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 Bozeman Yellowstone International Airport (BZN) to provide an updated set of passenger and operational projections. The intent of the Master Plan is to assist the Gallatin Airport Authority 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 2019-2039.

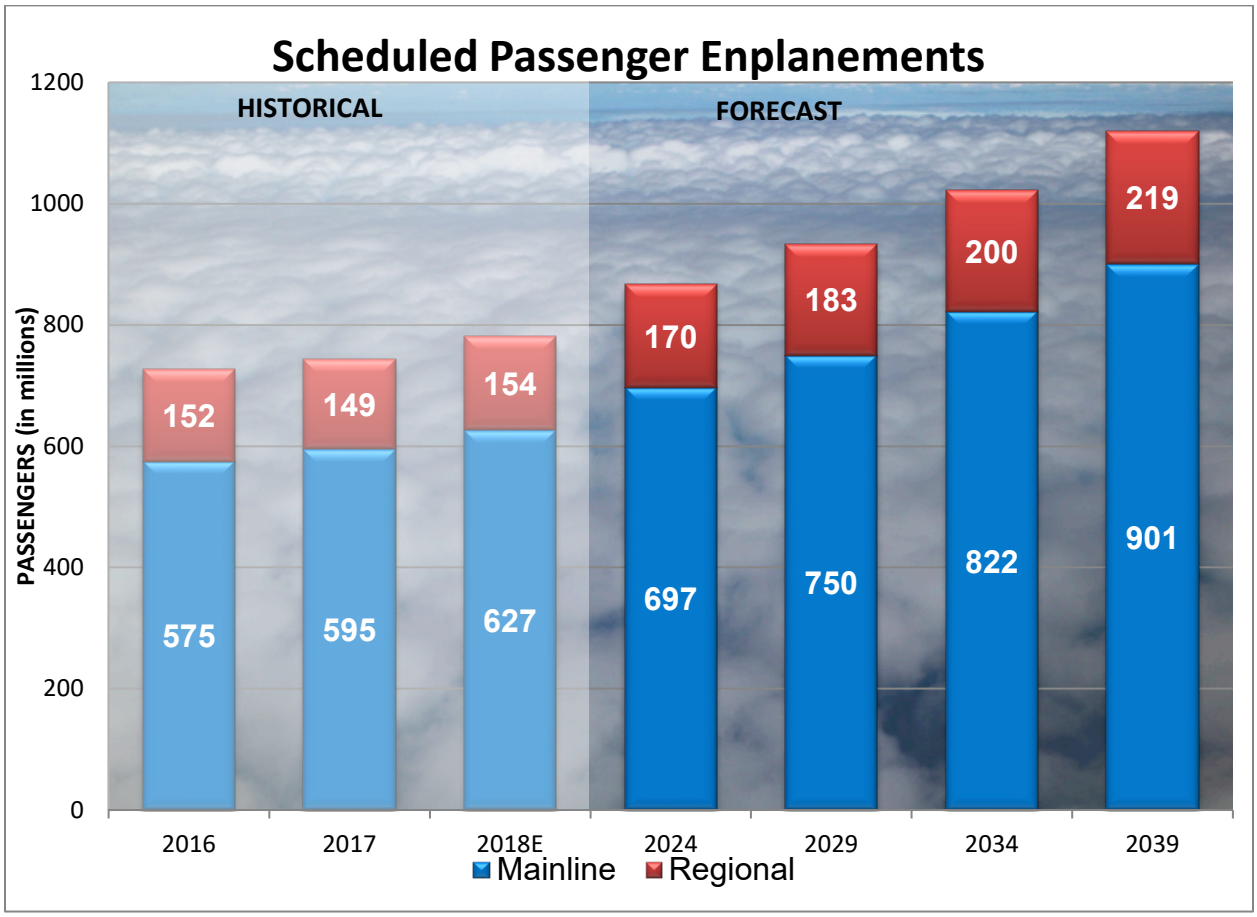
The FAA forecast notes that the U.S. airline industry underwent considerable restructuring since the 2007-2009 recession. Air carriers adopted a strategy of "capacity discipline", fine-tuning their business models to minimize losses by lowering operating costs, eliminating unprofitable routes, and grounding 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.

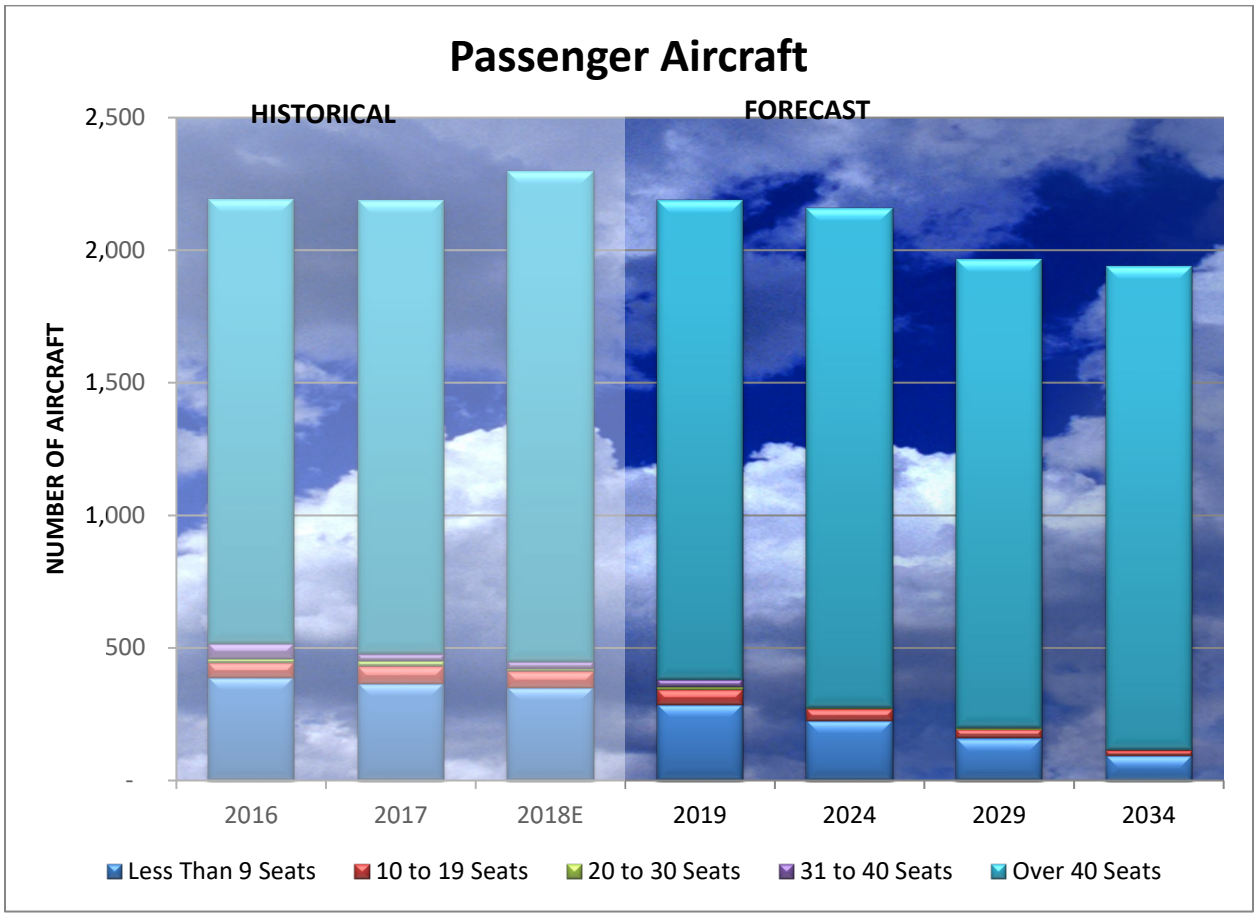
As noted in the FAA forecast, regional carriers have less leverage with the mainline carriers than they have had in the past as the mainline carriers have negotiated contracts that are more favorable to their operational and financial bottom line. Furthermore, the regional airlines are facing pilot shortages 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 76 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 2019 FAA forecast calls for mainline U.S. carrier passenger growth over the next 20 years to average 1.6 percent per year with regional carriers also 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 2019-2039, 2018 Estimated

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

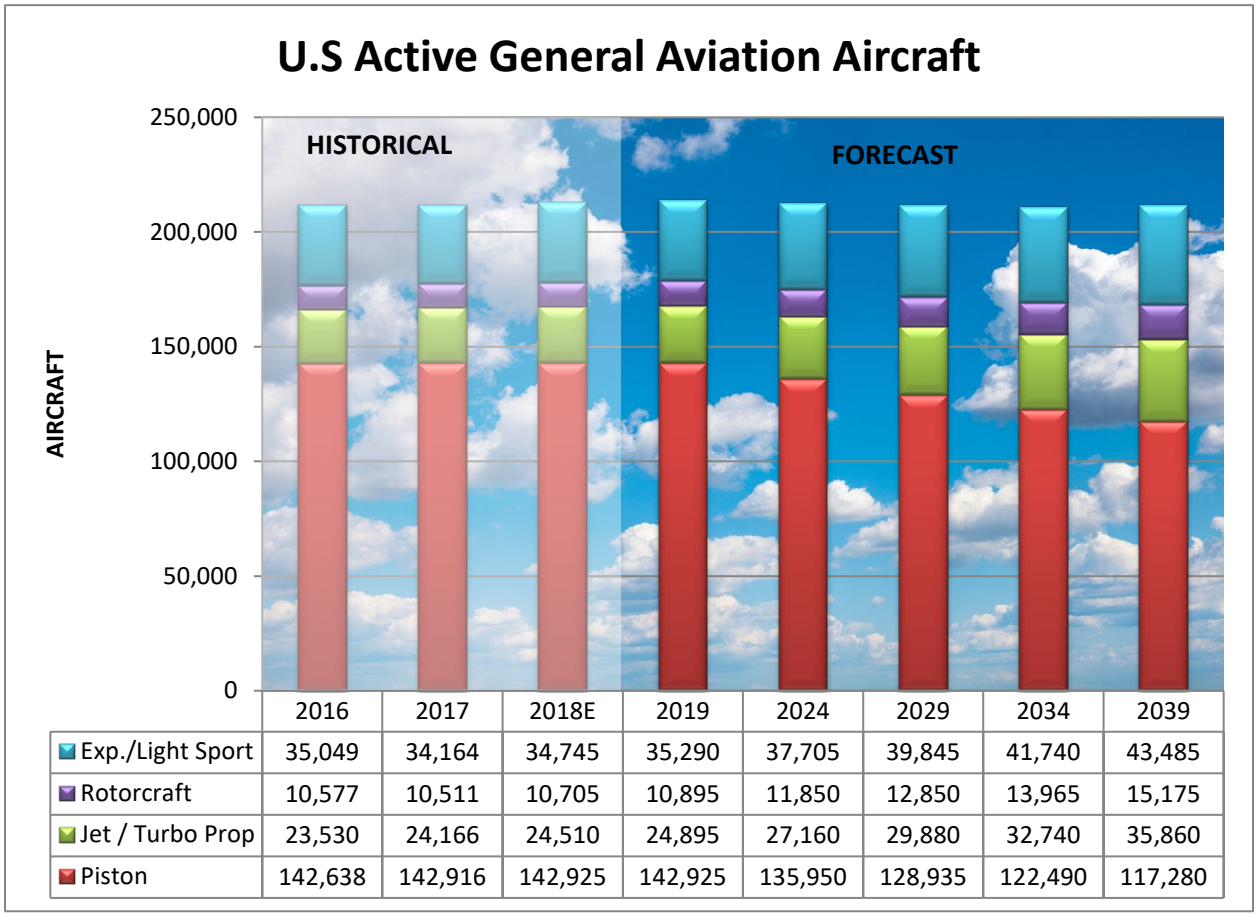


Source: FAA Aerospace Forecast, FY 2019-2039, 2018 Estimated

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 1.8 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 25,645 aircraft (an average annual rate of -1.0 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 3.5 percent annually, adding about 2,890 new aircraft by 2039, nearly doubling its 2018 fleet size.

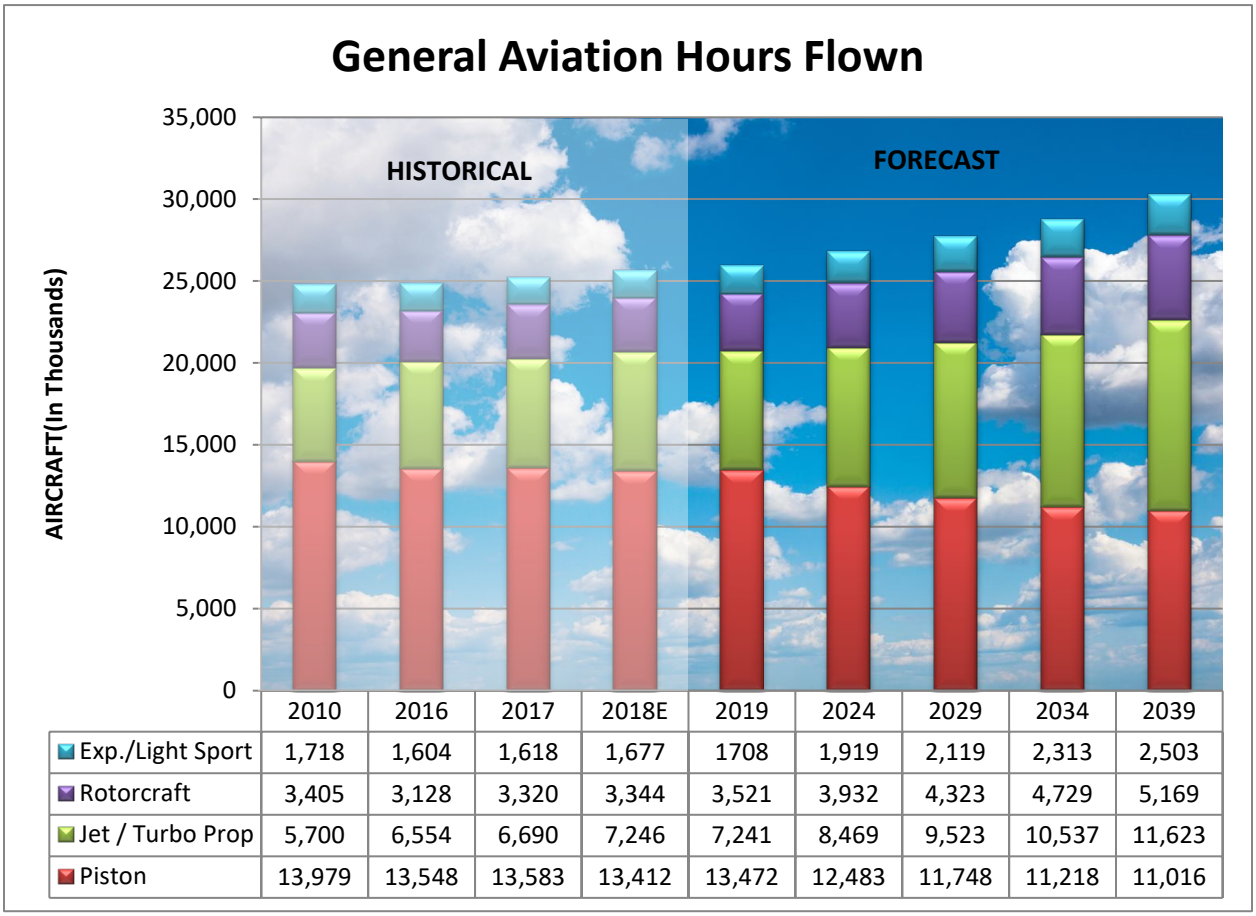


	2016	2017	2018E	2019	2024	2029	2034	2039
Exp./Light Sport	35,049	34,164	34,745	35,290	37,705	39,845	41,740	43,485
Rotorcraft	10,577	10,511	10,705	10,895	11,850	12,850	13,965	15,175
Jet / Turbo Prop	23,530	24,166	24,510	24,895	27,160	29,880	32,740	35,860
Piston	142,638	142,916	142,925	142,925	135,950	128,935	122,490	117,280

Source: FAA Aerospace Forecast, FY 2019-2039, 2018 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 2039 from 25.6 million in 2018, 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 0.8 percent. Countering this trend, hours flown by turbine aircraft 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 2.4 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.



	2010	2016	2017	2018E	2019	2024	2029	2034	2039
Exp./Light Sport	1,718	1,604	1,618	1,677	1708	1,919	2,119	2,313	2,503
Rotorcraft	3,405	3,128	3,320	3,344	3,521	3,932	4,323	4,729	5,169
Jet / Turbo Prop	5,700	6,554	6,690	7,246	7,241	8,469	9,523	10,537	11,623
Piston	13,979	13,548	13,583	13,412	13,472	12,483	11,748	11,218	11,016

Source: FAA Aerospace Forecast, FY 2019-2039, 2018 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 BZN.

2.3 Airport Service Area

The airport service area is generally defined by the proximity of other airports providing similar services. 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.

The airport service area has been defined to include Gallatin County and the five surrounding counties of Broadwater, Jefferson, Madison, Meagher, and Park. While the passenger service area may extend outside the boundaries of the defined service area, these six counties provide the source for the majority of locally originating passengers.

Local Population and Economy

Table 2-1 shows 2018 population estimates for the BZN service area. The projections reflect U.S. Census estimates from July 1, 2018. In 2018, the population estimates for the airport service area were:

Table 2-1 BZN Service Area Population Projection for 2018

County	Population (2018)
Gallatin County	111,876
Broadwater County	6,085
Jefferson County	12,097
Madison County	8,768
Meagher County	1,866
Park County	16,736
Service Area Population	**157,428**

Source: US Census Bureau Population Estimates July 1, 2018

Table 2-2 shows historic census counts and population projections for the BZN Service Area through 2040. The projections were obtained from the City of Belgrade 2018 Long Range Transportation Plan for Gallatin County and from Census & Economic Information Center (CEIC), Montana Department of Commerce for surrounding counties. In 2010 the U.S. Census estimated the population of Gallatin County at 89,513 persons, and that of Broadwater, Jefferson, Madison, Meagher, and Park Counties at 5,612, 11,406, 7,691, 1,891 and 15,636 respectively. Projections provided by CEIC and the City of Belgrade Long Range Transportation Plan reflect a population for the Airport Service Area of about 230,000 in the year 2040. This represents an average annual growth rate of 2.2 percent over the planning period.

Table 2-2 BZN Service Area Population Projections

	Actual			Projected		
County	1990	2000	2010	2020	2030	2040
Gallatin County	50,463	67,831	89,513	113,574	143,437	177,477
Broadwater County	3,318	4,385	5,612	6,276	7,198	7,709
Jefferson County	7,939	10,049	11,406	11,852	11,877	11,947
Madison County	5,989	6,851	7,691	8,843	10,298	10,873
Meagher County	1,819	1,932	1,891	1,861	1,980	1,936
Park County	14,562	15,694	15,636	16,996	18,543	19,111
TOTAL	**84,090**	**106,742**	**131,749**	**159,402**	**193,332**	**229,052**
% Change Between Census Years		27%	23%	21%	21%	18%
State of Montana	**799,065**	**902,195**	**989,415**	**1,082,994**	**1,191,208**	**1,237,282**
% Change Between Census Years		13%	10%	9%	10%	4%

Sources: Source: US Census Bureau
Gallatin County projections - 2018 Belgrade Long Range Transportation Plan, W&P projections
Surrounding Counties' and State of MT projections - CEIC, MT Department of Commerce

The economy of the BZN trade area is thriving. As noted previously, Bozeman has become the #1 fastest growing city of its size in the nation, with a population approaching 50,000 people. The Airport is located close to downhill skiing, blue ribbon trout streams, Yellowstone National Park, and a multitude of other outdoor activities in the pristine nearby wilderness areas. These qualities draw new residents and tourists alike.

New and growing industries have chosen to locate in the community in recent years, diversifying the local economy and providing consistent employment opportunities.

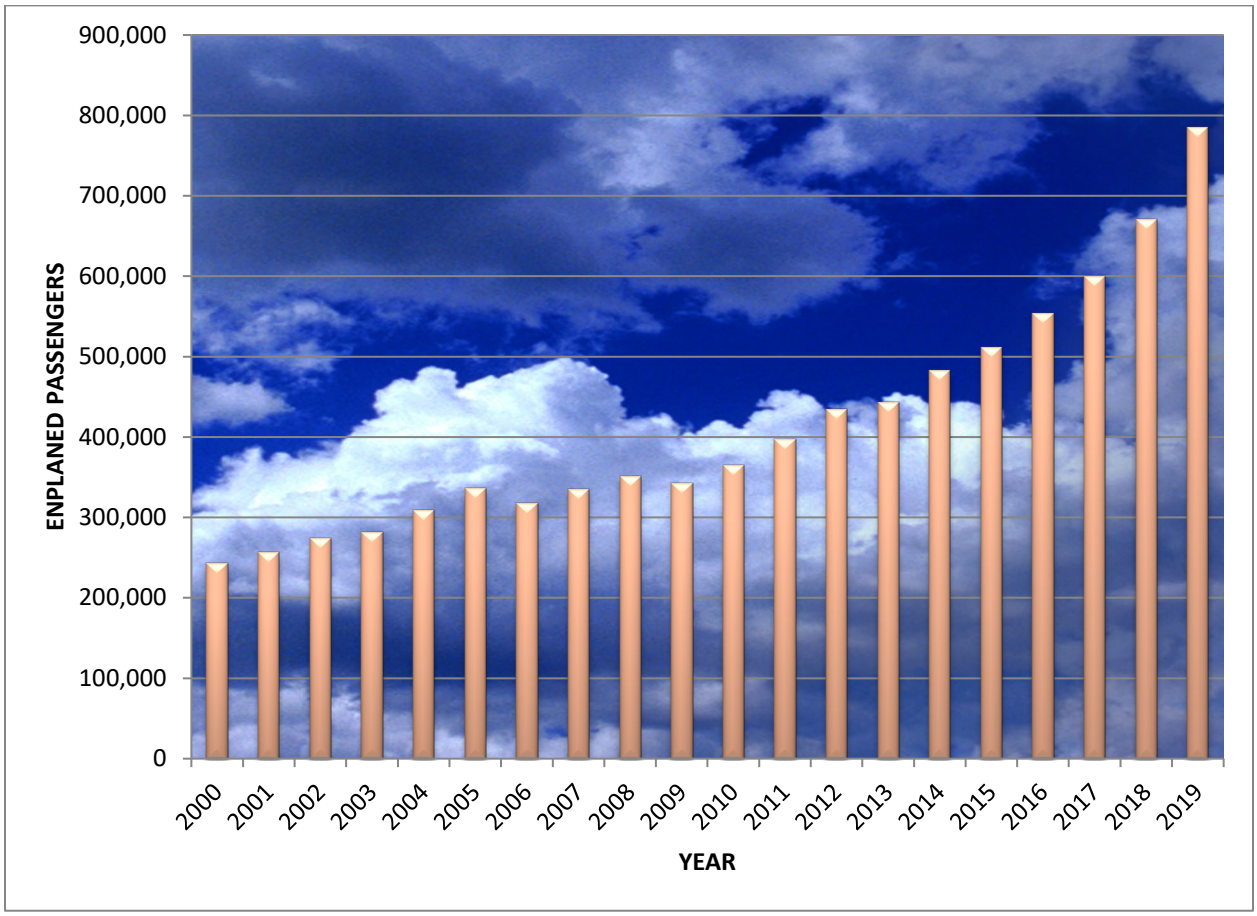
2.4 Historical Enplaned Passengers

Table 2-3 and **Figure 2-5** shows the historical enplaned passengers at BZN for the last twenty years, from 2000, when the airlines enplaned 242,650 passengers, through 2019, when 785,706 passengers were enplaned.

The two decades have been characterized by consistent strong and steady growth. While most airports in the US experienced high volatility over the past decade, BZN has experienced sustained growth. Through the "Great Recession" years of 2007 through 2009, where most airports experienced sharp declines in passenger enplanements, BZN experienced steady increases in 2007 and 2008 and a modest 2.4% decline in 2009. Over the last twenty years, the average annual growth rate has been 6.6%, while over the last ten years, growth has averaged 8.7%. Passenger counts have more than doubled in the ten years between the 2010 and 2019.

Table 2-3 Historical Enplaned Passengers

Year	Total Enplanements	Annual % Change
2000	242,650	8.9%
2001	256,134	5.6%
2002	274,499	7.2%
2003	281,052	2.4%
2004	308,985	9.9%
2005	335,679	8.6%
2006	317,850	-5.3%
2007	335,276	5.5%
2008	351,214	4.8%
2009	342,714	-2.4%
2010	365,210	6.6%
2011	397,822	8.9%
2012	433,829	9.1%
2013	442,540	2.0%
2014	483,132	9.2%
2015	511,723	5.9%
2016	554,034	8.3%
2017	600,361	8.4%
2018	670,923	11.8%
2019	785,706	17.1%
Avg. annual % change 2000 - 2019		6.6%
Avg. annual % change 2010 - 2019		8.7%
Avg. annual % change 2015 - 2019		10.3%



Source: Airport / MDT Aeronautics Records

Figure 2-5 Historical Enplaned Passengers

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.

Rather than applying an average compounding annual growth rate, a regression based time series projection produces coefficients which are used to create a "best fit" line through historical data. This can be projected into the future to predict future values based on the linear trend.

Initially, a linear time-series regression analysis was performed on historical enplanement data for the 15 year 2005-2019 time period. This yielded an r-squared value of 0.88 indicating a relatively high level of predictive reliability.

A linear time-series regression analysis was also performed on historical enplanement data for the ten year 2010-2019 time period. This also yielded an r-squared value of .93, a high level of predictive reliability.

A regression analysis was also performed on enplanements vs. population (for the six county area) for the ten year time period between 2010 and 2019. This provided an r-squared value of .96, providing the best level of predictive reliability of the regression analyses performed.

Market Share Analysis

A market share projection was also developed using a variable share of BZN's historical share of the national regional/commuter market.

Historical passenger enplanements, US regional / commuter enplanements and local market share have been summarized in **Table 2-4** for the 20 year period beginning in 2000 and extending through 2019. The airport has experienced a steadily increasing share of the US market consistently over this 20 year period. The annual increase in BZN's market share over the twenty year period has averaged 0.026% increase over the ten year period between 2010 and 2019.

A market share projection was developed using FAA projections for national regional /commuter traffic. A variable market share rate was applied reflecting the increasing market share experienced at BZN over the past 10 years.

Table 2-4 Historical Passenger Enplanements and Market Shares

Year	BZN Passenger Enplanements	U.S. Regional Carriers Scheduled Passenger Traffic	BZN Share of U.S Passenger Traffic
2000	242,650	82,800,000	0.293%
2001	256,134	83,600,000	0.306%
2002	274,499	91,500,000	0.300%
2003	281,052	108,600,000	0.259%
2004	308,985	130,000,000	0.238%
2005	335,679	149,700,000	0.224%
2006	317,850	155,700,000	0.204%
2007	335,276	159,700,000	0.210%
2008	351,214	162,600,000	0.216%
2009	342,714	156,600,000	0.219%
2010	365,210	164,389,154	0.222%
2011	397,822	164,083,263	0.242%
2012	433,829	162,084,540	0.268%
2013	442,540	158,375,106	0.279%
2014	483,132	156,999,012	0.308%
2015	511,723	156,073,085	0.328%
2016	554,034	155,115,116	0.357%
2017	600,361	152,185,334	0.394%
2018	670,923	157,216,458	0.427%
2019	785,706	163,579,636	0.480%

Sources: FAA Aerospace Forecast, FY 2019-2039
Airport Records

2.6 Enplanement Forecast Summary

A summary of enplanement forecasts is presented in **Figure 2-6** and in **Table 2-5**. **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 population based forecasts represents the mid-range forecast. In addition, based on historical regression analysis, it is the forecast with the greatest statistical reliability for BZN. 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 2-5 Summary of Passenger Enplanement Forecasts

	2024	2029	2034	2039
10 Yr. Linear Trend	994,552	1,203,397	1,412,243	1,621,088
15 Yr. Linear Trend	932,008	1,078,310	1,224,612	1,370,914
20 Yr. Linear Trend	901,839	1,017,972	1,134,105	1,250,237
Market Share	1,060,975	1,383,609	1,782,103	2,247,850
Regression - Population	1,033,679	1,295,763	1,565,899	1,836,063
FAA Terminal Area Forecast	972,359	1,141,525	1,309,123	1,483,468

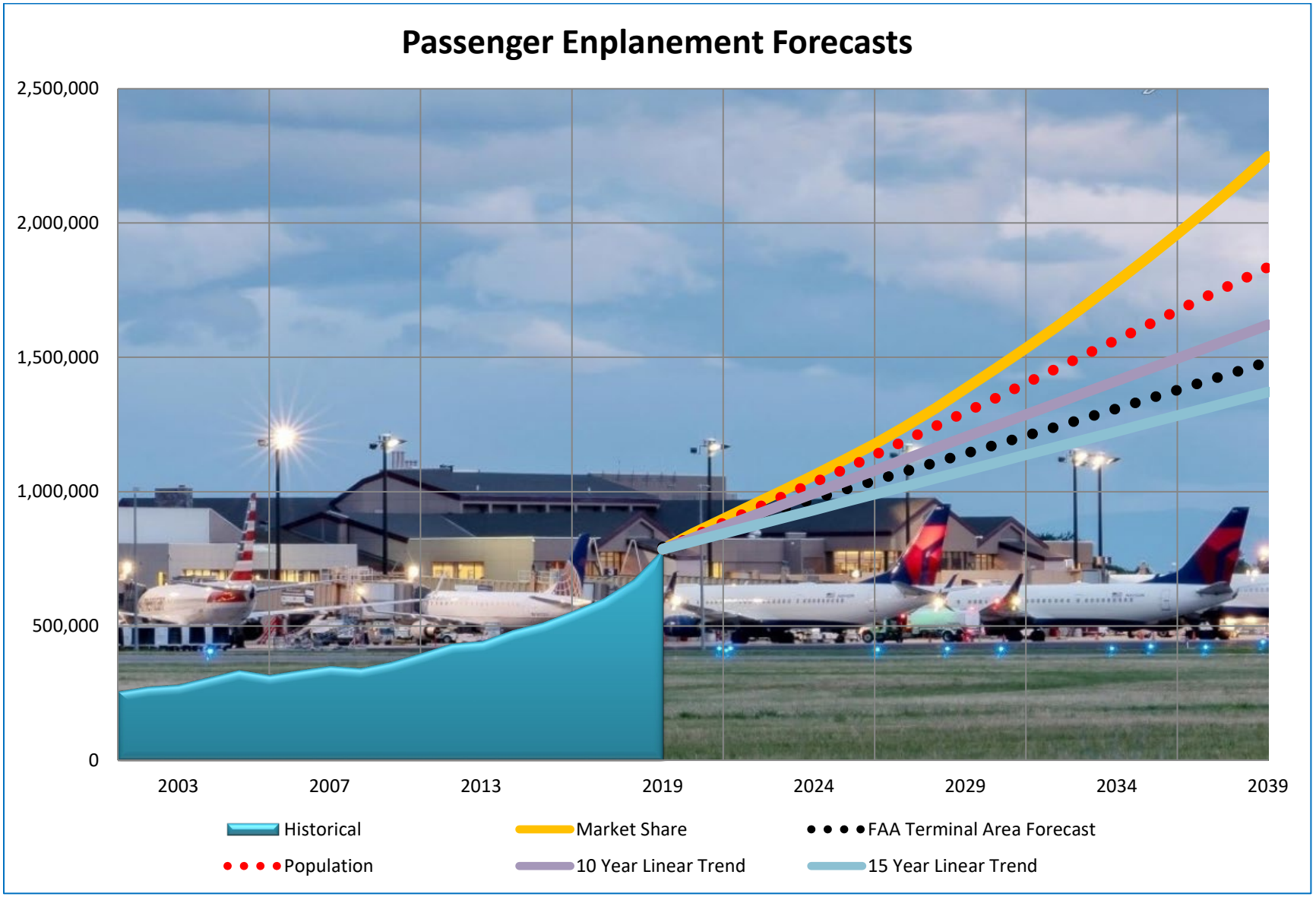


Figure 2-6 Passenger Enplanement Forecasts

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 2-6 presents the based aircraft at BZN between 2000 and 2019 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 risen steadily from a low of 158 in 2000 to a high of 344 in 2019. The last 10 years have seen based aircraft counts rise from 290 to 344, representing an average annual growth rate of 2.41 percent. In the last five years based aircraft counts have increased from 298 to 344, an average annual growth rate of 3.09 percent.

Table 2-6: Historic Based Aircraft

	Single Engine	Jet	Multi	Helicopter	Other	TOTAL
ACTUAL						
2000	133	4	7	3	11	**158**
2001	155	12	8	3	18	**196**
2002	155	12	8	3	18	**196**
2003	155	12	8	3	18	**196**
2004	175	18	11	7	20	**231**
2005	177	20	12	6	17	**232**
2006	177	20	12	6	17	**232**
2007	206	27	17	8	17	**275**
2008	228	21	19	10	14	**292**
2009	228	21	19	10	12	**290**
2010	230	21	17	9	0	**277**
2011	219	25	17	9	0	**270**
2012	219	25	17	9	8	**278**
2013	215	26	15	18	10	**284**
2014	229	23	19	20	11	**302**
2015	235	23	18	22	0	**298**
2016	238	24	20	20	10	**312**
2017	247	26	24	22	0	**319**
2018	250	27	24	22	0	**323**
***2019**	245	43	27	20	9	**344**

Source: FAA 2018 Terminal Area Forecast

* 2019 Data Source: FAA Form 5010, Airport Master Record, eff. 9/12/19

The FAA's Terminal Area Forecast (TAF) for BZN is presented in **Table 2-7**. Adjustment has been made to account for 2019 based aircraft which were not reflected in the 2018 TAF and showed a significant increase in the number of jet aircraft based at the airport, from 27 to 43. The TAF forecasts an average growth rate of 0.85 percent for the twenty year planning period.

Table 2-8 presents a based aircraft forecast using a time series regression for the ten year period from 2009 to 2019.

Table 2-9 presents a based aircraft forecast using a time series regression for the five year period from 2015 to 2019.

A regression analysis was also performed using the population of the BZN service area (Gallatin, Broadwater, Jefferson, Meagher, and Park, Counties). **Table 2-10** presents a based aircraft forecast based on population forecasts for the BZN service area.

The mid-range based aircraft forecast based on population growth (**Table 2-10)** has been selected as the preferred forecast. The range of based aircraft forecasts is graphically depicted on **Figure 2-7**

Table 2-7 FAA Terminal Area Forecast*

	Based Aircraft
Base Year	
2019	344
Forecast	
2024	363
2029	382
2034	402
2039	422

Note: Adjusted to reflect 2019 base year data found in FAA Form 5010, Airport Master Record, eff. 9/12/19

Table 2-8 Based Aircraft Projections Based on 2010 to 2019 Linear Trend

	Based Aircraft
Base Year	
2019	344
Forecast	
2024	387
2029	429
2034	472
2039	514

Table 2-9 Based Aircraft Projections Based on 2015 to 2019 Linear Trend

	Based Aircraft
Base Year	
2019	344
Forecast	
2024	412
2029	452
2034	547
2039	614

Table 2-10 Based Aircraft Projections Based on Forecast Population Growth

	Based Aircraft
Base Year	
2019	344
Forecast	
2024	386
2029	434
2034	484
2039	533

Source: CEIC, MT Department of Commerce

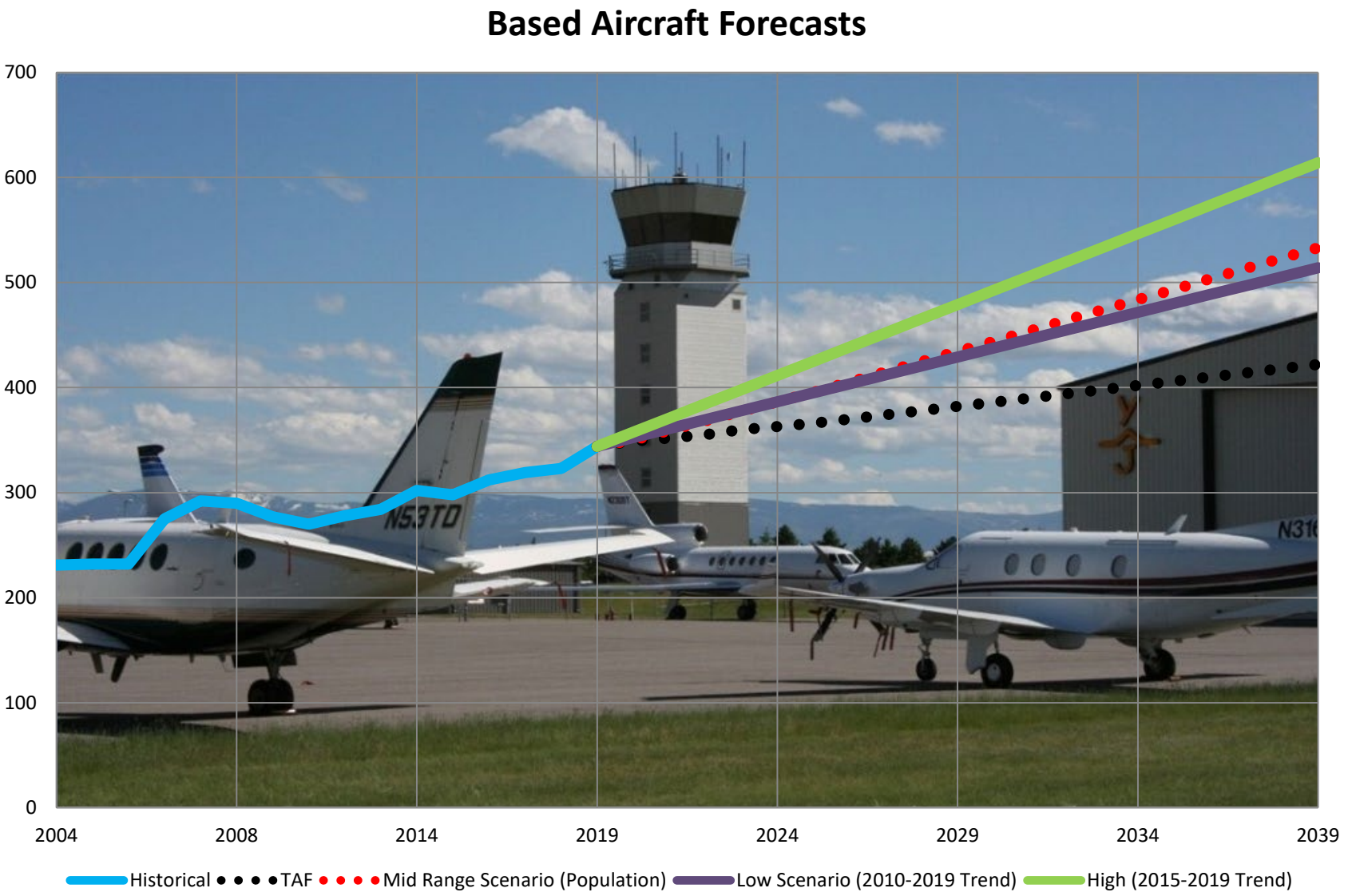


Figure 2-7 Based Aircraft Forecasts

2.8 Operations Forecasts

Table 2-11 displays historic commercial air carrier operations by seating capacity as well as load factors and enplanements at BZN for the last five years. 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. Consistent with national trends, BZN has seen a general trend toward larger aircraft as 50 seat regional jets are replaced with 76 to 100 seat aircraft. In addition, due to strong and steadily increasing demand, BZN attracts mainline carriers utilizing aircraft seating in excess of 100 passengers. Aircraft over 100 passengers have represented a steadily increasing share of the fleet mix over the last five years. This trend toward larger aircraft has corresponded with a steadily increasing count of enplanements per departure, a steady increase in overall commercial departures from year to year and passenger boarding load factors consistently over 80 percent, all indicators of very high air service demand at BZN.

Table 2-12 summarizes fleet mix and operations projections for commercial service airlines at BZN. Fleet mix projections have been applied to estimate projected future average seats per departure, which (after applying a load factor) were combined with enplanement forecasts to project annual departures. 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 76 seat EMB 175, the 76 seat CRJ-700 and the 90 seat CRJ-900 over the planning period. Larger aircraft in use by mainline carriers are anticipated to continue to represent an increasing share of the fleet mix at BZN over the planning horizon.

Table 2-11 Historic Scheduled Airline Fleet Mix and Operations

Fleet Mix Seating Capacity	2015	2016	2017	2018	2019
< 40	0.0%	0.0%	0.0%	0.0%	0.0%
40 - 59	19.5%	15.8%	11.4%	10.5%	9.1%
60-99	42.9%	43.8%	41.6%	43.5%	42.5%
>100	37.7%	40.3%	47.0%	46.0%	48.4%
Average Seats Per Departure	88	101	108	109	113
Boarding Load Factor	86.0%	85.1%	83.3%	81.9%	77.7%
Enplanements Per Departure	75	86	90	89	94
Annual Enplanements	511,723	554,034	600,361	670,923	785,706
Annual Departures	6,210	6,248	6,626	7,519	8,359
Annual Operations	12,420	12,496	13,252	15,038	16,718

Source: Airport Records

Table 2-12 Scheduled Airline Fleet Mix and Operations Forecast

	Forecast			
Fleet Mix Seating Capacity	**2024**	**2029**	**2034**	**2039**
< 40	0.0%	0.0%	0.0%	0.0%
40 - 59	5.0%	0.0%	0.0%	0.0%
60-99	42.0%	41.0%	39.0%	38.0%
>100	53.0%	59.0%	61.0%	62.0%
Average Seats Per Departure	116	121	123	123
Boarding Load Factor	83%	83%	84%	84%
Enplanements Per Departure	96	101	103	104
Annual Enplanements	1,033,679	1,295,763	1,565,899	1,836,063
Annual Departures	10,773	12,870	15,193	17,713
Annual Operations	21,547	25,740	30,386	35,426

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 counted by the FAA tower 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. For the purposes of this report, air carrier operations have been considered to be any commercial flight that uses the terminal regardless of the numbers of seats. Air taxi numbers represent flights of passengers or cargo for hire that do not use the terminal facilities. Data is presented in this format to support planning decisions for the terminal area.

Air taxi operators are defined as being a classification of air carriers which directly engage in the air transportation of persons, property, mail, or in any combination of such transportation and which do not directly or indirectly use large aircraft. At BZN this includes cargo operators and charters. Air taxi operations rose dramatically between 2000 and 2005 and have fluctuated from year since that time. For purposes of this forecast, an annual growth rate of 0.75 percent has been applied to air taxi operations which is consistent with the average annual growth rate over the past ten years.

General aviation local operations projected under the all growth scenarios assume an Operations Per Based Aircraft (OPBA) of 92 derived from a comparison of based aircraft and local operations in recent years. (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 mid-range and the high-growth scenarios utilize average annual growth rates of 1.0 percent, 1.1 percent and 1.3 percent respectively. These growth rates reflect typical past growth rates in itinerant general aviation operations seen over the past 10 to 15 years.

While military operations have historically fluctuated at BZN without a clear upward or downward trend, the recent addition of parallel Runway 11-29 has precipitated a dramatic increase in military operations since its opening in 2017. Continued growth in military training operations is anticipated as awareness of the facility grows among military operators. Operations for military air traffic are projected to increase at a rate of 0.5 percent over the 20 year planning period.

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 compound annual growth rates of 1.7 percent, 1.8 percent and 2.5 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.

Tables 2-13, 2-14 and **2-15** present aircraft operations forecasts for the low-growth, mid-range and high-growth scenarios and **Figure 2-8** graphically presents the range of operations forecasts.

Table 2-13 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
2024	387	92	21,547	8,447	39,088	682	69,764	35,559	0	35,559	105,323
2029	429	92	25,740	8,753	40,950	698	76,141	39,471	0	39,471	115,612
2034	472	92	30,386	9,058	42,811	715	82,970	43,382	0	43,382	126,352
2039	514	92	35,426	9,363	44,672	732	90,193	47,294	0	47,294	137,487

Table 2-14 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
2024	386	92	21,547	8,447	39,274	682	69,950	35,557	0	35,557	105,507
2029	434	92	25,740	8,753	41,322	698	76,513	39,962	0	39,962	116,475
2034	484	92	30,386	9,058	43,369	715	83,528	44,502	0	44,502	128,030
2039	533	92	35,426	9,363	45,417	732	90,938	49,043	0	49,043	139,980

Table 2-15 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
2024	412	92	21,547	8,447	40,104	682	70,780	37,858	0	37,858	108,638
2029	479	92	25,740	8,753	43,203	698	78,395	44,068	0	44,068	122,463
2034	547	92	30,386	9,058	46,542	715	86,701	50,278	0	50,278	136,979
2039	614	92	35,426	9,363	50,139	732	95,660	56,488	0	56,488	152,148

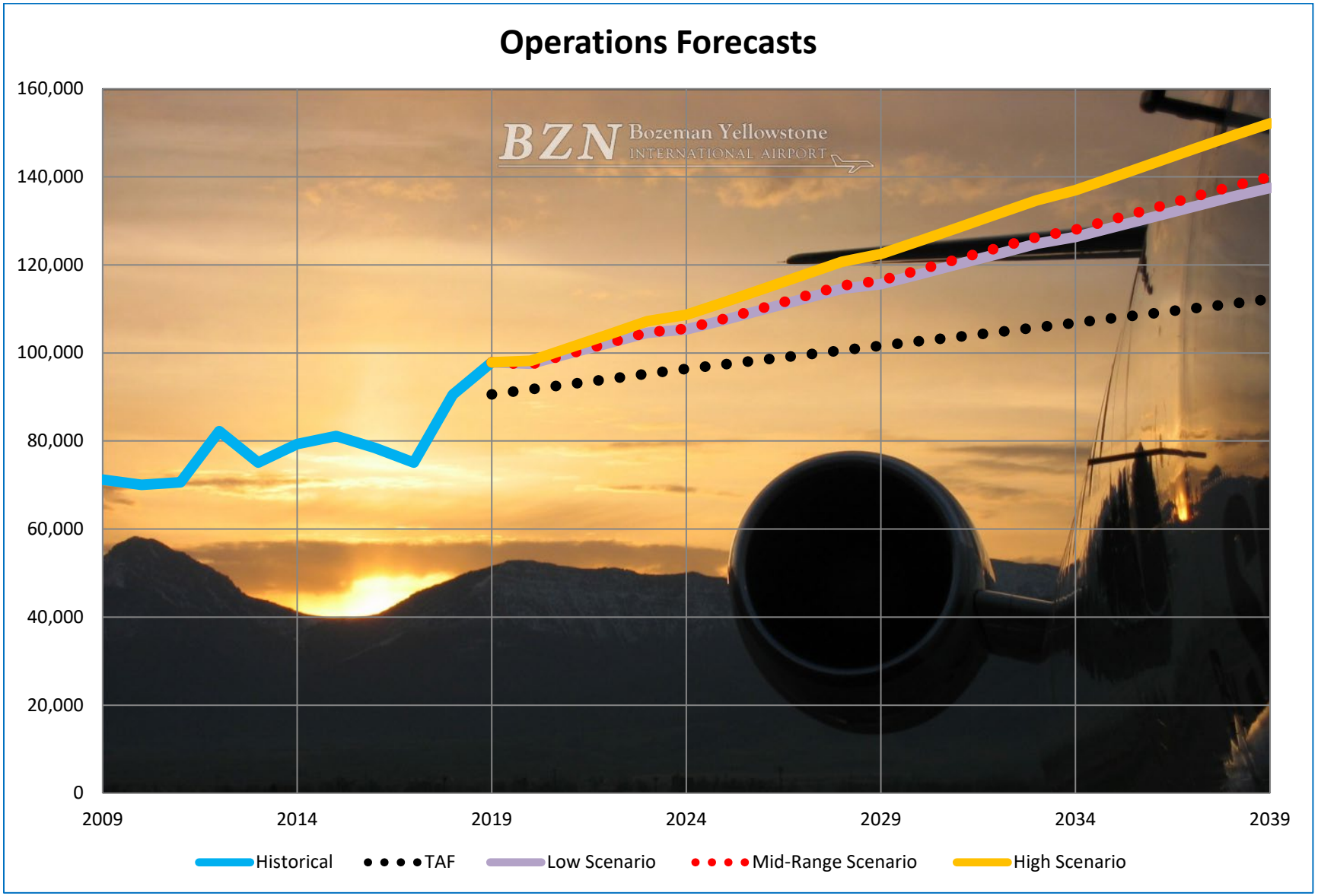


Figure 2-8: Operations Forecasts

2.9 Instrument Operations

Annual instrument approaches are recorded by the tower. This data can be used to determine future navigation aide facilities. Historic instrument approaches by aircraft category are displayed in **Table 2-16**.

As operations increase, so will the number of instrument operations. Between 2010 and 2019 instrument operations as a percentage of total operations have averaged 100% for Air Carrier, 95% for Air Taxi, 24% for General Aviation and 39% for Military. It is anticipated that these percentages will remain fairly constant throughout the planning period.

Table 2-16: Annual Instrument Operations

	Air Carrier	Air Taxi	General Aviation	Military	Total
2010	7,467	10,555	4,815	81	22,918
2011	7,521	9,501	5,384	67	22,473
2012	8,758	8,566	5,112	127	22,563
2013	8,261	8,940	5,776	100	23,077
2014	10,100	8,194	7,350	109	25,753
2015	9,724	8,215	8,656	153	26,748
2016	10,579	8,144	9,458	110	28,291
2017	11,337	8,340	9,556	120	29,353
2018	13,404	9,386	9,673	129	32,592
2019	15,679	9,089	11,066	230	36,064

2.10 Air Cargo

Carriers of cargo include the airlines as well as independent cargo specific operators. Specific carriers operating on the airport include DHL, FedEx, and UPS.

The demand for air cargo services is the result of economic activity. Consistent with the volatility in the U.S. economy, air cargo rates have fluctuated over the last 10 years. Increases as high as 17.7% in 2011 were offset by declines as great as -22.5 in 2010.

Historic air cargo statistics for the last ten years are provided in **Table 2-17.** Note that all cargo carriers are not required to report their activity levels. Historical information is provided for air freight which is reported to the airport, which includes that carried by airlines, UPS and FedEx.

Historically, about 40% of the total air cargo is loaded on, and 60% is off loaded.

Table 2-18 is the forecast for air cargo. An annual growth rate of 2.7 percent was applied, which is consistent with the average annual growth rate over the past ten years.

Table 2-17: Historic Annual Air Cargo (Pounds)

YEAR	TOTAL	Growth Rate	Annual Total On	% On	Annual Total Off	% Off
2010	3,168,500	-22.5%	1,085,500	34.3%	2,083,000	65.7%
2011	3,729,163	17.7%	1,031,191	27.7%	2,697,972	72.3%
2012	4,340,338	16.4%	1,778,310	41.0%	2,562,028	59.0%
2013	4,514,543	4.0%	1,759,709	39.0%	2,754,835	61.0%
2014	4,718,860	4.5%	1,810,189	38.4%	2,908,671	61.6%
2015	4,983,356	5.6%	1,975,776	39.6%	3,007,580	60.4%
2016	5,318,256	6.7%	2,165,855	40.7%	3,152,401	59.3%
2017	5,499,472	3.4%	2,241,202	40.8%	3,258,270	59.2%
2018	5,178,114	-5.8%	1,979,957	38.2%	3,198,157	61.8%
2019*	4,253,910	-17.8%	1,553,442	36.5%	2,700,468	63.5%

Source: Airport Records
*2019 data estimated based on partial year data

Table 2-18: Air Cargo Forecast (Pounds)

YEAR	TOTAL	Annual Total On	Annual Total Off
2024	6,070,736	2,280,752	3,789,984
2029	6,931,057	2,603,971	4,327,086
2034	7,913,300	2,972,996	4,940,304
2039	9,034,742	3,394,318	5,640,425

2.11 Fuel Volume

Table 2-19 summarizes the Historic Fuel Sales at BZN for the ten year period from 2010 to 2019. The sales include Avgas and Jet-A, including sales to the airlines by the Fixed Base Operators.

Sales have fluctuated considerably over the years with annual changes ranging from a 14.2 percent decline in 2009 to a 14.6 percent increase in 2017. Sales overall have been trending upward since 2015.

In general, all things being equal, fuel volumes are projected to increase as operations increase over the next 20 years. Fuel storage areas should be reserved for such an increase.

Table 2-20 applies an annual growth rate of 4.0 percent to airline fuel and an annual growth rate of 5.1 percent to non-airline jet fuel which are consistent with the average annual growth rates over the past ten years. Av gas sales have historically been trending downward are forecast at no growth. Due to past fluctuations, the forecasts in **Table 2-20** should be viewed as fairly speculative. Additional research is required before making any investment decision based on forecast fuel sales.

Table 2-19: Historic Fuel Usage (Gallons)

YEAR	TOTAL FUEL	Growth Rate	Airline Fuel	Growth Rate	Non-Airline Jet Fuel	Growth Rate	Av Gas 100LL	Growth Rate
2010	5,694,897	0.4%	4,072,626	-0.4%	1,622,271	2.3%	153,029	-7.5%
2011	6,449,615	13.3%	4,689,215	15.1%	1,760,400	8.5%	136,241	-11.0%
2012	6,483,942	0.5%	4,754,666	1.4%	1,729,276	-1.8%	159,031	16.7%
2013	7,053,507	8.8%	5,190,362	9.2%	1,863,146	7.7%	139,626	-12.2%
2014	7,018,469	-0.5%	5,065,950	-2.4%	1,952,519	4.8%	139,626	0.0%
2015	7,538,304	7.4%	5,470,412	8.0%	2,067,892	5.9%	136,880	-2.0%
2016	8,640,817	14.6%	6,369,988	16.4%	2,270,829	9.8%	130,463	-4.7%
2017	9,159,973	6.0%	6,643,473	4.3%	2,516,500	10.8%	138,844	6.4%
2018	9,350,154	2.1%	6,029,571	-9.2%	3,320,583	32.0%	131,854	-5.0%
2019	11,447,322	22.4%	8,150,142	35.2%	3,297,180	-0.7%	144,632	9.7%

*per fiscal year
Source: Airport Records

Table 2-20: Forecast Fuel Usage (Gallons)

Year	TOTAL FUEL	Airline Fuel	Non-Airline Jet Fuel	Av Gas 100LL
2024	12,237,735	7,636,402	4,469,479	131,854
2029	15,155,101	9,298,025	5,725,222	131,854
2034	18,786,838	11,321,206	7,333,778	131,854
2039	23,310,743	13,784,615	9,394,274	131,854

*per fiscal year

2.12 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.
- **Peak Day:** The busy day of a typical week in the peak month.
- **Design Hour:** The peak hour within the design day.

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 2019 was July with 12.1 percent of the annual total. This percentage

has been applied to the forecasts of annual enplanements.

The design day is derived by dividing the peak month operations or enplanements by the number of days in the month. Commercial activity is heavier on weekends at BZN. A review of the airline schedule indicates that there are 24 percent more seats available on the peak day (Saturday) than the average day, therefore, a 24 percent adjustment has been applied to the design day figures to reflect the peak day activity.

The design hour enplanements were estimated at 20 percent of design day after reviewing the peak hourly departures from the airline schedule, aircraft seating capacity and average load factors.

Peak monthly airline operations were projected at 13 percent of annual operations based on a review of historic airline operations data. Design day and hour airline operations were calculated upon review of current schedules. The forecast of design day airline operations was calculated as 3 percent of peak month activity. Airline design hour operations were estimated at 17 percent of design day operations based on flight schedules.

Peak month general aviation operations and military were projected based on monthly tower operations counts. Design day operations were estimated as peak month operations / 31. Overall design hour operations were derived from a 6.7 ratio to the design day. This ratio was established in a February, 2015 capacity study for secondary Runway 11-29 from hourly tower data utilized

Table 2-21 summarizes peak activity forecasts for the BZN.

Table 2-21 BZN Peaking Characteristics

		Forecasts			
	2019	2024	2029	2034	2039
Airline Enplanements					
Annual	785,706	1,033,679	1,295,763	1,565,899	1,836,063
Peak Month	95,856	126,109	158,083	191,040	224,000
Design Day	3,092	4,068	5,099	6,163	7,226
Peak Day	3,834	5,044	6,323	7,642	8,960
Design Hour	767	1,009	1,265	1,528	1,792
Airline Operations					
Annual	17,580	21,547	25,740	30,386	35,426
Peak Month	2,285	2,801	3,346	3,950	4,605
Design Day	69	84	100	119	138
Design Hour	12	14	17	20	23
General Aviation & Military Operations					
Annual	80,287	83,961	90,735	97,644	104,554
Peak Month	8,832	9,236	9,981	10,741	11,501
Design Day	285	298	322	346	371
Design Hour	41	43	46	49	53
Total Operations (Airline Operations + GA Operations)					
Annual	97,867	105,507	116,475	128,030	139,980
Peak Month	11,117	12,037	13,327	14,691	16,106
Design Day	353	382	422	465	509
Design Hour	53	57	63	69	76

2.13 Forecast Summary

This chapter has outlined the key aviation demand levels anticipated over the planning period. Long term growth at the BZN 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 2-22**.

Table 2-22 Aviation Demand Forecast Summary

	2019	2024	2029	2034	2039
Enplanements	**785,706**	**1,033,679**	**1,295,763**	**1,565,899**	**1,836,063**
Based Aircraft	**344**	**386**	**434**	**484**	**533**
Annual Operations					
Airline	17,580	21,547	25,740	30,386	35,426
Air Taxi	8,142	8,447	8,753	9,058	9,363
Military	665	682	698	715	732
General Aviation					
Local	34,253	35,557	39,962	44,502	49,043
Itinerant	37,227	39,274	41,322	43,369	45,417
Total Operations	**97,867**	**105,507**	**116,475**	**128,030**	**139,980**

2.14 Comparison with the TAF

The FAA annually updates a Terminal Area Forecast (TAF), which forecasts enplanements, based aircraft and operations. The 2018 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 2-23 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.

The preferred enplanement forecasts, based aircraft forecasts and operations forecasts are within 10 percent in the five year and 15 percent in the ten year period and are therefore consistent with the TAF.[1]

[1] Based aircraft TAF adjusted to reflect 2019 base year data found in FAA Form 5010, Airport Master Record, eff. 9/12/19

Table 2-23 Comparison of Master Plan and TAF Forecasts

	Year	Airport Forecast (AF)	TAF	AF/TAF (% Difference)
Passenger Enplanements				
Base yr.	2019	785,706	794,119	-1.1%
Base yr. + 5yrs.	2024	1,033,679	972,359	6.3%
Base yr. + 10yrs.	2029	1,295,763	1,141,525	13.5%
Base yr. + 15yrs.	2034	1,565,899	1,309,123	19.6%
Total Operations				
Base yr.	2019	97,867	90,585	8.0%
Base yr. + 5yrs.	2024	105,507	96,375	9.5%
Base yr. + 10yrs.	2029	116,475	101,632	14.6%
Base yr. + 15yrs.	2034	128,030	106,852	19.8%
Based Aircraft*				
Base yr.	2019	344	344	0.0%
Base yr. + 5yrs.	2024	386	363	6.5%
Base yr. + 10yrs.	2029	434	382	13.7%
Base yr. + 15yrs.	2034	484	402	20.3%

TAF Data is on a U.S. Government fiscal year basis (October through September)
* Based aircraft TAF adjusted to reflect 2019 base year data found in FAA Form 5010, Airport Master Record, eff. 9/12/19

2.15 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 2-24**, 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.

Under former guidance, taxiway design was based on ADG. In the updated Advisory Circular AC 150/5300-13A, taxiway design is based on **Taxiway Design Groups (TDG)**, which are based on the overall Main Gear Width (MGW) and the Cockpit to Main Gear (CMG) distance. TDG classifications are presented in **Figure 2-9**.

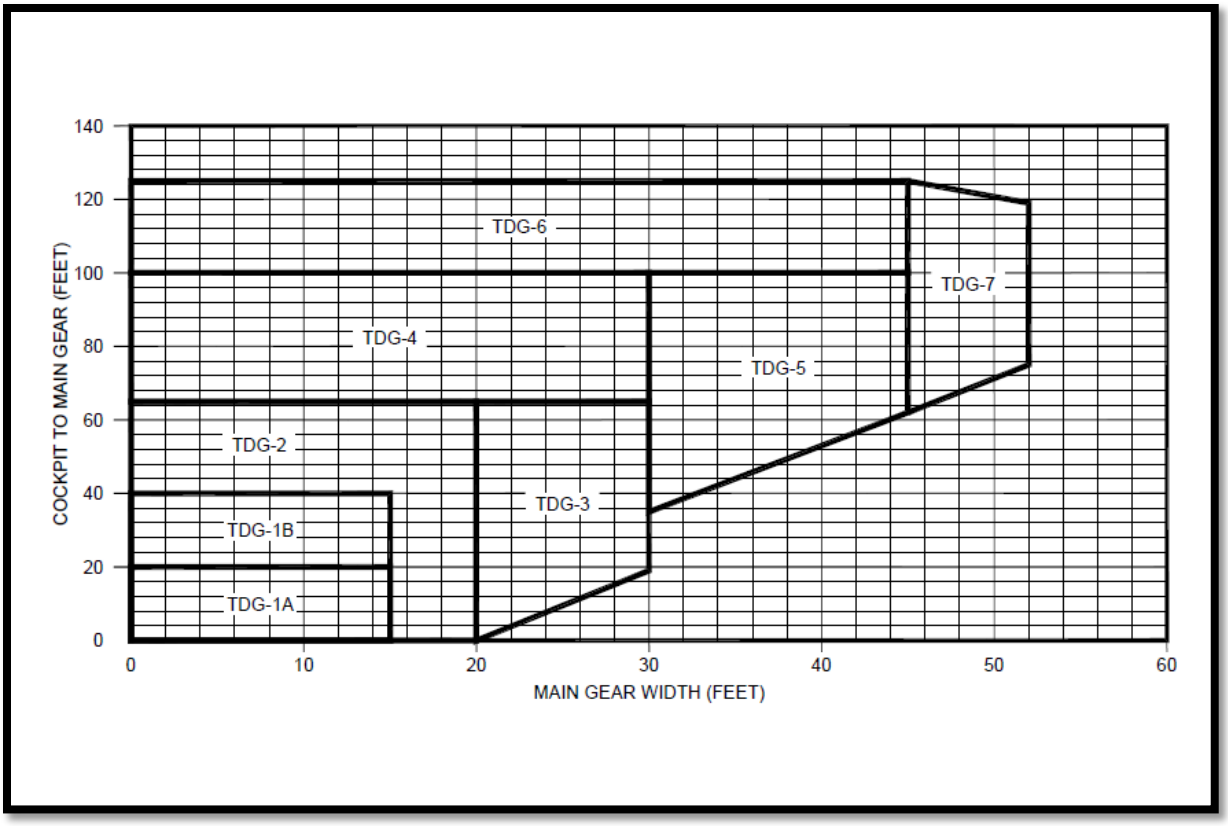
Table 2-24: Airfield Classification Systems

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 2-25** below.

Table 2-25 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)



Source: Figure 1-1 from AC 5300-13a, Change1

Figure 2-9: Taxiway Design Groups

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 2-26 depicts a representation of the more demanding aircraft types in approach categories C and D observed at the airport over the course of calendar year 2019. The data presented in **Table 2-27** represents a summary of TFMSC operations counts by Aircraft Approach Category and Airplane Design Group.

Table 2-26 AAC C & D Aircraft Filing Instrument Flight Plans – BZN

Aircraft Type	AAC	ADG	Wingspan	Operations
HAWK - BAe Systems Hawk	C	I	30'10"	3
H25A - BAe HS 125-1/2/3/400/600	C	I	47'10"	1
H25B - BAe HS 125/700-800/Hawker 800	C	I	54'4"	328
LJ31 - Bombardier Learjet 31/A/B	C	I	44'0"	37
LJ40 - Learjet 40; Gates Learjet	C	I	48'0"	36
LJ45 - Bombardier Learjet 45	C	I	48'0"	130
LJ55 - Bombardier Learjet 55	C	I	44'0"	18
LJ60 - Bombardier Learjet 60	C	I	44'0"	126
WW24 - IAI 1124 Westwind	C	I	44'10"	16
CL60 - Bombardier Challenger 600/601/604	C	II	64'0"	355
LJ70 - Learjet 70	C	II	51'0"	2
LJ75 - Learjet 75	C	II	51'0"	120
ASTR - IAI Astra 1125	C	II	54'7"	18
CL30 - Bombardier (Canadair) Challenger 300	C	II	64'0"	641
CL35 - Bombardier Challenger 300	C	II	64'0"	500
CRJ1 - Bombardier CRJ-100	C	II	69'6"	4
CRJ2 - Bombardier CRJ-200	C	II	69'7"	1534
G150 - Gulfstream G150	C	II	55'7"	20
G280 - Gulfstream G280	C	II	63'0"	99
GALX - IAI 1126 Galaxy/Gulfstream G200	C	II	58'0"	69
CRJ7 - Bombardier CRJ-700	C	II	58'0"	845
E135 - Embraer ERJ 135/140/Legacy	C	II	76'0"	14
E145 - Embraer ERJ-145	C	II	65'9"	2
E35L - Embraer 135 LR	C	II	65'9"	28
GLF3 - Gulfstream III/G300	C	II	65'9"	8
GL5T - Bombardier BD-700 Global 5000	C	III	77'8"	147
GLEX - Bombardier BD-700 Global Express	C	III	94'0"	214
P3 - Lockheed P-3C Orion	C	III	99'7"	1
B712 - Boeing 717-200	C	III	98'5"	42
CRJ9 - Bombardier CRJ-900	C	III	82'0"	251
A319 - Airbus A319	C	III	117'5"	2156
A320 - Airbus A320 All Series	C	III	117'5"	2656
A321 - Airbus A321 All Series	C	III	112'0"	897
B734 - Boeing 737-400	C	III	95'0"	47
B735 - Boeing 737-500	C	III	94'9"	4
B737 - Boeing 737-700	C	III	113'0"	48
E170 - Embraer 170	C	III	85'4"	303
E190 - Embraer 190	C	III	94'3"	2

E75L - Embraer 175	C	III	85'4"	4640
E75S - Embraer 175	C	III	85'4"	174
C130 - Lockheed 130 Hercules	C	IV	132'0"	10
C30J - C-130J Hercules ; Lockheed	C	IV	132'7"	15
B752 - Boeing 757-200	C	IV	124'10"	153
B2 - Northrop B-2 Spirit	C	V	172'0"	2
F15 - Boeing F-15 Eagle	D	I	43'0"	1
F16 - Lockheed F-16 Fighting Falcon	D	I	33'0"	1
F18 - Boeing FA-18 Hornet	D	I	37'5"	1
F18H - F/A 18 Hornet	D	I	37'5"	13
F18S - F18 Hornet	D	I	37'5"	15
LJ35 - Bombardier Learjet 35/36	D	I	40'0"	30
GLF4 - Gulfstream IV/G400	D	II	77'10"	559
GLF5 - Gulfstream V/G500	D	III	94'0"	486
GLF6 - Gulfstream	D	III	99'7"	140
B738 - Boeing 737-800	D	III	117'5"	2011
B739 - Boeing 737-900	D	III	117'5"	206
P8 - Boeing P-8 Poseidon	D	III	123'0"	10
P8A - P-8A Posieden Maritime Surveillance	D	III	123'0"	2

Source: FAA Traffic Flow Management System Counts (TFMSC) Jan 2019-Dec 2019

Table 2-27: Instrument Flight Plans by Type BZN – 2019

AAC / ADG	2019 Operations
Approach Category A	2,048
Approach Category B	11,035
Approach Category C	16,716
Approach Category D	3,456
Aircraft Design Group I	4,404
Aircraft Design Group II	12,686
Aircraft Design Group III	15,417
Aircraft Design Group IV	178
Aircraft Design Group V	2

Source: FAA Traffic Flow Management System Counts (TFMSC) Jan 2019-Dec 2019

The totals in **Table 2-27** indicate that the most demanding aircraft type that currently exceeds 500 operations are aircraft in Aircraft Approach Category D and Airplane Design Group III.

In terms of taxiway design, the most demanding aircraft regularly operating at BZN is the Bombardier Dash 8 Q-400 (TDG 5). According to TFMSC data, the Dash 8 Q-400 had 931 operations in 2019.

Given the operations counts in recent years, it is recommended that D-III and TDG 5 aircraft should function as the current critical aircraft.

The future air carrier fleet mix will be the primary driver the critical aircraft for BZN in the future. Delta began regularly operating a 757-200 (C-IV) for a portion of its operations at BZN in 2007. A daily flight to Atlanta utilizing this particular aircraft currently accounts for 167 annual operations according to TFMSC data. Annual operations by group IV aircraft would exceed 500 operations with only two additional scheduled daily flights utilizing the 757-200 or comparably sized aircraft.

Currently, the fleets of Delta, United and American Airlines (all operating at BZN) include the 757-200. Given the strong and increasing demand for air service at BZN, it is considered highly likely that one or more of these carriers, or a new entrant, will add service with a group IV aircraft or upgauge a scheduled group III aircraft to a group IV aircraft comparable to the 757-200 over the twenty year planning horizon.

Boeing discontinued the 757-200 in 2004 and a direct replacement has not been developed. It is anticipated that airlines will eventually replace the 757-200 with a similarly sized aircraft. With a wingspan of 124 feet 10 inches, the 757-200 is at the smaller end of airplane design group IV aircraft (wingspans 118-171 feet). Given that the critical aircraft utilizing the terminal movement area will likely be on the lower end of the group IV scale, it may be prudent to design terminal movement areas according to specific aircraft requirements rather than design group standards.

It is expected that group IV aircraft will account for more than 500 operations in the planning horizon. Future taxiway design standards are recommended to remain TDG 5.

With the anticipated addition of scheduled flights on 757-200 and similarly sized aircraft over the planning period, it is recommended that D-IV aircraft should function as the future critical aircraft and serve as the basis for future airport design. Future taxiway design standards are recommended to remain TDG 5.

BZN has historically been planned and built to ARC D-IV / TDG 5 and greater standards. Chapter 3, 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.