



3.0 AVIATION DEMAND FORECASTS

Forecasts of aviation demand are a key element in all airport planning activities. Demand forecasts, based upon the characteristics of the service area and the airport, provide a basis for determining the type, size, and timing of aviation facility development and are a platform upon which this master planning study will be based. Consequently, these forecasts influence virtually all phases of the planning process. Major sections of this chapter include:

- Purpose
- Historical Aviation Activity
- Industry Trends
- Regional Trends
- Aviation Forecasts
- Selection of Design Aircraft
- Comparison with Other Forecasts
- Aviation Forecast Summary

This section presents the methodologies and assumptions used in the development of the aviation forecasts. To provide a useful planning tool for implementing improvements, the projections are presented for short (0-5 years), intermediate (6-10 years), and long (11-20 years) range timeframes. These timeframes will be used to develop the airport capital improvement plan (ACIP). In accordance with the Scope of Work (SOW) for this project, the base year for the forecasts is 2005; actual data for 2006 was not available from the FAA at the time of writing.

3.1 PROLOGUE

As indicated in Chapter 2, *Inventory*, of this report, the airport and the aviation industry as a whole, are constantly changing, therefore some information which was current at the time of writing may be out-of-date by the completion of the Master Plan Update (MPU). This disclaimer is particularly relevant to the *Aviation Demand Forecasts* chapter of this report. During the time of this writing, the Greater Binghamton Airport (BGM) was served by regional airlines affiliated with four major/national carriers, including United Express, Northwest Airlink, Delta Connection and US Airways Express. Since the completion of the aviation demand forecasts and the Federal Aviation Administration's (FAA) subsequent review and approval of the forecasts, Delta Connection discontinued service at BGM in September 2007. As a result, the airport is now served by the three remaining regional airlines. These remaining airlines are currently reviewing the unfilled demand associated with Delta's pullout and the ability to serve that demand. With load factors into the 80's on Delta flights (prior to their withdrawal) and ongoing discussions with the airlines, it is reasonable to assume that the other carriers will fill the unsatisfied demand,





left after the Delta pullout, to some extent. It should also be noted that in July 2007, passenger traffic at BGM increased by 24.2% over July 2006, marking the tenth consecutive month that boardings have increased at the airport. During July, US Airways reported a 14.5% increase in boardings, while Northwest reported a 13.1% increase and United Express reported a 50.2% increase over the same month one year ago. For year ending 2007 enplanements are up 11.5% over 2006, which includes almost half a year with Delta gone. Based on these facts, it appears that although Delta is no longer operating at BGM, the forecasts that are presented throughout the remainder of the chapter, which include Delta, remain reasonable.

3.2 PURPOSE

The aviation demand forecasts will serve as the basis for:

- Determining the necessary capacity of the airfield, passenger terminal area, general aviation area, and ground access system serving the airport.
- Sizing of future facilities (i.e. terminal building, hangars, runway length, etc.).
- Determining the timing of needed facilities.

Forecasts of aviation demand can be developed for numerous elements. In the case of BGM, the key demand elements focus on scheduled airline passenger traffic and operations and general aviation descriptors such as based aircraft and operations. Other important elements are derived from these basic indicators. For this study aviation activity forecasts were prepared for the following elements:

- **Annual Passenger Enplanements:** Defined as fare paying air travelers who have boarded departing airline aircraft at BGM.
 - Air Carrier
 - Commuter (Regional)
- **Operational Factors:** These statistics include a combined total for air carrier and commuter operations.
 - Average seats per aircraft
 - Average load factor (Load factor is generally defined as the percentage of seats that are occupied by passengers boarding an aircraft.)
- **Annual Itinerant Aircraft Operations:** This type of operation is either a takeoff or a landing of an aircraft flying to or from another airport. Each takeoff and landing is counted as a separate operation. Forecasts are made for





the following types of activity.

- Air Carrier
 - Commuter and Air Taxi
 - Air Cargo
 - General Aviation
 - Military
- **Annual Local Aircraft Operations:** This type of operation is either a takeoff or a landing of an aircraft that flies within the local area and returns to the airport from which it departed. These operations are usually associated with pilot training or recreational flying.
 - General Aviation
 - Military
 - **Peak Period Aircraft Operations:** The number of aircraft operations that occur during a busy period at the airport, used for performing a quantitative analysis of the amount and size of certain airport facilities (i.e. aprons, terminal areas)
 - Peak Month
 - Peak Hour
 - **Number of Based Aircraft by Type:** A based aircraft is defined as an active aircraft that is kept at an airport on a permanent basis. Types are single engine, multi-engine (propeller driven), jet, rotorcraft, and other (including light sport aircraft).
 - **Instrument Approaches:** This type of operation is typically recorded during Instrument Meteorological Conditions (IMC) by an aircraft completing an Instrument Flight Rules (IFR) approach procedure.

3.3 HISTORICAL AVIATION ACTIVITY

The components of aviation activity include commercial airline activity, general aviation and military. Unlike many airports, which were originally military facilities, BGM was constructed for the express purpose of providing commercial service to the Southern Tier. The airport was opened in 1951. Although multiple sources are available for historic aviation activity, historic activity will be reported from the FAA's Terminal Area Forecast (TAF), which generally agrees with the airport's records. As shown in Table 3.1, the total number of annual operations has been declining since 1977, after reaching a high of 80,249. This overall decline is primarily a result of declining general aviation (GA) activity. Although flight training comprises only one component of GA activity, stricter rules





governing flight training and higher fuel costs has caused a decline in GA activity at BGM and other airports in New York State (NYS). On April 15, 2005 a bill was introduced in NYS requiring criminal background checks for all flight students. On August 16, 2006, this bill became law. At BGM, 2005 represents the lowest level of GA activity at the airport during the 29-year period documented in Table 3.1. On January 24, 2007 a bill was introduced to the NYS Assembly, which if passed would stipulate that “no person less than 17 years of age shall engage in operating aircraft within this State or apply within this State for a license to operate aircraft”. Continued “anti-GA” legislation combined with high fuel prices and BGM’s close proximity to Pennsylvania may result in a continued decline in recreational GA activity at the airport. However, tax incentives designed to encourage business aviation growth in NYS such as GA sales tax relief legislation that took effect on December 1, 2004, which exempts aircraft maintenance, repairs and equipment from NYS Sales and Use tax may help reduce this decline.

The decrease in air carrier and regional/commuter operations may be attributable, in part, to a change in aircraft size, which has resulted in fewer flights but a higher number of enplanements per operation (improved load factors). Larger planes with more seating capacity result in fewer operations but similar or more passengers flying. At BGM a change from smaller turboprop aircraft to larger regional jets have contributed to this change. In addition, the size of regional jet aircraft in general continues to increase. This is evident when looking at the family of Embraer Regional Jets (ERJ). The ERJ progressed as follows: ERJ 135 (37 passengers); ERJ 140 (44 passengers); ERJ 145 (50 passengers); ERJ 170 (70-80 passengers); ERJ 175 (78-88 passengers); ERJ 190 (98-114 passengers); with the newest model, the ERJ 195 (108-122 passengers), having entered service in September 2006. The Canadair family of regional jets (CRJ) has followed a similar progression including: CRJ 100 and 200 ER/LR (50 passengers); CRJ 700: 701 series (70 passengers); CRJ 700: 705 series (75 passengers); CRJ 900 (86 passengers). In February 2007, Bombardier announced the launch of its CRJ 1000 regional airliner with seating for up to 100 passengers. The new CRJ 1000 is scheduled to enter service in the fourth quarter of calendar year 2009.¹ A recent article (January 22, 2007) published in *Airline Bulletin* indicates that, “In the next five years, airlines will likely end contracts for regional lift providers that could result in dozens or hundreds, of 37, 40, 44 or 50-seat regional jets being scrapped. The jets are simply too inefficient for these airlines purposes.” “Regional lift” is a term sometimes used to refer to the service provided by a regional carrier. As of this writing, fifty-seat aircraft comprise the majority of the “regional lift” fleets. The *Airline Bulletin* article indicates that more airlines will be shifting regional service to 70+-seat regional jets, which may be used for longer stage lengths to reach hubs. This “hub extension” effect will allow more regional airports to provide service to hub airports by “right sizing” the aircraft fleet mix. Bombardier Aerospace’s Commercial Aircraft Market Forecast 2006-2025 and the 2007-2026 Embraer

¹ [Http://www.canadair.com](http://www.canadair.com) (Accessed: 2/23/07)





Market Outlook (4th Edition) concur that while the 20-59 seat (Bombardier) and 30-60 seat (Embraer) segments will continue to play an important role, they have reached their maturity and RJs with greater seating capacity represent the current growth phase for regional airlines. The development of both the ERJ and CRJ will be discussed further in Section 3.4, *Industry Trends* of this chapter.

Since 1976, on average, approximately 50.76% of all operations at BGM have been performed by general aviation aircraft, 46.98% by commercial aircraft, and 2.26% by military aircraft. In 2005, the baseline year for the forecasts, approximately 49.78% of the annual operations being performed by general aviation aircraft, 44.63% by commercial aircraft, and 5.59% by military aircraft.

Operations

Table 3.1 provides detailed operational and enplanement statistics for BGM for the 29 year period from 1976 through 2005. Table 3.1 divides the airport's commercial operations into two categories: "Air Carrier" and "Regional." The *FAA Aerospace Forecasts Fiscal Years 2006-2017* indicates that there are 34 mainline air carriers that use large passenger jets (over 90 seats) and 79 regional carriers that use smaller piston, turboprop, and regional jet aircraft (up to 90 seats). The definition of "air carrier" and "regional" has changed throughout the timeframe provided in Table 3.1. However, defining air carrier operations as those conducted with aircraft that have over 90 seats and regional operations as those conducted with aircraft that have up to 90 seats is appropriate at BGM and is reflected in more recent aviation activity data.

In 2005 all of the operations were conducted with aircraft containing less than 90 seats, this is representative of the airport's existing commercial fleet mix, which consists of the SAAB 340 and Dash-8, along with 50-seat Regional Jets. Large jet service was provided at the airport through 2001. In 2001 US Airways (operated by Allegheny) was operating the DC 9 with 103 seats. In January, February, and March of 2001, when service was provided on the DC 9, the average load factor on these flights was in the low to mid 60% range. US Airways also operated the 737 with 140 seats in March 2001 with a 58% load factor. In April-July of the same year they operated the Fokker 100 with 99 seats averaging in the 59-65% range for load factors.

Enplanements

In addition to the number of annual operations, air carrier activity is measured by the number of annual passenger enplanements. An enplanement is counted every time a ticket holding passenger boards a regularly scheduled commercial aircraft departing BGM. Overall, the total number of enplanements in 2005 exceeded the 1976 level, which was the first year





FAA TAF data is available, by 24%.

Enplanement statistics are kept by the air carriers and the airport under a reporting procedure established by the FAA. That procedure is based on ticket sales and continues the distinction between Major/National carriers and Regional carriers, and thereby results in a division of enplanements into “air carrier” enplanements, and “regional/commuter” enplanements. This distinction is shown in Table 3.1.

Table 3.1: Historical Aviation Activity

Year	Enplanements			Operations				
	Air Carrier	Regional	Total	Air Carrier	Regional	GA	Military	Total
1976	69,214	33,680	102,894	6,792	20,167	46,949	2,083	75,991
1977	78,774	40,275	119,049	6,643	22,134	50,022	1,450	80,249
1978	73,216	45,979	119,195	5,670	22,732	40,490	1,562	70,454
1979	72,219	53,637	125,856	7,035	24,985	36,314	870	69,204
1980	73,943	49,874	123,817	2,685	28,404	34,514	1,669	67,272
1981	78,582	33,990	112,572	1,939	28,388	31,848	1,223	63,398
1982	76,902	33,839	110,741	1,669	23,497	29,197	1,180	55,543
1983	61,253	54,217	115,470	2,044	23,606	31,332	1,796	58,778
1984	80,163	66,594	146,757	3,010	29,927	33,814	1,703	68,454
1985	89,023	79,439	168,462	2,803	29,910	31,456	1,244	65,413
1986	84,094	81,590	165,684	3,482	24,071	29,302	974	57,829
1987	89,853	96,670	186,523	5,776	25,529	30,837	1,199	63,341
1988	113,589	80,944	194,533	4,807	28,407	28,400	947	62,561
1989	106,920	74,257	181,177	4,879	31,549	23,823	1,133	61,384
1990	100,885	70,973	171,858	4,329	29,971	24,401	963	59,664
1991	102,414	63,737	166,151	4,107	24,009	29,053	609	57,778
1992	86,361	78,418	164,779	3,318	23,200	26,928	1,156	54,602
1993	68,722	85,230	153,952	2,750	25,911	24,837	1,044	54,542
1994	77,741	81,767	159,508	2,880	24,256	20,536	788	48,460
1995	77,759	72,359	150,118	2,896	20,433	20,726	545	44,600
1996	75,240	72,336	147,576	2,683	20,404	19,666	590	43,343
1997	72,454	72,054	144,508	2,551	21,324	22,128	302	46,305
1998	57,798	80,107	137,905	2,082	18,257	28,608	1,227	50,174
1999	49,388	86,858	136,246	2,035	15,698	25,246	1,380	44,359
2000	46,377	81,180	127,557	1,690	14,442	21,626	1,249	39,007
2001	35,555	87,829	123,384	1,139	16,229	21,098	1,481	39,947
2002	356	107,590	107,946	3	16,921	22,859	1,659	41,442
2003	0	119,987	119,987	0	17,605	18,236	1,880	37,721
2004	0	135,425	135,425	4	17,024	17,309	1,710	36,047
2005	0	127,719	127,719	0	12,514	13,957	1,566	28,037

Source: FAA Terminal Area Forecast (1976-2005)





3.3.1 Commercial Airline Activity

Airline Service

BGM is currently served by regional airlines affiliated with four major/national carriers. As of this writing, service is provided by United Express, Northwest Airlinck, Delta Connection and US Airways Express. These air carriers provide direct air service to five cities via a total of 16 departures Monday through Friday (15 on Tuesday and Wednesday), 12 departures on Saturday and 11 departures on Sunday. Regional operations in 2005 accounted for 44.6% of total operations, or 12,514 operations. All commercial airline activity at BGM in 2005 was attributable to regional operations.

United Express, affiliated with United Air Lines, Inc. offers direct service to Washington Dulles International Airport located in Dulles, Virginia. United Express operates the 34-seat SAAB 340 turboprop at BGM. Their operating schedule (current as of June 1, 2007) is as follows:

Departures

Destination	Flight	Departure Time	Aircraft	Comments
Wash-Dulles	5250	6:00 am	SAAB	Except Sat & Sun
Wash-Dulles	5256	10:17 am	SAAB	Except Tue & Wed
Wash-Dulles	5252	2:30 pm	SAAB	
Wash-Dulles	5254	7:10 pm	SAAB	Except Sat

Arrivals

Arriving From	Flight	Arrival Time	Aircraft	Comments
Wash-Dulles	5251	10:00 am	SAAB	Except Sat & Sun
Wash-Dulles	5257	2:08 pm	SAAB	Except Tue & Wed
Wash-Dulles	5253	6:43 pm	SAAB	
Wash-Dulles	5255	11:01pm	SAAB	Except Sat

Northwest Airlinck, affiliated with Northwest Airlines provides direct service to Detroit Metropolitan Wayne County Airport located in Detroit, Michigan twice daily. Both flights are conducted using a 50-seat Canadair Regional Jet (CRJ). Their operating schedule (current as of June 1, 2007) is as follows:





Departures

Destination	Flight	Departure Time	Aircraft	Comments
Detroit	2910	6:05 am	CRJ	Non-Stop
Detroit	2916	4:58 pm	CRJ	Non-Stop

Arrivals

Arriving From	Flight	Arrival Time	Aircraft	Comments
Detroit	5822	4:24 pm	CRJ	Non-Stop
Detroit	3786	10:53 pm	CRJ	Non-Stop

Delta Connection Comair, affiliated with Delta Air Lines, Inc. provides direct service to Hartsfield – Jackson Atlanta International Airport located in Atlanta, Georgia once daily (except Sundays) using the 50-seat Canadair Regional Jet-200 (CRJ). As of May 2007, Delta Connection Comair also offers direct service to John F. Kennedy International Airport located in Jamaica, New York twice daily using the 50-seat CRJ. Delta’s current (as of June 1, 2007) operating schedule is as follows:

Departures

Destination	Flight	Departure Time	Aircraft	Comments
NY-JFK	5958	6:20 am	CRJ-200	Except Sun
Atlanta	6031	10:55 am	CRJ-200	Except Sun
NY-JFK	6012	3:10 pm	CRJ-200	Non-Stop

Arrivals

Arriving From	Flight	Arrival Time	Aircraft	Comments
NY-JFK	6031	10:30 am	CRJ-200	Except Sun
Atlanta	6012	2:43 pm	CRJ-200	Non-Stop
NY-JFK	6131	8:00 pm	CRJ-200	Non-Stop

US Airways Express, affiliated with US Airways Inc. provides direct service to Philadelphia International Airport located in Philadelphia, Pennsylvania. They operate the 50-seat CRJ and the 37-seat De Havilland Dash-8 turboprop. Their operating schedule (current as of June 1, 2007) is as follows:

Departures

Destination	Flight	Departure Time	Aircraft	Comments
Philadelphia	3793	5:45 am	CRJ	
Philadelphia	3631	7:30 am	DH-8	
Philadelphia	4467	12:29 pm	DH-8	Except Sun





Philadelphia	4052	1:25 pm	CRJ	Except Sat
Philadelphia	4052	1:45 pm	CRJ	Sat Only
Philadelphia	3644	2:35 pm	CRJ	Except Sat & Sun
Philadelphia	4172	5:25 pm	DH-8	
Philadelphia	4599	8:05 pm	DH-8	Except Sat

Arrivals

Arriving From	Flight	Arrival Time	Aircraft	Comments
Philadelphia	4467	12:05 pm	DH-8	Except Sun
Philadelphia	4052	12:55 pm	CRJ	Sun Only
Philadelphia	4052	1:14 pm	CRJ	Except Sun
Philadelphia	3644	2:07 pm	CRJ	Except Sat & Sun
Philadelphia	4172	5:00 pm	DH-8	
Philadelphia	3978	7:35 pm	DH-8	Sat Only
Philadelphia	4599	7:40 pm	DH-8	Except Sat
Philadelphia	3796	10:26 pm	CRJ	
Philadelphia	3900	11:55 pm	DH-8	Except Sat

3.3.2 General Aviation Activity

The 2005 level of general aviation operations, at 13,957 annual operations, or 49.8% of total operations was the lowest at the airport since 1976. As mentioned previously; this decline may be attributable to BGM’s close proximity to Pennsylvania, a state with a more liberal GA legislative environment than New York State along with record high fuel prices across the country and particularly in New York where fuel taxes are among the nations highest. According to the TAF, GA activity in 2005 was comprised of 4,520 local operations and 9,437 itinerant operations. By definition, local operations are performed by aircraft that operate within the local traffic pattern or within sight of the airport. This designation can also be assigned to aircraft arriving or departing from local practice areas within 20 miles of the airport. In essence, local operations are associated with pilot training and recreational flying. Itinerant operations, on the other hand, travel to/from other airports and represent operations other than those associated with local operations.

According to the TAF and Airport Master Record (5010), there are 21 aircraft based at BGM currently. This number is low compared to data provided by airport management. Table 3.2 provides detail as per airport records on the general aviation aircraft currently based at BGM. Fourteen of these aircraft are hangared in Atlantic Aviation’s two conventional hangars. The remaining 12-based aircraft are stored in T-hangars. The total number is 26, which will be used as the basis during the forecasting process. It is not





unusual for the TAF to trail actual activity metrics.

Table 3.2: Based Aircraft Fleet Mix

Location	Single	Multi-	Jet	Total
Atlantic Aviation (Conventional) Hangar(s)	5	6	3	14
T-Hangar(s)	11	1	0	12
TOTAL	16	7	3	26

Source: Greater Binghamton Airport (Information Current as of February 1, 2007).

3.3.3 Other Aviation Activity

Other activity at BGM includes military operations. Current (2005) military use is infrequent accounting for approximately 1,566 annual operations or 5.6% of total operations according to the TAF. The number of military operations in 2005 appears high, as the average annual number of military operations at the airport since 1976 has been less than 2.5%. Military operations at BGM can be attributed to practice approaches conducted by the National Guard and Navy. According to the TAF, the number of operations can be further broken down into 587 local operations and 979 itinerant operations. For planning purposes, military operations are not of key importance at an airport such as BGM, which does not receive funding from military sources. The FAA will not fund more stringent design criteria if they are based solely on use by military aircraft. Planning criteria will be based on the most critical civilian aircraft conducting at least 500 operations annually.

3.4 INDUSTRY TRENDS

The aviation industry is international in scope, and its functioning is influenced by events and developments around the world. Aviation activity at BGM is influenced by local and national trends that sometimes have little to do with what is going on directly in the Greater Binghamton area. For this reason, knowledge of what is shaping the aviation demand landscape in the United States is important. This section primarily examines the commercial aviation sector and will cover 1) the increasing role of regional jets, 2) airline restructuring, and 3) FAA national aviation forecasts.

Regional Jet Aircraft

The development of the Regional Jets (RJ) has had a major impact on the way air services are provided in the United States, particularly at non-hub airports serving smaller markets. In generic terms, a regional jet includes any turbo-fan powered airplane seating 100





or fewer passengers. Among the originators of this type of aircraft was the Netherlands based Fokker Aircraft Company, which first produced the F-28 regional jet airliner in 1969, primarily for the European market. The F-28 seated from 65 to 85 passengers, and was joined by the Fokker 100 (seating 100) in 1988 and the Fokker 70 (seating 79) in 1994. Another early entrant was the Hawker Siddeley Company (later absorbed by British Aerospace), which produced the BAe 146 (a 70-seat aircraft) in 1983, with a larger version, the AvroRJ (seating 80) first produced in 1990. Currently, the RJ industry leaders in terms of deliveries are the Brazilian company Embraer, which produces the ERJ family of regional jets, and the Canadian firm, Bombardier Aerospace, which produces the CRJ (Canadair) family of regional jets. The popularity of the regional jet seemed to take off with the introduction of the smaller 50-seat models in the early 1990s as airlines attempted to “right-size” their routes and retain/provide jet service in these markets. The CRJ-100, a 50-seat airliner, was first produced in 1992, and the EMB-145, also with 50 seats, was first produced in 1996. Following up on the success of the 50-seat models, both Embraer and Bombardier have developed a series of larger models, seating up to 100 or more passengers. Additional information on the newest/largest Embraer and Canadair Regional Jet Aircraft can be found in Section 3.3, *Historical Aviation Activity* of this chapter. Recent aircraft delivery information for both Embraer and Bombardier can be found in Tables 3.3 and 3.4, respectively.

Deliveries by Segment*	4th Quarter 2006	2006
<i>Commercial Aviation</i>	25	98
ERJ 145	2	12
Embraer 170	6 (1)	32 (3)
Embraer 175	3 (1)	11 (1)
Embraer 190	12	40
Embraer 195	2	3
<i>Executive Aviation</i>	10	27
Legacy 600	9	26
Legacy Shuttle	1	1
<i>Defense and Government**</i>	2	5
Embraer 170	2	4
Embraer 190	--	1
TOTAL	37	130

* Units identified in parentheses were aircraft delivered under operating leases.
 ** Includes only deliveries of executive jets configured for transporting public authorities and aircraft delivered to state-run airlines.

Source: www.embraer.com





Table 3.4: Bombardier Aircraft Fiscal Year 2006/07 Deliveries		
Aircraft	Deliveries Fiscal Year 2006/07 (Year Ending Jan. 31, 2007)	Deliveries Fiscal Year 2005/06 (Year Ending Jan. 31, 2006)
Regional Aircraft		
CRJ200	1	36*
CRJ700/CRJ900	63	74*
Q100/200/300	17	12
Q400	31	16
Total Regional Aircraft	112	138
Business Aircraft		
Learjet 40/ 40 XR / Learjet 45 / 45 XR	52	55
Learjet 60	19	14
Challenger 300	55	52
Challenger 604 / Challenger 605	32	35
Challenger 800 Series	12	11*
Bombardier Global 5000 / Global Express XRS	42	30
Total Business Aircraft**	212**	197**
Amphibious Aircraft		
Bombardier 415	2	2
TOTAL	326	337
* For fiscal year 2005/06, 8 Challenger 850 corporate shuttles and 3 Challenger 870 shuttles have been reclassified to business aircraft. ** Deliveries detailed under Business aircraft include 15 aircraft sold to customers of the North American Bombardier Flexjet program in fiscal year 2006/07 and 14 aircraft sold to customers in fiscal year 2005/06. An aircraft delivery is included in the above table when the equivalent of 100% of the fractional shares of an aircraft model have been sold to external customers.		

Source: www.bombardier.com

As their name implies, the vast majority of RJs are operated by regional airlines, both independent companies affiliated with a Major/National, and partially or wholly owned subsidiaries of a Major. The 50-passenger capacity of the earlier more popular RJs makes them suitable for smaller markets served by regional carriers, and the airplanes provide operating economies for their operators, when used to replace larger aircraft on routes with low load factors or multiple flights by smaller turboprop aircraft. Perhaps most important to the RJs popularity, however, is the degree of customer acceptance they have achieved. It is





well known in the industry that many passengers do not prefer to fly turboprop airliners. Declining enplanements had been blamed on the willingness of passengers to travel to a nearby hub airport rather than take a connecting flight on a turboprop airplane that was perceived as a less desirable means of transportation. Introduction of regional jet service allowed non-hub airports to advertise jet service on new aircraft that were faster and more comfortable, and passenger enplanements on the shorter routes increased. Over the last several years, RJs have filled a number of roles in the airlines' route structures including:

- *Turboprop Replacement* - Some markets have outgrown 30-seat aircraft during peak periods. RJs permit incremental increases in capacity through use of 40, 50 and 70 seat aircraft as the demand warrants. In addition, the greater customer acceptance of RJs results in increased enplanements directly attributable to the change in equipment.
- *Large Jet Replacement* - Carriers that cannot profitably operate larger 100+ seat aircraft in multiple daily nonstop frequencies find that RJs offer the ability to “right-size” equipment to the route. Larger aircraft are replaced with RJs operated either by the Major/National carrier or by a regional affiliate.
- *Off-peak Scheduling* - RJ's can be used in scheduling off-peak periods of the day or week as appropriate to the smaller size of the aircraft.
- *Hub Extension* - RJ's provide significantly longer-range capability relative to turboprop aircraft and can serve to comfortably extend the reach of low-density markets to a carrier's hub.
- *Point-to-Point (Hub Bypass)* - There are some low-density markets that will support point-to-point non-stop service with RJ's. Traditionally, these markets have been joined through hub-and-spoke routings.

The regional jet has had a major impact on non-hub airports such as BGM. Lower density markets can be served with jet aircraft, which has been viewed positively by the traveling public. To date it appears that service to existing destinations via RJs has increased enplanements. In addition, each of the four airlines currently operating at BGM provides direct service to one of their hub airports. Northwest's hub cities include Detroit, Michigan (with direct service from BGM), Memphis, Tennessee, Minneapolis/St. Paul, Minnesota, and Tokyo, Japan (Narita). Northwest, which is based in Minneapolis, serves 750 destinations in 120 countries. United Air Lines hubs include Washington Dulles (with direct service from BGM), Chicago, Illinois, Denver, Colorado, and Los Angeles and San Francisco, California. United serves 119 destinations throughout 26 counties. US Airways hubs include Philadelphia, Pennsylvania (with direct service from BGM), Pittsburgh, Pennsylvania, at





which operations have been significantly reduced, and Charlotte, North Carolina. Since their merger with America West in 2005, additional hub cities include former America West hubs in Phoenix, Arizona and Las Vegas, Nevada. Prior to the merger, US Airways served 77 destinations throughout the United States, Europe, Canada, Mexico and the Caribbean and America West provided service to approximately 100 destinations in the United States, Canada, and Mexico with service to Europe and Hawaii provided through a code-sharing arrangement. After the merger it was expected that the airlines would maintain almost all of the routes that they operated separately and expand to more international destinations, especially in Asia.² Delta's major hubs are located in Atlanta, Georgia (with direct service from BGM), Cincinnati, Ohio, Dallas/Ft. Worth, Texas, and Salt Lake City, Utah. Delta serves 494 destinations in 86 countries.

A total of five major hub cities are serviced by the airlines operating at BGM. A traveler departing on any one of the flights offered has the ability to connect to virtually anywhere in the world from any of these hub cities. The ability of BGM passengers to connect to international flights became even greater with the commencement of service to JFK in May 2007.

Airline Restructuring

The airline industry is one of the most fluid and dynamic sectors of the national economy. Restructuring has been a continuing process since the industry's infancy, with the Airline Deregulation Act of 1978 serving as additional fuel for the restructuring. The industry restructuring at that time addressed the problems of excess capacity and low profit margins on some routes, and resulted in fare reductions and increasing enplanements as airlines fought to increase their market share. The number of airlines decreased, as some were better able to adapt to the changing conditions and those that did not were acquired by more successful companies or went out of business. A subsequent wave of restructuring has been due to the impact of the so-called "low-fare carriers" into the market. Airlines such as Southwest Airlines, AirTran (formerly ValuJet), and Jet Blue have been very successful through a combination of "no-frills" service and operational efficiencies that permit them to provide service on selected routes at consistently low prices while making a profit. These airlines typically offer "point to point" service using large narrow-bodied jetliners rather than the traditional "hub and spoke" network structure. In response, the "Main Line" Major/National carriers have restructured in an attempt to reduce their costs to the levels achieved by the most efficient airlines. The restructuring has included route realignments, reducing service or withdrawing from unprofitable hubs, seeking work rule changes and wage concessions, purchasing more efficient aircraft, increasing productivity and in some cases starting competing "low-fare" versions of the legacy carriers such as Ted (United) and

² http://www.airlinebulletin.com/america_west/index.html (Accessed: 3/2/07)





Song (Delta).

The regional jet has played a large part in the airlines' response to the financial challenges over the last decade. By the mid-1990s airlines were "right-sizing" their equipment to their routes, replacing 130-seat jetliners with 50-seat RJs when passenger load factors were low. As enplanements on these routes increase, the smaller RJs will be replaced in turn by larger RJs, and even narrow-body jetliners, with lower seat mile costs as long as the available seats can be reasonably filled. Another potential cost saving pursued by the airlines with increasing aggressiveness since 2001 has been the reduction in labor costs that RJs can provide. Pilots for most of the major airlines are represented by the Airline Pilots Association (ALPA). Their contracts with the major airlines include provisions (scope clauses) relating to the airline's use of regional jets, and the compensation of the pilots who fly them. Because pilot compensation is usually proportional to the size of the aircraft being flown, pilots who fly RJs are typically paid less than those who fly larger jetliners. Historically, these union contracts limited the number of RJs an airline could operate in the interest of pilot job security and safety (until 2001, regional airlines operated under a different set of Federal regulations which were less stringent than those that governed the major carriers). In response, many airlines transferred unprofitable routes to regional airlines, which can be often independent companies or wholly owned subsidiaries. The regional affiliate, operating smaller aircraft and subject to lower labor costs (often the result of a non-unionized work force), can operate the route at a profit and benefit its Major/National partner by feeding passengers into connecting flights at the airline's hub. With the relaxation of scope clauses in the United States and Europe, demand for new jet aircraft in the 20 to 59-seat category is decreasing.

This restructuring has been accelerated by financial stress on the airline industry beginning in the late 1990's and into 2000. Due to heightened concerns on the part of the general public about aviation safety, and the implementation of new aviation security procedures, enplanements declined dramatically after September 2001 through most of 2004. Other international events such as an outbreak of Severe Acute Respiratory Syndrome (SARS) in Asia, and the US invasion of Iraq during this period also served to depress the public's desire to travel by air. However, at the end of 2005, there was some positive news as commercial air carrier enplanements exceeded pre-September 11th, 2001 levels by 5.9% while revenue passenger miles (RPMs) were 11.6% higher than in 2000. The system-wide load factor increased 1.9 points to 77.1% in 2005, an all-time high.³

The rising world price of oil, and of aviation fuel, has been a cause of financial stress on the industry. From a historical average (from 1985) price of about \$20 per barrel, and a temporary low of \$10 per barrel in 1999, the price of oil has climbed steeply. From a price of

³ FAA Aerospace Forecasts Fiscal Years 2006-2017





around \$25 per barrel in 2003, the price has more than doubled to \$58 per barrel in early 2007. The rise in fuel has had a huge impact on the financial health of the aviation industry. Based on financial data compiled by International Civil Aviation Organization (ICAO), since 2000, world airlines have incurred cumulative operating losses of \$14.7 billion and net losses of \$36.1 billion.

At the end of 2005, three legacy carriers, Delta, Northwest, and United were operating under Chapter 11 bankruptcy protection. Although record high fuel costs and airline restructuring kept many airlines in “the red” in 2005 positive gains in passenger traffic did occur. Throughout 2006 the industry continued to see an increase in passenger traffic and cost saving measures began to improve the financial outlook at many of the legacy carriers. United Air Lines emerged from bankruptcy protection on February 1, 2006. At the end of 2006, both Delta and Northwest remained under bankruptcy protection. However, both airlines have since exited Chapter 11. Delta Air Lines emerged from Chapter 11 on April 30, 2007, with Northwest following shortly after on May 31, 2007.

Financial troubles that plagued some of the major carriers also affected their regional affiliates. This is especially true of Mesaba Airlines a regional subsidiary of Northwest, and Comair, a regional subsidiary of Delta. MAIR Holdings, Inc., whose primary business units are its regional airline subsidiary Mesaba Aviation Inc., d/b/a Mesaba Airlines, and its regional airline subsidiary Big Sky Transportation Co., d/b/a Big Sky Airlines, reported in its 2006 annual report that Northwest’s missed payments to Mesaba and changes to Mesaba’s fleet resulted in Mesaba filing for bankruptcy protection on October 13, 2005. Mesaba officially exited Chapter 11 bankruptcy protection on April 22, 2007 and became a wholly owned subsidiary of Northwest Airlines.⁴ Comair emerged from bankruptcy protection shortly after on April 30, 2007 along with Delta Air Lines. Comair’s fate with Delta has yet to be decided, although a decision is to be made by the airline as to whether or not they will sell off the regional carrier.

With United, Delta, and Northwest out of bankruptcy protection, things seem to be improving in the airline industry. There were strong increases in the last quarter of 2006 and the demand environment remains positive for 2007. According to the International Air Transport Association’s (IATA) business confidence index, airlines are increasingly confident that improvements in profitability can be sustained into 2007. Three-quarters of respondents expect profitability to improve in 2007, with only five percent expecting to see a deterioration. Increased confidence in future profitability is linked to the fall of more than 25 percent in oil prices since August 2006, and is boosted by further demand growth and by greater airline efficiency improvements.⁵

4 <http://usatoday.com> (Accessed: 6/13/07)

5 <http://www.sundaytimes.lk/070211/financialtimes/ft316.html> (Accessed: 3/2/07)





National Forecasts

The FAA has an entire division dedicated to aviation forecasting. This division prepares national forecasts of aviation activity for several sectors of the industry. These are based on assumptions as to future short term and long term national and international economic activity, oil prices, foreign exchange rates, and anticipated industry restructuring, including changes in equipment. These forecasts serve as a basis for estimating FAA workload, and also assist in achieving some level of consistency among forecasts for sub-areas, such as FAA Regions, states and ultimately, individual airports. For commercial carriers, the specific forecast elements include revenue passenger enplanements, revenue passenger miles, percent load factors, and available seat miles. These forecasts are separated into (in the 2005 report) mainline and regional carriers.

There were 523.1 million mainline domestic enplanements in 2005. This represents a 4% increase in enplanements over 2004. According to the FAA's Aerospace Forecasts, domestic mainline enplanements are forecast to decrease by 1.0% in 2006 to 517.9 million, but then increase by 3.1% in 2007 to 533.7 million. By the end of the forecast period in 2017, mainline enplanements are expected to be at a high of 707.1 million. The passenger load factor, which reached an all time high of 77.3% in 2005, is forecast to increase slowly to 78.6% by 2017. According to the FAA's forecasts, domestic aircraft size declined in 2005 by 1.3 seats to 120.4. Aircraft size was forecast to shrink in 2006 and 2007 dropping by 1.4 and 0.6 seats, respectively. After 2007, aircraft size is projected to continue its decline until bottoming out in 2011 at 117.7. After 2011, seats per aircraft mile climb gradually, reaching 119.2 in 2017. The short-term decline in aircraft size is attributed to the decrease in the legacy carrier fleet of larger aircraft as well as an increase in smaller aircraft flying longer distances.

For the regional carriers, the FAA forecasts strong growth in the short term, moderating slightly over the long term but, overall, growing much faster than the mainline carriers. The very high percentage growth in domestic regional enplanements (17% from 2004 to 2005) was expected to slowdown dramatically to 2.8% in 2006, but then forecast to increase to 5.9% in 2007 before leveling off to between 4% - 4.5% annually through 2017. Passenger load factors for the regional carriers are forecast to increase slightly for each year that was forecast, from 71.6% in 2006 to 75.2% by 2017.

The higher percentage increase in regional enplanements than mainline enplanements over the forecasting period may be attributable to the fact that mainline carriers have been reducing the size of aircraft flown domestically, while regional carriers have been increasing the size of their aircraft. The most visible example of this trend is the wave of 70-90 seat





regional jets entering the fleet with the continuing relaxation of scope clauses. Regional carriers are better able to support operations on their mainline partners when they can provide capacity that complements market demand. The greater number of 70 and 90 seat regional jets increases the average seating capacity of the regional fleet from 49.9 seats in 2005 to 55.1 seats in 2017. The changing aircraft fleet mix is narrowing the gap between the size and aircraft types operated by the mainline and regional carriers.⁶

Table 3.5 presents a summary of the forecast of scheduled domestic passenger traffic for both the mainline and regional carriers for the years 2006 through 2017.

Table 3.5: U. S. Air Carriers – Scheduled Domestic Passenger Traffic Forecast				
	Revenue Passenger Enplanements (Millions)		Passenger Load Factor	
Year	Mainline Carriers (% increase)	Regional Carriers (% increase)	Mainline Carriers	Regional Carriers
2005	523.1	146.7	77.3%	69.8%
Forecast				
2006	517.9 (-1.0%)	150.8 (2.8%)	77.9%	71.6%
2007	533.7 (3.1%)	159.7 (5.9%)	78.0%	72.1%
2008	547.8 (2.6%)	166.0 (3.9%)	78.0%	72.5%
2009	562.3 (2.6%)	173.5 (4.5%)	78.0%	72.9%
2010	577.7 (2.7%)	181.2 (4.4%)	78.0%	73.3%
2011	593.6 (2.8%)	189.1 (4.4%)	78.1%	73.6%
2012	610.4 (2.8%)	197.2 (4.3%)	78.1%	73.9%
2013	627.8 (2.9%)	205.6 (4.3%)	78.2%	74.2%
2014	646.3 (2.9%)	214.2 (4.2%)	78.3%	74.5%
2015	665.3 (2.9%)	223.1 (4.2%)	78.4%	74.7%
2016	685.5 (3.0%)	232.1 (4.0%)	78.5%	75.0%
2017	707.1 (3.2%)	241.4 (4.0%)	78.6%	75.2%

Source: FAA Aerospace Forecasts FY 2006-2017

3.5 REGIONAL TRENDS

Within the framework of the airline industry as a whole, this report will now consider the local conditions that will impact the level of aviation activity at BGM. The population, the income level of the residents, and the type of economic activity in Broome County will be important variables that may influence future activity.

⁶ FAA Aerospace Forecast Fiscal Years 2006-2017





Regional Demographics

Population and income statistics are collected by the US Census Bureau every ten years, and estimates are made from time to time during the interim years. Historic data (by decade) on population is available for Broome County from 1900. In 1900 the population of Broome County was at its lowest, 69,149. The population rose each decade through 1970 when the population was at its highest with 221,815 people. Beginning with the 1980 census, the population began to slowly decline with a total of 213,648 people in 1980, 212,160 people in 1990 and 200,536 people in 2000. Current (2006) data indicates that the existing population is 196,269.⁷ It should be noted that the percent change in population from 2005 to 2006 was -0.1%, which is the lowest negative change in population Broome County has experienced since 2002 which also saw a -0.1% change from the previous year.

The Bureau of Economic Analysis (U.S. Department of Commerce) computes per capita personal income (PCPI) using Census Bureau midyear population estimates. The most recent year of available data is represented by 2005. In 2005, PCPI in Broome County was \$29,119. This represents an increase over the two previous years. According to the Bureau of Economic Analysis, in 2003 PCPI in Broome County was \$26,108 and in 2004 it was \$27,838.

According to the January 2006 addition of *Employment in New York State*, a publication of the New York State Department of Labor, private sector employment in the Southern Tier rose approximately 0.4 percent, to 256,600 over the 12-month period ending in November 2005. The largest job gains were in educational and health services (+600), professional and business services (+500), and trade, transportation and utilities (+500). Losses were concentrated in manufacturing (-700) and natural resources, mining and construction (-300).

In January 2005, Lockheed Martin was awarded a \$6.1 billion contract to build the US 101 presidential helicopter replacement fleet. Lockheed Martin located in Owego, New York (Tioga County) hired 700+ people to ramp up for the presidential helicopter project. These jobs are generally high-paying engineering and manufacturing type positions.

Evidence of Lockheed Martin's growth has also directly impacted BGM. Lockheed Martin has recently signed a five-year agreement for Hangar No. 1. Lockheed Martin will be utilizing the facility for their "Flying Test Bed" program for advanced technologies and integrated systems. Renovations are underway to the 28,000 square foot facility.

In addition to the gains at Lockheed Martin other evidence of a rebound in the local

⁷ <http://recenter.tamu.edu>





economy has emerged. According to the New York State Department of Labor, several new projects/initiatives are planned for Broome County in the near future. Some of the more notable are highlighted in the following bulleted list.

- Wal-Mart plans to open a super center in Johnson City. Construction is expected to begin in spring 2008 with a grand opening in fall 2008 or spring 2009. The store will employ approximately 300 people.
- BAE Systems Solutions, manufacturer of search, navigation, and detection equipment plans to create 125 high-paying engineering, program management and marketing jobs at its Westover facility by July 2008.
- CMP Advanced Mechanical Solutions, which acquired Universal Instruments' less than one year ago announced that they will invest more than \$5 million and add approximately 50 jobs to its existing 75-person workforce in Binghamton over the next three years. Universal Instruments lost approximately 600 employees (half of its workforce in the region) since 2000.
- Maines Paper and Food Services received approval to build a 76,655 square-foot distribution facility in Conklin. This facility could employ more than 200.
- Nationwide Credit, which runs an accounts receivable call center in Vestal received a five-year contract for debt-collection work. This contract will result in the creation of 455 local jobs over the next three years. Two months before receiving this contract, 211 employees were laid off after losing a contract with MCI.
- The State of New York is considering spending \$50 to \$60 million to construct a science and engineering building at Binghamton University. If constructed, an additional 300 students could enroll in the University.
- Governor Pataki unveiled the final design plans for the \$29 million *Binghamton University Education and Community Development Center*. The 72,900 square-foot facility will house programs for Binghamton University and Broome County Community College and it is expected that 3,500 students will visit downtown Binghamton weekly as a result. The increase in student and faculty traffic is seen as an "economic boon to the downtown area".

In addition to this economic activity in Broome County; it should be noted that the percentage of travelers utilizing BGM from outside Broome County is on the rise. In 2000, approximately 12% of enplaning passengers were from outside Broome County as compared to current trends, which indicate that approximately 22% to 24% of enplaning passengers are from outside of Broome County. These travelers are primarily coming from Tioga,





Delaware, Chenango, Cortland, and Tompkins Counties in New York and Bradford and Susquehanna Counties in Pennsylvania according to airport research. The airport has been actively marketing these areas through the use of billboards and other mediums.

3.6 AVIATION FORECASTS

The numerous forecast elements defined in Section 3.2 will be developed into two groups 1) airline related elements and 2) general aviation elements. The general methodologies used in preparing the forecasts are described below, with more detail being provided in the individual sections.

3.6.1 Methodology

Forecasting future events, whether they be aviation demand or future economic performance, is characterized by both a mathematical approach, and the application of judgment resulting from a knowledge of industry and market conditions. The primary mathematical forecasting techniques used in this report are Market Share Analysis, and Trend Analysis. The results of these models are supplemented and adjusted as appropriate to arrive at a reasonable expectation of actual activity. The final forecasts need to adequately consider the potential level of activity in order for facilities to be in place to accommodate demand when it occurs, but also need to be conservative enough so that unnecessary improvements are not undertaken. Some but not all improvements will be demand driven.

Market Share Projection

Market share projections are based on the assumption that the amount of activity at an individual airport or region is proportional to that of a larger region of which it is a part. These projections are developed by calculating the historical proportion of some aviation activity measure (the “market share”), and projecting this market share into the future. Market share projections reflect historical trends and may include static (in which the market share remains constant over time) or dynamic (in which the market share increases or decreases). This method of projection reflects demand based upon trends occurring in the larger region, and is particularly useful when there are available forecasts for the larger region. In this report, FAA Terminal Area Forecasts (TAF) for the Eastern Region and the entire U.S. will be used.

Trend Analysis

Trend projections are based on the assumption that the historical trend of aviation activity is a good predictor of future activity. For this study, two trend analysis methods were used to project future aviation activity - linear trending and exponential smoothing.





The linear trending projections were further divided between “straight line” linear trending and dynamic trending. These methods use aviation activity regressed against time to produce a projection. Straight line linear trending sometimes referred to as “least squares” linear trending is often used with simple linear data sets to estimate the maximum likelihood that a data set could have occurred. Data is considered linear if the pattern in its data points resembles a line. Typically, a linear trend line shows that something is generally increasing or decreasing at a steady rate. Dynamic trending uses these same principles but introduces outside variables into the trend analysis. This process is further described in the forecast itself. No assumptions about the causes of trends are included in the trending methodology.

The exponential smoothing process produces projections by combining the forecast for the previous period with an adjustment for past errors. It is desirable to correct for past errors when the error results from changes in the trend. In such cases, correcting for past errors can put the forecast back on track. Exponential smoothing is appropriate when the time series contains a linear trend. It functions by calculating two smoothed series - a single and a double smoothed value. Both will lag behind any trend. However, the difference between them indicates the size of the trend. This difference is used to adjust the forecast for the trend.

3.6.2 Commercial Service Demand Forecasts

The principal variable upon which the forecasts of airline related activity will be based is the number of annual enplanements. Once that has been forecast, the number of departures, and operations, will be forecast on the basis of assumptions regarding the seating capacity of the aircraft providing service, and the expected load factors.

Airline Enplanement Forecast

Because of its importance in the overall master planning process, the projections of airline enplanements used several different methodologies to determine if consistent trends evolved. As noted previously; methods used in the forecasting process included:

- Market Share
 - Percentage of Domestic Enplanements (United States)
 - Percentage of Regional Enplanements (Eastern Region)
- Trend Analysis
 - Linear Trending
 - Straight Line
 - Dynamic
 - Double Exponential Smoothing





Because the definitions of air carrier and regional enplanements have changed, and BGM currently has service only by regional airlines, the combined enplanements figures will be used in this forecast.

Market Share Projections

The historical enplanement numbers at BGM were compared to the historical enplanement numbers in the United States and Eastern Region to determine the BGM market share. This enplanement market share at BGM has declined as a percent of both U.S. and Eastern Region enplanement totals. The BGM market share of U.S. enplanements dropped from 0.04% in 1976 to 0.02% in 2005, and the market share of Eastern Region enplanements went from 0.23% to 0.11% during the same period. This trend indicates that enplanement growth occurring at BGM has not kept pace with other parts of the nation. The historical factors that have created this slow growth, such as air service quality and price, the local business climate, etc., are not identified by the market share forecasting method - only the resulting historical market share trends. While the static market share is based upon maintaining a particular share of the market; the dynamic market share can be adjusted based upon local/regional/industry trends and experienced professional judgment and site-specific conditions.

To obtain a forecast, the BGM market shares were applied to the FAA 2005 forecasts of total U.S. and Eastern Region enplanements. The constant market share was calculated based upon the last year of available data (0.02% and 0.11% respectively), and carried forward into the future. This static market share was applied to both FAA forecasts. The dynamic market share was applied only to the Regional forecast because Eastern Region activity is felt to be more representative of BGM activity. Based upon historic enplanements at BGM relative to the Eastern Region; a declining market share was assumed. However, because BGM service is entirely via regional carriers, and that segment of the industry is expected to increase their enplanements very rapidly over the forecast period, the BGM market share of all Eastern Region enplanements is expected to be stronger than in the past. Table 3.6 presents the market share projections of airline enplanement demand for BGM.

Trend Projections

Trend projections use historical enplanement data to formulate predictions of future activity. For this study, two trend analysis methods were used to project airline enplanement activity; linear trending (including straight line and dynamic) and exponential smoothing. As discussed previously, trend projections use aviation activity regressed against time to produce projections based upon historic data. The straight line linear trend shows a slow and steady increase in forecast enplanements; from 144,922 forecast enplanements in 2006 to 149,021





forecast enplanements in 2025. However, the dramatic increase from actual enplanements in 2005 (127,719) to the number forecast for 2006 (149,021) appears to be an anomaly. To adjust for this anomaly in 2006 a dynamic trend was analyzed. The FAA’s TAF shows a decrease in enplanements from 2005 (127,719) to 2006 (116,988). Unlike the linear trend which forecasts a large increase in enplanements from 2005 to 2006; the dynamic trend, like the TAF shows a decrease from 2005 (127,719) to 2006 (122,837). This decrease is less substantial than the decrease forecast by the FAA and appears appropriate based upon the 29 years of available historic data and based on professional judgment, which indicates that the recovery in enplanements will occur at a faster pace than indicated by the TAF. The exponential smoothing trend shows a decrease in enplanements throughout the planning period from 127,719 actual enplanements in 2005 to 124,721 enplanements forecast by the end of the planning period. Based on historic trends at the airport, the anticipated introduction of larger regional jets at the airport, and the addition of destinations such as JFK, this downward trend in enplanements does not appear logical at BGM.

Table 3.6 presents a summary of trend projections of enplanements and resulting statistics.

Table 3.6 - Forecasts of BGM Enplanements				
PROJECTION/FORECAST	2005*	2010	2015	2025
MARKET SHARE				
U.S. Domestic (Constant Share)	127,719	147,864	170,515	227,562
Eastern Region (Constant Share)	127,719	146,681	169,157	227,829
Eastern Region (Dynamic Share)	127,719	118,966	105,235	55,641
TREND ANALYSIS				
Linear Trend (Straight Line)	127,719	145,785	146,864	149,021
Dynamic Trend	127,719	130,180	137,639	148,317
Exponential Smoothing	127,719	124,274	124,423	124,721
DERIVED PROJECTIONS				
High/Low Average	127,719	133,415	137,875	141,735
Multi-Average	127,719	135,625	142,305	155,515
PREFERRED FORECAST	127,719	130,180	137,639	148,317

* Actual





Selection of Preferred Enplanement Forecast

Table 3.6 presents a summary of all of the projections of airline enplanement demand at BGM. As shown, there is a fairly wide range in the projection numbers; however using derived projections a consensus between these projections is sought.

The selected forecast considered each of the eight projections as a possible forecast for BGM enplanements however; the market share projections did not produce viable forecasts with the constant share projections being overly optimistic and the dynamic too low.

The Dynamic Trend Analysis was selected as the preferred forecast. The high-low average also came up with reasonable estimate however the highs and lows were very extreme; therefore this method was not chosen as the preferred. When compared to the FAA's TAF, the preferred forecast trends similarly with slightly higher results. A comparison is provided at the end of this chapter in Table 3.18. As BGM continues to add flights to desirable destinations and hub airports such as JFK and market new and existing service in the community, enplanements should increase at a pace slightly higher than indicated by the TAF, which does not account for such variables. In addition, airlines are starting to recover and invest money in new routes. Figure 3-1 displays a visual representation of each of the eight forecasts of enplanements.

Airline Operations Forecast

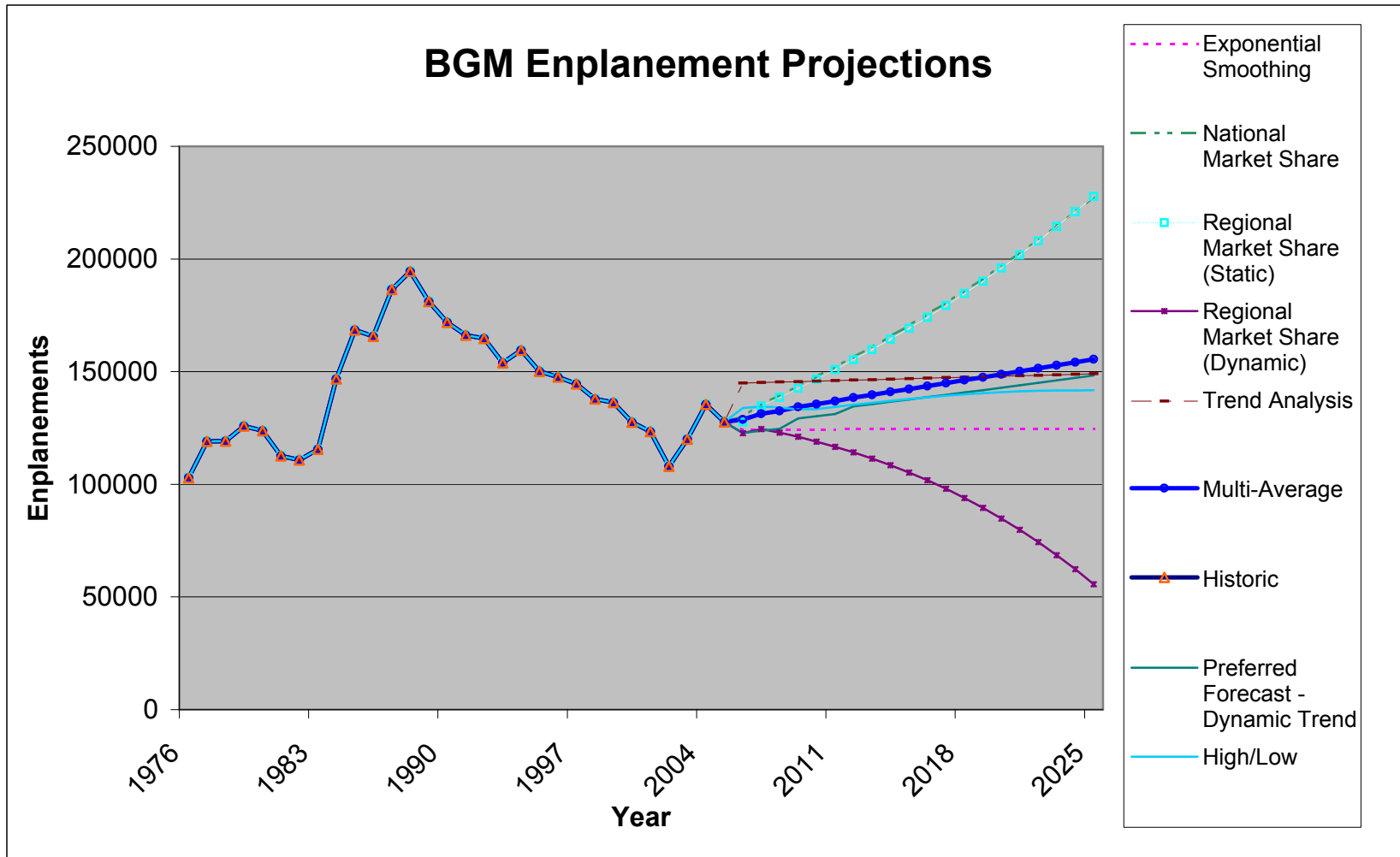
The forecast of annual airline operations is derived from the forecast of annual enplaned passengers, each operation consisting of one takeoff or landing. The methodology used consisted of the following steps:

- Determine the historical ratio of enplaned passengers to airline departures for both the major/national carriers and the regional carriers ((enplanements/operations) times 2);
- Project changes in the enplaned passengers per departure ratio for the planning period for each component of demand;
- Apply the projected enplaned passengers per departure ratios to the forecasts of annual enplaned passengers to calculate airline operations, ((enplanements/enplanements per departure) times 2).

The key component of the forecast, therefore, is the projection of a reasonable enplanement per departure ratio. In this regard, the historical records can provide insight into



Graph 3.1: BGM Enplanement Projections





the long-term trends at BGM. Historical records show that the ratios vary wildly for air carrier and regional operations. Between 1976 and 2001, air carriers averaged 50.3 passengers per departure, while the regional carriers averaged only 7.3 passengers per departure. The combined ratio, however, considering all departures and all enplanements from 1976 through 2005, indicates a clear upward trend in the number of passengers per departure. As illustrated in Figure 3-2, the ratio has been as low as 7.4 in 1981 and as high as 20.4 in 2005. The increase in the last several years is likely attributed to changes in equipment and the change in routes offered by airlines at the airport.

For the future, it was assumed that the enplanements per departure ratio would continue to increase. Growth in enplanements over the near term is expected to be the result of service to additional non-stop desirable destinations in the northeast and increases in the number of flights to current successful routes. In the short term, these routes are expected to be served by the same type of aircraft that are now operating at BGM. Although continuing use of smaller turboprops will continue to keep the enplanements per departure similar to current figures, some growth in the enplanement/departure ratio is expected to be a result of service to more distant hubs on the larger regional jets that are coming into service. These aircraft are designed to carry from 70 to 90 passengers, and the carriers will require an increase in passengers per departure for continuing service to be viable.

The passengers per departure ratio is a combination of two elements of the FAA's Aerospace Forecast: Average Aircraft Size and Passenger Load Factor. The FAA's forecast anticipates that the average number of seats for the domestic regional air carrier fleet will increase by 0.64 seats per year over the planning period. Because BGM is a relatively small market, the influx of larger regional jets, where most of this growth will come from, is expected to be delayed relative to larger markets throughout the U.S. The nationwide load factor (percentage of seats that are occupied by passengers boarding regional air carrier aircraft) is also expected to increase – by about 2% over the planning period. Finally, routes currently being served by smaller turboprop aircraft, particularly the United Express service to Dulles on the 34-seat Saab 340 are expected to be upgraded to larger aircraft within the forecast period. For these reasons, the ratio of passengers per departure at BGM is projected to increase at a rate of approximately 0.5% per year over the first 10 years and approximately 1% per year for the remainder of the planning period. That increase will result in the following ratios, which will be used for the forecast of air carrier operations at BGM:



Graph 3.2: Historic Enplanements per Departure

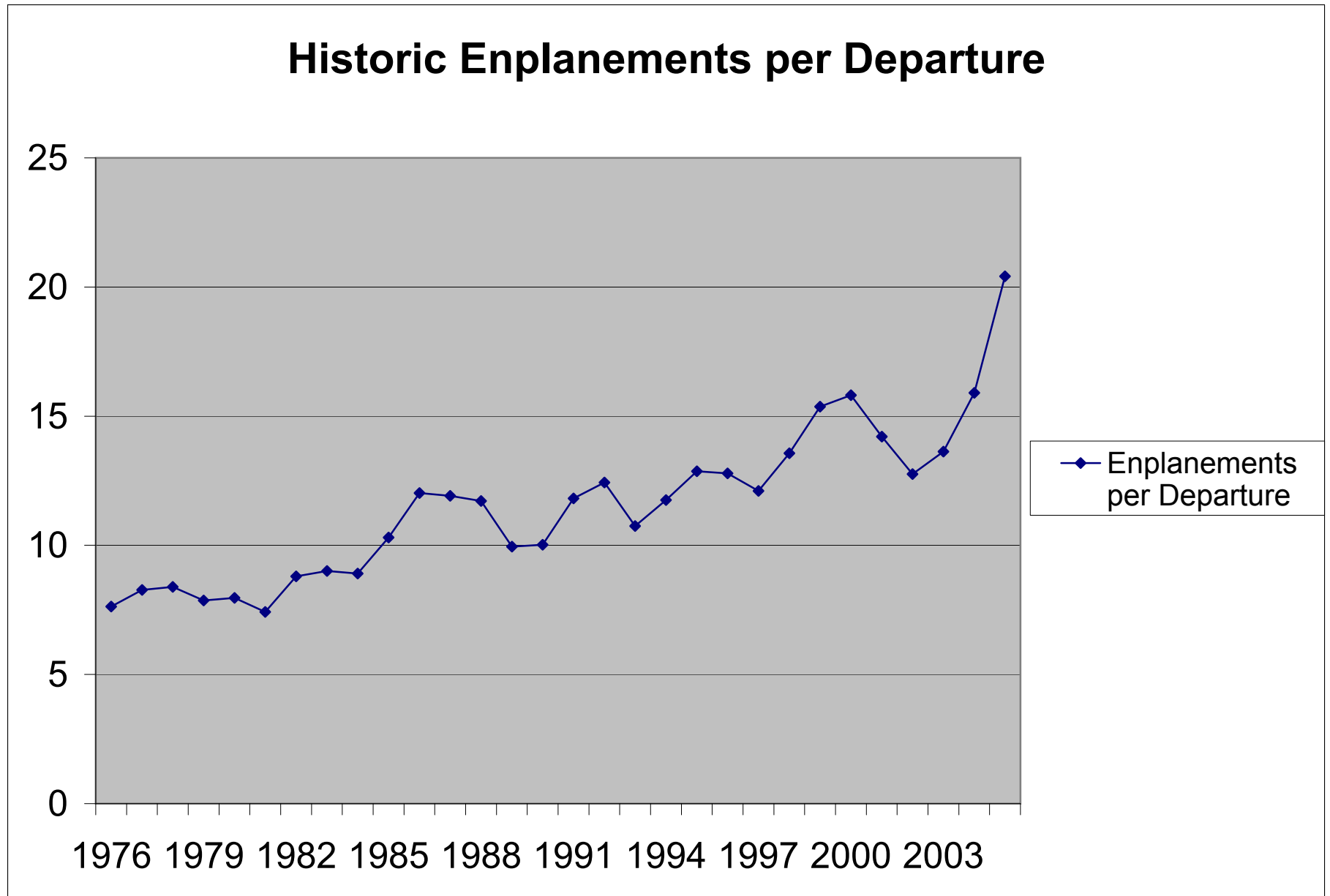




Table 3.7 - Forecast of BGM Airline Operations			
Year	Total Airline Enplanements	Average Passengers / Departure	Total Airline Operations
2005	127,719*	20.4	12,514*
2010	130,180	20.9	12,441
2015	137,639	21.5	12,830
2025	148,317	23.7	12,516

* Actual

As illustrated in Table 3.7 *Forecast of BGM Airline Operations*, the total number of airline operations will remain flat over the planning period, the number of average passengers per departure will increase. This trend is consistent with industry trends, lagging behind slightly due to the characteristics of the area.

Peak Period Airline Activity

Airline activity is subject to peak period movements. At non-hub airports such as BGM, this is typically due to the scheduling of flights to hub airports in order to connect with continuing flights to passengers’ final destinations. Based on the current (June 2007) operating schedule at BGM, peak departures typically occur within the first two hours of the morning. Between 5:45 am and 7:30 am there are five daily departures. Based on the same flight schedule, peak arrivals occur in last hour and a half of the day. Between 10:26 pm and 11:55 pm there are four arrivals. It should be noted that on Saturdays, this number is reduced to two arrivals. Measures of this activity include peak hour operations and peak hour enplanements. These indicators are used by airport planners to evaluate the adequacy of the airfield layout, terminal building, and parking facilities. Because airline operations are scheduled, it is easier to track peak period activity than similar measures for general aviation activity. Discussed below are the methods used to forecast peak period airline activity, along with the forecasts themselves.

Airline peak hour operations are defined as the highest number of operations to occur during any one hour in any one calendar year. For this study, historical air carrier and air taxi records, supplied by airport management, from 1996 through 2005 were examined, and it was determined that monthly percentages of operations are quite consistent throughout the year. For the ten-year period that was analyzed, the monthly percentage of operations ranged from 8% to 9%. On average, 8% of annual operations occurred in January, February, June, August, September, November and December. While an average of 9% of annual operations occurred in the remaining months, March, April, May, July and October. Over the last ten





years, the number of average monthly operations has dropped from 1,955 in 1996, to 1,018 in 2005. The highest number of operations occurred in 1996 (23,463) followed closely by 1997 (23,436). The highest number of monthly operations throughout the 10-year period occurred in either of two years. Five of the months (January, February, March, April, June) with the most amount of operations occurred in 1997, with the remaining seven months (May, July, August, September, October, November, December) with the highest number of operations occurring in 1996. The historical peak month is October of 1996 with 2,118 operations (9% of 1996 annual operations). The 2005 peak month occurred in May, with 1,091 operations (9% of 2005 annual operations). This report will use the historic peak month average of 9%, which is the same as the 2005 peak month to project future peak month activity.

Future operations on the average day during the peak month were estimated by dividing peak month operations by 30. To forecast the peak hour, the current airline schedule was analyzed. According to the June 2007 schedule there are 16 departures on Monday, Thursday, and Friday and 15 departures on Tuesday and Wednesday. According to the same schedule, there are 16 arrivals Monday, Thursday and Friday and 15 arrivals on Tuesday and Wednesday for a total of approximately 31 operations. The busiest time for operations is during the first two hours of the day and during the last hour and a half of the day. There are five operations during the first two hours and four arrivals during the last hour and half. For the purposes of this report, the peak hour will be defined as 5:45 am to 6:45 am during which time there are four departures. Based on the total number of daily airline operations (31) the four operations conducted during peak hour (5:45 am to 6:45 am) accounts for 13% of daily airline operations. Using the 13% average and the actual number of peak month operations (1,091) in 2005 there are five peak hour operations shown in Table 3.8 for 2005. Although the current airline-operating schedule accounts for four operations during the peak hour, schedules are dynamic, changing often and using the average percentage (13%) to determine 2005 peak hour operations appears appropriate. The number of peak hour operations remains constant throughout the 20-year planning period. Table 3.8 presents the forecast of peak month, day, and hour airline operations.

Table 3.8 - Peak Period Airline Operations			
Year	Peak Month Operations	Average Day of Peak Month	Peak Hour Operations
2005*	1,091	36	5
2010	1,120	37	5
2015	1,155	39	5
2025	1,126	38	5

* Historical peak month operations taken from airport records. Peak hour is derived, not actual.





Peak Hour Airline Enplanements

Peak hour airline enplanements are defined as the number of enplanements during the busiest one-hour period in a calendar year. Estimating the future peak hour is accomplished using inputs already generated by peak-hour airline operations methodology. The peak hour departures times the peak number of enplanements per departure will yield peak hour enplanements. For this analysis, the most recent (June 2007) airline schedule was reviewed to determine arrival and departure times, and the available seats on the arriving and departing aircraft. Airline load factor statistics were reviewed and airport management was interviewed to determine an appropriate estimate for the peak hour load factors. Based upon this information it was determined that the airport has an average load factor of approximately 65%, with the highest load factors on the most popular flights during the spring and summer months increasing to the low 80% range. For the purposes of this forecast, a peak load factor of 82% was used.

The airline schedule indicates that the peak period for departures occurs during the first two hours of the day, between 5:45 am and 7:30 am, with the peak hour being between 5:45 am and 6:45 am. Four flights are scheduled for departure during this hour. Each of the four airlines operating at the airport has a departure scheduled during this time period. Based on their current equipment in use, a combined total of 184 seats are available during the 5:45 am to 6:45 am hour. At an 82% peak hour passenger load factor, the total number of passengers boarding during this peak hour would be 151. The passengers per departure ratios would be 38. To estimate a future peak hour passengers per departure ratio, the 82% load factor will have to be applied to the increasing passenger capacity of the regional airline fleet that operates at BGM. By applying the logic identified in the *Airline Operations Forecast*, the rate of increase in the number of enplanements per departure would be approximately 0.5% during the first 10 years of the forecast and approximately 1% thereafter. Applying these rates of increase results in the following enplanements per departure during the peak hour: 38 (2005), 39 (2010), 40 (2015), and 44 (2025). The increase in seats available is based upon the assumed replacement of older and smaller aircraft with newer and larger models especially in the out years.

Table 3.9 shows the actual 2005 peak hour departures, based upon the airline schedule. For the forecast period, peak hour enplanements are anticipated to grow from 152 in 2005 to 264 by the year 2025 based upon modest increases in both departures and enplanements per departure.





Table 3.9 – Peak Period Airline Enplanements			
Year	Peak Hour Departures	Peak Hour Enplanements per Departure	Peak Hour Enplanements
2005	4*	38	152
2010	5	39	195
2015	5	40	200
2025	5	44	264

* Actual 2005 peak hour departures based on current (6/07) airline schedule

3.6.3 General Aviation

General Aviation activity at BGM has been declining since 2002, the last year, which saw an increase in GA operations over the previous year. As previously mentioned in this chapter, this decline may be attributable to BGM’s close proximity to Pennsylvania, a state with a more liberal GA legislative environment than New York along with record high fuel prices.

This declining activity trend is consistent with national trends in general aviation, which presented a mixed picture in 2005. Operations at combined FAA and contract towers declined 2.5% with declines in both itinerant and local operations. GA instrument activity (IFR) at combined FAA and contract towers also declined in 2005, falling 3.4%. The number of GA aircraft handled at FAA en route centers remained rather flat, up 0.2%.⁸ Based on statistics compiled by the FAA, the number of student pilots decreased by 0.8% in 2005.

Despite a slowdown in the demand for business jets over the past several years, the current FAA forecast assumes that business use of GA aircraft will expand at a more rapid pace than that for personal/sport use. The business/corporate side of GA should continue to benefit from a growing market for new microjets. In addition, corporate safety/security concerns for corporate staff, combined with increasing processing times at some U.S. airports have made fractional, corporate and on-demand charter flights practical alternatives to travel on commercial flights.⁹

Broome County Registered Aircraft

Current aircraft registration data is available on-line through the FAA website <http://registry.faa.gov/ardata.asp>. Historical registration data is available for some years through a private vendor. By way of definition, a registered aircraft is a civil aircraft, either

8 FAA Aerospace Forecast Fiscal Year 2006-2017

9 FAA Aerospace Forecast Fiscal Year 2006-2017





fixed or rotary wing that has been flown one or more hours during the previous calendar year. Excluded are aircraft owned and operated in regularly scheduled, nonscheduled, or charter service by commercial air carriers. The aircraft registration data will provide input for the forecast of based aircraft at BGM. From the based aircraft forecast, the future fleet mix will be established with reference to current trends. Operational forecasts will be generated from the based aircraft numbers, the national forecasts, and an assumed continuation of some current trends. The total number of registered aircraft in Broome County for available years is shown below:

Table 3.10: Study Area Registered Aircraft		
Year	Broome County	
	Registered Aircraft	Average Annual Increase (%)
1997	156	N/A
1998	160	2.56%
1999	161	0.63%
2000	154	-4.35%
2001	159	3.25%
2002	N/A	N/A
2003	N/A	N/A
2004	N/A	N/A
2005	157	-1.26%
FORECAST*		
2010	158	0.17%
2015	160	0.17%
2025	162	0.17%

* Forecast by Consultant

N/A = Not Available

Source: International Air CD (1997-2001), FAA Aircraft Registration Database (2005)

Aircraft registration in Broome County has remained relatively constant from 1997 through 2005, with the biggest decrease in aircraft (based on available data) occurring between 1999 and 2000. By 2005, there was one more registered aircraft in Broome County than was registered in the county in 1997. The average annual increase/decrease in registered aircraft in Broome County based on available data from 1997 through 2005 was 0.17%. This average was applied to the historical numbers to arrive at the forecast of registered aircraft. Based on this forecast, there will be an additional five aircraft registered in Broome County by the end of the 20-year planning horizon in 2025.





Based Aircraft Fleet Mix

An aircraft fleet mix refers to the characteristics of a population of aircraft. General aviation aircraft are classified with regard to specific physical traits such as aircraft type (i.e. fixed wing or rotorcraft), weight, and the number and type of engines. Aircraft having dissimilar physical and operating traits require varying types and amounts of airport facilities. For this reason, it is important to identify and estimate the types of aircraft that will be operating and based at BGM.

In the forecasting process, the based aircraft fleet mix can be used to help determine operational fleet mix forecasts. Fleet mix categories examined for BGM include single engine, multi-engine and jet. Additional categories such as rotorcraft and “other,” typically comprising ultralights, balloons, and experimental aircraft, etc. were not included in the GA based aircraft fleet mix because the last year the TAF reports a helicopter based at BGM was 1982 and the last year an aircraft falling under the category of “other” was based at the airport was 1984. Because these types of aircraft have not based at the airport in over 20 years they were not included in the future forecast of based aircraft. However, it should be noted that Lockheed Martin as a new tenant has now based a helicopter at the airport and it is anticipated that there will be additional growth in the future. Although helicopters were not included in the based aircraft fleet mix, they were taken into account in the operations forecast and will be considered throughout this MPU in areas such as the *Facility Requirements* chapter and noise modeling to be completed during the formulation of the Airport Layout Plan (ALP) drawing set.

Table 3.11 presents the forecast of based aircraft fleet mix anticipated for BGM. According to airport management, there are currently 26 aircraft based at the airport. The majority of these aircraft are single engine aircraft. To forecast the future based aircraft at the airport the TAF was analyzed. FAA based aircraft forecasts on the national level, for the eastern region, and for BGM specifically were analyzed for the 45 year period between 1980 and 2025. It was determined that the average annual percent change in based aircraft for this 45 year period was one percent (1%) nationally, two percent (2%) regionally, with a decrease of one percent (-1%) at BGM. The average (1%) of these three areas was used to forecast the total number of future based aircraft at BGM.

A review of the historic TAF figures from 1980 through 2005 shows that on average there have been 18 single engine, 14 multi-engine, and two jet aircraft based at BGM. The forecasts presented in Table 3.11 indicate that by the end of the planning period there will be only a slight increase in single engine aircraft, resulting in the historic average number of single engine aircraft, 18. The number of multi-engine aircraft is shown to increase slightly from the 2005 actual number, but remains lower than the historic average from 1980 through 2005, resulting in nine based multi-engine aircraft by the end of the planning period.





According to the forecasts prepared for BGM as part of this MPU and presented in Table 3.11, the greatest increase in based aircraft will be in the jet category. It is predicted that the number of based jets will double by the end of the planning period. This is consistent with industry trends which point to an increase in business jet deliveries. The development and recent certification of very light jets (VLJ) will accelerate this trend.

Changes at the airport, such as airport management actively marketing new based aircraft (i.e. corporate), the potential for t-hangar and/or conventional hangar development, and recent flooding, which effected other airports in the service area, but not BGM, along with the introduction of the VLJ and the availability of instrument approach procedures, will allow the number of based aircraft to grow at a higher rate than it has historically. However, as has been seen historically, it is anticipated that the number of based aircraft will not grow as fast as the number of based aircraft in the eastern region. As shown in Table 3.11 the forecast of based aircraft increases from the current 26 based aircraft to 33 based aircraft by the end of the planning period. This represents an increase of seven based aircraft at the airport. The forecast of aircraft registered within Broome County increased by five aircraft over the same timeframe; therefore it can be assumed that some of the aircraft based at BGM by the end of the planning period have relocated from other airports within Broome County.

Year	Single	%	Multi-	%	Jet	%	Total
2005*	16	62%	7	27%	3	12%	26
2010	16	59%	7	26%	4	15%	27
2015	17	57%	8	27%	5	17%	30
2025	18	55%	9	27%	6	18%	33

* Actual

Annual General Aviation Operations

An aircraft operation is defined as either a takeoff or a landing. A takeoff and landing are two operations. The annual general aviation operations forecast was derived for both local and itinerant operations through the use of an operations per based aircraft (OPBA) ratio. The OPBA ratio was determined based on the current number of based aircraft (26) and the current number of GA operations (13,957). The OPBA was therefore determined to be 537, which is typical of an airport such as BGM. Based upon the characteristics of the airport and industry norms, the same OPBA was used throughout the entire timeframe analyzed. Table 3.12 highlights the results of this process. There are currently 13,957 GA operations, which is forecast to increase to 17,715 operations by the end of the planning period. The percentage of local operations is expected to decrease slightly over the planning period to 30% while the percentage of itinerant operations is expected to increase slightly to a total of 70%. This change is due to the change in forecast aircraft fleet mix, which shows





the largest increase in jet aircraft, which primarily conduct itinerant operations.

Table 3.12: Annual GA Operations Forecast

Year	Based Aircraft	Local Operations		Itinerant Operations		Total Operations
		Number	Percentage	Number	Percentage	
2005*	26	4,520	32%	9,437	68%	13,957
2010	27	4,638	32%	9,856	68%	14,494
2015	30	4,831	30%	11,273	70%	16,104
2025	33	5,315	30%	12,400	70%	17,715

* Actual Based on TAF/Airport Records

GA Operational Fleet Mix Forecast

The operational fleet mix forecast tells a great deal about the operational character of the airport, and as such, can serve as a basis for developing specific airfield and landside facility designs. A forecast of the general aviation operational fleet mix was developed by applying based aircraft fleet mix categories to the established OPBA for each category. Table 3.13 presents the results of this process.

Table 3.13: GA Operational Fleet Mix

Year	Single	Multi	Jet	Total
2005	8,589	3,758	1,610	13,957
2010	9,126	3,758	1,610	14,494
2015	9,663	4,294	2,147	16,104
2025	10,736	4,831	2,147	17,715

Peak Hour Activity

Since a number of the airport's facility needs are related to the levels of activity during peak periods, forecasts were developed for general aviation peak month and peak hour operations. At airports such as BGM, general aviation operations are interspersed with scheduled airline operations, yielding an overall peak hour number that is higher than either individual component. Thus, it is important to estimate peak hour general aviation operations and add this total to the airline peak hour in order to estimate the total potential airfield peak demand.

For this study, a review of historic airport statistics was used to develop a base year peak hour GA operations total. To accomplish this task, actual monthly GA operations including both local and itinerant operations that were recorded at the airport between 1996 and 2005 were analyzed. During this timeframe, the average peak month for GA operations





was July, with approximately 11% of annual GA operations. This accounted for 2,372 of the total 20,860 GA operations that took place at the airport between 1996 and 2005. On average, August also accounted for approximately 11% of total GA operations, with slightly fewer operations (2,332) than July. This percentage (approximately 11%) was extrapolated into future years to provide a forecast of the peak month. It should be noted that the actual peak month in 2005 was September with 1,649 operations or approximately 12% of total 2005 GA operations. However, because as a whole, 2005 represented the lowest year for GA activity at the airport, and because on average July represented the peak month, the peak month percentage (approximately 11%) was applied to 2005 as well as the remainder of the forecast years. Therefore the number shown in Table 3.14 for 2005 GA peak month operations, represents approximately 11% of actual annual GA operations for the year, and is slightly less than the actual peak month for that year. A 30-day peak month was assumed for BGM. Therefore, the average day peak month figures were calculated by dividing the peak month operations by 30. Typically, GA operations will range between 15% and 20% of the design day operations for airports with a GA activity profile similar to BGM. The lower level representing 15% of the “average day peak month” was used throughout the forecast period to estimate future GA peak hour operations. Table 3.14 presents the forecast of peak hour and peak month operations at BGM.

Table 3.14 - GA Peak Period Operations Forecast				
Year	Annual GA Operations	GA Peak Month Operations	Average Day Peak Month	GA Peak Hour Operations
2005	13,957	1,535	51	8
2010	14,494	1,594	53	8
2015	16,104	1,771	59	9
2025	17,715	1,949	65	10

Summary of GA Demand Forecasts

The major GA demand forecast elements that were analyzed are summarized in Table 3.15. Demand elements from these forecasts along with the commercial service demand forecasts will be used throughout the Master Plan Update (MPU) to help in the development of facility requirements and in the identification of alternatives.





Item	2005	2010	2015	2025
Based Aircraft	26	27	30	33
OPBA	537	537	537	537
GA Local	4,520	4,638	5,153	5,669
GA Itinerant	9,437	9,856	10,951	12,046
Total GA Ops	13,957	14,494	16,104	17,715
GA Enplanements	11,863	12,320	13,689	15,057

3.6.4 Other Forecast Elements

Military Operations

Military operations accounted for approximately 5.6% (1,566) of total annual airport operations in 2005. Military operations at BGM are attributable to practice approaches conducted by the National Guard and Navy. A large component of the military operations are conducted with a C-130 by the Air National Guard out of Schenectady. Military operations are generally scheduled at the discretion of military officials and available budget, and there is no practical means of forecasting them at a facility such as BGM that receives only occasional use. Airfield dimensional standards are based on the most critical civilian aircraft conducting at least 500 operations annually. Based on this fact and the minimal number of military operations conducted at BGM, forecasts will not be prepared for military operations. Military operations will however be considered in the forecast of instrument approaches, because the military operations at the airport are attributable to practice approaches. Under the assumption that military activity will remain relatively constant throughout the forecasting period, a constant 1,566 operations will be applied annually to the total number of airport operations as portrayed in Table 3.16, to come up with an accurate forecast of instrument approaches. The TAF forecasts minimal growth (979 operations in 2005 to 1,110 operations for each year from 2006 through 2025) in itinerant military operations but a considerable growth (587 operations in 2005 to 1,093 operations for each year from 2006 through 2025) in local military operations.

Instrument Approaches

A necessary task in assessing the need for new or improved landing aids is a forecast of the levels of instrument approaches at the airport. An instrument approach can be defined as a series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing or to a point from which a landing may be made visually.

Information concerning instrument approaches is available via the FAA’s Air Traffic





Activity System (ATADS) database (<http://www.apo.data.faa.gov/main/atads.asp>). At BGM, an 11-year history was used in developing a ratio of instrument approaches to total operations. In the period between 1995 and 2005, instrument approaches have fluctuated from year to year, with a high of 3,941 in 1996, to 1,136 in 2005. The relationship between total operations and instrument approaches has ranged between 4% and 9%, with the average percentage during that period at 5%. The 2005 percentage was 4%. Future instrument approach operations will be forecast using the 5% average of total airport operations. Although no forecasts were prepared in this MPU for military operations, the current 2005 number of military operations (1,566) was included for the baseline year 2005. In addition, a constant military operations count of 1,566 was applied to each of the forecast years. Because military operations at BGM are attributed to practice approaches including them in the forecast of instrument operations is appropriate.

It should be noted that runway ends 10 and 28 are scheduled to receive localizer precision with vertical guidance (LPV) approaches during 2008. This may have an effect on the number of instrument approach operations conducted at the airport, which was not taken into consideration during the forecast.

Table 3.16: Forecast of Instrument Approach Operations

Year	Airport Operations	Percentage	Approach Operations
2005	28,037	4%	1,136
2010	28,815	5%	1,441
2015	31,156	5%	1,558
2025	33,813	5%	1,691

3.7 SELECTION OF DESIGN AIRCRAFT

Airport planning and design are based upon the designation of a critical aircraft for design, or a design aircraft, for the airport. The dimensions and performance characteristics of the critical aircraft are the basis for the identification of design guidelines for the airport, which in turn determine appropriate runway and taxiway width and separation standards, as well as dimensions of various airport safety areas. The critical aircraft for an airport is defined as the most demanding aircraft (on the basis of its approach speed and wingspan) that conducts, or is anticipated to conduct, a minimum of 250 or more takeoffs/landings (500 operations) per year.

The critical aircraft is the basis for the identification of the Airport Reference Code (ARC) for the airport. The ARC is used as the basis for the identification of the applicable design standards for the airport. The ARC coding system has two components: the aircraft approach category (speed), and the airplane design group (wingspan). Approach Categories





are designated A through E, with A being less than 91 knots (most small aircraft) and E being 166 knots or more. Most commercial jet airliners are within Approach Category C or D. Design groups are designated I through VI, with the smallest aircraft (wingspan up to 49 feet) being in Group I. Most Regional jetliners are in Group III (wingspans from 79’ to 118”) or IV (wingspans 118’ up to 171’). Table 3.17 presents the relevant characteristics for the most demanding aircraft that are now, or are expected to use the airport on a regular basis.

Table 3.17: Aircraft Characteristics			
Runway 16-34			
Aircraft Model	Passengers	Wingspan	ARC
Existing Users			
deHavilland Dash-8	37	90’ 0”	A-III
Bombardier CRJ 200	50	69’ 8”	C-II
SAAB 340	34	70’ 4”	B-II
Future Users			
Bombardier CRJ 700	70	76’ 3”	C-III
Embraer 170	70	85’ 4”	C-III
Bombardier CRJ 900	90	76’ 3”	C-III
Embraer 190	90	94’ 3”	C-III
Airbus 320	150-180	111’ 1”	C-III
Runway 10-28			
Aircraft Model	Passengers	Wingspan	ARC
SAAB 340	34	70’ 4”	B-II
Cessna 550 Citation II	6-10	51’ 7”	B-II
Dassault Falcon 900	8-18	63’ 4”	B-II
Dassault Falcon 2000	8-12	63’ 5”	B-II
Raytheon/Hawker 125-800	8-14	61’ 9”	B-I

The 50-seat RJs made by Bombardier and Embraer are currently the most demanding airline aircraft using the airport. Within the next 10 years, the airport is expected to see the introduction of the larger 70-seat and 90-seat RJs which will also fall within Design Group III as noted above. According to Bombardier Aerospace’s Commercial Aircraft Market Forecast (2006-2025) and the 2007-2026 Embraer Market Outlook, the 60-99-seat (Bombardier) and 61-90-seat (Embraer) segments represent the current growth phase for regional airlines. The higher capacity equipment will increase revenue and market share, help airlines replace ageing aircraft, and allow carriers to right size their fleets to better match capacity with demand.¹⁰ According to Derek J. Kerr, Senior Vice President and Chief

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Financial Officer for US Airways, US Airways will lessen its stock of small regional jets, making room for mid-size jets, such as the Embraer 190. According to Kerr, they are trying to “up-gauge” the aircraft that comprise the US Airways Express fleet. Kerr recently stated, “Every chance we get to bring in larger aircraft and we reduce the 50-seat aircraft, we do that... You will continue to see us getting out of the 50-seat aircraft (in favor of) 86-seat and 90-seat aircraft.”¹¹

In addition, as passenger volumes increase over the mid-term and long-term forecast periods, industry analysts anticipate that many of the airlines may return some of the narrow-bodied jetliners to service, if load factors permit, because the operational cost per seat is often less than the smaller RJ. A potential aircraft for this at BGM is the Airbus 320. Three (Northwest, United, US Airways) of the four major carriers affiliated with the regional airlines currently operating at BGM operate the Airbus 320 in their fleet; therefore the potential to see these aircraft operating at BGM in the future may exist.

According to the 1997 MPU, the largest aircraft anticipated to regularly use BGM were identified as a group of narrow-body jet aircraft including the Boeing 737-300, MD-80, and Fokker 100. These jets fall within aircraft approach category C and airplane design group III. Therefore, the 1997 MPU designed BGM’s ARC as C-III.

In 2005, the airport undertook a Runway Safety Area (RSA) study for Runway 10-28 at BGM. According to the RSA Study, the most demanding airplanes regularly using the airport are commercial service regional jets (RJ) including the Embraer RJ 145 and Canadair RJ 100 and 200. The report also indicated that the airport sees use by commercial service turboprops including the deHavilland Dash-8 and the Saab 340. Some of the RJs noted fall into approach category C and/or design group III, however due to runway length requirements these RJs rarely operate on the airport’s crosswind Runway 10-28. The most demanding aircraft, which operate on Runway 10-28 on a regular basis, fall into approach category B and design group II. These aircraft have wingspans less than 79 feet and approach speeds of less than 121 knots. Representative aircraft from this group include the Saab 340, which is operated by the contract carrier for United Express on a daily basis. Additionally, business jet general aviation (GA) aircraft also use this runway. Representative GA aircraft include the Cessna Citation series, the Dassault Falcon 900 and 2000 and the Hawker 800.

Based upon current use of Runway 10-28 and future anticipated use, the appropriate ARC for this runway is B-II and the critical aircraft for this runway should be based upon this group of turboprops and GA business jets. Although aircraft in approach categories C and D and also aircraft in design group III may on occasion use Runway 10-28, it is on an

¹¹ <http://usatoday.com> (Accessed: 3/21/07)





infrequent basis. In addition, it should be noted that the Dash-8, with an approach speed of 90 knots and a wingspan of approximately 90 feet falls within approach category A and design group III. This aircraft, which once regularly used the airport, influenced the design group III designation for Runway 10-28. Current usage of Runway 10-28 by the Dash-8 is limited and will be phased out completely in the future, therefore application of a smaller (B-II) RSA is appropriate.

According to Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5300-13, *Airport Design*, “for airports with two or more runways, it may be desirable to design all airport elements to meet the requirements of the most demanding ARC. However, it may be more practical to design some airport elements, e.g., a secondary runway and its associated taxiway, to standards associated with a lesser demanding ARC.” In 2006, the FAA issued an RSA determination for Runway 10-28. The determination indicated that while a C-III designation is appropriate for Runway 16-34, an ARC B-II is the appropriate designation for Runway 10-28. As such, the airport’s ARC is C-III for the primary runway (16-34) and associated infrastructure and B-II for the crosswind runway (10-28) and associated infrastructure.

3.8 COMPARISONS WITH OTHER FORECASTS

To determine their reasonableness, the aviation forecasts prepared for this report should be compared with other aviation forecasts prepared for the airport and the region. To be useful, this report’s forecasts should be reasonably consistent with other forecasts of future airport activity and compatible with forecasts for the larger region unless significant changes have occurred to influence the results. Forecasts for comparison purposes are those prepared for the Regional Aviation System Plan (RASP), and the New York State Aviation System Plan (SASP), along with the FAA’s TAF. Table 3.18 presents a summary of the forecast comparisons among these documents.

	2005*	2010	2015	2025
Master Plan Update (2007)				
Commercial Enplanements	127,719	130,180	137,639	148,317
Commercial Operations	12,514	12,755	13,486	14,532
GA Operations	13,957	14,494	16,104	17,715
Based Aircraft	26	27	30	33
RASP (2001 Update)				
Commercial Enplanements	N/A	240,000	N/A	N/A
Commercial Operations	N/A	43,000	N/A	N/A
GA Operations	N/A	41,000	N/A	N/A





Based Aircraft	N/A	49	N/A	N/A
SASP (1998)**				
Commercial Enplanements	178,400	196,000	215,300	N/A
Commercial Operations	28,300	29,600	31,000	N/A
GA Operations	31,700	32,000	32,300	N/A
Based Aircraft	38	38	39	N/A
FAA TAF				
Commercial Enplanements	127,719	120,537	125,126	134,834
Commercial Operations	12,514	11,020	11,232	11,665
GA Operations	13,957	15,363	16,685	18,572
Based Aircraft	21	22	24	27

* 2005 Numbers for MPU and TAF are actual.

** SASP Enplanement and Operations Numbers for 2005-2015 are all forecast. Numbers for 2025 are not available.

N/A = Not Available

The SASP was published in 1998, prior to the events of September 11, 2001 and data used to project future activity was based upon a period of strong aviation growth. It does not take into account the changes that have affected the airline industry in recent years. The RASP was published in 1994, with a brief update following in 2001. The aviation forecasts in both documents are out of date and of little value for comparison purposes. As can be seen in Table 3.19, based on the information available from the SASP and RASP during the planning period studied in this MPU, the number of enplanements, operations, and based aircraft forecast in both the SASP and RASP is significantly higher than forecast in the FAA’s TAF or this MPU. The most useful forecasts for comparison are those prepared by the FAA including the national and regional forecasts previously referenced throughout this chapter.

According to the FAA, forecasts are considered “consistent” if they differ less than 10% from the TAF in a five year period and less than 15% in a 10-year period. The forecast of total operations and total enplanements are the most critical forecast elements. The TAF is broken down into two groups 1) the busiest 100 airports and 2) all other airports. Forecasts for the latter category are based on historic performance.

The MPU forecasts are within 10% of the TAF for 2010 and within 15% of the TAF for 2015 for enplanements and total operations (commercial and GA combined). In 2010 the MPU forecasts exceed the TAF by 8% for enplanements and 3.5% for total operations. At the end of the forecast period the MPU forecasts exceed the TAF by 10%, for enplanements and 6.5% for total operations. While there appears to be a fairly significant difference in the number of based aircraft, the 2005 number of 21 aircraft contained in the TAF is in error. According to airport records there are 26 aircraft currently based on the airfield therefore the





MPU begins with the appropriate baseline data. The TAF forecasts an increase of six aircraft over the planning period, while this MPU forecasts an increase of seven aircraft over the same time period. Therefore, the forecast of based aircraft appears reasonable in comparison to the TAF.

In conclusion the forecasts prepared for this MPU, are generally consistent with those prepared for the FAA’s TAF. The MPU process typically results in a refinement of the FAA’s forecasts. This occurs due to the relative generality of the FAA forecasting process and the more airport specific process used in the MPU forecasts.

3.9 AVIATION FORECAST SUMMARY

Table 3.19 presents a summary of the aviation demand forecasts for BGM. These forecasts are considered reasonable and achievable and will be used throughout the master plan update to help in the development of facility requirements and the identification of alternatives.

Table 3.19: Aviation Demand Forecast Summary				
	ACTUAL	FORECAST		
	2005	2010	2015	2025
ENPLANEMENTS				
Airline	127,719	130,180	137,639	148,317
Peak Hour	152	195	200	264
AIRCRAFT OPERATIONS				
Airline	12,514	12,441	12,830	12,516
General Aviation	13,957	14,494	16,104	17,715
GA Itinerant	9,437	9,856	11,273	12,400
GA Local	4,520	4,638	4,831	5,315
TOTAL AIRPORT	26,471	26,935	28,934	30,231
Annual Instrument Approaches	1,136	1,441	1,558	1,691
PEAK PERIOD				
Airline Peak Hour	5	5	5	5
GA Peak Hour	8	8	9	10





TOTAL AIRPORT	13	13	14	15
GENERAL AVIATION				
Broome County Registered Aircraft	157	158	160	162
Airport Based Aircraft	26	27	30	33

