3

FORECAST OF AVIATION DEMAND

3.1 FORECASTING BACKGROUND

This chapter of the Juneau International Airport (JNU) Sustainability Master Plan (SMP) presents forecasts of future aviation demand. These forecasts are a key step in the airport planning process and provide the basis for determining:

- The airport's role in the aviation system
- Improvements needed on the airfield, terminal facilities, apron areas, and landside facilities now and in the future to accommodate growth in demand
- Potential environmental effects, such as noise, of the airport's operation on the surrounding community
- The financial feasibility of alternative airport development proposals.

Forecasts were developed using historical data as recorded by Airport Management and FAA. In most cases the data was reliable up to 2012, which is used as the forecast base year. Where possible the 2013 and 2014 data was incorporated to assure that the forecasts were as current and up-to-date as possible. Forecast years were adjusted to reflect short-term through 2020, mid-term through 2025 and long-term through 2035. 2030 forecasts are also presented to provide an interim check during the long-term period.

3.2 SUMMARY OF FORECASTS

Development of forecasts for JNU followed a process described in FAA Advisory Circular (AC) 150/5070-6B, Airport Master Plans. Details of historical information, assumptions, and decisions regarding these forecasts are contained in the chapter. The following is a summary of the forecasting results.

- Examining historical records showed that the number of enplaned passengers at JNU fluctuated over the past ten years at about the same rate as did passenger levels nationally. The indication is that much of the passenger activity at JNU is tied to tourism. This is certainly true with the On-Demand passengers where records show it to be

seasonal. The Part 121 and 135 passengers also show peak during the summer months, indicating that a tie to the tourist market exists. In the future enplaned passengers are expected to continue to increase at about the same rate as the national forecast prepared by the Federal Aviation Administration (FAA). The forecast used herein tempered the national growth trends with the growth expected in the regional population to reflect that part of the market that includes connections to other destinations within Southeast Alaska.

- Operationally it is anticipated that the Part 121 carrier traffic will continue to be offered using narrow body jet aircraft having 130 – 140 seats represented by the Boeing 737-series aircraft. Flights will continue to include non-stop service to Seattle and Anchorage as well as flights that make multiple stops out of Juneau. Overall levels of growth in this category will be driven by the growth in enplaned passengers.

- Air taxi and commuter flights include the Part 135 carriers, the on-demand carriers, air cargo flights and other for hire air taxi activity. Historically this category has comprised the majority of operations at JNU. This is expected to continue in the future with growth rates tied to both passenger growth in the commuter market, growth in the regional population and forecast increases in the amount of freight and mail.

- General aviation activity makes up a small portion of the total operations. The growth in this category is expected to be moderate over the 20-year forecast period and driven primarily by local population growth and economic conditions.

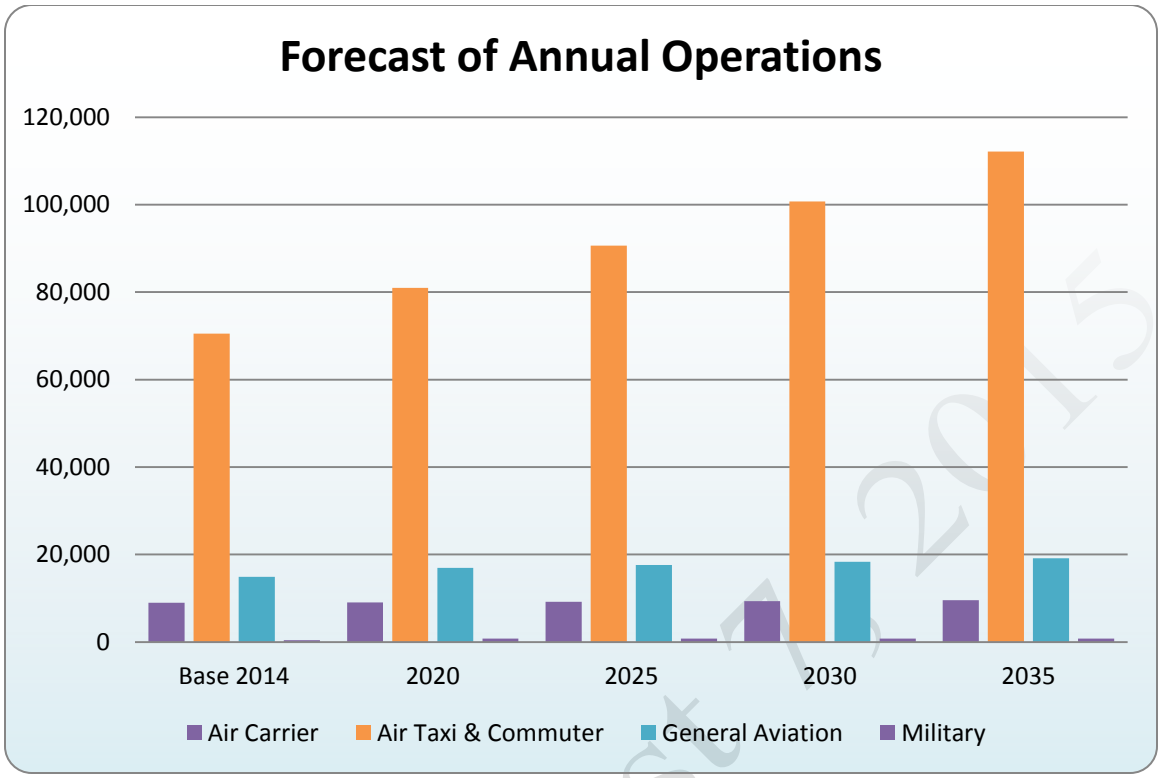
- Military activity at JNU has always been minimal and the future is not expected to see any growth in this category.

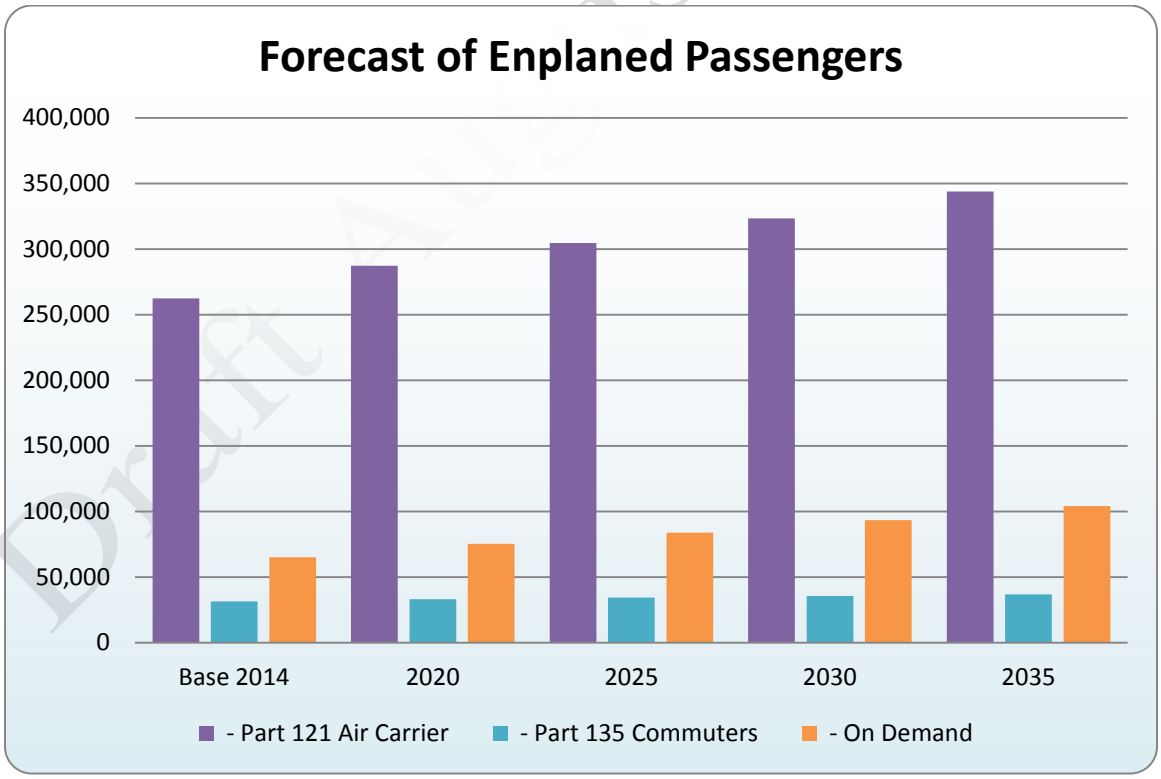
Table 3-1 shows a summary of the forecasts prepared for JNU that will be used in the remainder of this master plan.

Table 3-1: Summary of Forecasts

Category	Base Year	2020	2025	2030	2035
Enplaned Passengers					
- Air Carrier	262,252	287,289	304,616	323,231	343,272
- Commuter	31,262	33,123	34,212	35,467	36,814
- On Demand	64,965	75,162	83,764	93,374	104,043
Total Passengers	358,479	395,583	422,592	452,072	484,129
Operations					
Air Carrier	8,319	8,432	8,544	8,657	8,769
Air Taxi & Commuter	70,540	80,943	90,595	100,725	112,160
General Aviation	16,287	16,954	17,625	18,352	19,118
Military	440	775	775	775	775
Total Operations	95,586	107,104	117,538	128,508	140,822
Based Aircraft	332	346	364	383	403

Note: The base year for the forecasts is 2012, the most recent year where comprehensive records where available for all activity categories.





3.3 FORECASTING PROCESS

Developing demand forecasts follows the same process regardless of the type or size of the airport. Key steps defined in Advisory Circular 150/5070-6B, Airport Master Plans, include the following:

1. Identify key aviation activity parameters and measures to forecast, such as aircraft operations and fleet mix
2. Collect and review previous forecasts, such as the 1999 Juneau International Airport Master Plan and Federal Aviation Administration (FAA) Terminal Area Forecast (TAF)
3. Gather additional data as needed
4. Select the forecast methods to be used
5. Apply the forecast methods and evaluate the results
6. Compare the results with the FAA TAF to obtain FAA approval of the new forecasts

Subsequent sections of this chapter provide the background information on how the forecasts were developed. Forecasts have been prepared for periods ending 5, 10, and 20 years from the base year of the forecast. Forecasts were also prepared for the peak month, design day, and peak hour of each period.

3.4 KEY ACTIVITY PARAMETERS

The nature and scope of aviation demand forecasts vary from airport to airport depending on the facility's role and level of activity. For JNU, the forecasts will address the following elements:

Enplaned Passengers

- Part 121 Air Carriers
- Part 135 Commuter/Air Taxis
- On Demand Carriers
- Total Enplaned Passengers

Part 121 Air Carrier Operations

- Commercial aircraft fleet
- Annual load factors
- Total annual commercial operations

Air Taxi and Commuter Activity

- Part 135 Operations

- On-Demand Operations
- Air Mail and Air Cargo
    - Enplaned pounds
    - Annual operations
- Other Air Taxi Operations

General Aviation Activity

- Total number of based aircraft
- Based aircraft fleet mix
- Annual general aviation operations
- Local and itinerant operations

Military Activity

Peak Period Activity

- Peak month
- Average day peak month
- Peak hour

Critical Aircraft

3.5 REVIEW OF PREVIOUS FORECASTS

To begin the forecast process it is valuable to examine the forecasts that were prepared during previous planning efforts. For JNU there are two previous forecasts that are applicable, those contained in the previous airport master plan adopted in 1999 and those prepared as part of the FAA's TAF in 2014.

3.5.1 1999 Master Plan Forecasts

The forecasts created as part of the 1999 Juneau International Airport Master Plan are shown in Table 3-2. These forecasts were based on a set of assumptions regarding local and national economic conditions that were expected at the time that the forecasts were created. Subsequent events have tempered these expectations to a large degree:

1. The terrorist attacks that occurred on September 11, 2001, drastically changed the commercial aviation marketplace resulting in reduced travel over the subsequent years.

2. The economic downturn of 2007 suppressed the aviation market, and the market is only now recovering.

3. Oil prices have risen over the past decade, increasing the cost of passenger tickets and the cost of owning and operating aircraft.

Table 3-2 shows the forecast from the 1999 master plan compared with the traffic levels that have occurred. The forecasted passenger levels from the 1999 plan have not been achieved but the total annual operations levels have been very close.

Table 3-2: Forecast from the 1999 Master Plan compared with actual recorded activity levels

From the 1999 Master Plan								
	Passengers			Aircraft Operations				
	Carrier	Air Taxi	Total	Carrier	Air Taxi	General Aviation	Military	Total
1992	234,502	96,041	330,543	8,782	95,645	35,000	978	140,405
1993	199,424	116,364	315,788	6,838	98,336	39,937	1,074	146,185
1994	227,954	117,551	345,505	8,325	113,615	43,226	1,151	166,317
1995	244,954	123,441	368,395	7,814	127,371	34,774	1,103	171,062
2000	277,503	136,681	414,184	8,545	115,331	36,835	1,000	161,711
2005	317,831	156,544	474,375	9,306	116,224	37,954	1,000	164,484
2015	415,811	204,802	620,613	11,602	123,186	39,836	1,000	175,624
Actuals								
	Passengers			Aircraft Operations				
	Carrier	Air Taxi	Total	Carrier	Air Taxi	General Aviation	Military	Total
1992	229,944	32,657	262,601	8,771	82,818	125,615	990	218,194
1993	201,675	39,398	241,073	6,869	86,723	131,499	1,061	226,152
1994	220,030	43,455	263,485	8,164	99,658	143,446	1,108	252,376
1995	245,139	49,825	294,964	7,972	112,798	157,166	1,222	279,158
2000	251,933	35,967	287,900	8,391	103,418	147,805	906	260,520
2005	266,288	32,521	298,809	9,277	73,507	104,695	1,187	188,666
2015	278,308	34,151	312,459	8,915	76,545	102,987	582	189,029

Source: Forecasts from Juneau International Airport Master Plan – March 1999
Actuals from Airport Records

3.5.2 Federal Aviation Administration (FAA) Terminal Area Forecasts (TAF) FY 2013 -2040

The Terminal Area Forecast (TAF) is the official FAA forecast of aviation activity for U.S. airports. It includes forecasts for all airports that are included in the National Plan of Integrated Airport Systems (NPIAS). Forecasts are prepared for air carrier, air taxi/commuter, general aviation, and military. The forecasts are prepared to meet the budget and planning needs of FAA and provide information for use by state and local authorities, the aviation industry, and the public.

The most recent TAF was prepared in 2014 and contains forecasts based on historical data through the year 2012. Forecasts are made for the period from 2013 through 2014. The TAF forecast for JNU is shown in the following Tables.

Table 3-3: TAF Forecast of Enplaned Passengers

Fiscal Year	Air Carrier	Commuter	Total
2010	250,228	32,669	282,897
2011	258,126	38,562	296,688
2012	261,843	32,272	294,115
2013*	260,762	30,161	290,923
2014*	267,282	31,065	298,347
2015*	273,965	31,996	305,961
2016*	280,814	32,955	313,769
2017*	287,835	33,944	321,779
2018*	295,032	34,962	329,994
2019*	302,406	36,012	338,418
2020*	309,966	37,093	347,059
2021*	317,715	38,204	355,919
2022*	325,658	39,349	365,007
2023*	333,799	40,530	374,329
2024*	342,144	41,745	383,889
2025*	350,696	42,997	393,693
2026*	359,465	44,288	403,753
2027*	368,451	45,616	414,067
2028*	377,664	46,984	424,648
2029*	387,105	48,394	435,499
2030*	396,784	49,847	446,631
2031*	406,703	51,342	458,045
2032*	416,871	52,882	469,753
2033*	427,293	54,469	481,762
2034*	437,976	56,102	494,078
2035*	448,927	57,785	506,712
2036*	460,150	59,519	519,669
2037*	471,654	61,304	532,958
2038*	483,445	63,143	546,588
2039*	495,532	65,037	560,569
2040*	507,920	66,989	574,909

Table 3-4: TAF Forecasts of Annual Operations

	Itinerant Operations					Local Operations			
Fiscal Year	Air Carrier	Air Taxi Commuter	GA	Military	Total	GA	Military	Total	Total Ops
2010	8,127	64,118	11,090	497	83,832	5,607	287	5,894	89,726
2011	8,217	70,738	12,057	487	91,499	5,191	378	5,569	97,068
2012	8,319	64,313	8,747	433	81,812	4,357	362	4,719	86,531
2013*	8,748	69,703	9,573	376	88,400	4,762	64	4,826	93,226
2014*	8,966	70,540	9,851	376	89,733	5,055	64	5,119	94,852
2015*	9,190	71,385	9,938	376	90,889	5,080	64	5,144	96,033
2016*	9,419	72,242	10,026	376	92,063	5,105	64	5,169	97,232
2017*	9,653	73,108	10,116	376	93,253	5,130	64	5,194	98,447
2018*	9,894	73,985	10,206	376	94,461	5,156	64	5,220	99,681
2019*	10,142	74,873	10,297	376	95,688	5,182	64	5,246	100,934
2020*	10,397	75,771	10,389	376	96,933	5,208	64	5,272	102,205
2021*	10,656	76,681	10,481	376	98,194	5,234	64	5,298	103,492
2022*	10,924	77,603	10,574	376	99,477	5,260	64	5,324	104,801
2023*	11,198	78,534	10,668	376	100,776	5,286	64	5,350	106,126
2024*	11,476	79,473	10,762	376	102,087	5,312	64	5,376	107,463
2025*	11,762	80,428	10,858	376	103,424	5,338	64	5,402	108,826
2026*	12,055	81,392	10,955	376	104,778	5,365	64	5,429	110,207
2027*	12,356	82,370	11,052	376	106,154	5,392	64	5,456	111,610
2028*	12,664	83,359	11,150	376	107,549	5,419	64	5,483	113,032
2029*	12,980	84,359	11,249	376	108,964	5,446	64	5,510	114,474
2030*	13,303	85,372	11,348	376	110,399	5,473	64	5,537	115,936
2031*	13,635	86,397	11,448	376	111,856	5,500	64	5,564	117,420
2032*	13,974	87,435	11,550	376	113,335	5,527	64	5,591	118,926
2033*	14,324	88,485	11,653	376	114,838	5,554	64	5,618	120,456
2034*	14,680	89,549	11,756	376	116,361	5,581	64	5,645	122,006
2035*	15,046	90,624	11,860	376	117,906	5,609	64	5,673	123,579
2036*	15,422	91,712	11,965	376	119,475	5,637	64	5,701	125,176
2037*	15,806	92,814	12,071	376	121,067	5,665	64	5,729	126,796
2038*	16,200	93,929	12,177	376	122,682	5,693	64	5,757	128,439
2039*	16,605	95,058	12,285	376	124,324	5,721	64	5,785	130,109
2040*	17,019	96,199	12,394	376	125,988	5,749	64	5,813	131,801

3.6 ENPLANED PASSENGERS

The number of enplaned passengers at an airport is commonly used in the airport planning process to calculate the need for terminal facilities as well as being important in financial planning over the course of a master plan. Enplaned passengers, or enplanements, are used rather than total passengers since they provide the best indicators of need. Naturally, it is assumed that the number of enplaned passengers is roughly duplicated by the number of deplaned passengers.

3.6.1 Historical Enplaned Passengers

The Juneau International Airport is the primary commercial service airport in Southeast Alaska. Two commercial airlines, certified under FAR Part 121, offer service to and from JNU, Alaska Airlines offers year-round service to Seattle, Anchorage, Ketchikan, Petersburg, Sitka, Yakutat and Cordova and Delta Airlines offers service to Seattle and Anchorage.

Three Part 135 Scheduled Commuter Carriers, Wings Airways, Wings of Alaska, and Alaska Seaplanes offer scheduled Air Taxi service to and from JNU using land based aircraft and one, Ward Air operates using floatplanes. These airlines serve Angoon, Hoonah, Haines, Sitka, Tenakee, Gustavus, Kake and Skagway.

Figure 3-1 shows the communities served by scheduled commercial airlines or air taxis from Juneau.

Figure 3-1: Communities Served From Juneau

In addition to these scheduled carriers, there are others that offer on-demand passenger services using both conventional fixed-wing aircraft (both land-based and floatplanes) and helicopters. These on-demand carriers serve a multitude of customers including the tourist market, mining camps and others.

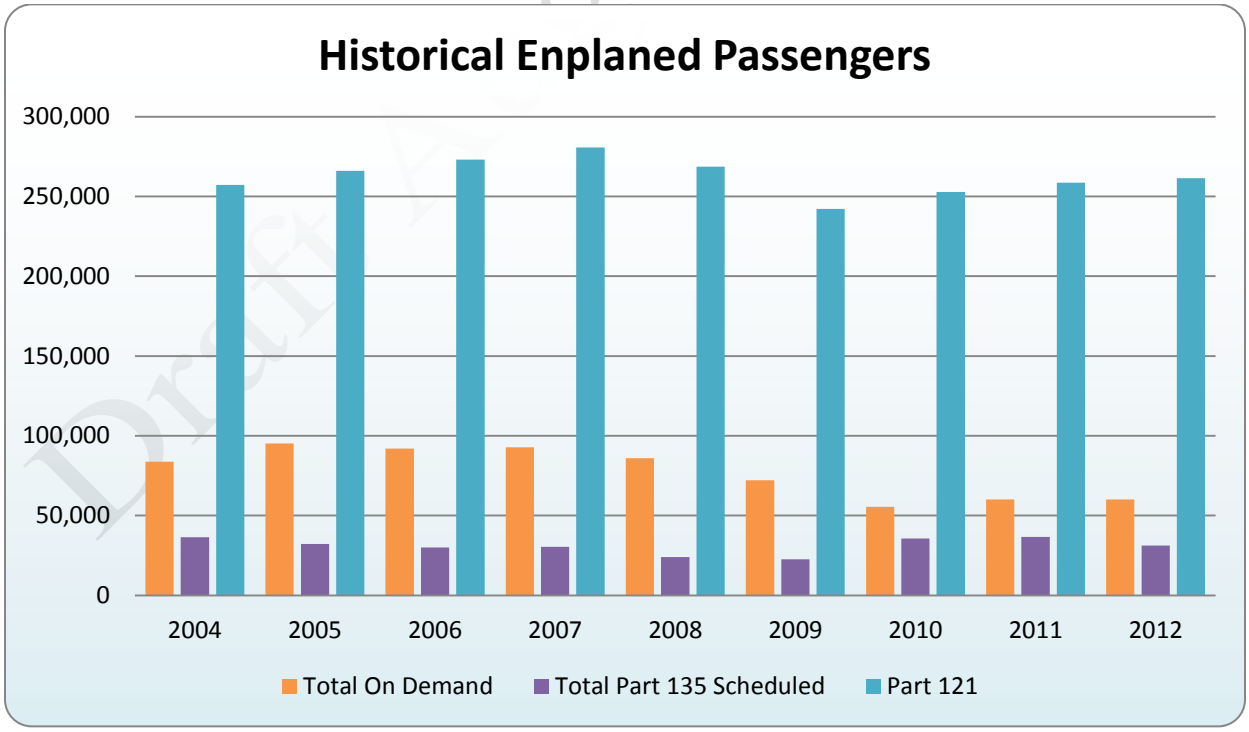
The total number of passengers at JNU has generally grown over the past 10 years but this growth was negated somewhat by decreases in passenger levels in 2008 and 2009. These decreases are

consistent with decreased passenger levels at airports across the country so are not seen as specific reactions to the situation in Juneau. Table 3-5 shows the recorded passenger levels by type for JNU from 2004 through 2012.

Table 3-5: JNU Historical Recorded Passenger Levels

	2004	2005	2006	2007	2008	2009	2010	2011	2012
On Demand Carriers									
- Land Based	998	10,231	2,143	844	799	931	914	826	269
- Floatplanes	21,610	6,177	14,545	15,628	18,484	14,063	8,224	7,372	8,829
- Helicopters	61,181	78,871	75,244	76,271	66,724	57,195	46,406	51,996	51,028
Total On Demand	83,789	95,279	91,932	92,743	86,007	72,189	55,544	60,194	60,126
Part 135 - Scheduled									
- Land Based	35,011	30,167	27,495	26,645	20,950	19,751	23,044	22,656	18,212
- Floatplanes	1,458	1,975	2,482	3,729	3,120	2,961	12,580	13,897	13,050
Total Part 135 Scheduled	36,469	32,142	29,977	30,374	24,070	22,712	35,624	36,553	31,262
Part 121	257,247	266,032	273,020	280,708	268,664	242,137	252,869	258,655	261,441
TOTAL ENPLANED PASSENGERS	377,505	393,453	394,929	403,825	378,741	337,038	344,037	355,402	352,829

Source: Juneau International Airport Records



3.7 ENPLANED PASSENGER FORECAST

A variety of methods are available for forecasting air carrier passengers. The three most commonly used are market share analyses, regression analysis, and time-series analysis. These share the shortcoming that they assume that relationships which existed in the past will continue unchanged into the future. Consequently, they do not allow for the effects of more aggressive marketing, airline decisions, increased service levels, or other changes independent of past indicators.

Similarly, these methods do not permit the analysis of the impact of point-in-time activity changes such as shown by the introduction of seasonal service by Delta in 2014. To counter this weakness, the second phase of forecasting involves a judgmental analysis. During this phase, decisions are made regarding the growth projections resulting from the analyses. These decisions require that a number of intangible factors, such as potential service increases, airport or airline policy and regional changes be considered. The forecast team adds these elements to the process using experience from other airports, industry trends, knowledge of the aviation community, and information gathered from airlines, airport users and passengers.

In this section forecasts are prepared for three distinct types of enplaned passengers including the Part 121 Scheduled Carriers, the Part 135 scheduled commuter carriers and the On-Demand Carriers. Since growth in each of these categories is likely to be driven by different factors and the needs for each of these categories may vary considerably.

3.7.1 Forecast of Enplaned Passengers on FAR Part 121 Air Carriers

Passengers using the FAR Part 121 Carriers make up more that 70 percent of all passengers at JNU. The airport is served by both Alaska Airlines and Delta Airlines. In forecasting future growth of passengers several methods were used to produce a range of projections, each influenced by different factors. These methods include the following

Market share analyses techniques involve a review of historical activity levels at the individual airport (JNU) and a comparison of these to those recorded for a larger area (the US and the State of Alaska). This comparison is used to determine what share of the larger market has used JNU. This share can then be applied to forecasts of passengers prepared for the larger market by the FAA in the TAF to project future activity levels at JNU. Two market share models were used for these forecasts as follows:

- JNU enplanements as a percentage of total U.S. enplanement levels as forecast by FAA in the TAF.
- JNU enplanements as a percentage of total enplanements for the FAA Alaska Region

The underlying assumption in this forecast technique is that the FAA's overall passenger market projections reflect realistic national and regional growth rates and that, based on historical trends, JNU can be expected to retain its demonstrated historical share of that market into the future.

Regression Analyses bases projections of passenger demand (the dependent variable) on one or more outside indicators, such as population (the independent variables). Historical values for both the dependent and the independent variables are tested using correlation analyses to determine whether a relationship exists between them. If it is determined there is a relationship, projections of the independent variable can be used to project future aviation activity, assuming a continuation of the past relationship. This method requires the use of forecasts of the independent variables prepared by others.

For this analysis a regression model was prepared comparing the historical annual enplanements at JNU as recorded by the airport to the population of Juneau. The analysis showed that there was not a strong relationship between the growth in population in the region and enplaned passenger levels at the airport.

However, to assure that local and regional population was fully considered in the forecast, we used the growth rates that were developed in the projections of population for Juneau and presented in "Alaska Population Projections, 2012 – 2042" prepared by the Alaska Department of Labor and Workforce Development. And the rates for high, medium and low population growth projections prepared by the CBJ. Developing forecasts of passengers for future years applied these growth rates to the recorded number of passengers and projected them into the future.

The time-series analysis is a simple and widely used forecasting technique. The time-series analysis is a basic regression that fits growth curves to historical data and uses these past growth rates to forecast future activity levels. This type of analysis assumes that, although short-term perturbations may occur from time to time, a consistent overall trend can be identified over an extended period. The time-series analysis for JNU was rejected from consideration as the correlation between time and passenger growth was not strong enough to justify further consideration.

3.7.1.1 Summary of Part 121 Enplaned Passenger Projections and Preferred Forecast

The projections prepared for this forecast all reflect continued growth over the next 20 years ranging from a low of 291,000 in 2035 based on the low projection of population growth to a high of 402,534 assuming that the passengers at JNU will continue to be driven by national growth factors.

In analyzing the range of projections, the preferred forecast of enplaned passengers includes elements of all of the forecasting methods.

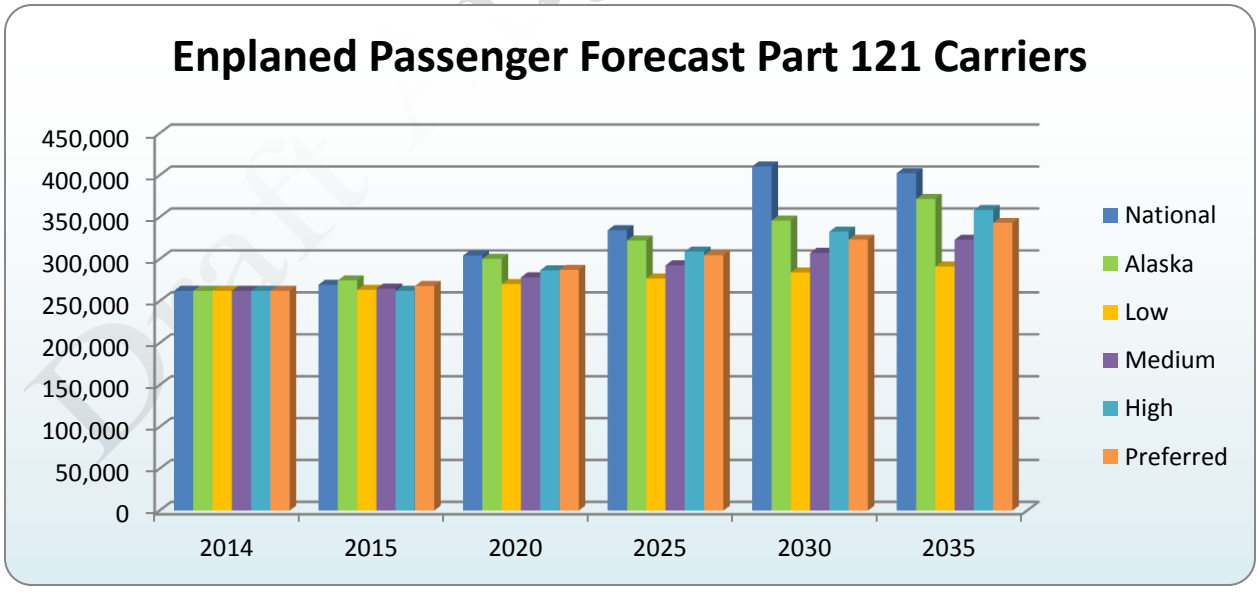
- The market share analyses reflect the facts that the primary factor in historical passenger growth has been the changes in national passenger levels reflecting the increasing importance of tourism on the regional economy.
- The population based projections have been factored into the forecast to recognize the impact that regional growth has on passenger levels, particularly in the winter months.

Table 3-6 and Figure 3-2 show the full range of projections as well as the preferred forecast.

Table 3-6: Forecast of Enplaned Passengers on Part 121 Carriers

	Market Share		Population Based			
Year	**National**	**Alaska**	**Low**	**Medium**	**High**	**Preferred**
2013	290,923	290,923	290,923	290,923	290,923	290,923
2014	262,252	262,252	262,252	262,252	262,252	262,252
2015	269,580	274,646	263,563	264,875	262,252	267,996
2020	304,364	300,542	270,219	278,386	286,758	287,289
2025	334,523	322,266	277,042	292,586	308,919	304,616
2030	410,609	345,906	284,038	307,511	332,794	323,231
2035	402,534	371,720	291,210	323,197	358,514	343,272

Figure 3-2: Forecast of Enplaned Passengers on Part 121 Carriers



3.7.2 Forecast of Enplaned Passengers on Part 135 Commuter Carriers

The FAR Part 135 commuter carriers offer service from Juneau to other cities in Southeast Alaska including Angoon, Hoonah, Haines, Sitka, Tenakee, Gustavus, Kake and Skagway. Airlines providing service include Alaska Juneau Aeronautics, Alaska Seaplane Service, ERA Aviation, SeaPort Airlines, and Ward Air. In 2013 these airlines carried more than 31,000 passengers using both wheeled aircraft and floatplanes. Passengers using these airlines are generally regional residents rather than tourists and therefore growth is less influenced by the national economy and more driven by local and regional factors. In making forecasts for this segment two methods were employed as follows.

National Growth Rates: This method increased the number of passengers at the same rate as was forecast for passengers nationwide by FAA.

Local Growth Rates: The forecasts using this method looked at the projected growth in population of Southeast Alaska as projected in the publication "Alaska Population Projections 2012 – 2042", prepared by the State of Alaska Department of Labor and Workforce Development, April 2014.

Table 3-7 shows the result of applying these growth rates to the base year number of passengers. Also shown in the table is the preferred forecast of passengers. The forecast relies primarily on the Part 135 commuters increasing at the same rate as the national passenger levels while include consideration of the fact that the State of Alaska is projecting a gradual decrease in population throughout the southeast region over time. The forecast shown is based on the assumption that other regional transportation options, such as the Alaska Ferry System and regional roads remain at the levels of service that exists at the time these forecasts were prepared.

Table 3-7: Forecast of Part 135 Commuter Airline Enplaned Passengers

	Base	2020	2025	2030	2035
National	31,262	36,587	40,038	43,803	47,844
Local	31,262	31,405	31,299	31,299	31,299
Preferred	**31,262**	**33,132**	**34,212**	**35,467**	**36,814**

Source: AECOM

3.7.3 Forecast of Enplaned Passengers on the On-Demand Carriers

The airlines that offer on-demand service included in this category include Coastal Helicopters, Fjord Flying Services, Harris Aircraft Services, Laughlin, Harold, Northstar Trekking, Tal Air, Temsco Helicopters, and Ward Air. These operate on a seasonal basis since the majority of their

passengers are related to the tourist industry. More than 90 percent of all passengers in this category are carried by floatplanes and helicopters. In forecasting future activity for these carriers it is recognized that future growth will be highly dependent of national economic trends rather than local factors since most are currently tourist or mining related and therefore depend on a healthy national economy.

Two separate forecast market growth factors were explored in developing these forecasts. These are;

National Market Growth Rate: This projection bases growth in the on-demand passenger levels on the rate of growth expected in aviation activity nationally, as forecast by FAA.

Juneau Market Growth: FAA has also developed growth projections for JNU in the TAF. The projections for On-Demand passengers are based on the rate of growth projected for the airport in the TAF.

Table 3-8 shows the projections developed using these methods as well as the preferred forecast of enplanements. The preferred forecast represents an average of the two projections in an effort to provide equal consideration to both national and local factors. It needs to be noted that the growth rates shown may not be sustainable due to the limitations that the National Park Service has placed on tourist activity on the glaciers.

Table 3-8: Forecast of Enplaned Passengers – On Demand Carriers

	Base Year	2020	2025	2030	2035
National Market Growth (TAF)	64,965	74,751	81,802	89,494	97,750
Juneau Market Growth TAF	64,965	75,572	85,727	97,254	110,336
Preferred Forecast	**64,965**	**75,162**	**83,764**	**93,374**	**104,043**

Source: AECOM

3.7.4 Forecast of Enplaned Passengers – Combined

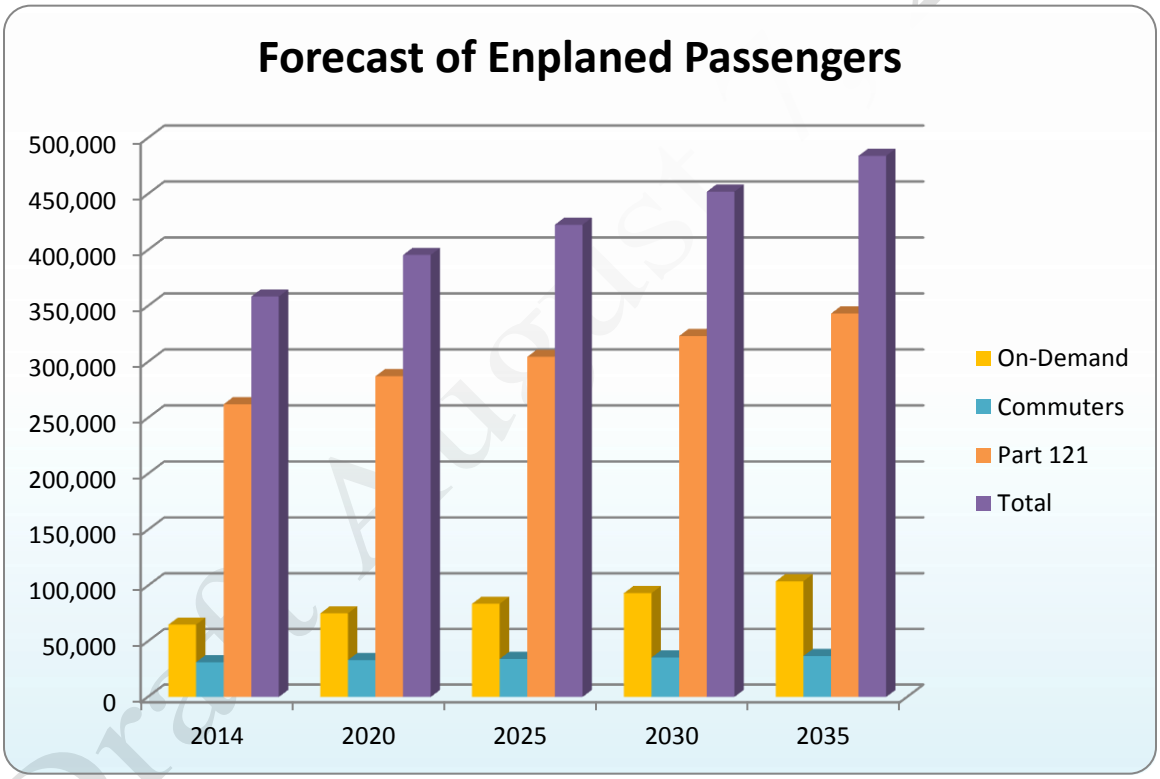
Combining the forecasts for the three classes of passenger service offered at JNU results in a total number of enplaned passengers exceeding 484,000 by the year 2030. The forecasts are shown in Table 3-9 below.

Table 3-9: Total Enplaned Passenger Forecast

Year	On-Demand	Commuters	Part 121	Total
2014	64,965	31,262	262,252	358,479
2020	75,162	33,132	287,289	395,583
2025	83,764	34,212	304,616	422,592
2030	93,374	35,467	323,231	452,072
2035	104,043	36,814	343,272	484,129

Source: AECOM

Figure 3-3: Forecast of Enplaned Passengers



3.8 AIR CARRIER OPERATIONS (PART 121 CARRIERS)

An aircraft operation is defined as a take-off or a landing, thus each individual flight consists of two operations. Forecasting the number of commercial operations uses a process that considers the historical average number of enplaned passengers per airline departure and applies these changes to the preferred forecast of enplaned passengers. The forecast of air carrier operations is based on the derived ratio of passenger enplanements per operation using the following process:

1. Determine the ratio of enplaned passengers to airline departures,
2. Project changes in the enplaned passenger to departure ratio (passenger load factor),
3. Apply the projected ratios to the enplaned passenger forecast to determine the number of annual departures,
4. Double the number of departures by two to determine the total operations.

A direct relationship exists between the number of air carrier operations and the number of passenger enplanements. The average number of passengers on a departing airplane helps the airlines determine the frequency of flights and/or the size of the aircraft being used. This relationship is measured using a load factor, which is expressed as a percentage of seats filled on each departing aircraft. If a carrier has a high load factor it will choose to either increase the number of flights or use an aircraft with greater seating capacity. In the situation at Juneau the use of a load factor is complicated because several daily flights are not direct so the average load factor from JNU appears to be low.

To determine the future of airline service at Juneau, it is necessary to separate the Part 135 commuter carriers from the Part 121 commercial carriers. The on-demand carriers included in the forecast of enplaned passengers are classified as air taxi operations and forecasts for these will be included in a later section.

3.8.1 Part 121 Commercial Aircraft Fleet and Load Factors

The following assessment of the aircraft fleet being operated by the commercial airlines serving Juneau can be made.

- Alaska Airlines has a fleet of Boeing 737 aircraft that includes the 737-400, -400C, -400F, -700, -800, and -900. In the future Alaska is expected to continue to use an all-Boeing fleet with similar seating capacities. Gradual evolution to a more modern,

quieter, and fuel-efficient aircraft such as the 737-900 or the 737-Max will occur over the next 20 years.

- Delta Airlines currently offers service using the Boeing 737-800. It is likely that this is the aircraft that they will use on this route for the future.

Table 3-10 shows the projected percentages for the daily fleet serving JNU and the resultant number of seats per departure (calculated as a weighted average) expected throughout the forecast period.

Table 3-10: Average Seats per Commercial Airline Departure

		Base Year		2020		2025		2030		2035	
Aircraft Type	Seats	%	Seats	%	Seats	%	Seats	%	Seats	%	Seats
Boeing 737-2	135	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0
Boeing 737-40C	72	12.48%	9	0.00%	0	0.00%	0	0.00%	0	0.00%	0
Boeing 737-400	144	76.71%	110	0.00%	0	0.00%	0	0.00%	0	0.00%	0
Boeing 737-7	124	2.61%	3	2.50%	3	5.30%	7	2.10%	2	2.00%	2
Boeing 737-800	150	4.22%	6	4.36%	7	8.54%	13	4.62%	7	4.68%	7
Boeing 737-9	158	2.01%	3	90.14%	142	82.16%	130	88.28%	139	87.32%	138
Boeing 757-200	180	1.97%	4	3.00%	5	4.00%	7	5.00%	9	6.00%	11
Total		100.00%	136	100.00%	157	100.00%	156	100.00%	157	100.00%	158

Source: AECOM

Using the average seats per departure calculated above, the historical passenger load factors and assumptions regarding changes to be experienced in the future, and the forecast of annual enplaned passengers, the forecast of annual air carrier operations has been developed, as shown in Table 3-11. In reviewing the forecast shown in the above it needs to be recognized that the operations forecasts are derived through a mathematical process that considers the airline fleet as well as probable future passenger load factors. The results of these calculations, as shown on the table, can be misleading if judged in their original form. To make the forecast look more logical, we have applied a "smoothing" process to the raw calculated forecast. The final smoothed forecast is also shown in the table.

Table 3-11: Forecast of Part 121 Air Carrier Operations

Year	Enplaned Passengers	Seats/ Departure	Load Factor	Annual Departures	Annual Operations	Operations Forecast
2014	262,252	136	47%	4,160	8,319	8,319
2020	287,289	157	47%	3,882	7,764	8,453
2025	304,616	156	47%	4,144	8,288	8,586
2030	323,231	157	48%	4,281	8,561	8,720
2035	343,272	158	49%	4,426	8,853	8,853

Source: AECOM

3.9 AIR TAXI AND COMMUTER

FAR Part 135 includes all for hire services, whether scheduled or non-scheduled that occur at an airport. These are classified by FAA Air Traffic Control as Air Taxi and Commuter Operations. At JNU this category includes all the Part 135 carriers, the on-demand carriers, the all-cargo activity and other activity that is performed on a "for hire" basis.

3.9.1 Part 135 Commuter and On-Demand Operations

Forecasting Part 135 Commuter and On-Demand operations follows the same method that was employed for the Part 121 carriers. The forecast of is based on the derived ratio of passenger enplanements per operation using the following process:

1. Determine the ratio of enplaned passengers to airline departures,
2. Project changes in the enplaned passenger to departure ratio,
3. Apply the projected ratios to the enplaned passenger forecast to determine the number of annual departures,
4. Double the number of departures by two to determine the total operations.

At JNU the commuter carriers, Alaska Juneau Aeronautics, Alaska Seaplane Service, ERA Aviation, SeaPort Airlines, and Ward Air, offer scheduled commuter service using aircraft with fewer than 9 seats. These aircraft are either wheeled or floatplanes. Table 3-12 shows the forecast of future seats per aircraft for these carriers.

Table 3-12: Average Seats per Departure – Part 135 Airlines

		Base Year		2020		2025		2030		2035	
Part 135 Scheduled	**Seats**	**%**	**Seats**	**%**	**Seats**	**%**	**Seats**	**%**	**Seats**	**%**	**Seats**
Land	9	58.00%	5	58.00%	5	58.00%	5	58.00%	5	58.00%	5
Floatplanes	9	42.00%	4	42.00%	4	42.00%	4	42.00%	4	42.00%	4
Total		100.00 %	9	100.00 %	9	100.00 %	9	100.00 %	9	100.00 %	9
On-Demand											
- Land Based	9	0.45%	0	0.45%	0	0.45%	0	0.45%	0	0.45%	0
- Floatplanes	9	14.68%	1	14.68%	1	14.68%	1	14.68%	1	14.68%	1
- Helicopters	9	84.87%	8	84.87%	8	84.87%	8	84.87%	8	84.87%	8
Total		100.00 %	9	100.00 %	9	100.00 %	9	100.00 %	9	100.00 %	9

Source: AECOM

Using the average seats per departure calculated above, the historical passenger load factors and assumptions regarding changes in the future, and the forecast of annual enplaned passengers, the forecast of annual air taxi operations has been developed, as shown in

Table 3-13.

Table 3-13: Forecast of Part 135 Commuter and On-Demand Airline Operations

Part 135 Scheduled					
Year	**Enplaned Passengers**	**Seats/ Departure**	**Load Factor**	**Annual Departures**	**Annual Operations**
2014	31,262	9	25%	868	1,737
2020	35,641	9	28%	1,109	2,218
2025	38,708	9	32%	1,376	2,753
2030	42,034	9	35%	1,635	3,269
2035	45,611	9	38%	1,926	3,852
On-Demand					
Year	**Enplaned Passengers**	**Seats/ Departure**	**Load Factor**	**Annual Departures**	**Annual Operations**
2014	64,965	9	55%	3,970	7,940
2020	75,162	9	58%	4,844	9,688
2025	83,764	9	62%	5,770	11,541
2030	93,374	9	65%	6,744	13,487
2035	104,043	9	68%	7,861	15,722

Source: AECOM

3.9.2 Air Mail and Cargo

At JNU both Air Mail and Air Cargo are carried by the scheduled airlines in the planes used for passenger service (referred to as belly-cargo). This includes the cargo that is hauled by Alaska Airlines in their Combi Aircraft. Additional cargo is brought in and flown out by one of the all-cargo carriers, Alaska Central Express and Empire Airlines or by Alaska Airlines on an all-cargo flight. As shown in

Table 3-14, the majority of the cargo at JNU is handled by the airlines and there is more freight and mail shipped into Juneau than shipped out.

Table 3-14: Historical Air Mail and Air Cargo (in Pounds)

	2011	2012	2013	2014
Total Cargo and Mail				
- Mail On	2,361,501	2,175,887	2,027,305	2,057,715
- Mail Off	4,401,771	4,084,208	4,062,231	4,123,164
- Freight On	5,462,916	4,838,752	6,328,746	6,423,677
- Freight Off	7,973,643	7,802,486	9,098,314	9,234,789
Belly Cargo				
- Mail On	1,610,367	1,297,308	1,175,881	1,193,519
- Mail Off	3,533,524	3,103,109	3,055,539	3,101,372
- Freight On	4,494,534	2,872,990	2,872,990	2,916,085
- Freight Off	5,889,072	4,995,849	4,337,510	4,402,573
All Cargo Carriers				
- Mail On	751,134	878,579	851,424	864,195
- Mail Off	868,247	981,099	1,006,692	1,021,792
- Freight On	521,106	783,765	1,752,867	1,779,160
- Freight Off	1,091,985	1,454,143	2,427,216	2,463,624

Source: Airport Records – Year 2014 estimated based on partial airport records

3.9.3 Forecast of Air Mail and Cargo Volumes

Forecasts of the volume of mail and cargo being processed in Juneau are the first step in determining the air cargo needs. In forecasting future demand the following factors have been considered.

- The cargo being shipped from Juneau includes products from the local fisheries that is time sensitive and is generally shipped to Seattle as belly cargo.
- The volume of both mail and freight shipped into Juneau exceeds the volume that is shipped out. Discussions with the cargo carriers reveal that much of the recent growth is the result of increased use of on-line shopping services by regional residents.
- The amount of belly cargo being shipped in the future will be influenced by the decreasing lift capacity of the aircraft that are anticipated to be introduced into the Alaska Airlines fleet. This forecast assumes that if the demand for cargo service exists, Alaska or another carrier will provide service sufficient to accommodate it.

With consideration of these factors, forecasts of future volumes of mail and cargo can be made on the basis of the following.

- The growth in mail will be driven primarily by growth in the local population. Since the mail is carried to Juneau by the on both Alaska Airlines and Alaska Central Express, the population of both the CBJ and the Southwest Region must be considered when making projections.

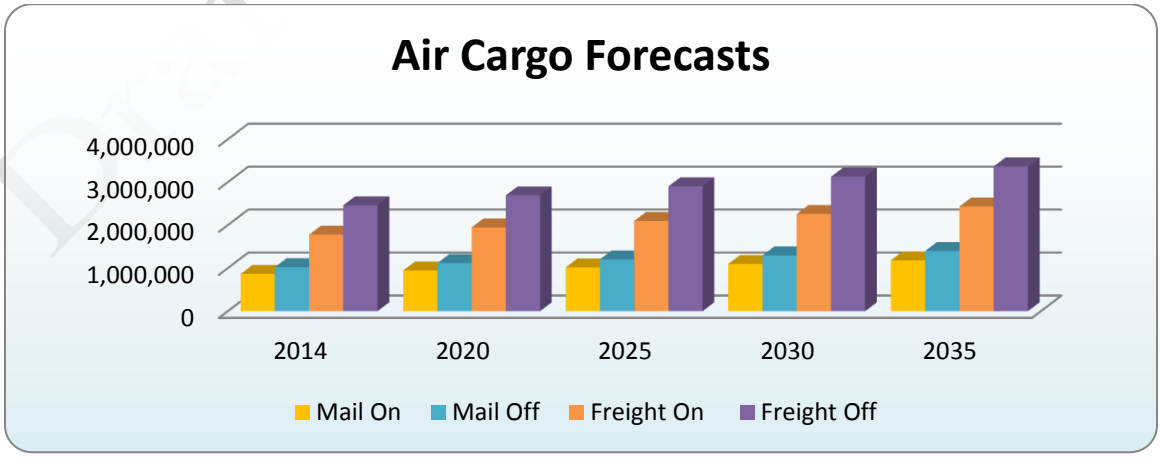
- Cargo projection will also be based on the growth in population coupled with the increasing use of on-line shopping services that are creating new demand levels.

Given these factors, air cargo forecasts were prepared to represent the range of potential future levels. These were compared with the forecast comparing JNU growth at the rate that Boeing has projected for cargo growth in North America. These projections are shown in Table 3-15.

Table 3-15: Forecast of Air Cargo (Mail and Freight) in Pounds

Total All Cargo Carriers				
	Mail		Freight	
Year	On	Off	On	Off
2014	864,195	1,021,792	1,779,160	2,463,624
2020	944,949	1,117,272	1,945,411	2,693,833
2025	1,017,978	1,203,619	2,095,760	2,902,024
2030	1,096,651	1,296,640	2,257,728	3,126,304
2035	1,181,405	1,396,849	2,432,215	3,367,917
Belly Cargo				
	Mail		Freight	
Year	On	Off	On	Off
2014	1,193,519	3,101,372	2,916,085	4,402,573
2020	1,305,046	3,391,174	3,188,573	4,813,963
2025	1,405,905	3,653,258	3,434,999	5,186,006
2030	1,514,559	3,935,596	3,700,470	5,586,801
2035	1,631,610	4,239,755	3,986,457	6,018,571
All Cargo				
	Mail		Freight	
Year	On	Off	On	Off
2014	2,057,715	4,123,164	6,423,677	9,234,789
2020	2,249,994	4,508,446	7,023,927	10,097,718
2025	2,423,883	4,856,877	7,566,764	10,878,110
2030	2,611,210	5,232,236	8,151,554	11,718,813
2035	2,813,015	5,636,604	8,781,538	12,624,490

Source: AECOM



3.9.4 Forecast of Air Cargo Operations

In preparing the air cargo operations forecast the first step is to determine the number of airplane flights needed to move the cargo. For the belly cargo no individual forecasts will be prepared since by definition this is mail and freight that is carried by the commercial airlines. For the all-cargo portion, this is presently hauled on aircraft such as the Beech 1900 and the ATR72. Airport records show that over the past three years Alaska Central Express has enplaned about 1,300 pounds of cargo per departure, or about 20 percent of the lift capacity of the Beech 1900 aircraft. The same records show that Empire Air had loads averaging 2,550 pounds per departure or less than 20 percent of the lift capacity of the ATR 72 aircraft. Table 3-16 shows the forecast of air cargo operations.

In addition, Alaska Airlines presently provides cargo service using combination passenger and cargo "combi" aircraft. In the future these aircraft will be removed from the Alaska Airline's fleet and replaced with all freighter aircraft. Cargo lift capacity will not change with the removal of the Combi aircraft.

Table 3-16: Forecast of Air Cargo Operations

	Mail (pounds)		Freight (pounds)				
Year	On	Off	On	Off	Pounds/ Landing	Annual Landings	Annual Operations
2011	751,134	868,247	521,106	1,091,985	1,457	873	1746
2012	878,579	981,099	783,765	1,454,143	1,674	993	1986
2013	851,424	1,006,692	1,752,867	2,427,216	2,114	1,232	2464
2014	864,195	1,021,792	1,779,160	2,463,624	2,534	1,301	2,603
2020	944,949	1,117,272	1,945,411	2,693,833	4,634	1,648	3,295
2025	1,017,978	1,203,619	2,095,760	2,902,024	5,423	1,537	3,074
2030	1,096,651	1,296,640	2,257,728	3,126,304	6,211	1,462	2,924
2035	1,181,405	1,396,849	2,432,215	3,367,917	7,000	1,411	2,822

Source: AECOM
Year 2014 based on partial airport records

3.10 OTHER AIR TAXI

The remainder of the air taxi operations at JNU is conducted by aircraft for hire and passengers are not reported to the airport as enplanements. These include special deliveries, hunting and fishing expeditions, cargo deliveries, personnel services or other. Historically much of this activity has been in support of the mining industry. Table 3-17 shows the forecast prepared for these. As shown in the table future growth was projected using three different rates of growth.

1. The first assumed that these operations will increase at the same rate as regional population.
2. The second rate of growth makes the assumption that this category of operation will grow over time at the same rate as forecast for the Part 135 Commuter operations.
3. The final growth level used was to apply the rate of growth for all commuter/air taxi operations as set forth in the TAF and apply this rate to the historic base numbers to project the future.

Table 3-17 shows the three forecasts as well as the preferred forecast adopted for this report. The preferred forecast was developed to reflect the full range of the future influences on activity, by averaging the three forecasts.

Table 3-17: Forecast of Air Taxi Operations

	Population Based	Same Rate as Commuters	TAF Rate	Preferred
2014	58,261	58,261	58,261	58,261
2020	63,705	71,676	61,845	65,742
2025	68,628	86,055	65,000	73,228
2030	73,932	100,885	68,316	81,044
2035	79,646	117,845	71,800	89,764

Source: AECOM

3.11 GENERAL AVIATION

General Aviation (GA) includes all civil aviation operations other than scheduled air services and non-scheduled air transport operations for remuneration or hire. General aviation covers a large range of activities, both commercial and non-commercial, including flying clubs, flight training, agricultural aviation, light aircraft manufacturing and maintenance.

General aviation activity at JNU consists of operations by both based and transient aircraft. In forecasting, the number of based aircraft will be considered as will the number of annual operations.

3.11.1 Forecast of Based Aircraft

Historical records of the total number of aircraft based at JNU from 2004 through 2012 as recorded in the FAA's Terminal Area Forecasts (TAF) were examined as part of this master plan. These records only include the total number and do not provide a breakdown by type of aircraft.

To forecast the growth in based aircraft at JNU, various forecast modeling techniques were used. Standard regression analyses were discounted as a viable approach as any model that relies on historical relationships with any independent variable such as population have proven to have low correlation values and therefore are poor forecasting tools. There are, however, several forecasting methods that can be used to generate reliable estimates of future growth in based aircraft. These are:

1. **FAA Terminal Area Forecast (TAF):** The TAF includes based aircraft forecasts for 2013 through 2042. Under the FAA TAF model, based aircraft are expected to continue to increase through 2035 when 416 aircraft can be expected at the airport.
2. **Population Based Growth**: Testing the historical relationship between area population and the number of based aircraft resulted in a finding that the relationship between the two, although not very strong historically, did show evidence that area population is a force behind based aircraft. Therefore, we have produced a forecast of based aircraft using the growth rate for population applied to current based aircraft counts. This projection represents local growth conditions.
3. **Market Share Analyses**: As with previous forecasts, projections were made to represent the number of aircraft at JNU that result from the airport maintaining its current share of the growth in the nation and FAA's Alaska region as forecast in the TAF.

Table 3-18 shows these projections for based aircraft. In reviewing these and considering the factors discussed in the preceding, it was determined the preferred forecast for based aircraft should combine the growth rates for population as well as the national growth rates for aircraft as a whole as represented by the national market share. This combination results in a forecast of continued growth

in based aircraft at JNU at a rate sustainable and consistent with the national trends as well as reflecting the local factors discussed by the stakeholders.

Table 3-18: Forecast of JNU Based Aircraft

Year	TAF	POP	Market Shares		Preferred
			USA	AK	
2004	292	292	292	292	292
2005	292	292	292	292	292
2006	341	341	341	341	341
2007	341	341	341	341	341
2008	341	341	341	341	341
2009	339	339	339	339	339
2010	335	335	335	335	335
2011	321	321	321	321	321
2012	325	325	325	325	325
2013	330	330	330	330	330
2014	332	332	332	332	332
2020	354	363	322	345	346
2025	376	391	336	351	364
2030	396	421	351	364	383
2035	416	454	366	376	403

Source: AECOM

3.11.1.1 Based Aircraft Fleet Mix

The current based aircraft fleet at Juneau consists of a mixture of helicopters, wheeled aircraft and floatplanes. The JNU Airport Form 5010 shows the current fleet mix for the based aircraft. The forecast of the based aircraft fleet is based on the following breakdown:

- Single-Engine Piston (SEP): This category includes both traditional single-engine piston aircraft whether used for commercial or GA purposes.
- Multi-Engine Piston (MEP): The multi-engine category is composed of both twin-engine piston and turboprop aircraft.
- Turbojet: This category includes both traditional business/corporate jet aircraft.
- Rotor: The rotor category includes both piston and turbine-powered rotorcraft.

The based aircraft fleet mix forecast uses current data and forecasts changes to the mix based on the overall evolution of general aviation in the United States and the expectations and observations of the airport stakeholders. The fleet mix percentages were applied to the based aircraft forecast for the

airport. The recommended fleet mix forecast for the benchmark years is presented in Table 3-19 below.

Table 3-19: Forecast of Based Aircraft Fleet Mix

	Single Engine Piston		Multi Engine Piston		Jet		Helicopter		Military		Other		Total	
Year	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
2014	294	88.62%	3	0.92%	3	0.92%	28	8.31%	3	0.92%	1	0.31%	332	100.00%
2020	305	88.27%	3	1.00%	3	1.00%	29	8.50%	3	0.92%	1	0.31%	346	100.00%
2025	318	87.52%	5	1.25%	5	1.30%	32	8.70%	3	0.92%	1	0.31%	364	100.00%
2030	333	86.82%	6	1.55%	6	1.50%	34	8.90%	4	0.92%	1	0.31%	383	100.00%
2035	348	86.27%	6	1.60%	7	1.70%	37	9.20%	4	0.92%	1	0.31%	403	100.00%

Source: AECOM

3.11.2 General Aviation Operations

As with activity indicators at many airports, the historical records for general aviation operations at JNU exhibit a long term reduction. From 2004 to the present the number of annual operations has decreased from 22,874 to 13,104. Our forecast needs to rely on techniques that consider this historical record but do not underestimate the potential growth rate based on this same record. The methods used in forecasting include:

Population Based Forecast. This method employs the rate of growth projected for the CBJ population and applies it to the number of general aviation operations to derive future operational levels.

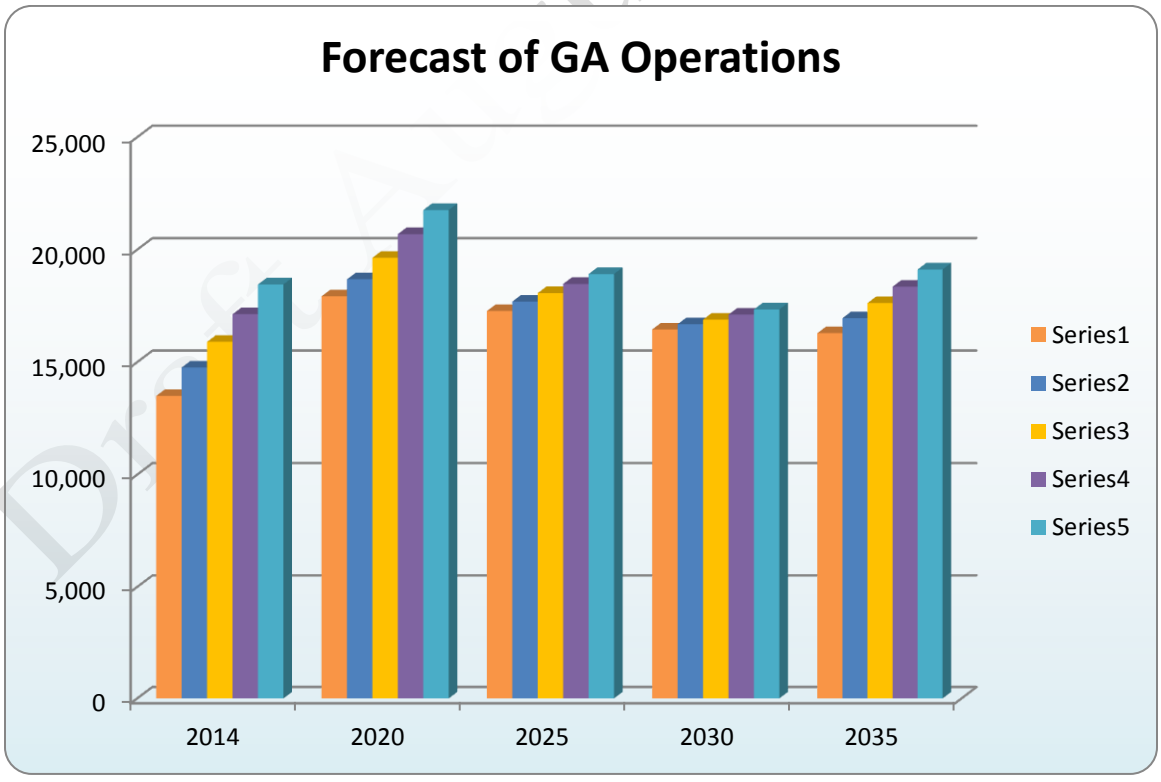
Operations per Based Aircraft: This forecasting technique used relied on applying a factor for the number of operations per based aircraft to the based aircraft forecast presented in the previous section. This technique is being used as a baseline for comparing the others. Forecasts generated by using operations per based aircraft alone are generally unreliable because the historical patterns are not reliable and the relationship has not proven to be strong. In addition many of the aircraft at JNU are not used for GA operations but are used for air taxi purposes.

Market Share Analyses: For general aviation operations, the share of the market in the State of Alaska, and the United States likely to occur at JNU was reviewed. These shares were calculated using the percentage of the larger market that was experienced at JNU in 2012.

The alternative general aviation operations forecasts for JNU are presented in Table 3-20. The exhibit also shows the preferred forecast for general aviation operations. This preferred forecast used an average of all of the projection methodologies.

Table 3-20: Forecast of General Aviation Operations

Year	Pop	OPBA	Market Share		Preferred
			USA	AK	
2004	22,874	22,874	22,874	22,874	22,874
2005	18,902	18,902	18,902	18,902	18,902
2006	21,459	21,459	21,459	21,459	21,459
2007	16,312	16,312	16,312	16,312	16,312
2008	14,274	14,274	14,274	14,274	14,274
2009	14,717	14,717	14,717	14,717	14,717
2010	16,697	16,697	16,697	16,697	16,697
2011	17,248	17,248	17,248	17,248	17,248
2012	13,104	13,104	13,104	13,104	13,104
2013	13,301	17,820	17,139	16,309	16,142
2014	13,500	17,928	17,270	16,449	16,287
2020	14,762	18,682	17,691	16,683	16,954
2025	15,902	19,638	18,069	16,890	17,625
2030	17,131	20,692	18,476	17,110	18,352
2035	18,455	21,760	18,916	17,342	19,118



There are two types of general aviation operations, local and itinerant. A local operation is defined as any operation that stays in the local traffic pattern or within sight of the airport or is known to be departing for or arriving from a local practice area. All others are classified as itinerant. Records of general aviation activity at JNU show that, on average, about 55 percent of all operations were itinerant and 45 percent local. Future levels of local and itinerant activity were forecast using this distribution, as shown in Table 3-21.

Table 3-21: Forecast of General Aviation Itinerant and Local Operations

Year	Itinerant	Local	Total
2013	10,654	5,488	16,142
2014	10,749	5,537	16,287
2020	11,190	5,764	16,954
2025	11,632	5,992	17,625
2030	12,112	6,240	18,352
2035	12,618	6,500	19,118

Source: AECOM

3.12 MILITARY OPERATIONS

Between 2004 and 2012, total military operations at JNU averaged 775 per year. In forecasting future military operations levels, it has been assumed that they would remain a low percentage of total airport activity and would continue to average 775 per year.

3.13 PEAK PERIOD ACTIVITY

To calculate facility requirements forecasts of peak future passenger and aircraft activity are needed. Peak levels of activity closely correlate with the need runways, taxiways, aircraft apron and passenger terminal facilities. Three primary indicators of peak aviation activity are used.

- **Peak Month**: Defined as the month in the calendar year when the highest overall activity levels occur.
- **Average Day/Peak Month (AD/PM)**: Defined as the average day within the peak month. This indicator is developed by dividing the peak month activity by 30 or 31, depending on which month is the peak.
- **Peak Hour:** Also referred to as the design hour within the average day, typically between 10 and 20 percent of the average day activity. According to FAA Advisory Circular 150/5360-13, design hour operations may reach levels as high as 12 to 20 percent of the average day operations and drop to as low as 6.25 percent.

It is important to note that neither the average day nor the design hour is the absolute peak that occurs within a year. By definition, average day activity will be exceeded at least fifteen days during the peak month. Likewise, design hour activity will likely be exceeded numerous times due to the calculation methodology used.

Peaking forecasts are prepared to determine the maximum number of passengers needing to use the terminal facilities and the hourly operations demand the runway system. In this regard, we have forecasted peak periods based on the following;

3.13.1 Enplaned Passenger Peaking – Part 121 Carriers

Peak month: Records show that 13.4 percent of total annual enplaned passengers on Part 121 carriers occur during the peak month at JNU. Over the past ten years this peak month is August.

Average day: The average day calculation divides the peak month by 31 days to yield the average daily operations figure.

Peak hour: The peak hour enplaned passenger forecast is estimated to be 15 percent of average day based on the daily airport flight schedule.

Table 3-22: Forecast Enplaned Passenger Peaking – Part 121 Carriers

	Annual	Peak Month	ADPM	Peak Hour
2014	262,252	35,142	1,134	170
2020	287,289	38,497	1,242	186
2025	304,616	40,819	1,317	198
2030	323,231	43,313	1,397	210
2035	343,272	45,998	1,484	223

Source: AECOM

3.13.2 Enplaned Passenger Peaking – Part 135 Carriers

Peak month: Approximately 21 percent of total annual enplaned passengers using the Part 135 carriers occur during the peak month of August.

Average day: The average day calculation divides the peak month by 31 days to yield an average daily operations figure.

Peak hour: The peak hour enplaned passenger forecast is estimated to be 33 percent of average day based on the flight schedules.

Table 3-23: Forecast Enplaned Passenger Peaking – Part 135 Carriers

	Annual	Peak Month	ADPM	Peak Hour
2014	31,262	8,753	282	85
2020	33,132	9,277	299	90
2025	34,212	9,579	309	93
2030	35,467	9,931	320	96
2035	36,814	10,308	333	100

Source: AECOM

3.13.3 Enplaned Passenger Peaking – On-Demand Carriers

Peak month: Approximately 28 percent of total annual enplaned passengers using on-demand carriers occur during the peak month. This peak month is typically August.

Average day: The average day calculation divides the peak month by 31 days to yield an average daily operations figure.

Peak hour: The peak hour enplaned passenger forecast is estimated to be 30 percent of average day.

Table 3-24: Forecast Enplaned Passenger Peaking – On-Demand Carriers

	Annual	Peak Month	ADPM	Peak Hour
2014	31,262	8,753	282	85
2020	33,132	9,277	299	90
2025	34,212	9,579	309	93
2030	35,467	9,931	320	96
2035	36,814	10,308	333	100

Source: AECOM

3.13.4 Operations Peaking - Part 121 Commercial Carriers

Peak month: This category includes scheduled service by the Part 121 Carriers (Alaska and Delta) where the peak month is about 11.5 percent of the annual and occurs in July.

Average day: The average day calculation divides the peak month by 31 days to yield an average daily operations figure.

Peak hour: The flight schedule shows that the peak hour is equal to approximately 18 percent of the average daily operations.

Table 3-25: Forecast of FAR Part 121 Carrier Operations – Peaking

	Annual	Peak Month	ADPM	Peak Hour
2014	8,966	1,031	33	6
2020	8,432	970	31	6
2025	8,544	983	32	6
2030	8,657	996	32	6
2035	8,769	1,008	33	6

Source: AECOM

3.13.5 Commuter and Air Taxi Peaking

Peak month: The commuter and Air Taxi category of operations includes all of the Part 135 carriers, the On-Demand Carriers, the air cargo activity and "other air taxi" where the peak month is about 11.5 percent of the annual and occurs in July.

Average day: The average day calculation divides the peak month by 31 days to yield an average daily operations figure.

Peak hour: The flight schedule shows that the peak hour is equal to approximately 18 percent of the average daily operations.

Table 3-26: Commuter and Air Taxi Peaking

Part 135 Operations				
	Annual	Peak Month	ADPM	Peak Hour
2014	1,737	486	16	5
2020	2,218	621	20	6
2025	2,753	771	25	7
2030	3,269	915	30	9
2035	3,852	1,079	35	10
On-Demand Operations				
	Annual	Peak Month	ADPM	Peak Hour
2014	7,940	2,223	72	22
2020	9,688	2,713	88	26
2025	11,541	3,231	104	31
2030	13,487	3,776	122	37
2035	15,722	4,402	142	43
Air Cargo Operations				
	Annual	Peak Month	ADPM	Peak Hour
2014	2,603	312	10	3
2020	3,295	395	13	4
2025	3,074	369	12	4
2030	2,924	351	11	3
2035	2,822	339	11	3
Other Air Taxi				
	Annual	Peak Month	ADPM	Peak Hour
2014	58,261	6,991	226	68
2020	65,742	7,889	254	76
2025	73,228	8,787	283	85
2030	81,044	9,725	314	94
2035	89,764	10,772	347	104

Table 3-26: Commuter and Air Taxi Peaking (cont'd)

Total Commuter and Air Taxi				
	Annual	Peak Month	ADPM	Peak Hour
2014	70,541	10,013	323	97
2020	80,944	11,618	375	112
2025	90,595	13,158	424	127
2030	100,724	14,768	476	143
2035	112,160	16,591	535	161

3.13.6 General Aviation Peaking

Peak month: General aviation activity is assumed to peak during the summertime when the days are longer and the weather suited for training activity. A peaking factor of eleven percent of the total annual operations is used in this analysis.

Average day: The average day calculation divides the peak month levels by 31 days to yield an average daily operations figure.

Peak hour: Peak hour operations are assumed to occur during the early summer evening periods when general aviation pilots are conducting training activity. During this time levels as high as 25 percent of the average day is expected to occur.

Table 3-27: General Aviation Activity Peaking

	Annual	Peak Month	ADPM	Peak Hour
2014	16,287	1,954	63	13
2020	16,954	2,034	66	13
2025	17,625	2,115	68	14
2030	18,352	2,202	71	14
2035	19,118	2,294	74	15

3.13.7 Total Activity Peaking

Peak month: Since the peak periods for each category are not likely to occur simultaneously, the peaks for total will not consist of the total for the other categories. Total activity levels peak during the summertime with a peaking factor of eleven percent of the total annual operations is used in this analysis.

Average day: The average day calculation divides the peak month levels by 31 days to yield an average daily operations figure.

Peak hour: Like general aviation, total peak hour operations are assumed to occur in early summer evenings. During this time levels as high as 25 percent of the average day is expected to occur.

The forecast peak period operations for are shown in Table 3-28.

Table 3-28: Forecast Total Operations Peaking

	Annual	Peak Month	ADPM	Peak Hour
2014	94,852	11,382	367	73
2020	104,104	12,492	403	81
2025	117,538	14,105	455	91
2030	128,508	15,421	497	99
2035	140,822	16,899	545	109

3.14 CRITICAL AIRCRAFT

An airport's critical (or design) aircraft reflects the operating requirements of the most demanding aircraft expected to generate 500 or more itinerant operations per year at the facility. The critical aircraft is used to determine which FAA planning and design criteria, as defined by the FAA's Airport Reference Code (ARC), should apply to the airport.

The FAA's Airport Reference Code is a classification system developed to relate airport design criteria to the operational and physical characteristics of the airplanes expected to operate at the airport. The ARC is based on two key characteristics of the designated critical aircraft. The first characteristic, denoted in the ARC by a letter code, is the Aircraft Approach Category as determined by the aircraft's approach speed in the landing configuration. Generally, aircraft approach speed affects runway length, exit taxiway locations, and runway-related facilities. The ARC approach speed categories are as follows:

- Category A: Speed less than 91 knots;
- Category B: Speed 91 knots or more, but less than 121 knots;
- Category C: Speed 121 knots or more, but less than 141 knots;
- Category D: Speed 141 knots or more, but less than 166 knots; and

- Category E: Speed 166 knots or more.

The second ARC component, depicted by a roman numeral, is the Airplane Design Group. The Airplane Design Group is defined by the aircraft's wingspan and determines dimensional standards for the layout of airport facilities, such as separation criteria between runways and taxiways, taxilanes, buildings, or objects potentially hazardous to aircraft movement on the ground. The Airplane Design Group categories include:

- Design Group I: Wingspan up to but not including 49 feet;
- Design Group II: Wingspan 49 feet up to but not including 79 feet;
- Design Group III: Wingspan 79 feet up to but not including 118 feet;
- Design Group IV: Wingspan 118 feet up to but not including 171 feet;
- Design Group V: Wingspan 171 feet up to but not including 214 feet;
- Design Group VI: Wingspan 214 feet up to but not including 262 feet.

Presently the critical aircraft at JNU is the Boeing 737-300, which is a C-III aircraft. Table 3-29 presents a forecast of future airport use by aircraft type. The information presented in this table was derived using the following assumptions;

1. For the Commercial Air Carrier the current and projected fleet mix for Alaska and Delta from Table 3-11 was applied to the commercial operations forecasts.
2. For the air taxi category the Part 135, on-demand, and air cargo fleet mix airport record were used to determine the existing fleet. Future fleet projections were based on a continuation of current fleet characteristics.
   For the "other" air taxis it was assumed that they will be reflective of the current fleet.
3. General aviation activity was assumed to reflect the composition of the based aircraft fleet.
4. Military operations were split evenly between fixed wing and helicopters.

Table 3-29: Projected Operational Fleet Mix

Category/ Aircraft	ADG	2012		2020		2025		2030		2035	
		%	Ops	%	Ops	%	Ops	%	Ops	%	Ops
Commercial Air Carrier											
Boeing 737 Series	C-III	96%	7,986	10%	845	14%	1,202	7%	610	7%	620
Boeing 737-900/Max	D-III	2%	166	87%	7354	82%	7041	87%	7586	87%	7,702
Boeing 757-200	C-IV	2%	166	3%	254	4%	343	5%	436	6%	531
Subtotal		**100%**	**8,319**	**100%**	**8,453**	**100%**	**8,586**	**99%**	**8,720**	**100%**	8,853
Commuter/Air Taxi											
Cessna Caravan-Land	A -II	4%	2,822	4%	3,238	4%	3,624	4%	4,029	4%	4,486
Cessna Caravan - Floatplane	A-II	6%	4,232	6%	4,857	6%	5,436	6%	6,043	6%	6,730
DC2 Beaver - Floatplane	A-I	23%	16,224	23%	18,617	23%	20,837	23%	23,167	23%	25,797
Beech 1900 Cargo	B-II	2%	1,411	2%	1,619	2%	1,812	2%	2,014	2%	2,243
ATR-72 - Cargo	B-III	2%	1,411	2%	1,619	2%	1,812	2%	2,014	2%	2,243
Single Engine Piston - Land	B-I	10%	7,054	10%	8,094	10%	9,059	10%	10,072	10%	11,216
Single Engine Piston - Floatplane	B-I	15%	10,581	15%	12,141	15%	13,589	15%	15,109	15%	16,824
Helicopters	N/A	38%	26,805	38%	30,758	38%	34,426	38%	38,275	38%	42,621
Subtotal		**100%**	**70,540**	**100%**	**80,943**	**100%**	**90,595**	**100%**	**100,725**	**100%**	**112,160**
General Aviation											
Corporate Jets - Heavy	C-II	1%	163	1%	170	1%	176	1%	184	1%	191
Corporate Jets - Light	B-II	3%	489	3%	509	3%	529	3%	551	3%	574
Multi-Engine Piston - Land	B-II	4%	651	4%	678	4%	705	4%	734	4%	765
Multi-Engine Piston - Floatplane	A-I	4%	651	4%	678	4%	705	4%	734	4%	765
Single- Engine Piston - Land	A-I	30%	4886	30%	5086	30%	5287	30%	5506	30%	5736
Single- Engine Piston - Floatplane	A-I	25%	4072	25%	4239	25%	4406	25%	4588	25%	4780
Rotorcraft	N/A	33%	5375	33%	5595	33%	5816	33%	6056	33%	6309
Subtotal		**100%**	**16,287**	**100%**	**16,954**	**100%**	**17,625**	**100%**	**18,352**	**100%**	**19,118**
Military											
Piston	C-II	50%	220	50%	388	50%	388	50%	388	50%	388
Helicopters	B-II	50%	220	50%	388	50%	388	50%	388	50%	388
Subtotal		**100%**	**440**		**775**		**775**		**775**		**775**
TOTAL			**95,586**		**107,125**		**117,580**		**128,571**		**140,906**

As shown in these forecasts, future commercial aviation service will continue to be offered using the 737 series aircraft, or their equivalent. With the gradual movement of the airlines to the 737-900/max aircraft, in the future the critical aircraft will be classified as a D-III between the years 2020 and 2025. On the floatpond the critical aircraft is classified as A-II.

The data presented on the above table also show the airport's use by the unique combination of land-based and floatplane aircraft and helicopters. Table 3-30 shows the anticipated use by each of these categories. This information is important to future analyses of airfield capacity as well as assuring that aircraft related noise is adequately considered.

Table 3-30: Projected Airport Use by Aircraft Category

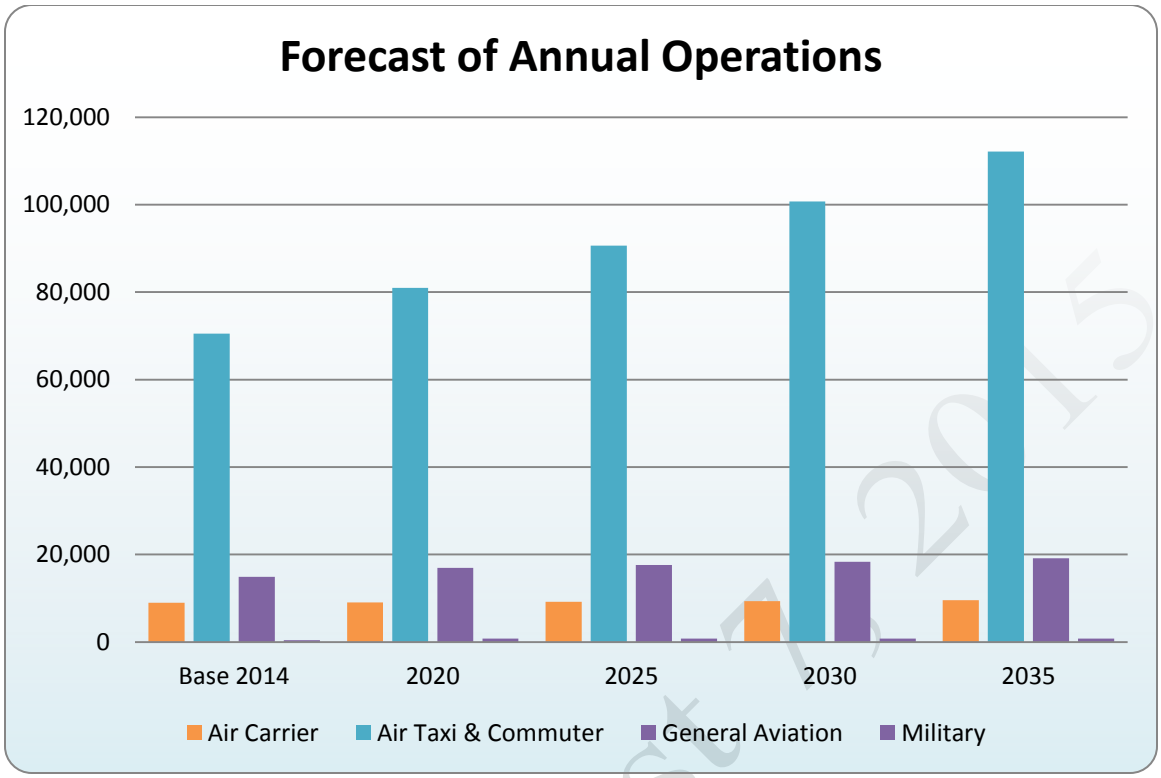
Aircraft Class	2012	2020	2025	2030	2035
Land	27,547	29,832	31,936	34,149	36,610
Floatplanes	35,360	40,532	44,973	49,641	54,895
Helicopters	31,944	36,741	40,630	44,719	49,317
TOTAL	**94,852**	**107,104**	**117,539**	**128,509**	**140,822**

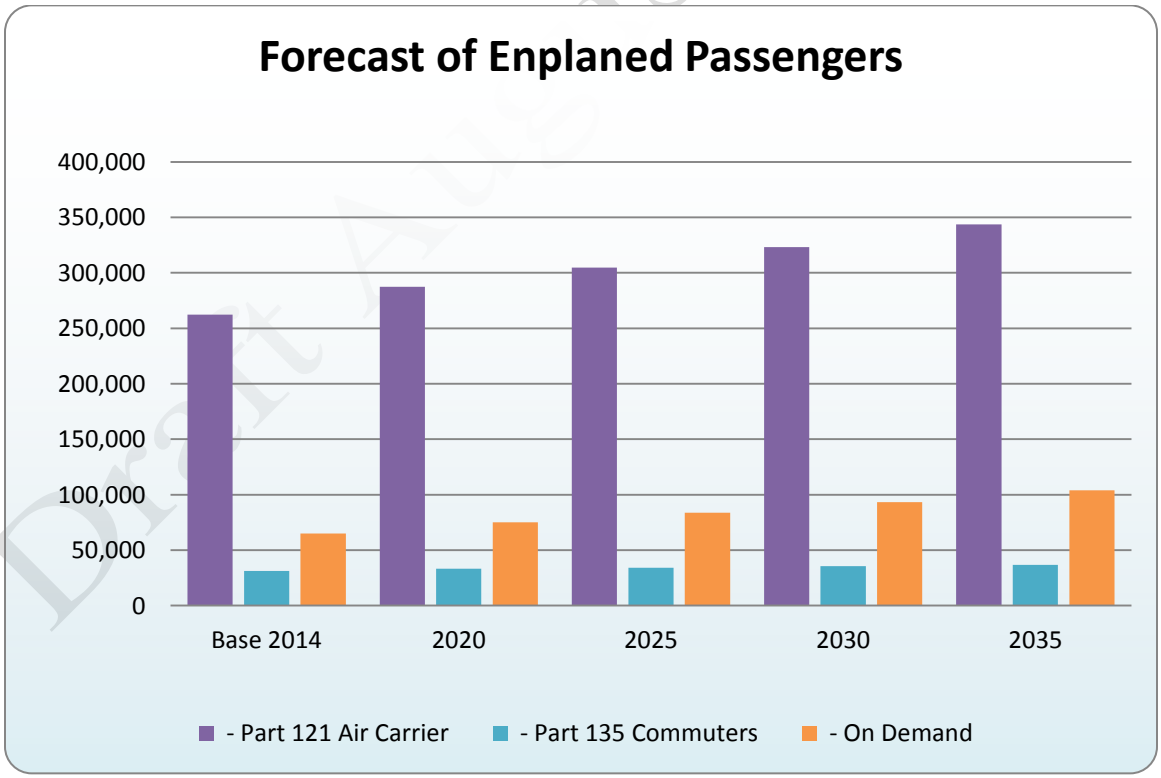
3.15 SUMMARY OF FORECASTS

The following is a summary of the forecasting results.

Table 3-31: Summary of Forecasts

Category	Base Year	2020	2025	2030	2035
Enplaned Passengers					
- Air Carrier	262,252	287,289	304,616	323,231	343,272
- Commuter	31,262	33,123	34,212	35,467	36,814
- On Demand	64,965	75,162	83,764	93,374	104,043
Total Passengers	358,479	395,583	422,592	452,072	484,129
Operations					
Air Carrier	8,319	8,432	8,544	8,657	8,769
Air Taxi & Commuter	70,540	80,943	90,595	100,725	112,160
General Aviation	16,287	16,954	17,625	18,352	19,118
Military	440	775	775	775	775
Total Operations	95,586	107,104	117,538	128,508	140,822
Based Aircraft	332	346	364	383	403





3.16 COMPARISON WITH FAA TAF FORECAST

Comparing the forecasts from this Sustainability Master Plan with the official FAA forecast for JNU as presented in the TAF is an important final step. Table 3-32 shows this comparison.

The forecasts of annual passenger enplanements produced in this SMP vary by more than 10 percent from the TAF forecasts for the same years through the 2022. The reason for this variance is the inclusion of the on-demand passengers in the airport's records that are not included in the FAA record. In 2012 this resulted in a 20 percent differential in the baseline number. All other forecasts are consistent with FAA's projections.

Table 3-32: Comparison of Master Plan Forecasts with Terminal Area Forecasts

	Year	Forecast	TAF	% Diff.
Passenger Enplanements				
Base yr.	2012	352,829	294,115	20.0%
Base yr. + 5yrs.	2017	377,773	321,779	17.4%
Base yr. + 10yrs.	2022	406,387	365,007	11.3%
Base yr. + 15yrs.	2027	434,384	414,067	4.9%
Commercial Operations				
Base yr.	2012	72,632	72,632	0.0%
Base yr. + 5yrs.	2017	84,752	82,761	2.4%
Base yr. + 10yrs.	2022	93,901	88,527	6.1%
Base yr. + 15yrs.	2027	103,868	94,726	9.7%
Total Operations				
Base yr.	2012	86,531	86,531	0.0%
Base yr. + 5yrs.	2017	101,290	98,447	2.9%
Base yr. + 10yrs.	2022	111,899	104,801	6.8%
Base yr. + 15yrs.	2027	122,559	111,610	9.8%