CHAPTER THREE – FORECASTS OF AVIATION DEMAND

INTRODUCTION

Forecasts of future levels of aviation activity are the basis for effective decisions in airport planning. These projections are used to determine the need for new or improved facilities. In general, forecasts should be realistic. They should be based on the latest available data, be supported by information in the study, and they provide an adequate justification for airport planning and development. This planning process will eventually result in various facility development recommendations tied to the demand projected within respective forecast periods.

In all likelihood, activity growth will not occur as projected. Undoubtedly, there will be peaks and valleys over the next 20 years that the planning process depicts in a linear fashion. Therefore, the facility development recommendations may have to be adjusted accordingly. Slower than projected growth may delay or even negate the need for recommendations, especially for those in outlying years. Naturally, the opposite may hold true for faster than projected growth.

This update started with the preparation of a reliable activity baseline, which was accomplished in Chapter 2. The next step will be a review of factors affecting aviation activity, followed by a discussion of other local, regional, and national aviation and related forecasts, and a review of various forecast methodologies. A forecast range will then be developed and compared to other forecasts for reasonableness.

FORECAST ELEMENTS

To establish the demands likely to be placed on Knox County Regional Airport, forecasts will include all relevant aviation demand elements, including both the type and level of aviation activity expected at the airport over the 20-year planning period. The forecast elements include:

- Number and type of based aircraft
- Aircraft operations and fleet mix
- Peak activity
- Identification of the Forecast critical aircraft
- Passenger activity
- Fuel requirements
- Airport Reference Code

AVIATION FORECAST PERIODS

Forecasts are prepared for short-, intermediate-, and long-term periods and will specify the existing and future critical aircraft. Short-term (zero to five years), forecasts are used to justify near-term development and support operational planning and environmental improvement programs. Intermediate-term forecasts (six to 10 years) are typically used in planning capital improvements and long-term forecasts (11 to 20 years) are used in general planning.

PREVIOUS AVIATION FORECASTS

Applicable forecasts prepared for Knox County Regional Airport are reviewed in this section. This includes the Terminal Area Forecasts (TAF) from the FAA, the previous master plan, and the Maine Aviation System Plan (MASPU). In addition, an assessment of the validity of these earlier forecasts is made.

FAA FORECASTS

The FAA Terminal Area Forecasts (TAF) has been selected as the FAA source to be utilized as the primary base for the forecasts for this AMPU. The TAF from 2013 to 2040 for Knox County Regional Airport was reviewed and analyzed for Forecast changes. Table 3.1 presents the TAF in five-year increments though 2040. Descriptors of the data are provided as well. As noted, enplanements (ENP) are projected to increase by 63%, from 8,274 to 13,468. Air taxi (AT) operations are forecast to increase from 10,198 to 13,307, or 30%. Itinerant operations are projected to increase by 6% overall and local operations by 8%. General Aviation (GA), both itinerant and local and the number of based aircraft indicate no change.

Table 3.1 - FAA Terminal Forecasts (2013 - 2040)

YEAR	ENP	ITINERANT					LOCAL			TOTAL	BASED ACFT
		AC	AT	GA	MIL	TOTAL	GA	MIL	TOTAL		
2013	8,274	3,000	10,198	27,000	125	40,323	15,000	0	15,000	55,323	79
2015	8,578	3,000	10,399	27,000	125	40,524	15,000	0	15,000	55,524	79
2020	9,378	3,000	10,919	27,000	125	41,044	15,000	0	15,000	56,044	79
2025	10,260	3,000	11,467	27,000	125	41,592	15,000	0	15,000	56,592	79
2030	11,234	3,000	12,049	27,000	125	42,174	15,000	0	15,000	57,174	79
2035	12,301	3,000	12,662	27,000	125	42,787	15,000	0	15,000	57,787	79
2040	13,468	3,000	13,307	27,000	125	43,432	15,000	0	15,000	58,432	79
Change	63%	0%	30%	0%	0%	8%	0%		0%	6%	0%

Source: FAA, March 2013 (http://aspm.faa.gov/main/taf.asp

Description of Activity Measures used in Table 3.1

- Local Operations: Aircraft operating in the traffic pattern or within sight of the tower, or aircraft known to be departing or arriving from flight in the local practice instrument approaches at the airport.
- Itinerant Operations FAA reports all aircraft operations other than local operations as itinerant. Essentially, these data represent takeoffs and landings of aircraft going from one airport to another.
- AC: Air Carrier – an aircraft that is being operated by an air carrier and is categorized, as determined by the aircraft type certificate issued by a competent civil aviation authority, as either a large air carrier aircraft - if designed for at least 31 passenger seats or small air carrier aircraft - if designed for more than 9 passenger seats but less than 31 passenger seats.
- AT: Air Taxi - an air charter passenger or cargo aircraft which operates on an on-demand basis
- GA: General Aviation - all aviation activity not associated with either certificated air carriers or the military, including business uses, commuter airlines, air taxi operators, various commercial applications, and personal flying.
- MIL: Military
- ENP: Enplanement – passengers boarding aircraft

Maine Aviation Systems Plan Update (MASPU) Forecasts

The MASPU was completed in 2001 and has not been updated since. As a result, the forecasts are not current and in some cases have not been realized. A review of MASPU forecasts (see Table 3.2) completed over 10 years ago indicates the data are mixed, with some trending accurate and others off.

Table 3.2 – MASPU Forecasts for Knox County Regional Airport

CATEGORY	2001	2006	2011	2021	% CHANGE
Operations	48,069	52,990	58,420	71,010	48%
Based Aircraft	55	58	60	65	18%
Enplanements	6,944	9,600	11,000	14,400	107%

Source: MASPU, Wilbur Smith Associates (2001)

Table 3.3 (next page) is a comparison of MASPU forecast for 2012[1] and actual data (presented earlier in Chapter 2). While operations were fairly well predicted, based aircraft and enplanements were off considerably.

[1] Linear interpolation of data between 2011 and 2021.

Table 3.3 – Comparison of MASPU Forecasts to Actual Data for RKD			
CATEGORY	**MASPU 2012**	**ACTUAL 2012**	**DIFFERENCE**
Operations	59,679	55,323	-4,356
Based Aircraft	61	84	+23
Enplanements	11,340	14,400	+3,060

Source: MASPU, Wilbur Smith Associates (2001). Actual data from airport management. Note: MASPU 2012 data provided through a linear interpolation of 2011 and 2021 forecast.

ENPLANEMENTS

Since 1980, enplanements at US airports have increased by 4.2% per year, or 134% overall in the 32 year period leading up to the end of 2012. Enplanements at RKD have increased slowly, but steadily in the past 10 years, and with the presence of Cape Air, enplanements will probably continue to climb, particularly during the summer peak tourist months.

LOCAL HISTORIC AVIATION FORECASTS

Forecasts from the last AMPU completed in 2000 were compared with actual data. As shown in Table 3.4 the based aircraft forecasts were well within an acceptable margin of error (±10%), however, operations and in particular enplanements were well off the mark, but probably consistent with expectations and general forecasting methodology used at the time. The same holds true for the MASPU forecasts.

Table 3.4 – Comparison of 2000 Forecasts to Actual Data for RKD			
CATEGORY	**AMPU 2012**	**ESTIMATE 2012**	**DIFFERENCE**
Operations	81,500	55,323	-26,177
Based Aircraft	86	84	-2%
Enplanements	37,450	8,000	-29,450

Source: AMPU, Dufresne-Henry, Inc. (2000). Actual data from airport management. Note: AMPU 2012 data provided through a linear interpolation of 2007 and 2017 forecast.

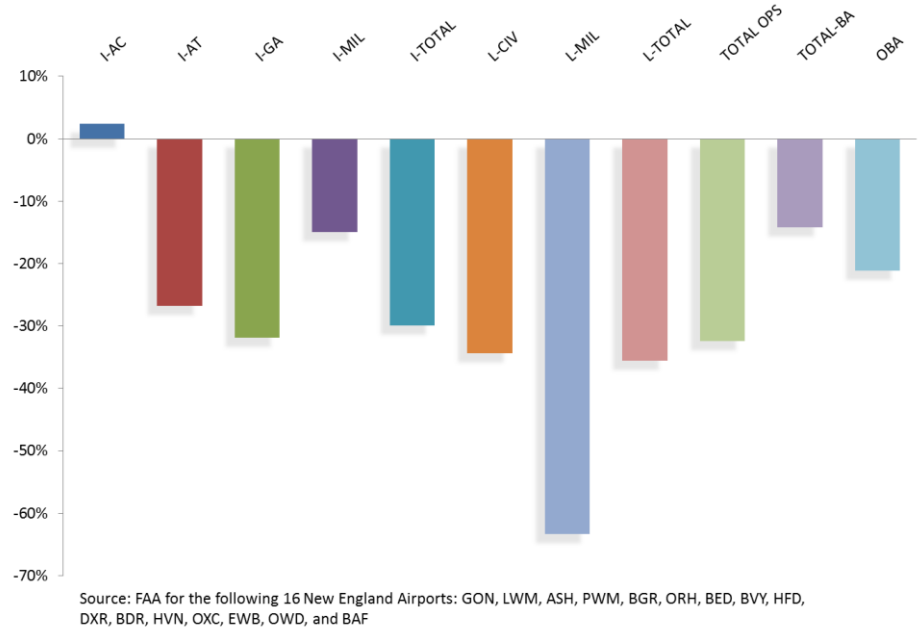
SUMMARY OF HISTORIC FORECASTS

As discussed in the previous sections, and presented earlier in Tables 3.1 through 3.4 and Figures 3.1, 3.2, and 3.3 that follow, the economic assessment in 2000 reflected in FAA, state, and local forecasts indicated almost unrestricted growth, however, the US economic downturn (2007 to present) resulted in a weakening general aviation market. While based aircraft increased, primarily because of the light sport and experimental aircraft markets, including homebuilt airplanes, the number of actual operations has declined on a national level.

Figure 3.1 shows the net change in various aviation categories during the period 2000 through 2012 at 16 New England towered airports[2]. Towered airports are used because the data report by air traffic control is considerably more accurate than estimates reported at non-towered airports. This figure shows both Itinerant (I) and Local (L) operations data for air carrier (AC), air taxi (AT), general aviation (GA) and military (MIL), as well as based aircraft (BA) and operations per based aircraft (OBA). Note that in every category less one – itinerant air carrier (I-AC), the 16 airports have shown a dramatic decrease in every other area.

One reliable measure of activity is the number of operations reported at an airport as compared to the number of based aircraft, known as Ops per Based Aircraft (OBA). Historically this data has remained consistent, varying up or down based on a number of factors, such as the presence or lack of flight training activity, or other related businesses that naturally increase flying. For most part, however, OBA has steadily declined during the past 10-15 years, primarily because of rising fuel costs. In 2000, the average price of a gallon of 100LL was about $2.50/gallon compared to a nationwide average of close to $6.00 today, or a 240% increase. This rapid increase, beyond normal inflation, resulted in a considerable drop in the number of hours flown, primarily for recreational purposes, which accounts for the majority of general aviation activity. While aircraft ownership has increased, the time flying has not.

Figure 3.1 - New England Towered Airport Data (2000 - 2012)

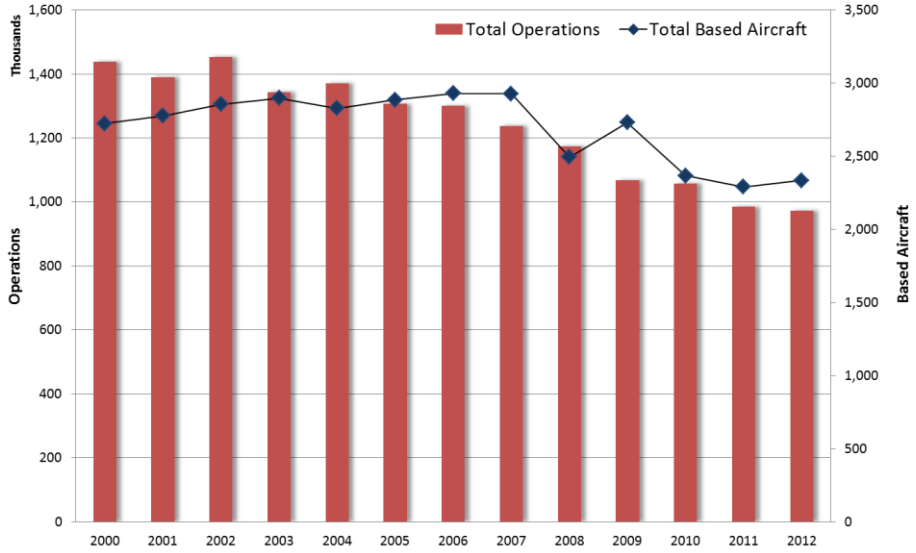


Source: FAA for the following 16 New England Airports: GON, LWM, ASH, PWM, BGR, ORH, BED, BVY, HFD, DXR, BDR, HVN, OXC, EWB, OWD, and BAF

[2] The 16 airports include Nashua (ASH), Barnes Municipal (BAF), Igor I Sikorsky (BDR), Lawrence G Hanscom (BED), Bangor (BGR), Beverly (BVY), Danbury (DXR), New Bedford (EWB), Groton-New London (GON), Hartford-Brainard (HFD), New Haven (HVN), Lawrence (LWM), Worcester (ORH), Norwood (OWD), Waterbury-Oxford (OXC), and Portland (PWM).

Figure 3.2 shows how OBA has changed (on average in New England) during the 10-year period from 2000 to 2012, and the change has been steady and consistent (with the continued rise in fuel costs). In 2000, the number of operations per based aircraft was approximately 528. Fast forward 10 years and the number have dropped considerably to 417, or 21%.

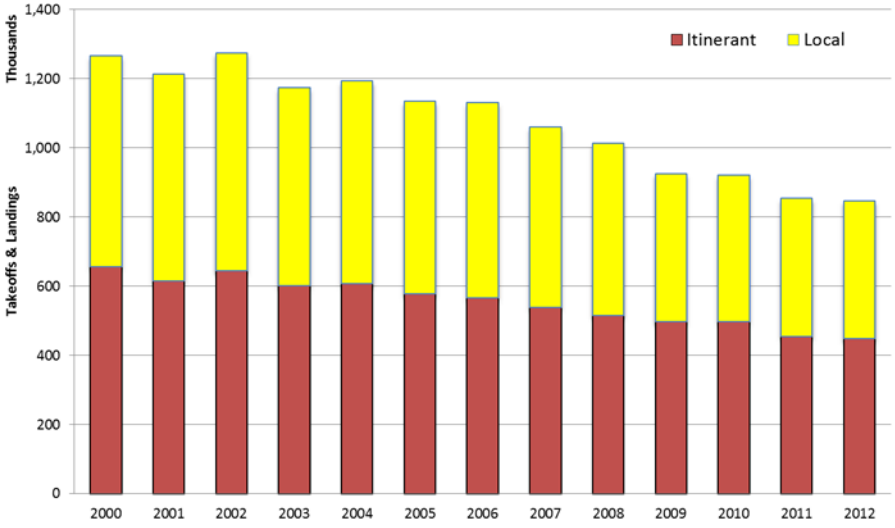
Figure 3.2 - Operations versus Based Aircraft at 16 New England Airports



Source: FAA for the following 16 New England Airports: GON, LWM, ASH, PWM, BGR, ORH, BED, BVY, HFD, DXR, BDR, HVN, OXC, EWB, OWD, and BAF

Figure 3.3 shows how the number of both itinerant and local operations at the same 16 airports has steadily declined. The average operations at each of the 16 report facilities dropped from just under 90,000 in year 2000 to not quite 61,000 in 2012, for a 32% decline.

Figure 3.3
Itinerant and Local Operations at Selected New England Towered Airports

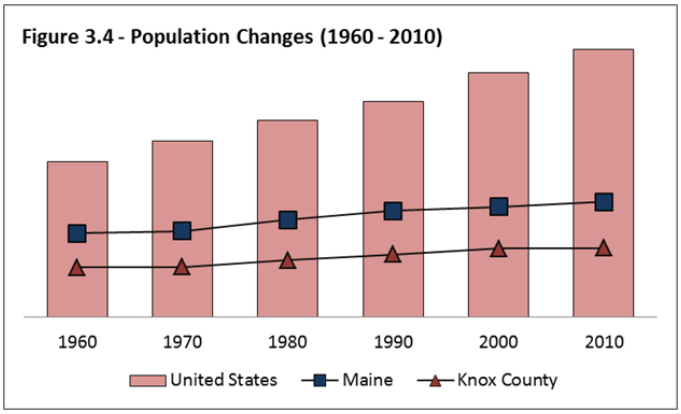


Source: FAA, March 2013 for the following facilities:
GON, LWM, ASH, PWM, BGR, ORH, BED, BVY, HFD, DXR, BDR, HVN, OXC, EWB, OWD, BAF

As noted earlier, enplanements on the other hand have continued to increase at an annual growth rate of about 4.2%, and much has to do with the type, frequency, and destination of service.

POPULATION TRENDS

Knox County and the state of Maine have seen an increase in population in the past 30-40 years. While the state and county have not grown at the same rate as the United States, both have seen increases in population, which translates to increased demand for transportation services, including airports. Figure 3.4 illustrates the relative changes during the period 1960 to 2010. During this 50-year period, the US population has increased by 72%, while the state has seen a 37% increase, with Knox County recording a 39% increase. However, the county's rate has been flat since 2000, and like the state, is forecast to see a decline in overall population in the next 20 years.



Projections for the period 2013-2028 forecast a 1.3% decline in state population and a 3.9% decline in the county[3]. On the positive side, Maine's "Quality of Place" will continue to pay dividends in terms of strong tourism. In addition, visitors are the human fuel that stokes the state's economic engine.

KNOX COUNTY REGIONAL AIRPORT FORECASTS

Understanding the historic performance for Knox County Regional Airport is important in order to determine aviation activity in the future. The long-term trend from in the past 20-30 years has been one of growth. The airport has seen a steady increase in based aircraft and enplanements.

[3] *Maine County and State Population Projections, 2013-2028*. Economics and Demographics Team, State Planning Office (March 2010).

Figure 3.5 shows the based aircraft trends since 1982. With a few exceptions, the number of aircraft has steadily increased from 58 aircraft in 1982 to the present count of 87. While the predominant type is a small single-engine reciprocating aircraft, the number of larger twin (multiengine) reciprocating, turbofan, and jet, as well as helicopters has called RKD home during the past two decades.

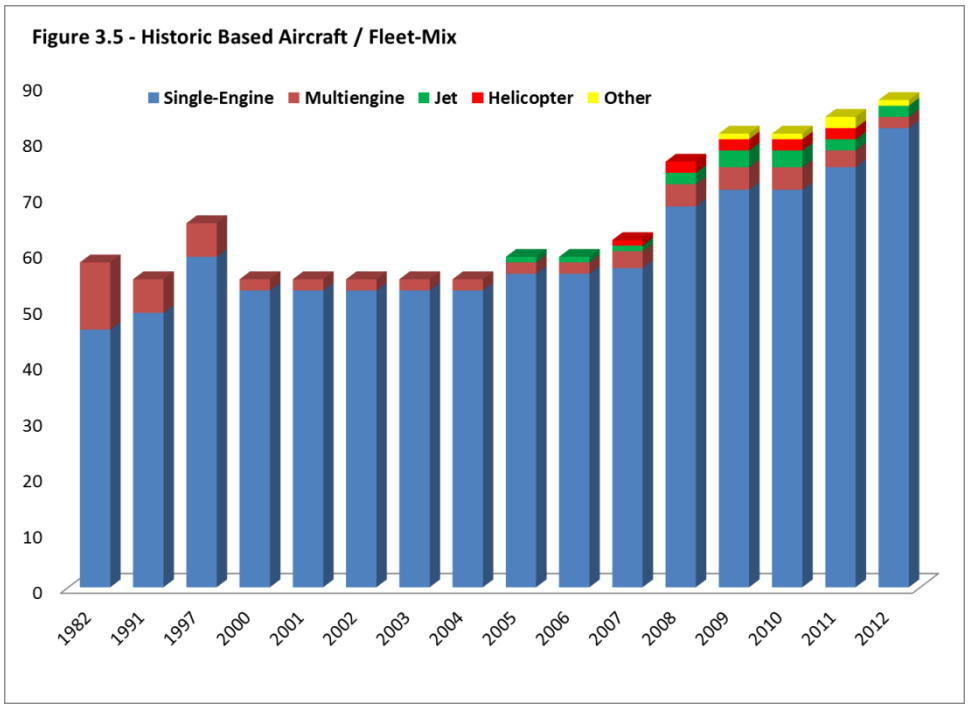
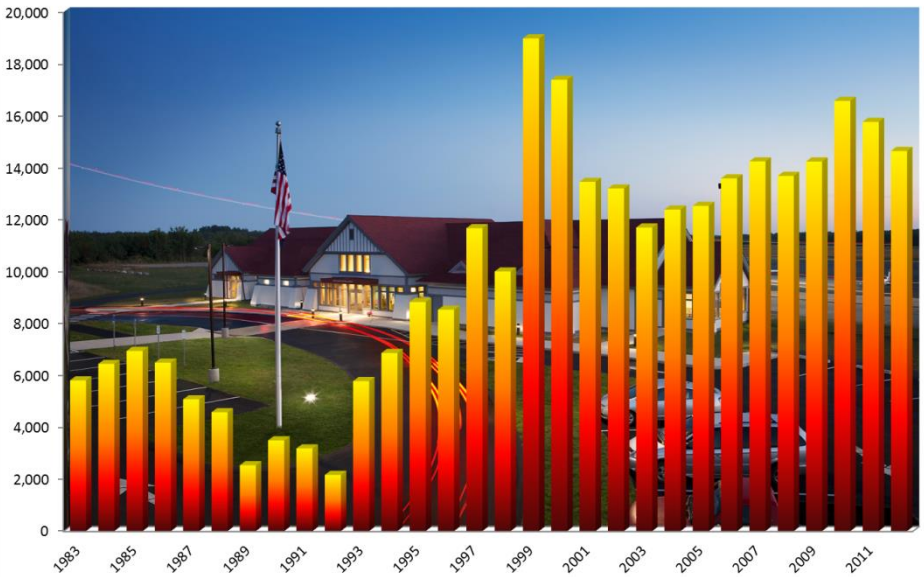


Figure 3.6 (next page) shows the historic enplanement data for the period 1983 through 2012. As noted, the airport's enplanement numbers steadily climbed during the period from 1993 through 2000, then like many U.S. airports saw a rapid decline in commercial passenger service following September 11, 2001. Then again, during the period 2003 through 2010, enplanements rose until the current economic downturn took hold. Overall, since 1983, enplanements have grown by 152%. Given the location of RKD, with its historically strong economic and tourism features, there is every reason to believe enplanements will continue to increase with occasional downturns that mirror the state and national economy.

Figure 3.6 - Historic Enplanements (1983-2012)



Source: Airport Manager, January 2013

Operations are difficult to assess at airports like RKD. As noted earlier (see Figures 3.1, 3.2 and 3.3 starting on page 37), aircraft takeoff and landing data is easy to assess at towered airports because air traffic personnel keep a running tab. However, there is no such opportunity at non-towered airports; hence, the need to estimate, which often results in skewed and unrealistic data. Earlier in Chapter 2 (see *Activity*, page 7), an estimate of annual operations was offered, and as noted, the total count has remained constant during the period from 2000 to 2012. The total count of approximately 55,000 operations when compared to the number of based aircraft (87) results in an OBA of 632.

From the data offered, we know the number of aircraft operations at general aviation airports has steadily declined over the past 10 years. Rising fuel prices and aircraft costs over the past decade have reduced the number of recreational flights. While commercial, including air taxi operations have increased, the typical pleasure flights have declined. This is the largest segment of operations at RKD. Thus, it is fair to assume that the actual number of takeoffs and landings at RKD is probably closer to 36,300 (87 based aircraft times an OBA of 417). The introduction of sport aircraft is anticipated to result in an increase in smaller, less expensive aircraft at general aviation airports. It is anticipated that the sports aircraft will replace some of the existing single-engine piston and some light multi-engine piston aircraft. The new light sport aircraft and the very light jets may erode the replacement market for traditional piston aircraft in the mid-range market; however, this is not anticipated to change the fleet mix at RKD.

FORECAST METHODOLOGY

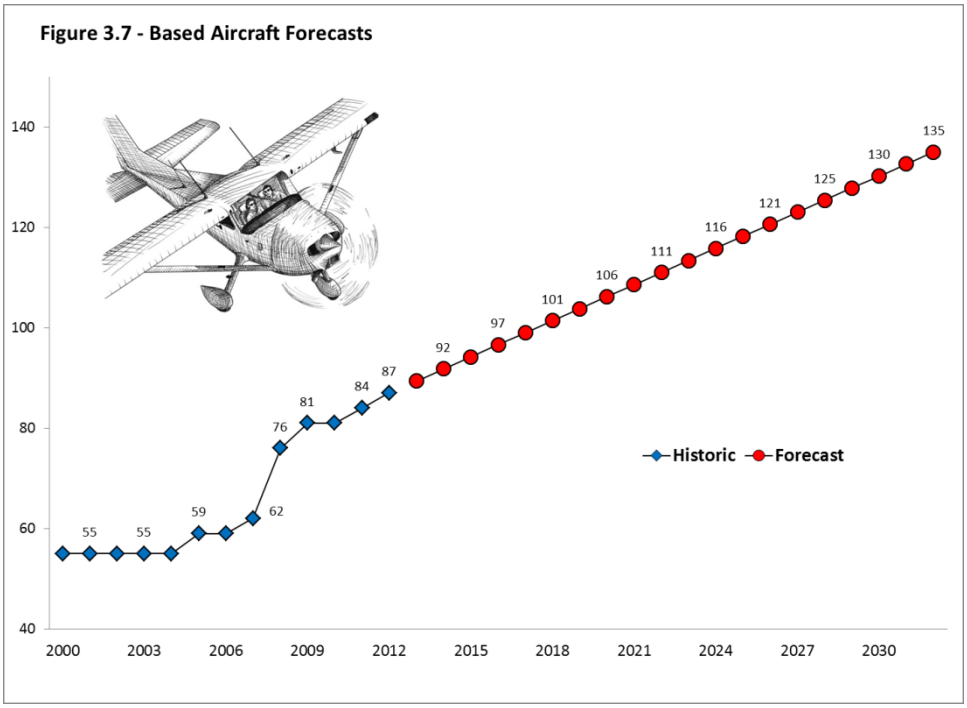
In preparing the RKD forecast, both qualitative and quantitative forecasting techniques will be used. Qualitative forecasting techniques are subjective, based on the opinion and judgment of the planner preparing this report, an expert; this appropriate when past data is not available (or unreliable) and will be used in estimating future operations.

Quantitative forecasting models are used to estimate future demands as a function of past data; appropriate when past data are available. We will use this method in assessing future based aircraft and enplanement numbers.

BASED AIRCRAFT FORECASTS

Historic based aircraft numbers are a good indication of what the future data will look like at RKD. The rate of growth in the past 20 years has been in the range of 2.5 to 3% per year and should continue at this same pace over the course of the next 20 years. For planning purposes, the airport should realize about 135 aircraft by the end of this 20-year cycle. Figure 3.7 shows the results of this linear trend analysis, resulting in 135-based aircraft at the end of the 20-year planning period (2032).

Figure 3.7 - Based Aircraft Forecasts



FLEET MIX

The fleet mix at RKD will remain about what it is today; predominantly recreational aircraft with a similar mix of multiengine, turbofan/jet and helicopter, with some gliders and other similar lightweight sport aircraft. In forecasting the future fleet-mix, we looked at the average number and types of aircraft at RKD during the past 10 years and determined that the average fleet mix consisted of 91% single engine, with the remaining 9% divided almost evenly between the other four categories. In looking at this historic trend, it is reasonable to believe that the same relative mix will occur in the next 20 planning years. This would result in the fleet mix presented in Table 3.5.

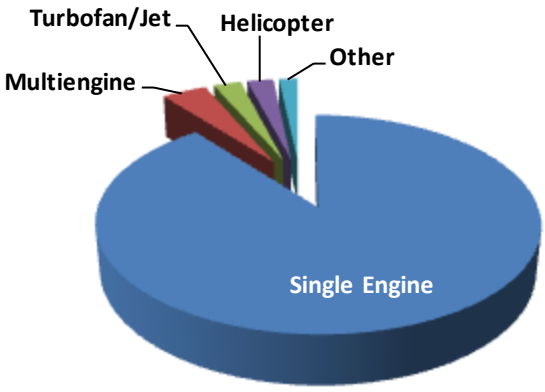


Figure 3.8 - Historic Fleet Mix

Table 3.5 – Fleet Mix Forecast				
CATEGORY	**EXISTING (2014)**	**SHORT-TERM (2015-2019)**	**INTERMEDIATE (2020-2024)**	**LONG-TERM (2025-2034)**
Single-Engine	82	90	101	123
Multiengine	2	4	5	6
Turbofan/Jet	2	3	3	3
Helicopter	0	2	3	3
Other	1	2	2	2
Total	**87**	**99**	**111**	**135**

OPERATIONS FORECASTS

Operations will not increase at the same rate as based aircraft. Historic industry trends suggest that the growth rate will either decline or at the very best slow to a very small growth rate. Any increase will be from commercial operations at RKD, while recreational flying will decline or at best remain flat. For planning purposes it is assumed that total operations will equal 417 operations per based aircraft in the first year (2013), declining at the rate of 1% annually through the 20 year planning period. Instrument operations,

which equal 18.8% of total operations today, will remain the same percent of total takeoffs and landings. The 20 year projection represents a 1.4% per annum (28% overall) increase in operations. Table 3.6 presents operations forecasts for the next 20 years broken out by VFR and IFR. Table 3.7 lists Forecast operations by itinerant and local, which assumes that the ratio of local to itinerant operations will remain constant at the current rate of 27% local and 73% itinerant.

Table 3.6 – Forecast VFR & IFR Operations

YEAR	BA	OBA	VFR OPS	IFR OPS	TOTAL OPS
Existing	87	417	29,459	6,820	36,279
2019	99	401	32,201	7,455	39,656
2024	111	381	34,335	7,949	42,284
2033	135	345	37,765	8,744	46,509

Source: Stantec analysis (2013)

Table 3.7 – Itinerant & Local Operations

YEAR	LOCAL	ITINERANT	TOTAL
Existing	9,795	26,484	36,279
2019	10,707	28,949	39,656
2024	11,417	30,867	42,284
2033	12,557	33,952	46,509

Source: Stantec analysis (2013)

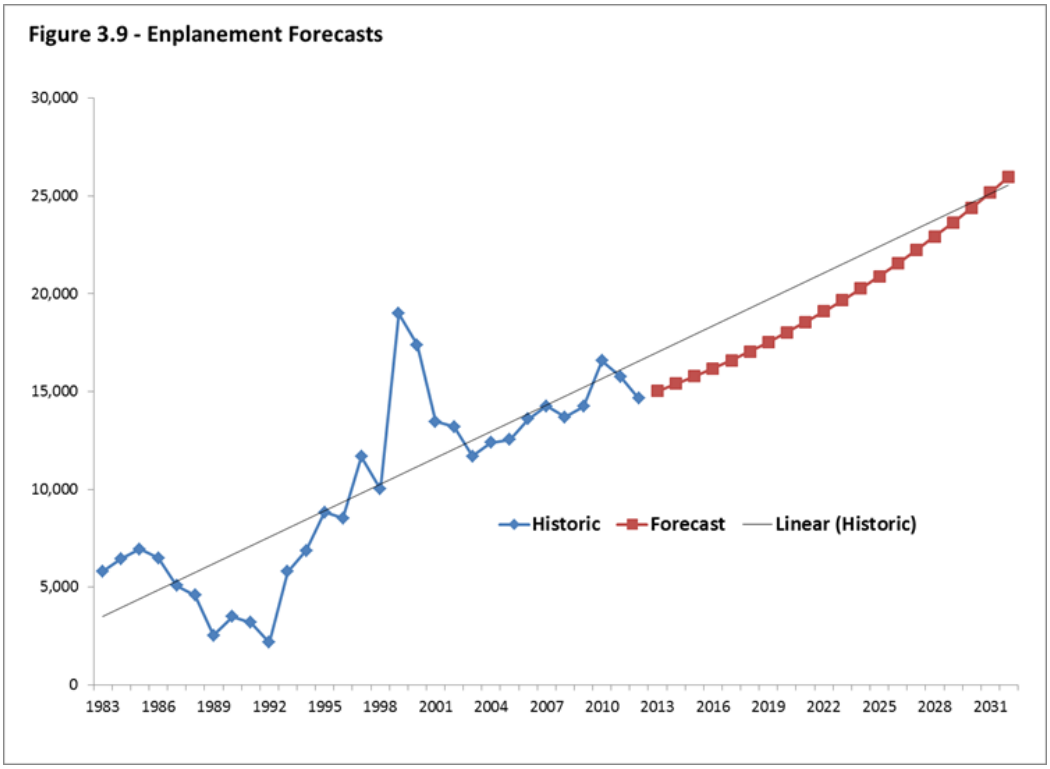
ENPLANEMENT FORECASTS

Enplanements will increase at an approximate linear rate, but will do so slowly as the U.S. economy improves. The improvement will start to materialize in the next 2-3 years and then slowly accelerate by 350 to 800 additional passengers per annum to the point where enplanements will reach about 25,000 per year by the end of the 20-year planning cycle. Table 3.8 and Figure 3.9 (next page) illustrate the change.

Table 3.8 - Enplanement Forecasts

YEAR	ENPLANEMENTS
Existing	14,645
2019	16,595
2024	19,095
2033	25,970

Source: Stantec analysis (2013)



DESIGN AIRCRAFT FORECASTS

The Design Aircraft in the 2000 AMPU was the Cessna Citation VII. In 2011, the decision was made to modify the design aircraft to a slightly smaller and slower aircraft, the Falcon 900. The Falcon 900 is a mid-size jet in the 45,000-pound weight category. As tourism and air travel increase in the coming years, demand for larger and faster aircraft will result in an adjustment of the design aircraft at RKD. The airport has the existing runway length and capacity to handle larger and faster aircraft and they do frequent RKD on a regular basis, particularly during the busy summer tourism months.

Using FAA Traffic Flow Management System Counts (TFMSC) data, we were able to assess the types of aircraft that current use RKD as well as the number of instrument operations. While instrument operations will not generally provide the level of detail required to analyze an airport's design/critical aircraft, it does provide an accurate assessment of jet operations because unlike piston-powered aircraft, the vast majority of pilots flying jet normally file a flight plan with the FAA, which is what TFMSC provides to the user. Our analysis, which is presented in Table 3.9, determined that the airport had approximately 1,568 jet operations in 2014, that 65% were in the approach category A & B group, and the remaining 35% were in the Category C & D group. The data also indicate that no single aircraft exceeds the 500 minimum annual operations that the FAA uses to establish the

airport's design aircraft. Technically the data should be further analyzed to include all airplanes that operate at RKD until a single aircraft that meets and exceed the 500 operations threshold is found. However, realistically, this would be an exercise in futility.

Table 3.9 – 2013 Jet Operations by Approach Category

CATEGORY A & B JET OPERATIONS				CATEGORY C & D JET OPERATIONS			
MAKE & MODEL	**OPS**	**MGTOW**	**ADG**	**MAKE & MODEL**	**OPS**	**MGTOW**	**ADG**
Cessna 510 Mustang	4	8,645	AI	Learjet 55	16	21,000	CI
Eclipse 500	22	4,700	AI	Learjet 60	32	23,100	CI
Cessna 501 Citation I/SP	2	10,600	BI	Beechjet 400-A	92	16,100	CI
Embraer Phenom 100	4	10,472	BI	Hawker HS 125-400/600/700	114	24,800	CI
Dassault Falcon 10	6	18,740	BI	Cessna 650 Citation III/VI	4	21,000	CII
Learjet 40	8	21,000	BI	Gulfstream III	4	68,700	CII
Learjet 31A	26	17,000	BI	Embraer ERJ-135	8	41,887	CII
Learjet 45	28	19,500	BI	Israel Astra 1125	12	23,500	CII
Raytheon Premire 1/390	28	12,500	BI	Challenger CL-600/601/604	68	41,250	CII
Cessna 525A (CJ1) (CJ2)	30	10,400	BI	Cessna 750 Citation X	114	36,100	CII
Dassault Falcon 20	6	28,660	BII	Bombardier Global Express	14	96,000	CIII
Dassault Falcon 50	10	39,900	BII	Learjet 35/36	20	18,000	DI
Embraer Phenom 300	14	17,968	BII	Gulfstream IV	16	71,780	DII
Cessna 550 Bravo	20	14,800	BII	Gulfstream II	28	68,700	DII
Hawker 4000	34	39,500	BII	**Subtotal Category C & D**	**542**		
Cessna 525C (CJ4)	38	16,950	BII				
Cessna 525B (CJ3)	42	13,870	BII				
Challenger 300	44	38,850	BII				
BAE Hawker HS 125-1000	46	31,000	BII				
Cessna 680 Sovereign	54	30,300	BII				
Dassault Falcon 900	94	45,500	BII				
Cessna 560 Encore	116	16,830	BII				
Cessna 560 Excel	**210**	**20,000**	**BII**	**← Current and short-term design aircraft**			
Gulfstream VG 500	40	85,100	BIII				
Dassault Falcon 2000	100	35,800	BIII				
Subtotal Category A & B	**1,026**						

Source: Traffic Flow Management System Counts (TFMSC)

Because RKD does have a wide-range of jets operating at the airport, and we know from the data that the airport routinely exceeds 1,000 or more jet operations per year, selecting a single or group of aircraft within this group is consistent with normal planning principles. Therefore, the Cessna 560 Excel is considered the current and short-term design aircraft. It is recommended that the airport continue to monitor activity and make adjustments as necessary.

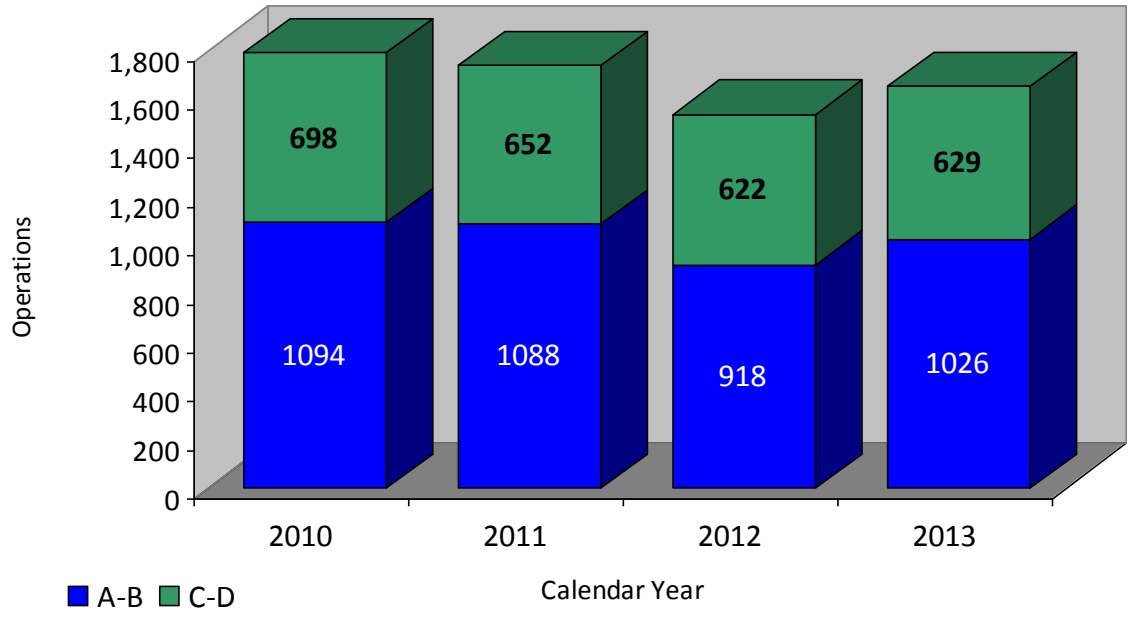
The data indicate two trends that are important in assessing both the design aircraft and the related airport design code, or ADC. Data were analyzed for the period between 2010 and 2013 indicates that the number of Category A through D operations have declined very slightly during this four-year period. What is not known is if this is a long-term trend or the result of economic issues related to both the nation and state since the 2008 recession.

AIRPORT REFERENCE CODE (ARC)

Since the last master plan update in 2000 the ARC for Knox County was C-II. In 2011, the airport reassessed the design aircraft and decided to downgrade it to B-II because the number and size of larger aircraft decreased to the point where a lower ARC made sense, at least in the interim. In reality, the airport is on the cusp of either design code. Under current conditions, the ARC for Knox County is B-II.

Figure 3.10 presents the findings by showing the four-year trend in Category A&B as well as C&D operations. As noted in the graphic below, Category A&B operations declined by approximately 6% from 1,094 to 1,026 operations, while Category C&D operations dropped by 24% from 698 to 542 takeoffs and landings. This trend indicates that while the airport has 500 or more C&D operations, the declining trend suggests that an upward revision of the ARC is not reasonable at this time.

Figure 3.10 - Airplane Design Group A&B versus C&D Comparison



For planning purposes, it is anticipated that the design code will change to C-II at some point in the next 5-10 years. This is an important to note that for fiscal planning the most critical period for designing an airport is the first five years. Thus, strict application of current FAA guidance leads to the following conclusions:

1. Current historic trend does not support investing in Category C or higher design standards in the next five years.
2. However, historic data indicates it is plausible that the airport can experience more than 500 ops of C&D aircraft as there are years in which activity had exceeded 500 operations.
3. Plausible 5 year forecast scenarios can be developed to support C&D operations either exceeding or remaining below the 500 operations standard.
4. Design should therefore incorporate C&D standards that eliminate the need for expensive demolition and reconstruction of facilities that would not conform to the current C&D design standards.
5. Design should not include C&D standards that can be added as incremental improvements to a reconstructed runway, e.g. an EMAS bed for Runway 13 overruns. However, the location of any such incremental improvements should be shown as the ultimate ALP.

RUNWAY DESIGN CODE (RDC)

The current RDC for the airport is B-II-2400 for Runway 13-31 and B-II-4000 for Runway 3-21. Like the ARC, this number is forecast to remain unchanged. The RDC on the primary runway is B-II-2400 for at least the next five years, increasing to C-II-4000 at some point thereafter. The crosswind RDC will remain B-II-4000 throughout the entire planning period.

PEAKING CHARACTERISTICS

Peaking characteristics are calculated for both aircraft (operations) and passenger movements. Peak aircraft operations are used to size aircraft parking needs and peak passenger data is used to help size terminal spatial needs. Each is calculated as discussed in the next two sections.

Historically we know that the months of July and August are typically the busiest period for Knox County Regional Airport (as well as most other airports in the state of Maine and other northern climates).

Standard planning guidelines suggest that the Peak Month (PM) realizes 15 percent of all annual operations and that busiest day of that month, or peak-month, average day (PMAD) is 1/30 of the PM. The Peak Hour (PH) is then assumed 20 percent of PMAD. The following formula is used to determine peak operations (both aircraft and passengers):

$$PH = \frac{Total\ Operations\ x\ 0.15}{30}\ x\ 0.20$$

PEAK-HOUR AIRCRAFT OPERATIONS

Table 3.10 identifies the peak activity forecasts for both current as well as the three key planning periods.

Table 3.10 – Peak Operations Data

DATA	CURRENT	2019	2024	2033
Operations	36,279	39,656	42,284	46,509
Peak Month	5,442	5,948	6,343	6,976
Peak-Month/Average Day	181	198	211	233
Peak Hour	36	40	42	47

PREFERRED PASSENGER-ENPLANEMENT ACTIVITY LEVELS

In 2012, there were 14,645 reported passenger enplanements. Using the same formula from the previous page, peak hour passengers equal 15 today and will increase to 26 at the end of the 20-year planning cycle. Table 3.11 breaks this data out by the four periods.

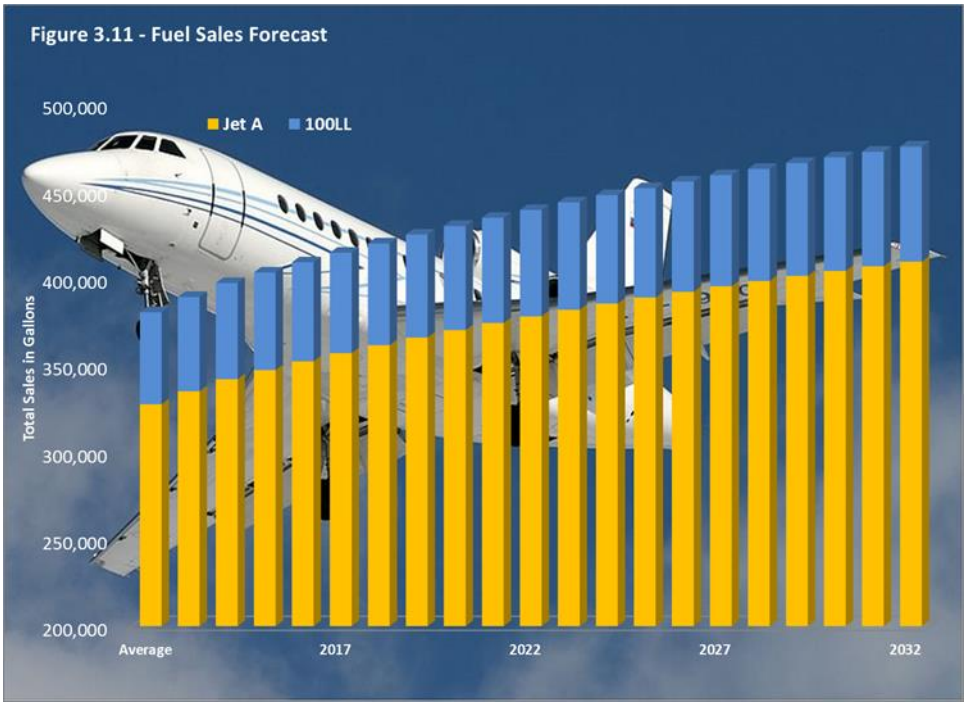
Table 3.10 – Peak Passenger Forecasts

DATA	CURRENT	2019	2014	2033
Passengers	14,645	16,595	19,095	25,970
Peak Month	2,197	2,489	2,864	3,896
Peak Month / Average Day	73	83	95	130
Peak Hour	15	17	19	26

FUEL SALES FORECASTS

In computing future fuel sales, we averaged sales from the previous five years (2008-2012) and then assumed future sales would mirror projected operations. The average sales during this five-year period were 327,293 in Jet A, 52,865 in 100LL, for total average of 380,158 gallons.

Operations in the next 20 years are expected to increase by 28% overall, or 1.4% on average per year. Figure 3.11 shows the results of these estimates.



SUMMARY

Table 3.11 (next page) summarizes the forecasts presented in this chapter.

Table 3.11 – Summary of Forecasts for Knox County Regional Airport				
DATA	**CURRENT**	**2019**	**2024**	**2033**
Design Aircraft	Citation Excel	Citation Excel	Citation X	Citation X
Airport Reference Code	B-II	B-II	C-II	C-II
Runway 13-31 Design Code	B-II-2400	B-II-2400	C-II-2400	C-II-2400
Runway 3-21 Design Code	B-II-4000	B-II-4000	B-II-4000	B-II-4000
Based Aircraft				
Single engine	82	90	101	123
Multi-engine	2	4	5	6
Turbofan/Jet	2	3	3	3
Helicopter	0	2	3	3
Other	1	2	2	2
Total	87	101	114	137
Operations (VFR v. IFR)				
VFR	29,459	32,201	34,335	37,765
IFR	6,820	7,455	7,949	8,744
Total	36,279	39,656	42,284	46,509
Operations (Local v. Itinerant)				
Local	9,795	10,707	11,417	12,557
Itinerant	26,484	28,949	30,867	33,952
Total	36,279	39,656	42,284	46,509
Peak Operations	36	40	42	47
Enplanements	14,645	16,595	19,095	25,970
Peak Passengers	15	17	19	26
Fuel (gallons)				
Jet A	327,293	356,696	377,831	409,153
100LL	52,865	57,614	61,028	66,087
Total	380,158	414,310	438,858	475,240