A	I	2

PA34 - Piper PA-34 Seneca	A	I	1
PA46 - Piper Malibu	A	I	8
TBM7 - Socata TBM-7	A	I	3
TBM8 - Socata TBM-850	A	I	2
B36T - Allison 36 Turbine Bonanza	A	I	2
BE33 - Beech Bonanza 33	A	I	1
BE35 - Beech Bonanza 35	A	I	5
BE36 - Beech Bonanza 36	A	I	8
BE55 - Beech Baron 55	A	I	2
BE65 - Beech 65 Queen Air	A	I	6
C212 - CASA Aviocar	A	II	1
DHC6 - DeHavilland Twin Otter	A	II	1
PC12 - Pilatus PC-12	A	II	221
AEST - Piper Aero Star	B	I	7
C340 - Cessna 340	B	I	69
TEX2 - Raytheon Texan 2	B	I	4
AC90 - Gulfstream Commander	B	I	6
BE10 - Beech King Air 100 A/B	B	I	115
BE40 - Raytheon/Beech Beechjet 400/T-1	B	I	16
BE99 - Beech Airliner 99	B	I	74
BE9L - Beech King Air 90	B	I	22
C206 - Cessna 206 Stationair	B	I	6
C414 - Cessna Chancellor 414	B	I	12
C421 - Cessna Golden Eagle 421	B	I	2
C425 - Cessna 425 Corsair	B	I	10
C501 - Cessna I/SP	B	I	5
E50P - Embraer Phenom 100	B	I	74
P180 - Piaggio P-180 Avanti	B	I	2
PRM1 - Raytheon Premier 1/390 Premier 1	B	I	3
BE58 - Beech 58	B	I	9
BE60 - Beech 60 Duke	B	I	2
C25A - Cessna Citation CJ2	B	I	4
C25M - Cessna Citation M2	B	I	4
C510 - Cessna Citation Mustang	B	I	2
C525 - Cessna CitationJet/CJ1	B	I	20
PAY3 - Piper PA-42-720 Cheyenne 3	B	I	2
B190 - Beech 1900/C-12J	B	II	10
C208 - Cessna 208 Caravan	B	II	532
C441 - Cessna Conquest	B	II	8
C550 - Cessna Citation II/Bravo	B	II	16
C560 - Cessna Citation V/Ultra/Encore	B	II	111

C56X - Cessna Excel/XLS	B	II	153
C750 - Cessna Citation X	B	II	12
E55P - Embraer Phenom 300	B	II	60
SW3 - Fairchild Swearingen SA-226T/TB Merlin 3	B	II	6
SW4 - Swearingen Merlin 4/4A Metro2	B	II	578
C25C - Cessna Citation CJ4	B	II	9
C680 - Cessna Citation Sovereign	B	II	26
C68A - Cessna Citation Latitude	B	II	16
F2TH - Dassault Falcon 2000	B	II	61
F900 - Dassault Falcon 900	B	II	11
FA50 - Dassault Falcon/Mystère 50	B	II	4
B350 - Beech Super King Air 350	B	II	24
BE20 - Beech 200 Super King	B	II	191
BE30 - Raytheon 300 Super King Air	B	II	14
C25B - Cessna Citation CJ3	B	II	48
FA7X - Dassault Falcon F7X	B	III	2
H25B - BAe HS 125/700-800/Hawker 800	C	I	28
LJ31 - Bombardier Learjet 31/A/B	C	I	6
LJ40 - Learjet 40; Gates Learjet	C	I	2
LJ45 - Bombardier Learjet 45	C	I	6
LJ60 - Bombardier Learjet 60	C	I	4
LJ25 - Bombardier Learjet 25	C	I	4
CL60 - Bombardier Challenger 600/601/604	C	II	26
CL30 - Bombardier (Canadair) Challenger 300	C	II	34
CL35 - Bombardier Challenger 300	C	II	11
CRJ1 - Bombardier CRJ-100	C	II	3
CRJ2 - Bombardier CRJ-200	C	II	1825
G150 - Gulfstream G150	C	II	2
G280 - Gulfstream G280	C	II	2
GALX - IAI 1126 Galaxy/Gulfstream G200	C	II	8
CRJ7 - Bombardier CRJ-700	C	II	20
E145 - Embraer ERJ-145	C	II	299
E45X - Embraer ERJ 145 EX	C	II	37
DC91 - Boeing (Douglas) DC 9-10	C	III	2
GL5T - Bombardier BD-700 Global 5000	C	III	2
GLEX - Bombardier BD-700 Global Express	C	III	2
CRJ9 - Bombardier CRJ-900	C	III	2
MD87 - Boeing (Douglas) MD 87	C	III	6

C130 - Lockheed 130 Hercules	C	IV	3
F18H - F/A 18 Hornet	D	I	4
LJ35 - Bombardier Learjet 35/36	D	I	16
GLF4 - Gulfstream IV/G400	D	II	14
GLF5 - Gulfstream V/G500	D	III	49
GLF6 - Gulfstream	D	III	4

Source: FAA Traffic Flow Management System Counts (TFMSC) Jan 2017-Dec 2017

Table 2-20 Instrument Flight Plans by Type Yellowstone Regional Airport

AAC / ADG	2017 Operations
Approach Category A	674
Approach Category B	2363
Approach Category C	2334
Approach Category D	87
Aircraft Design Group I	1215
Aircraft Design Group II	4171
Aircraft Design Group III	69
Aircraft Design Group IV	3

Source: FAA Traffic Flow Management System Counts (TFMSC) Jan 2017-Dec 2017

The totals in **Table 2-20** indicate that the most demanding aircraft type that currently exceeds 500 operations are aircraft in Aircraft Approach Category C and Airplane Design Group II.

Given the operations counts in recent years, it is recommended that C-II aircraft should function as the current critical aircraft.

The future air carrier fleet mix will drive the critical aircraft for Yellowstone Regional Airport in the future. The current passenger aircraft serving the airport are the 50 seat Bombardier CRJ 200 (reference code C-II) operated by Sky West Airlines and the 50 seat Embrear 145 (reference code C-II) operated by Trans States Airlines. As noted earlier in this chapter, regional carriers nationwide are in the process of phasing out smaller regional jets like the CRJ 200 in favor of larger, more fuel efficient and technologically advanced aircraft. While the exact timing is unknown, SkyWest plans to replace it's fleet of CRJ 200s with larger Embrear 175 (reference code C-III), CRJ-700 (reference code C-II) and CRJ-900 (reference code C-III) regional jets. Discussions with airline personnel suggest that the 50 seat CRJ-200 aircraft will likely be 80% phased out within the 10 year horizon and 100% phased out within the 15 year horizon with the Embrear 175 slated to become the "backbone" of the SkyWest fleet.

Table 2-21 shows projections of the future air carrier fleet mix.

Table 2-21 Future Air Carrier Operations by Aircraft Type

Typical Aircraft	ARC	2018	2023	2028	2033	2038
E 145/CRJ 200	C-II	**2321**	**2299**	453	246	274
CRJ 700	C-II	0	51	363	442	494
E 175 / CRJ 900	C-III	0	204	**1450**	**1768**	**1976**

* Based on airline fleet mix and airline orders as of May, 2018

With the anticipated replacement of the CRJ-200 with the EMB 175, CRJ-700 and CRJ-900 over the planning period, it is recommended that C-III aircraft should function as the future critical aircraft and serve as the basis for future airport design.

The Yellowstone Regional Airport has historically been planned and built to ARC C-III and greater standards. Chapter III, Facility Requirements will examine in detail the extent to which airport facilities meet current and future design standards, their ability to meet forecast demand, and identify changes to the airfield or landside facilities which will create a more functional facility.