Chapter 3
Forecasts of Aviation Activity

3.0 BACKGROUND

During the development of this Master Plan Update, the ongoing effects of an economic recession caused aviation activity levels to decline throughout the United States. Smith Reynolds Airport (INT) experienced record low activity levels in 2008 that were expected to decline even further by year-end 2009. Despite the declining projections, the airport experienced month-over-month operational increases during the first half of 2009 as illustrated in **Table 3-1**, which does not appear to resemble trends of previous years when several cycles of monthly growth and decline occurred. Because factors like these can be critical in the determination of aviation forecasts, this chapter presents a comprehensive analysis of ongoing and anticipated trends that could influence short- and long-term activity growth at INT.

Table 3-1
Month-Over-Month Operations Comparison (2001-2009)

Month	2001	2002	2003	2004	2005	2006	2007	2008	2009
January	31.96%	-9.91%	-7.11%	0.82%	-16.93%	-20.14%	-11.19%	21.14%	24.79%
February	8.58%	5.54%	-20.26%	-9.30%	13.99%	-2.07%	12.30%	-23.10%	3.41%
March	-12.91%	6.67%	31.55%	12.55%	9.35%	26.18%	21.25%	32.76%	5.18%
April	1.37%	8.00%	10.67%	22.28%	8.53%	-1.70%	-17.78%	-0.11%	2.97%
May	8.09%	5.21%	-10.19%	-7.25%	21.78%	-1.30%	25.88%	6.66%	0.59%
June	-3.52%	1.63%	11.87%	-7.16%	-19.69%	-4.78%	-9.97%	-6.49%	-15.99%
July	-6.99%	-12.02%	11.66%	7.33%	-10.21%	-0.58%	13.25%	-11.53%	11.25%
August	1.30%	-12.94%	-10.58%	4.60%	4.97%	9.11%	-22.87%	4.78%	N/A
September	-37.98%	-8.45%	20.46%	-6.01%	9.36%	-5.27%	17.11%	-16.48%	N/A
October	78.08%	4.12%	-10.74%	5.72%	-9.16%	1.00%	6.04%	31.33%	N/A
November	-11.96%	10.04%	-2.03%	8.53%	3.00%	-3.58%	-8.24%	-29.19%	N/A
December	-4.92%	-13.66%	-13.78%	-7.86%	0.42%	-5.82%	-29.25%	-16.67%	N/A
Annual Operations	69,136	63,533	52,868	55,036	63,129	59,528	59,569	51,839	44,158*
6-Month Declines (January-June)	2	1	3	3	2	5	3	3	1
12-Month Declines (January-December)	6	5	7	5	4	9	6	7	1

Sources: FAA Operations Network (OPSNET) database and The LPA Group Incorporated, September 2009.
Notes: Percentages in table represent month-over-month changes in operations. Decline values represent the number of months that a negative month-over-month change was observed.
** 2009 annual operations estimated from FAA's Draft 2009 Terminal Area Forecast (TAF). Operations counts for August-December 2009 were not available at the time of this writing.*

Considering the ongoing economic recession and the Federal Aviation Administration's (FAA's) updated projections of aviation activity, it was only reasonable to forecast conservative growth for INT during the 20-year planning period from 2008 to 2028. Still, the conservative growth forecasts allowed for a comprehensive master planning effort that addressed key goals of the

Airport Commission of Forsyth County (ACFC) and airport tenants. However, per the Scope of Services, this chapter does not identify forecasts for scheduled commercial airline service, nor does it investigate the potential for such service. Conversely, the ACFC's desire to preserve the ability to accommodate commercial airline service is discussed later in **Chapter 4**.

According to **FAA Advisory Circular (AC) 150/5070-6**, *Airport Master Plans*, aviation forecasting "should consider socioeconomic data, demographics, disposable income, geographic attributes, and external factors such as fuel costs and local attitudes towards aviation."[1] Particular attention was given to these factors during the development of the following forecasts:

- Operations Totals
- Annual Instrument Operations
- Operations by Flight Type
- Operations by Aircraft Type
- Based Aircraft Totals
- Based Aircraft by Type
- Peak Period Operations
- Air Carrier Charter Passengers

This chapter identifies forecast values for the 20-year planning period which extends from 2008 to 2028. The forecast base year was established as 2008 because it represented the most recent full-year of airport activity. Additionally, use of 2008 as the forecast base year allowed for the full impact of the economic recession to be illustrated. Milestone years for short-, mid-, and long-term growth include 2013, 2018, and 2028, respectively. Due to the presence of an on-site Air Traffic Control Tower (ATCT) and other FAA data sources, up-to-date and accurate activity data was incorporated into this forecasting effort.

3.1 NEEDS AND BENEFITS

Forecasts represent a key component of a master planning study because every subsequent decision related to the purpose, size, design, and location of any structure or equipment relies on estimated levels of activity. Failure to properly plan for the future can result in negative consequences to the capacity, activity, safety, and efficiency of the airport. Therefore, the forecast planning horizon term is 20 years to ensure that adequate facilities are in-place for the operator, the traveling public, and the surrounding community.

[1] FAA AC 150/5070-6B, Airport Master Plans, page 37.

3.2 FORECASTING LIMITATIONS

Forecasting aeronautical activity is a complex assessment based on a multitude of factors, both controllable and those beyond an airport's control. Forecasts are not to be confused with predictions of the future but rather an educated guess of future activity based upon a variety of predictors, mathematical formulae, assumptions, and subjective judgment.

The accuracy of the estimates decline as the planning term is extended, by unforeseen local or geo-political events, natural disasters, or longer-term weather or climatological events. These caveats notwithstanding, the forecasts provided in this chapter employ a variety of methodologies, which together constitute best practices in the industry.

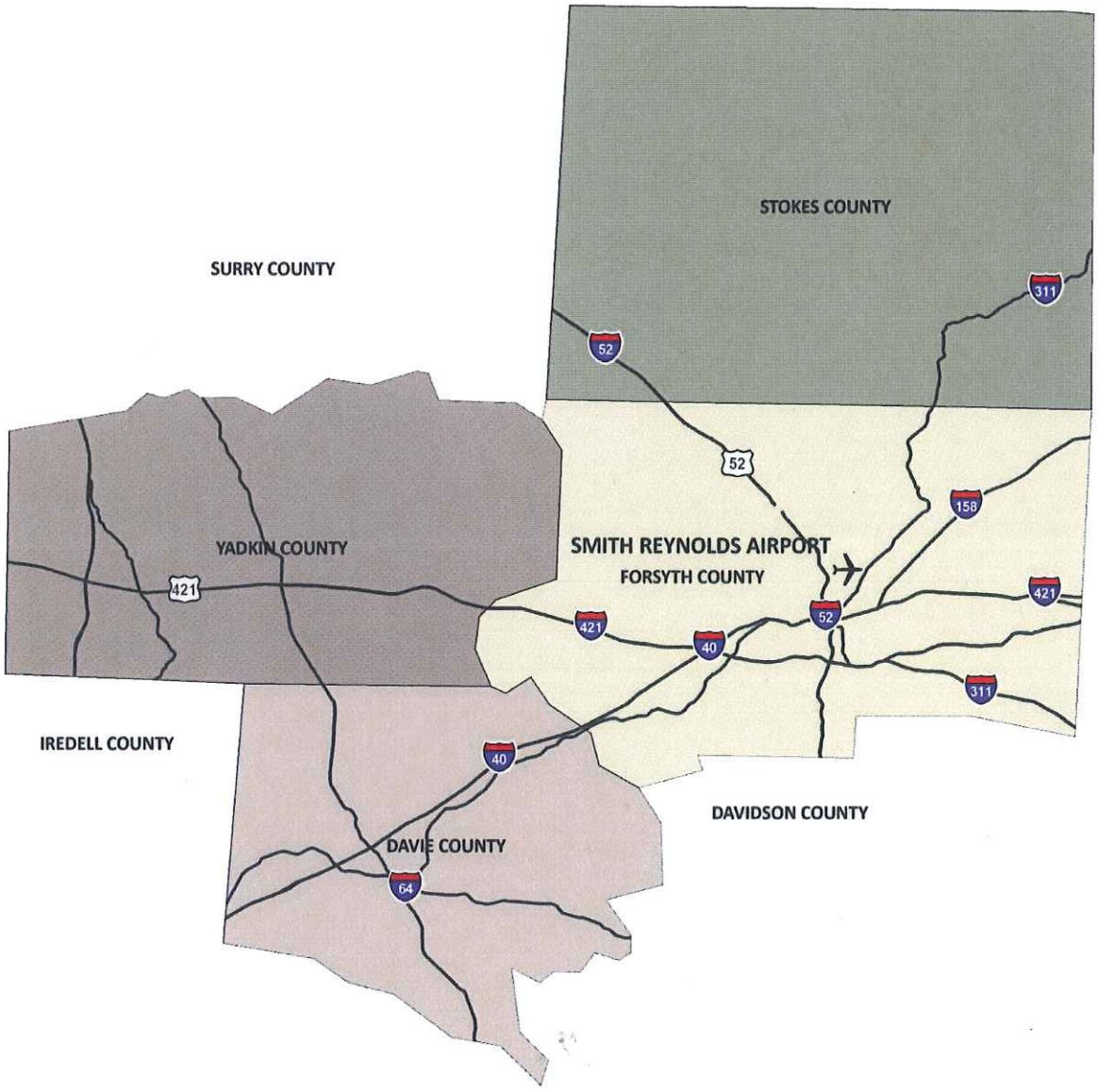
3.3 AIRPORT SERVICE AREA AND SOCIOECONOMIC CONDITIONS

According to the report, *2006 Economic Impact of Airports in North Carolina*, Smith Reynolds Airport produced a total economic output of approximately $137 million in 2006 (including direct, indirect, and induced economic impacts). Therefore, INT is recognized as a very important economic generator within the Winston-Salem area. As described earlier in **Chapter 2**, the Winston-Salem Chamber of Commerce and the U.S. Census Bureau identifies the metropolitan statistical area (MSA) of Winston-Salem as the four-county area including Forsyth, Davie, Stokes, and Yadkin Counties. Smith Reynolds Airport is the only publicly-owned airport within this four-county area (see **Exhibit 3-1**). As such, the socioeconomic conditions of the MSA are expected to have the most influence over INT activity levels.

This section includes a review of historical and forecast socioeconomic conditions within the airport service area, which is referred to herein as the *Four-County Region*. The review evaluates whether correlations exist between historical airport activity levels and historical population, employment, and/or per capital personal income (PCPI) rates within the airport service area. This potential correlation is tested later in this chapter using regression analysis. Regardless of what is identified through regression, socioeconomic growth trends within an airport service area still represent one of the most important considerations of any aviation forecasting effort.

This evaluation incorporates socioeconomic data from Woods & Poole Economics – the *2010 Complete Economic and Demographic Data Source* – which is recognized as an acceptable source of economic forecasts in the FAA report, *Forecasting Aviation Activity by Airport, July 2001*. While some agencies of Forsyth County may utilize alternate sources of economic forecasts, the Woods & Poole data presents up-to-date forecasts of 121 economic variables through the year 2040, thus providing a singular, comprehensive data set for analysis herein.

Exhibit 3-1
Airport Service Area Map



Source: The LPA Group Incorporated, September 2009.

Population

Aviation demand is affected by a combination of many factors described throughout this chapter, including population growth or decline. **Table 3-2** illustrates that population growth consistently occurred in the U.S., North Carolina, and the *Four-County Region* since at least 1990. However, the population of North Carolina and the *Four-County Region* grew more rapidly than the rest of the U.S. from 1990-2008 – most notably in recent years (refer to **Exhibit 3-2**). Much of the recent population growth in North Carolina has been associated with a significant number of

business relocations. For example, Winston-Salem was ranked 18th in the U.S. on Forbes.com's 2009 list of *Best Places for Businesses and Careers*, based primarily on a favorable cost of living, climate, and relocation incentives. Further, Raleigh ranked 1st, Durham 3rd, Asheville 6th, Wilmington 13th, and Charlotte 19th.[2] According to the Woods & Poole forecasts, strong population growth is expected to continue in North Carolina through 2030, while growth in the *Four-County Region* is expected to be more in-line with U.S. growth rates.

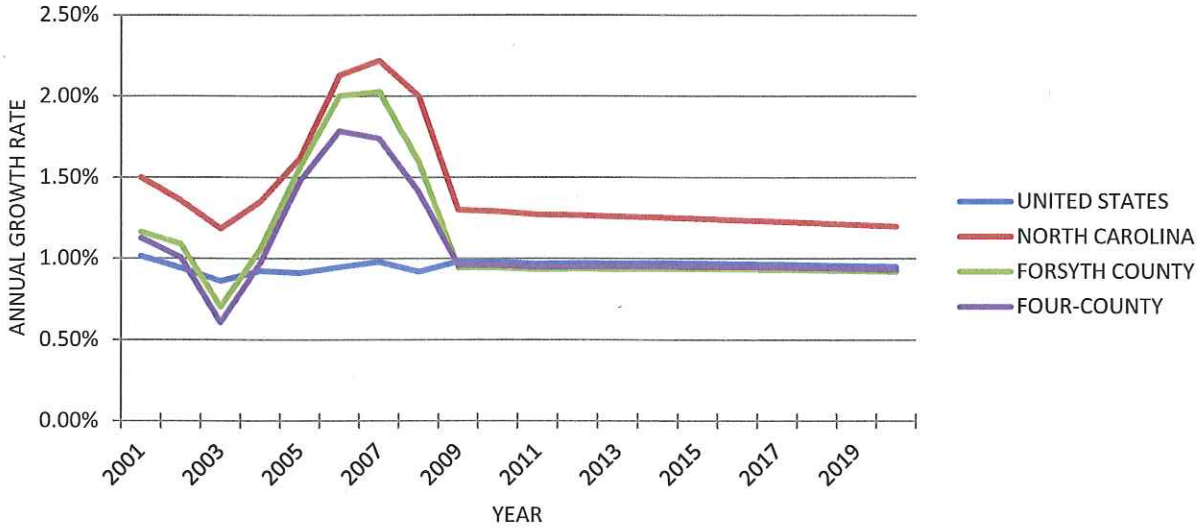
Table 3-2
Historical and Forecast Population (1990-2030)

Year	U.S.	NC	Forsyth	Yadkin	Davie	Stokes	Four-County
1990	249,622,814	6,664,016	266,855	30,576	28,032	37,396	362,859
1995	266,278,393	7,344,674	288,923	33,555	30,366	41,170	394,014
2000	282,171,936	8,078,824	306,933	36,508	35,058	44,833	423,332
2001	285,039,803	8,199,913	310,506	36,778	35,948	44,871	428,103
2002	287,726,647	8,311,263	313,897	37,178	36,523	44,822	432,420
2003	290,210,914	8,409,660	316,106	37,115	36,935	44,889	435,045
2004	292,892,127	8,523,199	319,441	37,019	37,656	45,157	439,273
2005	295,560,549	8,661,061	324,430	37,276	38,694	45,361	445,761
2006	298,362,973	8,845,343	330,926	37,514	39,583	45,699	453,722
2007	301,290,332	9,041,594	337,639	37,675	40,364	45,937	461,615
2008	304,059,724	9,222,414	343,028	37,954	40,971	46,171	468,124
2009	307,050,416	9,342,318	346,270	38,184	41,494	46,671	472,619
2013	319,189,413	9,826,916	359,439	39,129	43,609	48,697	490,874
2018	334,925,342	10,449,478	376,531	40,382	46,327	51,313	514,553
2025	357,582,283	11,340,472	401,159	42,211	50,216	55,070	548,656
2030	373,944,193	11,982,674	418,946	43,538	53,019	57,781	573,284
AAGR 1990-2000	1.23%	1.94%	1.41%	1.79%	2.26%	1.83%	1.55%
GROWTH 1990-2000	13.04%	21.23%	15.02%	19.40%	25.06%	19.89%	16.67%
AAGR 2000-2008	0.94%	1.67%	1.40%	0.49%	1.97%	0.37%	1.27%
GROWTH 2000-2008	7.76%	14.16%	11.76%	3.96%	16.87%	2.98%	10.58%
AAGR 2008-2013	0.98%	1.28%	0.94%	0.61%	1.26%	1.07%	0.95%
AAGR 2013-2018	0.97%	1.24%	0.93%	0.63%	1.22%	1.05%	0.95%
AAGR 2018-2030	0.92%	1.15%	0.89%	0.63%	1.13%	0.99%	0.90%
AAGR 2008-2030	0.94%	1.20%	0.91%	0.63%	1.18%	1.02%	0.93%
GROWTH 2008-2030	22.98%	29.93%	22.13%	14.71%	29.41%	25.15%	22.46%

Sources: Woods & Poole Economics 2010 CEEDS and The LPA Group Incorporated, September 2009.
AAGR – Average Annual Growth Rate

[2] Best Places for Businesses and Careers, Forbes.com, March 25, 2009.

Exhibit 3-2
Population Annual Growth Rate Comparison (2001-2020)



Sources: Woods & Poole Economics 2010 CEEDS and The LPA Group Incorporated, September 2009.

Employment

As employment grows (i.e., unemployment goes down), more people have money to spend on travel, personal aircraft, flight training, etc. Throughout the ongoing economic recession, the federal government has instituted programs to stimulate employment growth across the U.S. (and to help prevent further job losses that occurred in 2008 and 2009). As shown in **Table 3-3**, from 2000 to 2008 employment grew within the *Four-County Region* by nearly 16,500 jobs while at the same time the population grew by approximately 45,000. Between 2008 and 2030, the Woods & Poole forecasts illustrate approximately 69,000 new jobs for the *Four-County Region* and a population increase of more than 105,000 people.

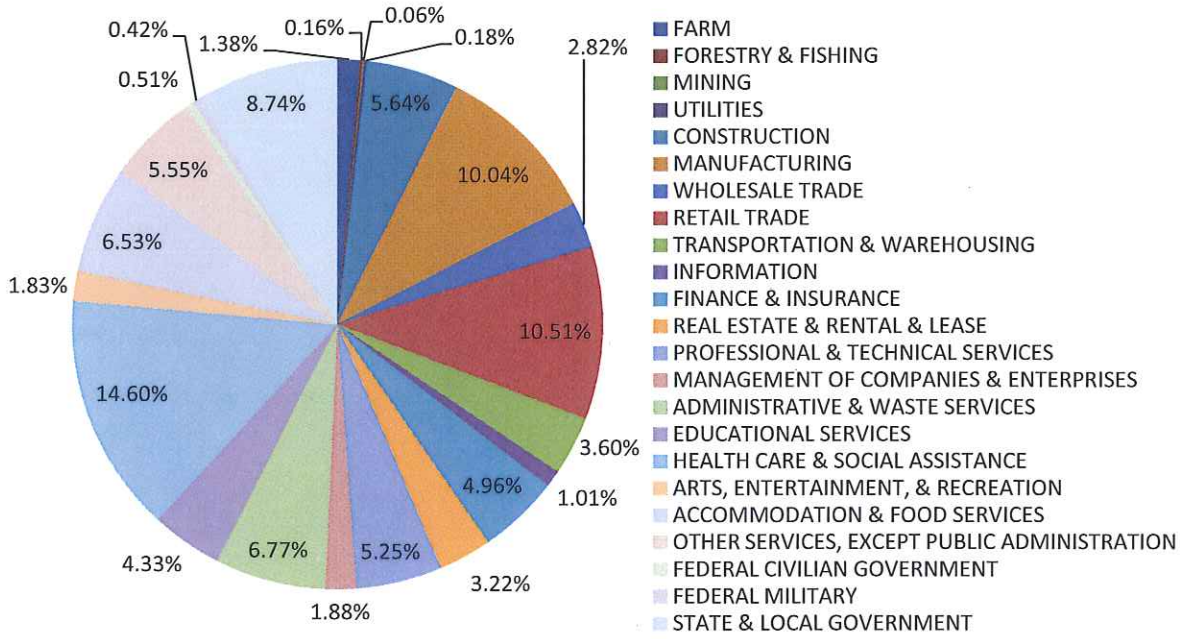
Exhibit 3-3 presents the 2008 employment distribution within the *Four-County Region*, with the top five employment sectors identified as: 1) health care, 2) retail trade, 3) manufacturing, 4) state and local government, and 5) administrative and waste services.

Table 3-3
Historical and Forecast Employment (1990-2030)

Year	U.S.	NC	Forsyth	Yadkin	Davie	Stokes	Four-County
1990	139,380,830	3,928,120	192,221	12,362	13,388	10,775	228,746
1995	148,982,936	4,380,521	203,551	14,056	14,976	12,238	244,821
2000	166,758,806	4,924,901	220,050	15,069	16,229	13,287	264,635
2001	167,014,653	4,885,070	217,450	14,714	15,859	13,031	261,054
2002	166,633,078	4,878,157	215,809	14,640	15,644	13,102	259,195
2003	167,553,481	4,891,145	216,506	14,220	15,582	12,975	259,283
2004	170,512,684	5,014,861	219,513	14,664	16,012	13,241	263,430
2005	174,228,321	5,145,883	225,501	14,979	16,418	13,242	270,140
2006	177,817,586	5,307,469	230,596	15,079	16,971	13,494	276,140
2007	180,943,811	5,460,851	235,782	14,698	17,390	13,718	281,588
2008	180,600,292	5,413,993	235,681	14,597	17,233	13,583	281,094
2009	177,667,193	5,275,824	229,815	14,079	16,643	13,131	273,668
2013	187,967,077	5,626,913	243,617	14,696	17,617	13,904	289,834
2018	199,022,617	6,013,862	257,719	15,184	18,530	14,708	306,141
2025	215,601,880	6,611,524	279,044	15,897	19,928	15,947	330,816
2030	228,283,967	7,082,285	295,503	16,424	21,013	16,930	349,870
AAGR 1990-2000	1.81%	2.29%	1.36%	2.00%	1.94%	2.12%	1.47%
GROWTH 1990-2000	19.64%	25.38%	14.48%	21.90%	21.22%	23.31%	15.69%
AAGR 2000-2008	1.00%	1.19%	0.86%	-0.40%	0.75%	0.28%	0.76%
GROWTH 2000-2008	8.30%	9.93%	7.10%	-3.13%	6.19%	2.23%	6.22%
AAGR 2008-2013	0.80%	0.77%	0.66%	0.14%	0.44%	0.47%	0.61%
AAGR 2013-2018	1.15%	1.34%	1.13%	0.66%	1.02%	1.13%	1.10%
AAGR 2018-2030	1.15%	1.37%	1.15%	0.66%	1.05%	1.18%	1.12%
AAGR 2008-2030	1.07%	1.23%	1.03%	0.54%	0.91%	1.01%	1.00%
GROWTH 2008-2030	26.40%	30.81%	25.38%	12.52%	21.93%	24.64%	24.47%

Sources: Woods & Poole Economics 2010 CEEDS and The LPA Group Incorporated, September 2009.
AAGR – Average Annual Growth Rate

Exhibit 3-3
2008 Four-County Region Employment Sector Distribution



Sources: Woods & Poole Economics 2010 CEEDS and The LPA Group Incorporated, September 2009.

Per Capita Personal Income (PCPI)

PCPI is a measurement of wealth that represents the average spending power for each individual among a sample population. PCPI is an important factor because higher per capital spending power typically correlates to increased activity within the aviation sector. As shown in **Table 3-4**, the PCPI of the U.S. grew at an average annual rate of 3.65 percent between 2000 and 2008. During the same period, the PCPIs of North Carolina and the *Four-County Region* grew at slower annual rates than the U.S.; however, stronger growth is forecast between 2008 and 2030. Additionally, the 2008 PCPI for Forsyth County is very similar to that of the U.S. and PCPI growth within the county is forecast to continue at about the same pace as the national rate.

Table 3-4
Historical and Forecast PCPI (1990-2030)

Year	U.S.	NC	Forsyth	Yadkin	Davie	Stokes	Four-County
1990	$19,477	$17,246	$22,185	$15,771	$19,105	$15,268	$20,694
1995	$23,076	$21,295	$25,860	$18,797	$23,237	$18,787	$24,317
2000	$29,847	$27,067	$31,013	$23,114	$29,277	$22,824	$29,321
2001	$30,582	$27,487	$31,004	$23,375	$28,803	$22,821	$29,306
2002	$30,838	$27,515	$31,372	$23,225	$28,915	$23,079	$29,604
2003	$31,530	$27,942	$31,915	$23,702	$29,366	$23,681	$30,148
2004	$33,157	$29,440	$34,052	$24,849	$30,763	$24,879	$32,052
2005	$34,690	$31,002	$35,070	$25,652	$31,846	$25,179	$32,996
2006	$36,794	$32,271	$35,938	$26,620	$33,236	$26,217	$33,953
2007	$38,615	$33,735	$37,600	$27,611	$34,594	$27,141	$35,481
2008	$39,755	$34,439	$38,775	$28,475	$35,621	$28,093	$36,610
2009	$40,255	$35,197	$39,928	$28,959	$35,959	$28,324	$37,547
2013	$47,577	$41,169	$47,563	$32,741	$41,889	$33,226	$44,455
2018	$59,841	$51,445	$59,767	$40,478	$51,940	$41,185	$55,695
2025	$84,559	$72,251	$84,443	$55,901	$72,183	$57,281	$78,399
2030	$109,512	$93,318	$109,429	$71,206	$92,561	$73,528	$101,348
AAGR 1990-2000	4.36%	4.61%	3.41%	3.90%	4.36%	4.10%	3.55%
GROWTH 1990-2000	53.24%	56.95%	39.79%	46.56%	53.24%	49.49%	41.69%
AAGR 2000-2008	3.65%	3.06%	2.83%	2.64%	2.48%	2.63%	2.81%
GROWTH 2000-2008	33.20%	27.24%	25.03%	23.19%	21.67%	23.09%	24.86%
AAGR 2008-2013	3.66%	3.63%	4.17%	2.83%	3.29%	3.41%	3.96%
AAGR 2013-2018	4.69%	4.56%	4.67%	4.33%	4.40%	4.39%	4.61%
AAGR 2018-2030	5.17%	5.09%	5.17%	4.82%	4.93%	4.95%	5.12%
AAGR 2008-2030	4.71%	4.64%	4.83%	4.25%	4.44%	4.47%	4.74%
GROWTH 2008-2030	175.47%	170.97%	182.22%	150.06%	159.85%	161.73%	176.83%

Sources: Woods & Poole Economics 2010 CEEDS and The LPA Group Incorporated, September 2009.
AAGR – Average Annual Growth Rate

3.4 HISTORICAL AND CURRENT AIRPORT ACTIVITY

Valuable clues about factors that could influence future activity levels may be revealed through a review of historical activity trends. For example, as part of the FAA's Terminal Area Forecast (TAF) for many general aviation airports, growth is projected according to nationwide economic and aviation trends. Thus, a review of historical airport activity might identify local factors that could be used to adjust the FAA's projections. Since INT has an on-site ATCT, historical activity has been well-documented by specific flight type (local and itinerant, air carrier, air taxi, general aviation, military, etc.). General aviation operations have consistently represented the majority of airport operations, but air carrier and corporate operations are also common at INT and therefore drive much of the demand for facilities and services. Although local activity has continually declined since the 1990s, flight training organizations like Piedmont Flight Training continue to lease facilities at the airport. Further, by reviewing historical based aircraft levels and the based aircraft fleet mix, past development trends for aprons, hangars, and other landside facilities can be examined to see if airport users were adequately served.

Historical and Current Operations

Smith Reynolds Airport maintains its Federal Aviation Regulations (FAR) Part 139 Certification due to existing charter activity with more than 31 seats, and therefore accommodates a mix of larger commercial, corporate, and general aviation traffic. The term general aviation essentially refers to pilot training, sightseeing, aerial photography, law enforcement, and medical flights, as well as business, corporate, and personal travel. All operations are divided into the categories of local or itinerant. Local operations are those arrivals or departures performed by aircraft that remain within the airport traffic pattern, or those that occur within sight of the airport – covering an area within a 20 nautical mile radius of the airfield. Local operations are most often associated with training activity and flight instruction (e.g., touch-and-gos).

The FAA defines an operation as either a single aircraft landing or takeoff. Under this definition, touch-and-go training procedures are considered two operations (one arrival and one departure) and are deemed local operations. Itinerant operations are typically comprised of private, business/corporate, and air taxi flight activity. Additionally, itinerant activity may include law enforcement and medical flights. As shown in **Table 3-5**, the FAA maintains historical operations counts for Smith Reynolds Airport as part of their Draft 2009 TAF. The FAA develops a TAF each year for all airports in the National Plan of Integrated Airport Systems (NPIAS). Depending upon the level of service provided at the subject airport (i.e., commercial/Part 139 or general aviation), the TAF may present forecasts of passenger enplanements, operations, and based aircraft. The FAA website indicates that the "TAF system is the official forecast of aviation activity at FAA facilities. These forecasts are prepared to meet the budget and planning needs of FAA and provide information for use by state and local authorities, the aviation industry, and the public."[3] As described later in this chapter, the TAF is used by the FAA as a benchmark for evaluating detailed airport forecasts.

At the time of this writing, the FAA's Draft 2009 TAF was determined to be most appropriate for analysis in this Master Plan Update. The FAA typically releases the Official TAF in December of each year, thus the Official 2008 TAF did not account for the effects of the economic recession to the same extent as the Draft 2009 TAF. Further, discussions with the FAA indicated that no drastic changes to the Draft 2009 TAF were anticipated before the release of the Official 2009 TAF. As shown in **Table 3-5**, INT experienced a record low number of operations in 2008, which is illustrative of the harsh effects of the economic recession. Still, past activity at INT has shown a strong resiliency to rebound quickly after periods of decline.

[3] http://aspm.faa.gov/main/taf.asp, accessed September 2009.

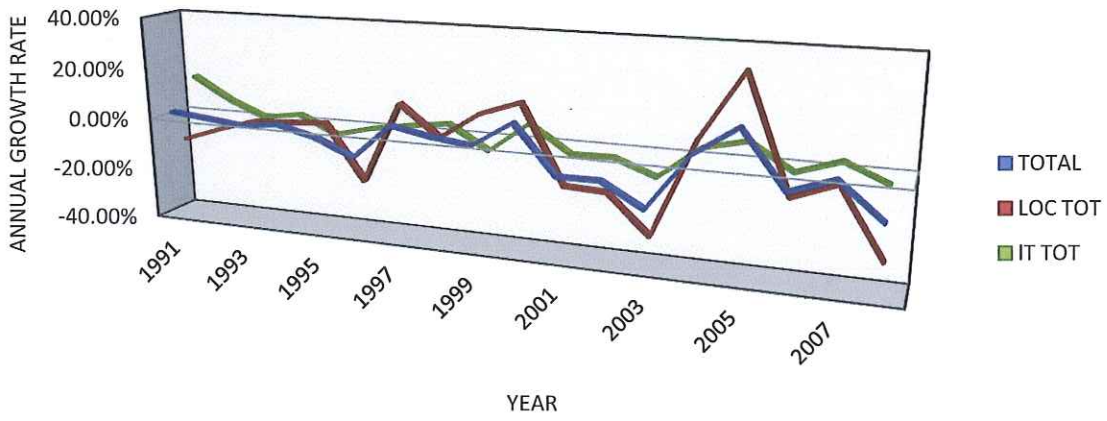
Table 3-5
Historical Airport Operations (1990-2008)

Year	Itinerant Operations					Local Operations			Total Operations
	Air Carrier	Air Taxi	GA	Military	Total	Civil	Military	Total	
1990	264	3,641	31,948	237	36,090	32,388	99	32,487	68,577
1991	212	4,352	36,589	82	41,235	29,150	144	29,294	70,529
1992	146	4,957	38,299	211	43,613	27,826	80	27,906	71,519
1993	180	4,446	38,687	178	43,491	27,770	45	27,815	71,306
1994	328	4,629	39,159	222	44,338	27,818	116	27,934	72,272
1995	235	2,966	38,853	178	42,232	28,247	109	28,356	70,588
1996	152	3,450	38,016	119	41,737	22,666	38	22,704	64,441
1997	242	2,800	39,094	122	42,258	25,236	50	25,286	67,544
1998	107	2,912	40,510	67	43,596	25,114	93	25,207	68,803
1999	31	2,541	38,351	127	41,050	27,644	61	27,705	68,755
2000	81	921	42,348	106	43,456	31,923	34	31,957	75,413
2001	211	955	40,234	238	41,638	27,350	148	27,498	69,136
2002	337	1,937	37,623	139	40,036	23,443	54	23,497	63,533
2003	414	2,078	33,456	271	36,219	16,539	110	16,649	52,868
2004	674	2,595	33,704	199	37,172	17,808	56	17,864	55,036
2005	542	2,947	35,795	203	39,487	23,475	167	23,642	63,129
2006	398	2,880	34,402	549	38,229	21,209	90	21,299	59,528
2007	419	2,864	35,567	195	39,045	20,488	36	20,524	59,569
2008	519	2,883	33,638	233	37,273	14,452	114	14,566	51,839
AAGR 1990-2000	-11.14%	-12.84%	2.86%	-7.73%	1.87%	-0.14%	-10.14%	-0.16%	0.95%
GROWTH 1990-2000	-69.32%	-74.70%	32.55%	-55.27%	20.41%	-1.44%	-65.66%	-1.63%	9.97%
AAGR 2000-2008	26.13%	15.33%	-2.84%	10.35%	-1.90%	-9.43%	16.33%	-9.35%	-4.58%
GROWTH 2000-2008	540.74%	213.03%	-20.57%	119.81%	-14.23%	-54.73%	235.29%	-54.42%	-31.26%

Source: FAA Draft 2009 TAF.
Note: The majority of INT's current Air Carrier activity includes passenger charters as well as airplanes undergoing maintenance.
AAGR – Average Annual Growth Rate

Exhibit 3-4 presents a comparison of annual growth rates for itinerant, local, and total operations at INT between 1991 and 2008.

Exhibit 3-4
Operations Annual Growth Rate Comparison (1991-2008)



Sources: FAA Draft 2009 TAF and The LPA Group Incorporated, September 2009.

By comparing this information to national and local trends in the economy and aviation industry, the following can be inferred about INT activity:

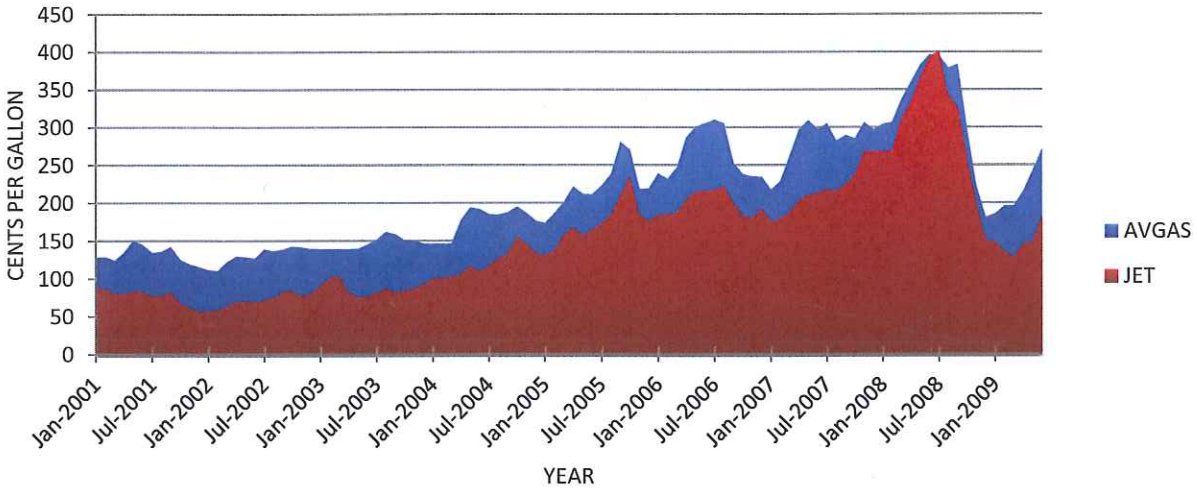
- Since 1991, three economic recessions have occurred in the U.S.: 1) July 1990 to March 1991, 2) March 2001 to November 2001, and 3) July 2007 to present.[4] It appears that INT activity was negatively affected by each of these economic recessions, most notably during the latter two. However, local activity experienced the greatest decline during these periods while itinerant traffic has been fairly consistent.
- In September 1996, Hurricane Fran "made landfall on the North Carolina coast as a category three hurricane on the Saffir/Simpson Hurricane Scale, resulting in significant storm surge flooding on the North Carolina coast, widespread wind damage over North Carolina and Virginia, and extensive flooding from the Carolinas to Pennsylvania." Fran caused an estimated $1.275 billion in damages to North Carolina.[5] Therefore, unforeseen weather events within the state may have the potential to impact aviation activity at INT.
- Scheduled airline service ended at Smith Reynolds Airport in 2000 following the pull-out of US Airways. At the time, there were a limited number of daily airline flights, but a noticeable decline in the number of annual air taxi flights still occurred in 2000 and 2001.
- All airport activity declined in the years immediately following the events of September 11, 2001, although a rapid rebound occurred in 2005.
- Hurricane Katrina hit the Gulf Coast of the U.S. in August 2005. As shown in **Exhibit 3-5**, a sharp increase in the price of aviation fuel occurred shortly thereafter because "Of the approximately 20 refineries and production facilities along the Gulf Coast – from Corpus Christi, Texas to Tampa, Florida – Katrina temporarily closed nine facilities and shut down two completely, reducing U.S. oil supplies by about 1.4 million barrels a day, or 8

[4] Recession.org.
[5] National Hurricane Center, Hurricane Fran Report.

percent of total U.S. production."[6] Consequently, increasing fuel prices negatively affected activity levels at Smith Reynolds Airport.

- Aircraft fuel prices remained high after 2005 and peaked during the summer of 2008. The U.S. Energy Information Administration predicts that the U.S. refined diesel fuels (such as jet fuel) will decrease slightly but remain relatively steady during 2012 due to an expected slowing of economic growth.[7]

Exhibit 3-5
Historical Aircraft Fuel Wholesale Price (2001-2009)

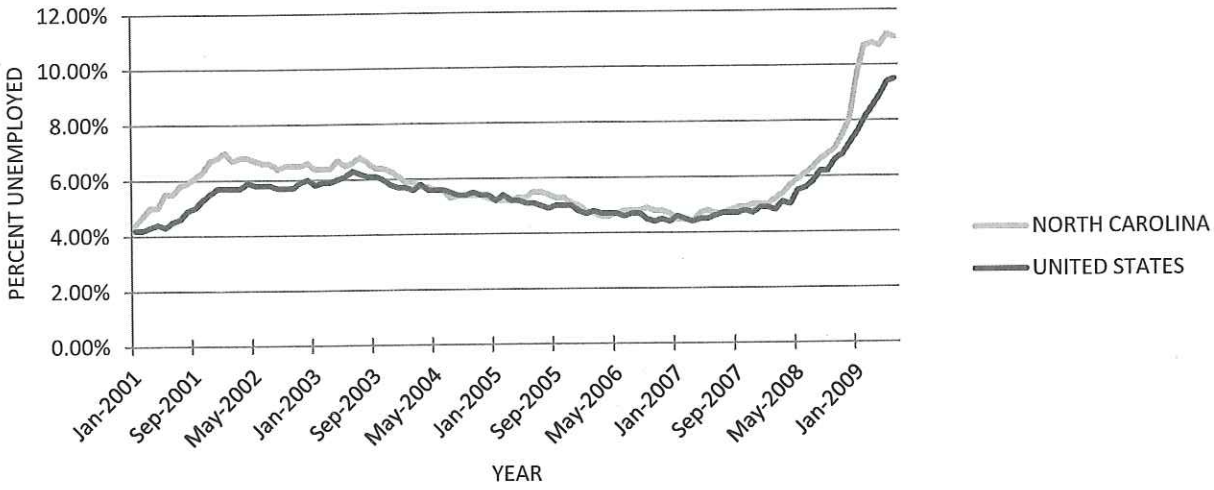


Sources: Energy Information Administration of the U.S. Department of Energy and The LPA Group Incorporated, September 2009.

- In September 2009, the U.S. was struggling through an economic recession. As shown in **Exhibit 3-6**, the U.S. unemployment rate was 9.50 percent in June 2009, which was approximately four points higher than June 2008. Unemployment levels in North Carolina have historically been similar to U.S. levels; however, many of the state's industrial and manufacturing companies recently conducted layoffs which contributed to the 11.00 percent unemployment rate in June 2009.

[6] Hurricane Katrina Underscores Tenuous State of U.S. Oil Refining Industry, PBS Online NewsHour, September 9, 2005.
[7] Short-Term Energy Outlook, Energy Information Administration, August 2009.

Exhibit 3-6
Seasonally Adjusted Historical Unemployment Rates (2001-2009)



Sources: U.S. Bureau of Labor Statistics and The LPA Group Incorporated, September 2009.

Historical and Current Based Aircraft

Historical based aircraft data for Smith Reynolds Airport was also obtained from the FAA's Draft 2009 TAF. As shown in **Table 3-6**, the 2008 mix of based aircraft included 68 single-engines, 23 multi-engines, 18 jets, and no helicopters. Historical based aircraft trends are discussed throughout this chapter, including the following general observations:

- **Single-Engines** – As large jet operations have increased since the early 1990s, local activity has continually decreased. Pilots of many smaller general aviation aircraft may be more comfortable flying to and from airports with less jet traffic, and may have relocated their planes to other local airports. Further, few projects have been conducted in recent years that would encourage based aircraft growth for single-engine piston aircraft at INT.
- **Multi-Engines** – Multi-engines may have experienced a similar trend as single-engines. Also, according to the *FAA Aerospace Forecast Fiscal Years 2009-2025*, the number of active multi-engine piston aircraft decreased by 9.30 percent across the U.S. between 2000 and 2008. The decline in the number of single- and multi-engines from 1996 to 1997 may have been related to Hurricane Fran which hit North Carolina in September 1996.
- **Jets** – Although the number of based jets at Smith Reynolds Airport grew from 8 in 1990 to 30 in 2007, this number recently decreased from 30 in 2007 to 18 in 2008. This decrease is mostly attributed to the recent economic recession which has caused some business owners to either sell their aircraft or to close their operation altogether.
- **Helicopters** – It is anticipated that the loss of based helicopters has been related to the same factors described under single-engines.

Table 3-6 Historical and Current Based Aircraft (1990-2008)					
Year	Single-Engine	Multi-Engine	Jet	Helicopter	Total
1990	82	45	8	3	138
1991	82	45	8	0	135
1992	80	46	10	0	136
1993	80	46	10	0	136
1994	80	46	10	0	136
1995	80	46	10	0	136
1996	80	46	10	0	136
1997	63	18	11	0	92
1998	63	18	11	0	92
1999	90	26	15	1	132
2000	90	26	15	1	132
2001	71	23	21	1	116
2002	71	23	21	1	116
2003	71	23	21	1	116
2004	60	10	30	0	100
2005	60	10	30	0	100
2006	60	10	30	0	100
2007	60	10	30	0	100
2008	68	23	18	0	109
AAGR 1990-2000	0.94%	-5.34%	6.49%	-10.40%	-0.44%
GROWTH 1990-2000	9.76%	-42.22%	87.50%	-66.67%	-4.35%
AAGR 2000-2008	-3.44%	-1.52%	2.31%	-100.00%	-2.36%
GROWTH 2000-2008	-24.44%	-11.54%	20.00%	-100.00%	-17.42%

Source: FAA Draft 2009 TAF.
AAGR – Average Annual Growth Rate

Direct Impacts of Aircraft Fleet Mix Changes

In most cases, general aviation airports with high levels of large jet traffic have less small aircraft activity (single- and multi-engine pistons). This is because pilots of small aircraft may conduct numerous operations at the same airport during an hour (i.e., touch-and-gos), while jets might only perform one takeoff and landing over the course of several hours. There are several reasons why pilots of smaller aircraft may avoid airports with frequent jet activity. Some avoid them due to the added danger of wake vortices (small tornadoes) that are produced by larger jet aircraft wings; whereas others may avoid these airports since they lie within controlled airspace which requires pilots to request permission and also to maintain a constant dialogue via radio communications. Despite the fact that INT's operations and based aircraft numbers have declined over the past ten years, the introduction of a larger aircraft fleet mix has increased fuel sales and has allowed the airport to recognize revenue potential that it would not otherwise be generated from smaller aircraft. This being said, the economic impact of the airport is less dictated by the total number of operations and based aircraft than it is by fleet mix indicators like jet activity and by the revenues recognized by the airport itself.

As shown in **Tables 3-5** and **3-6**, published historical data for Smith Reynolds Airport reveals that there has been an obvious reduction in both based aircraft and operational activity over the past ten years. Despite these declines, INT has consistently maintained more than 100 based aircraft and has experienced at least 51,000 annual operations through 2008. Furthermore, businesses such as Landmark Aviation, Piedmont Flight School, and several other airport tenants have been able to successfully maintain and grow their businesses based solely on airport traffic. A review of INT's historical data seems to reveal that the airport has become less and less active over the past two decades. While total operational and based aircraft numbers have declined, it should be acknowledged that INT experienced an identity change during this time that actually resulted in a growing economic output. A review of **Table 3-6** illustrates that both single- and multi-engine aircraft have declined since 1990, whereas the number of jets has significantly increased during the same timeframe. This decline occurred despite the fact that the airport constructed additional T-hangar facilities during the mid 1990s.

3.5 REGRESSION ANALYSIS AND SOCIOECONOMIC CORRELATION

Often times, a correlation can be made between historical airport activity and historical socioeconomic characteristics, which were presented in earlier sections of this chapter. In order to test if such a correlation exists, regression analysis is used to determine if an independent variable (*X*) can be used to predict a dependent variable (*Y*). Some regression analyses provide strong correlations (e.g., a comparison of automobile insurance rates to population within a square mile). The increased traffic in higher populated areas results in an additional number of accidents, thefts, etc., and therefore causes insurance rates to increase. In this example, the population per square mile would be the independent variable (*X*), whereas the cost of insurance would be the dependent variable (*Y*). In aviation forecasting, the independent variable is generally a socioeconomic characteristic (e.g., population or employment), while the dependent variable is passenger enplanements, airport operations, or based aircraft.

According to the FAA report, *Forecasting Aviation Activity by Airport, July 2001*, the ability of an independent variable to predict a dependent variable is measured by the Coefficient of Determination or R-Squared (R^2) regression statistic. "An R^2 of 0.00 indicates that there is no statistical relationship between changes in the independent and dependent variables. R^2 values near 1.00 mean there is a very strong statistical relationship." [8] The R^2 value "measures the percent of the variation in *Y* [e.g., historical change in airport activity] that is explained by the variation in *X* [e.g., historical change in population]."[9] In aviation forecasting, an R^2 value of 0.90 percent or greater should be achieved for the independent variable (*X*) to be considered a confident predictor of the dependent variable (*Y*).

For Smith Reynolds Airport, the independent variables (*X*) were population, employment, and PCPI for the *Four-County Region* service area (Forsyth, Davie, Stokes, and Yadkin Counties), and the dependent variables (*Y*) were the number of annual operations and based aircraft. The

[8] FAA Forecasting Aviation Activity by Airport, July 2001.
[9] Basic Statistics for Business and Economics, Third Edition, 2000.

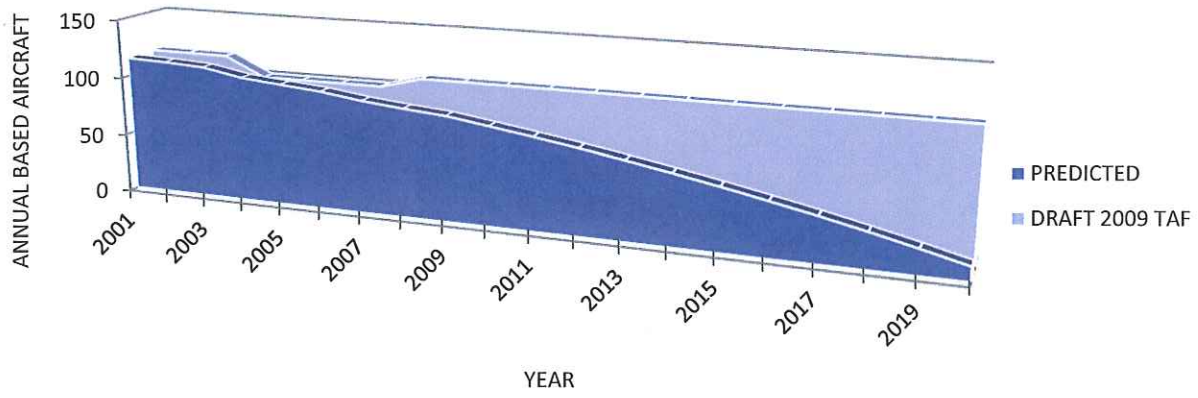
objective of the regression analyses was to determine if a correlation existed between historical socioeconomic variables and historical airport activity between the years 2001 and 2007 – this range was selected so that the outcomes would not be skewed by the significant airport activity decline in 2008. If such a correlation were to exist (i.e., producing an R^2 value close to 1.00), then it would be reasonable to assume that forecasts of the socioeconomic variables could be used to determine future airport activity. However, because of the large variation in historical airport operations and based aircraft levels year-to-year while all three socioeconomic characteristics generally showed consistent and positive growth, the regression analysis for total population and employment produced a low R^2 (correlation) value and were therefore deemed unusable for further forecast development. Conversely, the analysis of PCPI to based aircraft produced a strong correlation that was also rendered unusable due to an identified anomaly. Further investigation into this correlation confirmed that it was purely coincidental that the PCPI of the *Four-County Region* continued to increase from 2001 through 2007 while simultaneously the number of based aircraft decreased. As pointed out earlier, the reduction in based aircraft during this time period is attributed to a number of factors, thus any forecast developed utilizing this approach would illustrate a negative growth trend for based aircraft as demonstrated in **Exhibit 3-7**.

Table 3-7
Regression Analysis – Socioeconomic Characteristics

Socioeconomic Variable (X Variable)	Operations (Y Variable)	Conclusion	Based Aircraft (Y Variable)	Conclusion
Total Population – R^2 Value	0.06	Reject	0.65	Reject
Total Employment – R^2 Value	0.00	Reject	0.60	Reject
Total PCPI – R^2 Value	0.00	Reject	0.80	Reject

Source: The LPA Group Incorporated, September 2009.

Exhibit 3-7
Sample Regression – PCPI (X) to INT Based Aircraft (Y) (2001-2020)



Source: The LPA Group Incorporated, September 2009.

3.6 FACTORS AND OPPORTUNITIES AFFECTING ACTIVITY LEVELS

As described throughout this chapter, historical activity trends at Smith Reynolds Airport illustrate that economic events, aviation fuel prices, and natural disasters have the potential to influence operational demand – particularly local traffic levels. Although it is impossible to forecast many of these factors (e.g., hurricanes, economic recessions, terrorist attacks), these variables were considered in the evaluation and selection of the preferred forecasts. It is also important to identify ongoing and anticipated trends at INT, as well as within the *Four-County Region* airport service area and the U.S. aviation system as a whole.

Unanticipated Events

Unanticipated events like natural disasters and terrorist actions have the potential to influence aviation activity. For example, when Hurricane Katrina hit the Gulf Coast of the U.S. in August 2005, aviation fuel prices increased shortly thereafter which resulted in declining activity levels at INT. Nine years earlier, Hurricane Fran caused over a billion dollars in property damage across North Carolina that also negatively influenced airport activity. Therefore, the impacts of natural disasters must be recognized and considered in the development of long-term airport forecasts.

As evidenced by the events of September 11, 2001, and the British bomb plot in 2006 that resulted in liquids restrictions on commercial airlines, terrorism and security issues are a current and serious threat to aviation demand. The level and type of threats impacting all airports is constantly changing. Due in part to past terrorist actions, the Transportation Security Administration (TSA) is also considering stricter security measures for general aviation airports and aircraft operators that may affect future aviation demand.

FAA Next Generation Air Transportation System (NextGen)

In an effort to reduce congestion around the country, the FAA has begun to implement the Next Generation Air Transportation System (NextGen), which is a "plan to modernize the National Airspace System (NAS) through 2025. Through NextGen, the FAA is addressing the impact of air traffic growth while simultaneously improving safety, environmental impacts, and user access to the NAS."[10] The primary goals of NextGen are to provide order-of-magnitude improvements in the efficiency of the NAS by allowing aircraft to fly more direct routes (i.e., GPS-guided point-to-point paths), to safely reduce aircraft separation standards, and to provide more data to aircrews for operating their aircraft. The FAA's ongoing roll-out of NextGen initiatives should help to improve access and approach capability for airports around the country.

Aircraft Trends

Many general aviation activity trends presented in the *FAA Aerospace Forecast Fiscal Years 2009-2025* were drastically different than FAA predictions in previous years. This was due to factors like the ongoing economic recession, as well as several bankruptcies and business failures within the Very Light Jet (VLJ) sector that was previously expected to show rapid growth. Although the FAA has scaled-back their VLJ growth expectation to approximately 4,875 active aircraft by 2025, the demand for corporate jets is still expected to remain strong because "corporate safety/security concerns for corporate staff, combined with increasing flight delays at some U.S. airports have made factional, corporate, and on-demand charter flights practical alternatives to travel on commercial flights."[11] Therefore, this Master Plan Update assumes that there is strong potential for continued jet activity growth at Smith Reynolds Airport. Other nationwide activity trends from the *FAA Aerospace Forecast Fiscal Years 2009-2025* are referenced throughout this chapter.

3.7 REVIEW OF PREVIOUS FORECASTING EFFORTS

As previously described in **Section 3.6**, several factors and trends may negatively or positively affect future activity levels at Smith Reynolds Airport. Therefore, it is important to consider previous forecasting efforts to determine if they are consistent with current airport activity levels and anticipated trends. Previous forecasting efforts from the FAA's Draft 2009 TAF and the 1995 Master Plan Update are evaluated in this section.

Draft 2009 Terminal Area Forecast (TAF)

The FAA's Draft 2009 TAF was previously determined to be most appropriate for analysis in this Master Plan Update. As such, the Draft TAF shown in **Table 3-8** was used as a benchmark for evaluation in this updated forecasting effort. While Smith Reynolds Airport was expected to experience continued activity decline through year-end 2009, the Draft TAF illustrates a slow

[10] FAA NextGen Fact Sheet, October 29, 2008.
[11] FAA Aerospace Forecast Fiscal Years 2009-2025, page 41.

recovery in the short-term, followed by a modest recovery for the remainder of the 20-year planning period. However, the Draft TAF does not show total operations recovering to pre-2009 levels through the remainder of the planning period.

At the time of this writing, the Draft 2009 TAF did not include updated based aircraft forecasts for the years 2008 to 2028. Since the Official 2008 TAF held the number of based aircraft constant at 100 in every year of the forecast (i.e, the total number of based aircraft in 2007), an adjusted TAF forecast was developed for based aircraft by holding the number of based aircraft constant at 109 through 2028 as shown in **Table 3-8** (i.e, the total number of based aircraft in 2008).

Table 3-8
FAA Draft 2009 Terminal Area Forecast (2008-2028)

Year	Itinerant Operations					Local Operations			Total Operations	Total Based Aircraft*	OPBA
	Air Carrier	Air Taxi & Commuter	GA	Military	Total	GA	Military	Total			
2008	519	2,883	33,638	233	37,273	14,452	114	14,566	51,839	109	476
2009	481	2,549	28,563	446	32,039	11,832	287	12,119	44,158	109	405
2010	481	2,549	28,278	446	31,754	11,849	287	12,136	43,890	109	403
2011	481	2,549	28,658	446	32,134	11,866	287	12,153	44,287	109	406
2012	481	2,549	29,042	446	32,518	11,881	287	12,168	44,686	109	410
2013	481	2,549	29,431	446	32,907	11,896	287	12,183	45,090	109	414
2014	481	2,549	29,825	446	33,301	11,911	287	12,198	45,499	109	417
2015	481	2,549	30,153	446	33,629	11,926	287	12,213	45,842	109	421
2016	481	2,549	30,485	446	33,961	11,942	287	12,229	46,190	109	424
2017	481	2,549	30,820	446	34,296	11,958	287	12,245	46,541	109	427
2018	481	2,549	31,159	446	34,635	11,974	287	12,261	46,896	109	430
2019	481	2,549	31,502	446	34,978	11,990	287	12,277	47,255	109	434
2020	481	2,549	31,849	446	35,325	12,006	287	12,293	47,618	109	437
2021	481	2,549	32,199	446	35,675	12,022	287	12,309	47,984	109	440
2022	481	2,549	32,553	446	36,029	12,038	287	12,325	48,354	109	444
2023	481	2,549	32,911	446	36,387	12,054	287	12,341	48,728	109	447
2024	481	2,549	33,273	446	36,749	12,070	287	12,357	49,106	109	451
2025	481	2,549	33,639	446	37,115	12,086	287	12,373	49,488	109	454
2026	481	2,549	34,009	446	37,485	12,102	287	12,389	49,874	109	458
2027	481	2,549	34,383	446	37,859	12,118	287	12,405	50,264	109	461
2028	481	2,549	34,761	446	38,237	12,134	287	12,421	50,658	109	465
AAGR 2008-2013	-1.51%	-2.43%	-2.64%	13.87%	-2.46%	-3.82%	20.28%	-3.51%	-2.75%	0.00%	-2.75%
AAGR 2013-2018	0.00%	0.00%	1.15%	0.00%	1.03%	0.13%	0.00%	0.13%	0.79%	0.00%	0.79%
AAGR 2018-2023	0.00%	0.00%	1.10%	0.00%	0.99%	0.13%	0.00%	0.13%	0.77%	0.00%	0.77%
AAGR 2023-2028	0.00%	0.00%	1.10%	0.00%	1.00%	0.13%	0.00%	0.13%	0.78%	0.00%	0.78%
AAGR 2008-2028	-0.38%	-0.61%	0.16%	3.30%	0.13%	-0.87%	4.72%	-0.79%	-0.12%	0.00%	-0.12%
Growth 2008-2028	-7.32%	-11.59%	3.34%	91.42%	2.59%	-16.04%	151.75%	-14.73%	-2.28%	0.00%	-2.28%
Increase 2008-2028	-38	-334	1,123	213	964	-2,318	173	-2,145	-1,181	0	-11

Source: FAA Draft 2009 TAF.
Note: The majority of INT's current Air Carrier activity includes passenger charters as well as airplanes undergoing maintenance.
** Forecast adjusted per updated based aircraft counts in 2008.*
AAGR – Average Annual Growth Rate

1995 Master Plan Update

The operations and based aircraft forecasts from the 1995 Master Plan Update are summarized in **Table 3-9**. Although there have been various activity-related changes at Smith Reynolds Airport since the development of the previous plan, such as the loss of scheduled airline service, the techniques used to develop the previous forecasts can be examined for their relevance in this updated forecasting effort. Similar to the analysis herein, the 1995 Master Plan Update reviewed several forecasting techniques to derive a selected forecast, including forecasts from the 1987 Master Plan, FAA NPIAS 1990-1990, 1992 North Carolina Airports System Plan (NCASP), and 1992 TAF, as well as 1991 projections of population and PCPI. Although these previous forecasts of operations and based aircraft do not resemble current levels at INT, at the time they were considered reasonable projections of future activity. Where noted, some information from the 1995 Master Plan Update is incorporated into the analysis herein.

Table 3-9
1995 Master Plan Update Forecasts

Year	Airline	SEP	MEP	TP	Jet	Hel	Total
OPERATIONS							
1993	4,622	38,655	14,751	8,046	4,694	671	71,439
1998	5,364	42,067	16,233	8,854	5,534	1,007	79,059
2003	6,250	45,832	16,727	9,558	6,372	1,593	86,332
2013	8,556	53,054	18,956	10,989	7,692	2,656	101,903
AAGR 1993-2013	3.13%	1.60%	1.26%	1.57%	2.50%	7.12%	1.79%
GROWTH 1993-2013	85.11%	37.25%	28.51%	36.58%	63.87%	295.83%	42.64%
INCREASE 1993-2013	3,934	14,399	4,205	2,943	2,998	1,985	30,464
BASED AIRCRAFT							
1993	N/A	80	30	16	10	0	136
1998	N/A	85	33	18	12	2	150
2003	N/A	92	36	19	13	3	163
2013	N/A	107	40	22	16	5	190
AAGR 1993-2013	N/A	1.46%	1.45%	1.61%	2.38%	N/A	1.69%
GROWTH 1993-2013	N/A	33.75%	33.33%	37.50%	60.00%	N/A	39.71%
INCREASE 1993-2013	N/A	27	10	6	6	5	54

Source: 1995 Master Plan Update.
AAGR – Average Annual Growth Rate

3.8 FORECASTING METHODS CONSIDERED

The previous sections of this chapter introduced historical, present, and future trends that represent key considerations for this updated forecasting effort. Growth cannot be forecast for INT without recognizing factors that might influence growth. This section presents the results of the forecasting methods that were investigated for their reliability in determining future operations and based aircraft levels throughout the 20-year planning period. **FAA Advisory Circular 150/5070-6**, *Airport Master Plans*, identifies the following methods for aviation forecasting:

- "**Regression Analysis** – A statistical technique that ties aviation demand (dependent variables), such as enplanements, to economic measures (independent variables), such as population and income. Regression analysis should be restricted to relatively simple models with independent variables for which reliable forecasts are available.
- **Trend analysis and Extrapolation** – Typically uses the historical pattern of an activity and projects this trend into the future. This approach is useful where unusual local conditions differentiate the study airport from other airports in the region.
- **Market Share Analysis or Ratio Analysis** – This technique assumes a top-down relationship between national, regional, and local forecasts. Local forecasts are a market share (percentage) of regional forecasts, which are a market share (percentage) of national forecasts. Historical market shares are calculated and used as a basis for projecting future market shares. This type of forecast is useful when the activity to be forecast has a constant share of a larger aggregate forecast.
- **Smoothing** – A statistical technique applied to historical data, giving greater weight to the latest trend and conditions at the airport; it can be effective in generating short-term forecasts."[12]

Regression analysis was previously rejected from consideration as a forecasting method due to the poor correlations that were observed between historical socioeconomic variables and INT activity. Where applicable, the remaining forecasting methods were investigated.

Operations Forecasting Methods

According to the FAA's Draft 2009, 51,839 operations were conducted at Smith Reynolds Airport in 2008. Data from the ATCT (through July 2009) indicated that operations were expected to decline even further by year-end 2009. As previously shown in **Exhibit 3-4**, local operations have been generally decreasing since 1990, with mixed years of unpredictable growth and decline, while at the same time itinerant operations showed relative consistency. Factors contributing to this trend were described earlier in this chapter (airline service in the 1990s, increasing jet traffic and maintenance, natural disasters, etc.). **Table 3-10** illustrates the year-over-year percent growth or decline in annual operations since 1990. Although the economic recession had an impact on INT's operations in 2008 and 2009, factors like reduced fuel prices

[12] FAA Advisory Circular 150/5070-6B, Airport Master Plans, page 40.

and an estimated $8.6 billion infusion into North Carolina from the American Recovery and Reinvestment Act (ARRA) of 2009[13] should help stimulate growth in aviation activity throughout the U.S. Considering these factors, **Table 3-11** and **Exhibit 3-8** present the following operations forecasting methods for INT:

Growth Rate – As shown in **Table 3-10**, Smith Reynolds Airport has experienced cycles of growth and decline despite three economic recessions, hurricanes, loss of regularly-scheduled airline service, U.S. terrorist attacks, and the past temporary closure of the main runway for rehabilitation. While it is difficult to pinpoint the exact reasons for historical growth or decline, some general observations about airport operations can be inferred through this analysis. In the years immediately following cycles of activity decline (i.e., 1994, 1997, 2000, 2004, and 2007), operations rebounded an average of 4.0 percent. This indicates that the airport has been very resilient after periods of decline, showing quick ability to recover and once again grow. However, growth has not been quite as strong over the long-term due to the various reasons mentioned above. The FAA's Draft 2009 TAF illustrates negative growth through 2010, followed by slow recovery thereafter. However, as previously shown in **Table 3-1**, with the exception of June, activity in each month of 2009 has shown consistently positive growth over the previous month, which is a very different trend than has been experienced in past years. Also, consistent with historical growth after cycles of decline, activity in 2009 has grown at an average rate of 4.0 percent per month. During a conference on September 15, 2009, Federal Reserve Chairman Ben S. Bernake indicated that "From a technical perspective, the recession is very likely over at this point."[14] Therefore, considering the past resiliency of INT activity and the potential end of the economic recession, the Growth Rate Forecast took an alternative approach to the TAF and assumed a strong annual growth rate of 4.00 percent for 2010 and 2011 operations, but used a conservative annual growth rate of 0.95 percent for the remainder of the planning period to be consistent with historical long-term growth.

FAA Aerospace Forecast – The FAA publishes long-term forecasts of nationwide aviation demand each year. Although the FAA Aerospace Forecasts do not forecast general aviation operations, there is a forecast of *General Aviation Hours Flown* that is comparable to the anticipated growth in operations. According to the *FAA Aerospace Forecast Fiscal Years 2009-2025*, "The number of general aviation hours flown is projected to increase by 1.8 percent yearly over the forecast period."[15] The FAA further splits this forecast into the following periods and rates of annual growth, which were applied to operations throughout the 20-year planning period:

- 2008-2010 – 1.14% annual growth
- 2010-2020 – 1.77% annual growth
- 2020-2025 – 2.25% annual growth

[13] NCRecovery.gov.
[14] Fed Chief Says Recession Is 'Very Likely Over,' NYTimes.com, September 16, 2009.
[15] FAA Aerospace Forecast Fiscal Year 2009-2025, page 42.

Table 3-10
Historical Growth Summary (1990-2008)

Year	Total Operations	Actual Change	% Annual Change	Events
1990	68,577			
1991	70,529	1,952	2.85%	U.S. Recession (July 1990-March 1991)
1992	71,519	990	1.40%	
1993	71,306	-213	-0.30%	
1994	72,272	966	1.35%	
1995	70,588	-1,684	-2.33%	
1996	64,441	-6,147	-8.71%	NC Hurricanes Bertha (July) & Fran (September)
1997	67,544	3,103	4.82%	
1998	68,803	1,259	1.86%	NC Hurricanes Bonnie (August) & Floyd (September)
1999	68,755	-48	-0.07%	
2000	75,413	6,658	9.68%	US Airways Stops Service
2001	69,136	-6,277	-8.32%	U.S. Recession (March 2001-November 2001) & 9/11
2002	63,533	-5,603	-8.10%	
2003	52,868	-10,665	-16.79%	NC Hurricane Isabel (September)
2004	55,036	2,168	4.10%	NC Hurricanes Alex & Charley (both August)
2005	63,129	8,093	14.70%	Hurricane Katrina (August) & Increasing Fuel Prices
2006	59,528	-3,601	-5.70%	
2007	59,569	41	0.07%	U.S. Recession (July 2007-Present)
2008	51,839	-7,730	-12.98%	Runway 15-33 & South Apron Rehabilitation Projects
Avg. Growth After Decline Cycles			**4.00%** (avg. of growth that occurred in 1994, 1994, 2000, 2004, and 2007)	
Representative Long-Term Growth			**0.95%** (AAGR from 1990-2000 used to illustrate long-term growth)	

Source: The LPA Group Incorporated, September 2009.

Population Forecast – Although regression analysis illustrated no correlation between historical population and historical operations, the combined population of Forsyth, Davie, Stokes, and Yadkin Counties is forecast to grow at a similar rate to the historical long-term growth in operations (i.e., approximately 0.95 percent). Therefore, population may be a reasonable indicator of long-term activity growth at INT. As such, the following growth rates from Woods & Poole's population forecast of the *Four-County Region* were applied to operations:

- 2008-2013 – 0.95% annual growth
- 2013-2018 – 0.95% annual growth
- 2018-2028 – 0.90% annual growth

Employment Forecast – Similarly, regression analysis illustrated no correlation between historical employment and historical operations at INT. However, because employment forecasts show slow initial growth, which is representative of the ongoing economic recession, followed by steady growth thereafter, the Woods & Poole employment forecast for the *Four-County Region* was also applied to INT operations as follows:

- 2008-2013 – 0.61% annual growth
- 2013-2018 – 1.10% annual growth
- 2018-2028 – 1.12% annual growth

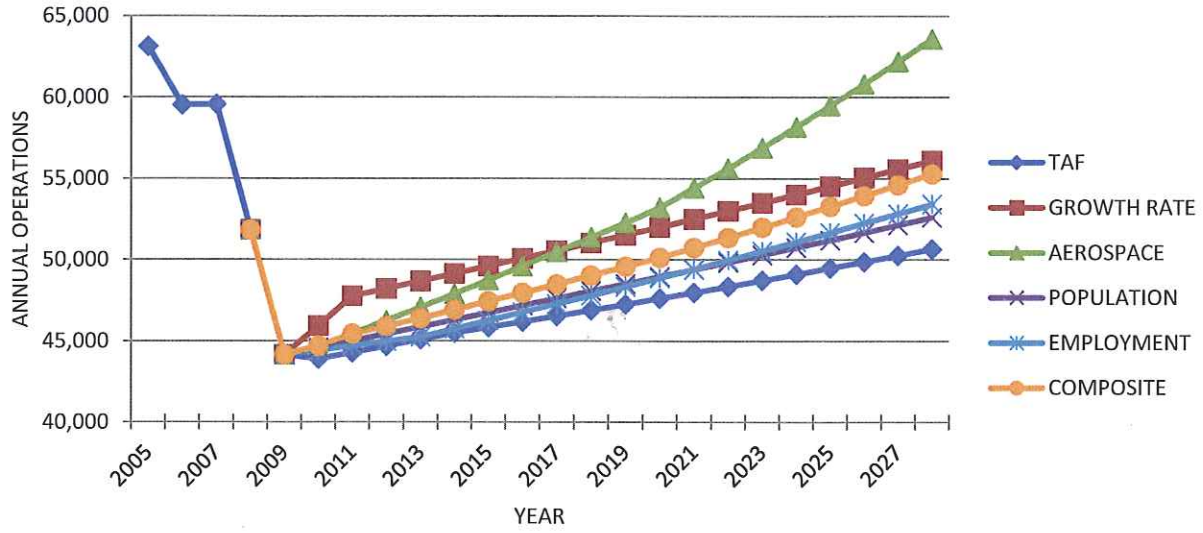
Composite Forecast – The Composite Forecast is the average of all forecasts presented including the FAA's Draft 2009 TAF, Growth Rate Forecast, FAA Aerospace Forecast, Population Forecast, and Employment Forecast. The Composite Forecast may be considered an applicable forecast because it incorporates anticipated growth rate trends on the local and national levels.

Table 3-11
Summary of Operations Forecasting Methods

Year	TAF	Growth Rate	Aerospace	Population	Employment	Composite
2008	51,839	51,839	51,839	51,839	51,839	51,839
2009	44,158	44,158	44,158	44,158	44,158	44,158
2013	45,090	48,677	47,068	45,867	45,253	46,391
2018	46,896	51,034	51,373	48,079	47,799	49,036
2023	48,728	53,505	56,881	50,294	50,534	51,988
2028	50,658	56,095	63,584	52,611	53,425	55,274
AAGR 2008-2013	-2.75%	-1.25%	-1.91%	-2.42%	-2.68%	-2.20%
AAGR 2013-2018	0.79%	0.95%	1.77%	0.95%	1.10%	1.12%
AAGR 2018-2023	0.77%	0.95%	2.06%	0.90%	1.12%	1.18%
AAGR 2023-2028	0.78%	0.95%	2.25%	0.90%	1.12%	1.23%
AAGR 2008-2028	-0.12%	0.40%	1.03%	0.07%	0.15%	0.32%
Growth 2008-2028	-2.28%	8.21%	22.66%	1.49%	3.06%	6.63%
Increase 2008-2028	-1,181	4,256	11,745	772	1,586	3,435

Source: The LPA Group Incorporated, September 2009.
AAGR – Average Annual Growth Rate

Exhibit 3-8
Summary of Operations Forecasting Methods



Source: The LPA Group Incorporated, September 2009.

Although month-to-month operational growth in 2009 may suggest a swifter short-term recovery at INT, there is still a great deal of uncertainty about when the U.S. economy, employment, and

aviation activity levels might rebound to pre-2008 levels. Therefore, it was determined that the Composite Forecast most realistically projected short- and long-term growth while remaining consistent with the FAA's national growth trends. Between 2008 and 2028, the Composite Forecast projects an average annual growth rate of 0.32 percent, which is below the FAA Aerospace rate of 1.03 percent. While the Composite Forecast is more optimistic than the FAA's Draft 2009 TAF, historical trends at INT show strong resiliency after cycles of decline that the TAF may not consider. Further, the Composite Forecast presents a conservative growth scenario because operations in 2028 are only predicted to grow by 3,435 over 2008 levels, and also because growth was projected from a record low number of operations in 2008 and 2009. Therefore, the Composite Forecast was identified as the *Preferred Operations Forecast*.

FAA TAF / Preferred Operations Forecast Comparison

According to the FAA memorandum, *Review and Approval of Aviation Forecasts June 2008*, "When reviewing a sponsor's forecast, FAA must ensure that the forecast is based on reasonable planning assumptions, uses current data, and is developed using appropriate forecasting methods." The FAA also reviews forecasts for consistency with the TAF, with consistency defined as follows: "Forecasts differ by less than 10 percent in the five-year forecast period, and 15 percent in the ten-year forecast period."[16] As shown in **Table 3-12** and **Exhibit 3-9**, the Composite Forecast is consistent with the FAA's Draft 2009 TAF, per the above criteria. Therefore, the Composite Forecast is considered in-line with FAA projections and is used as the *Preferred Operations Forecast* throughout this chapter to calculate derivative operations forecasts (peak hour, operations by aircraft type, etc.).

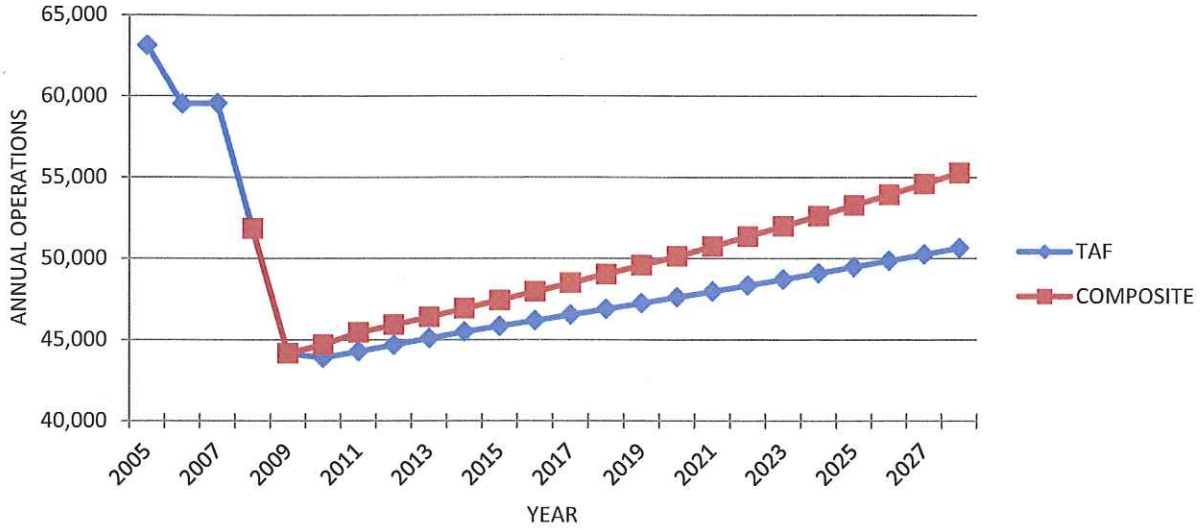
Table 3-12
FAA TAF / Preferred Operations Forecast Comparison

Year	TAF	Composite	Deviation From TAF
2008	51,839	51,839	0.00%
10% Deviation Acceptable in a Five-Year Period			
2009	44,158	44,158	0.00%
2013	45,090	46,391	2.89%
15% Deviation Acceptable in a Ten-Year Period			
2018	46,896	49,036	4.56%
No FAA Requirement for Last Ten Years			
2023	48,728	51,988	6.99%
2028	50,658	55,274	9.11%

Source: The LPA Group Incorporated, September 2009.

[16] FAA Memorandum, Review and Approval of Aviation Forecasts, June 2008.

Exhibit 3-9
FAA TAF / Preferred Operations Forecast Comparison



Source: The LPA Group Incorporated, September 2009.

Instrument Operations Forecast

According to the FAA report, *Forecasting Aviation Activity by Airport, July 2001*, instrument operations consist of "Arrivals, departures, and overflights conducted by an FAA approach control facility for aircraft with an Instrument Flight Rule (IFR) flight plan or special Visual Flight Rule procedures."[17] At INT, instrument operations generally consist of approaches and departures by aircraft with FAA filed flight plans (FAA Form 7233-1). By reviewing the FAA's Operations Network (OPSNET) database for the years 2001 through July 2009, it was determined that instrument operations historically represented an average of 27.70 percent of INT's annual activity (which was applied to 2008 activity). However, the *FAA Aerospace Forecast Fiscal Years 2009-2025* indicates that general aviation IFR activity is projected to grow at an average annual rate of 1.3 percent from 2008 to 2025. This is consistent with continuous upgrades to runway approach and departure procedures, aviation technologies, and the FAA's NextGen initiatives. Thus, as shown in **Table 3-13**, the 1.3 percent growth rate was applied to each year of the instrument operations forecast.

[17] Forecasting Aviation Activity by Airport, page A-2, July 2001.

Table 3-13
Instrument Operations Forecast

Year	Preferred Operations	Instrument Operations	% Instrument Operations
2008	51,839	14,362	27.70%
2009	44,158	12,234	27.70%
2013	46,391	12,882	27.77%
2018	49,036	13,742	28.02%
2023	51,988	14,659	28.20%
2028	55,274	15,637	28.29%
AAGR 2008-2013	-2.20%	-2.15%	
AAGR 2013-2018	1.12%	1.30%	
AAGR 2018-2023	1.18%	1.30%	
AAGR 2023-2028	1.23%	1.30%	
AAGR 2008-2028	0.32%	0.43%	
GROWTH 2008-2028	6.63%	8.88%	
INCREASE 2008-2028	3,435	1,275	

Source: The LPA Group Incorporated, September 2009.
AAGR – Average Annual Growth Rate

Operations by Flight Type

As shown in **Table 3-14**, the FAA records airport activity according to flight type (air carrier, air taxi, general aviation, and military). It is important to forecast each flight category since each might have a specific function in the facility requirements analysis. This forecast was conducted for each flight category by applying the year-over-year activity splits from the FAA's Draft 2009 TAF (as a percent of total annual operations) to the *Preferred Operations Forecast*. Overall, there are two flight categories that are not forecast to exceed 2008 levels by 2028 – itinerant air taxi & commuter and local general aviation. The FAA purposely scaled-back their anticipated growth in air taxi & commuter activity due to recent bankruptcies and failures by VLJ manufacturers like Eclipse Aviation and VLJ on-demand service providers like DayJet. However, growth in jet activity is still expected at INT, as shown by the large increase in itinerant general aviation activity during the 20-year planning period. Similar to the historical trend in local general aviation operations since 1990, only very minor growth is expected for the local general aviation sector after 2009.

Table 3-14
Operations by Flight Type Forecast

Year	Preferred Operations	IT AC	IT AT	IT GA	IT MIL	IT TOT	LOC GA	LOC MIL	LOC TOT	IT SPLIT	LOC SPLIT
2008	51,839	519	2,883	33,638	233	37,273	14,452	114	14,566	71.90%	28.10%
2009	44,158	481	2,549	28,563	446	32,039	11,832	287	12,119	72.56%	27.44%
2013	46,391	495	2,623	30,280	459	33,857	12,239	295	12,535	72.98%	27.02%
2018	49,036	503	2,665	32,581	466	36,216	12,520	300	12,821	73.85%	26.15%
2023	51,988	513	2,720	35,113	476	38,822	12,860	306	13,167	74.67%	25.33%
2028	55,274	525	2,781	37,929	487	41,721	13,240	313	13,553	75.48%	24.52%
AAGR 2008-2013	-2.20%	-0.95%	-1.88%	-2.08%	14.52%	-1.90%	-3.27%	20.97%	-2.96%		
AAGR 2013-2018	1.12%	0.32%	0.32%	1.48%	0.32%	1.36%	0.46%	0.32%	0.45%		
AAGR 2018-2023	1.18%	0.40%	0.40%	1.51%	0.40%	1.40%	0.54%	0.40%	0.53%		
AAGR 2023-2028	1.23%	0.45%	0.45%	1.55%	0.45%	1.45%	0.58%	0.45%	0.58%		
AAGR 2008-2028	0.32%	0.06%	-0.18%	0.60%	3.75%	0.57%	-0.44%	5.18%	-0.36%		
GROWTH 2008-2028	6.63%	1.12%	-3.53%	12.76%	108.86%	11.93%	-8.39%	174.70%	-6.96%		
INCREASE 2008-2028	3,435	6	-102	4,291	254	4,448	-1,212	199	-1,013		

Source: The LPA Group Incorporated, September 2009.
AAGR – Average Annual Growth Rate

Operations by Aircraft Type

Jet operations at Smith Reynolds Airport drive much of the requirements for airfield facilities such as runway length, approach capability, and separation criteria. According to the *FAA Aerospace Forecast Fiscal Years 2009-2025*, "As the demand for business jets has grown over the past several years, the current forecast assumes that business use of general aviation aircraft will expand at a more rapid pace than that for personal/sport use."[18] As shown in **Table 3-15**, the FAA's Enhanced Traffic Management System Counts (ETMSC) database was used to query historical jet operations at INT during the years 2000 through 2008. The ETMSC database summarizes FAA filed flight plans and therefore records the majority of jet and turboprop activity. The decline in turboprop operations from 2000 to 2008 is consistent with INT's historical decline in based multi-engine aircraft. During the same time, the number of based jets generally increased at INT, which may indicate that several airport tenants decided to upgrade from turboprop to jet aircraft. **Chapter 4**, *Demand Capacity/Facility Requirements*, provides specific analysis of the types, sizes, and flight categories of jets operating at INT.

Table 3-15
Historical Jet and Turboprop Operations (2000-2008)

Year	Jet Operations	Turboprop Operations
2000	6,639	5,415
2001	5,622	5,827
2002	6,698	4,654
2003	6,353	4,378
2004	7,765	3,928
2005	7,019	3,668
2006	7,018	2,761
2007	6,971	2,701
2008	6,661	2,499

Source: FAA ETMSC database.

The FAA ETMSC database indicates that 6,661 jet operations and 2,499 turboprop operations occurred at INT in 2008. As presented in **Table 3-16**, the forecast of operations by each aircraft type was conducted as follows:

Jet and Turboprop Operations – Consistent with the decrease in total operations between 2008 and 2009, jet and turboprop operations were forecast to decline 14.28 percent in 2009. Thereafter, an annual growth rate of 1.83 percent was used to forecast jet and turboprop operations through 2028. In the *FAA Aerospace Forecast Fiscal Years 2009-2025*, this growth rate represented the forecast of *Total General Aviation Hours Flown*. Since many jets and turboprops can fly more hours than piston-powered aircraft, the specific *Hours Flown* growth rates for jets and turboprops were assumed to be less representative of the actual number of operations; whereas use of the *Total General Aviation Hours Flown* growth rate provided a more realistic depiction of future corporate aircraft activity levels at Smith Reynolds Airport.

[18] FAA Aerospace Forecast Fiscal Years 2009-2025, page 41.

Helicopter Operations – All-inclusive counts for helicopter and piston aircraft activity are not recorded by the FAA. Therefore, data from the 1995 Master Plan Update was used to produce the forecasts for these aircraft. According to the 1995 Master Plan Update, approximately 1.00 percent of total operations were conducted by helicopters in 1993, which was subsequently incorporated into the forecasting effort herein.

Piston Operations – Piston operations were calculated as the remainder of total operations after the forecasts of jets, turboprops, and helicopters were produced. However, the separation of single-engine and multi-engine piston operations was calculated according to the split from the 1995 Master Plan Update – approximately 73 percent single-engine and 27 percent multi-engine.

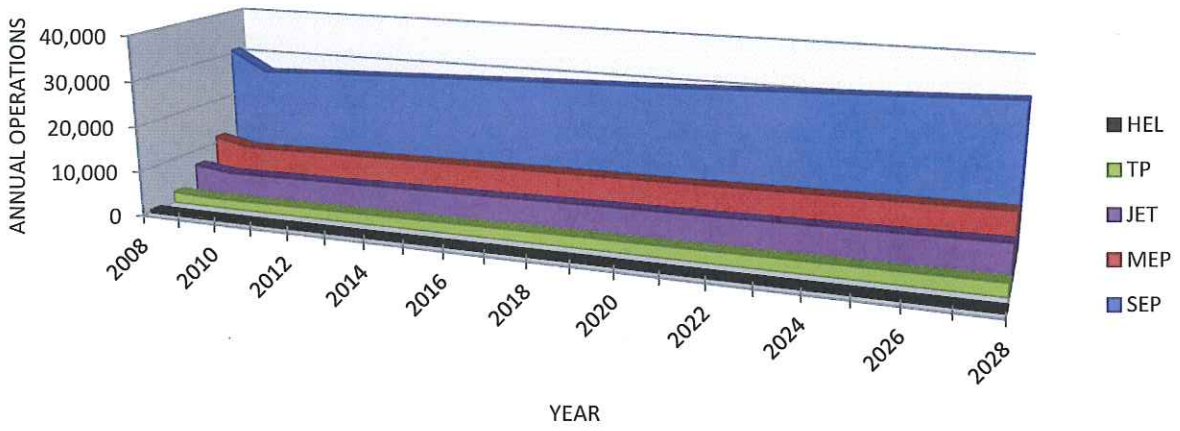
Table 3-16
Operations by Aircraft Type Forecast

Year	Preferred Operations	SEP	MEP	TP	Jet	Helicopter
2008	51,839	30,777	11,383	2,499	6,661	518
2009	44,158	26,217	9,697	2,129	5,674	442
2013	46,391	27,401	10,135	2,289	6,102	464
2018	49,036	28,730	10,626	2,507	6,683	490
2023	51,988	30,225	11,179	2,746	7,319	520
2028	55,274	31,901	11,799	3,007	8,015	553
AAGR 2008-2013	-2.20%	-2.30%	-2.30%	-1.74%	-1.74%	-2.20%
AAGR 2013-2018	1.12%	0.95%	0.95%	1.83%	1.83%	1.12%
AAGR 2018-2023	1.18%	1.02%	1.02%	1.83%	1.83%	1.18%
AAGR 2023-2028	1.23%	1.09%	1.09%	1.83%	1.83%	1.23%
AAGR 2008-2028	0.32%	0.18%	0.18%	0.93%	0.93%	0.32%
GROWTH 2008-2028	6.63%	3.65%	3.65%	20.33%	20.33%	6.63%
INCREASE 2008-2028	3,435	1,123	416	508	1,354	34

Source: The LPA Group Incorporated, September 2009.
AAGR – Average Annual Growth Rate

As shown in **Exhibit 3-10**, while single-engine piston aircraft are forecast to continue to comprise the majority of INT's operations, jet and turboprop operations are forecast to experience the highest average annual growth rate of 0.93 percent between 2008 and 2028. Still, 2028 is only projected to experience 1,354 more jet operations than were conducted in 2008.

Exhibit 3-10
Operations by Aircraft Type



Source: The LPA Group Incorporated, September 2009.

Based Aircraft Forecasting Methods

As Smith Reynolds Airport grew as a maintenance center for commercial jets during the 1990s and 2000s, based aircraft levels generally declined. In the early 1990s there were nearly as many local flights at INT as there were itinerant flights, while itinerant operations now comprise over 70 percent of operations. Consequently, this operational transformation may have caused a shift of smaller based aircraft to other nearby airports where general aviation pilots can operate independently from large jets. INT's based aircraft levels held stable at 109 in 2008 and 2009. The following based aircraft forecasting methods were investigated in this chapter as shown in **Table 3-17** and **Exhibit 3-11**:

Operations Per Based Aircraft Forecast (OPBA) – In 2008 there were 476 operations per based aircraft at Smith Reynolds Airport. For every year of the *Preferred Operations Forecast* that showed positive growth over 2008 (i.e., only 2021 through 2028), the number of annual operations was divided by 476 to determine the OPBA forecast.

FAA Aerospace Forecast – The *FAA Aerospace Forecast Fiscal Years 2009-2025* forecasts the *Active General Aviation Fleet* to increase at an average annual rate of 1.0 percent over the forecast period. The FAA further splits this forecast into the following periods and rates of annual growth, which were used to project INT's based aircraft growth from 2009 to 2028:

- 2008-2010 – 0.94% annual growth
- 2010-2020 – 0.94% annual growth
- 2020-2025 – 1.00% annual growth

Population Forecast – Similar to the operations forecasting method, the following growth rates from Woods & Poole's population forecast of the airport's *Four-County Region* service area were applied to based aircraft:

- 2008-2013 – 0.95% annual growth
- 2013-2018 – 0.95% annual growth
- 2018-2028 – 0.90% annual growth

Employment Forecast – Woods & Poole's employment forecast for the *Four-County Region* service was also used to project INT's based aircraft levels through 2028 as follows:

- 2008-2013 – 0.61% annual growth
- 2013-2018 – 1.10% annual growth
- 2018-2028 – 1.12% annual growth

Composite Forecast – The Composite Forecast is the average of all forecasts presented including the FAA's Draft 2009 TAF, OPBA Forecast, FAA Aerospace Forecast, Population Forecast, and Employment Forecast. The Composite Forecast may be considered an applicable forecast because it incorporates anticipated growth rate trends on the local and national levels.

Table 3-17
Summary of Based Aircraft Forecasting Methods

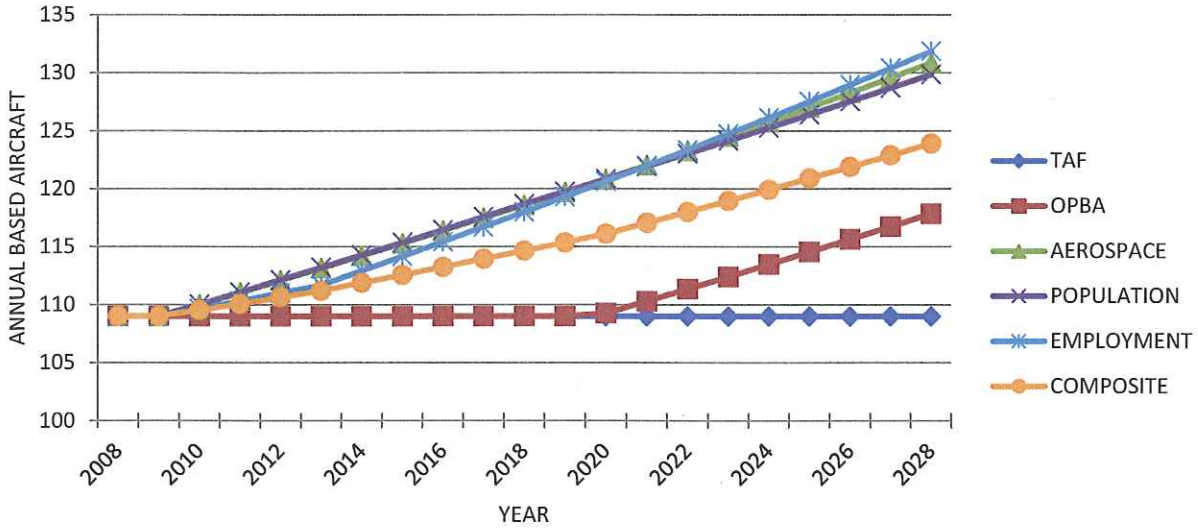
Year	TAF	OPBA	Aerospace	Population	Employment	Composite
2008	109	109	109	109	109	109
2009	109	109	109	109	109	109
2013	109	109	113	113	112	111
2018	109	109	119	119	118	115
2023	109	112	125	124	125	119
2028	109	118	131	130	132	124
AAGR 2008-2013	0.00%	0.00%	0.75%	0.76%	0.49%	0.40%
AAGR 2013-2018	0.00%	0.00%	0.94%	0.95%	1.10%	0.61%
AAGR 2018-2023	0.00%	0.62%	0.98%	0.90%	1.12%	0.74%
AAGR 2023-2028	0.00%	0.95%	1.00%	0.90%	1.12%	0.82%
AAGR 2008-2028	0.00%	0.39%	0.92%	0.88%	0.96%	0.64%
GROWTH 2008-2028	0.00%	8.12%	20.06%	19.14%	20.98%	13.66%
INCREASE 2008-2028	0	9	22	21	23	15

Source: The LPA Group Incorporated, September 2009.
AAGR – Average Annual Growth Rate

It is important to point out that the forecast of based aircraft directly affects future development recommendations in subsequent chapters of this report. It has been demonstrated that it is difficult to predict exactly what types and the number of aircraft that will reside at the airport in the next twenty years. However, from a planning perspective, it is in the airport's best interest to assume that additional aircraft and consequently additional facilities will be required. The airport currently maintains a hangar waiting list and also has plans to develop additional hangar facilities within the South Apron development area. As such, through careful consideration of historical based aircraft trends at INT, it was determined that the FAA Aerospace Forecast most realistically depicted future based growth trends at INT, and was therefore selected as the *Preferred Based Aircraft Forecast*. Overall, the *Preferred Based Aircraft Forecast* projects the

addition of 22 new based aircraft at Smith Reynolds Airport by the end of the twenty-year planning period.

Exhibit 3-11
Summary of Based Aircraft Forecasting Methods



Source: The LPA Group Incorporated, September 2009.

FAA TAF / Preferred Based Aircraft Forecast Comparison

Similar to the operations forecasts, the FAA also reviews based aircraft forecasts for consistency with the TAF. It should be noted that sufficient evidence must be available to support growth claims that are substantially greater than the FAA's 2009 TAF, thus the forecasts attempt to provide realistic, yet modest, growth expectations that still allow for a beneficial planning effort. According to the FAA memorandum, Review and Approval of Aviation Forecasts (June 2008), "when reviewing a sponsor's forecast, FAA must ensure that the forecast is based on reasonable planning assumptions, uses current data, and is developed using appropriate forecasting methods." The FAA defines consistency with the TAF as follows: "Forecasts differ by less than 10 percent in the five-year forecast period, and 15 percent in the ten-year forecast period."[19] As shown in **Table 3-18**, the FAA Aerospace Forecast is consistent with the Adjusted TAF, per the above definition, and was therefore selected as the *Preferred Based Aircraft Forecast* for the Smith Reynolds Airport.

[19] FAA Memorandum, Review and Approval of Aviation Forecasts June 2008.

Table 3-18
FAA TAF / Preferred Based Aircraft Forecast Comparison

Year	TAF	Aerospace	Deviation From TAF
2008	109	109	0.00%
10% Deviation Acceptable in a Five-Year Period			
2009	109	109	0.00%
2013	109	113	3.81%
15% Deviation Acceptable in a Ten-Year Period			
2018	109	119	8.79%
No FAA Requirement for Last Ten Years			
2023	109	125	14.22%
2028	109	131	20.06%

Source: The LPA Group Incorporated, September 2009.

Based Aircraft Forecast by Type

The previous sections of this chapter presented FAA based aircraft counts according to single-engines, multi-engines, jets, and helicopters. This section further splits the based aircraft forecasts by single-engine pistons, multi-engine pistons, turboprops, jets, and helicopters. The identification of turboprops is important because the dimensions and airfield design requirements of many turboprops are very different than piston-powered aircraft. The 2008 based aircraft mix at Smith Reynolds Airport included 109 aircraft: 66 single-engine pistons, 13 multi-engine pistons, 12 turboprops, 18 jets, and no helicopters. As shown in **Table 3-19** and **Exhibit 3-12**, the *Preferred Based Aircraft Forecast* grows to 131 with the addition of 22 based aircraft by 2028. The forecast of based aircraft by type was calculated as follows:

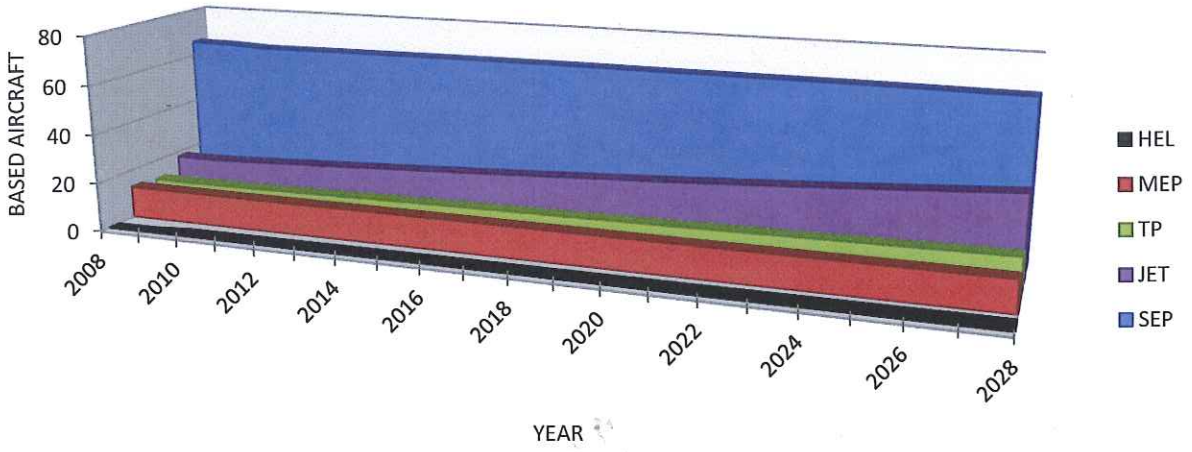
- **Jets** – Among all general aviation aircraft categories, the *FAA Aerospace Forecast Fiscal Years 2009-2025* predicts the strongest annual growth rate for the *Active Fleet* of jets. However, a more realistic projection of INT's based jet demand was achieved by applying an annual growth rate of 3.93 percent throughout the 20-year planning period, which represents the *Active Fleet Forecast* for all turbine-powered aircraft.
- **Turboprops** – The *FAA Aerospace Forecast Fiscal Years 2009-2025* forecasts the number of turboprops to grow at an average annual rate of 1.44 percent.
- **Helicopters** – Helicopters have been based at Smith Reynolds Airport in previous years. To sufficiently plan for helicopter storage, it was estimated that two helicopters would be based at INT by 2028.
- **Multi-Engine Pistons** – The *FAA Aerospace Forecast Fiscal Years 2009-2025* does not anticipate growth in the number of multi-engine piston aircraft.
- **Single-Engine Pistons** – The forecast of based single-engine pistons was determined as the remainder of total based aircraft after the calculations above were conducted.

Table 3-19
Based Aircraft Forecast by Type

Year	Preferred Based Aircraft	SEP	MEP	TP	Jet	HEL
2008	109	66	13	12	18	0
2009	109	66	13	12	18	0
2013	113	66	13	13	21	1
2018	119	66	13	14	24	1
2023	125	66	13	15	29	2
2028	131	66	13	16	34	2
AAGR 2008-2013	0.75%	-0.09%	0.00%	1.15%	2.75%	N/A
AAGR 2013-2018	0.94%	0.13%	0.00%	1.44%	3.45%	4.16%
AAGR 2018-2023	0.98%	0.02%	0.00%	1.44%	3.45%	4.16%
AAGR 2023-2028	1.00%	-0.12%	0.00%	1.44%	3.45%	3.32%
AAGR 2008-2028	0.92%	-0.02%	0.00%	1.37%	3.28%	N/A
GROWTH 2008-2028	20.06%	-0.31%	0.00%	31.26%	90.66%	N/A
INCREASE 2008-2028	22	0	0	4	16	2

Source: The LPA Group Incorporated, September 2009.
AAGR – Average Annual Growth Rate

Exhibit 3-12
Based Aircraft Forecast by Type



Source: The LPA Group Incorporated, September 2009.

3.9 PEAK PERIOD FORECASTS

As shown by the varying peak activity months in **Table 3-20**, historical peaking trends at INT do not reveal any strong seasonal correlation. This is because most of the activity is comprised of itinerant operations (e.g., air carrier, charter, corporate), versus local training operations which tend to drive-up activity levels during warmer months. Peak periods represent the times when the greatest amount of stress is placed on the airport. Peak period forecasts are used to determine

long-term requirements for airfield capacity, transient ramp, Fixed Base Operator (FBO) facilities, etc. The following procedures were used to develop the peak period forecasts for INT:

Table 3-20
Historical Peak Month Activity (2001-2008)

Peak Activity Month	Percent of Annual Activity
Feb-01	9.60%
Jun-02	10.06%
Sep-03	10.30%
Nov-04	9.57%
May-05	10.76%
Aug-06	9.03%
Jul-07	9.80%
May-08	9.96%
Average Peak Month	**9.88%**

Source: FAA OPSNET database.

- **Average Peak Month** – As shown in **Table 3-20**, monthly activity counts for INT were queried from the FAA's OPSNET database for the years 2001 through 2008. During this time, the peak month represented an average of 9.88 percent of annual activity, which was applied to the *Preferred Operations Forecast* to determine the average peak month operations throughout the 20-year planning period.
- **Average Peak Day** – Using the FAA's OPSNET database, the top 25 peak activity days were queried for 2008 operations at Smith Reynolds Airport. Subsequently, it was determined that the average peak day represented 0.50 percent of annual activity in 2008.
- **Average Peak Hour** – Through a review of records provided by the airport's ATCT, the average peak hour was determined to represent 20 percent of peak day operations.
- **Itinerant and Local Peak Hour** – Using the FAA's OPSNET database, the top 25 peak activity days were queried for 2008 itinerant and local general aviation operations. The data indicated that, on average in 2008, itinerant peak day operations represented 0.30 percent of annual operations and local peak day operations represented 0.21 percent. Accordingly, as a percentage of peak hour operations, itinerant peak hour operations represented 59.14 percent and local peak hour operations represented 40.86 percent.
- **Itinerant Peak Hour Passengers** – INT's itinerant operations range in size from small piston aircraft to medium jets. These aircraft carry anywhere from one to ten or more passengers, thus it was determined that an average of five passengers per itinerant operation would provide a realistic estimate considering the fleet mix variety. A forecast of air carrier charter passengers is presented in the next section (i.e., passengers that utilize the passenger terminal building as opposed to the FBO's facilities).

The results of the peak period forecasts are summarized in **Table 3-21**. As shown, itinerant peak hour operations are forecast to comprise the majority of peak hour activity throughout the 20-year planning period. Further analysis and breakdown of the peak period forecasts is presented in the facility requirements chapter.

Table 3-21
Peak Period Forecasts

Year	Preferred Operations	Average Peak Month	Average Peak Day	Average Peak Hour	IT Peak Hour	Local Peak Hour	IT Passengers
2008	51,839	5,124	259	52	31	21	153
2009	44,158	4,365	221	44	26	18	130
2013	46,391	4,586	232	46	27	19	137
2018	49,036	4,847	245	49	29	20	145
2023	51,988	5,139	260	52	31	21	154
2028	55,274	5,464	276	55	33	23	163
AAGR 2008-2013	-2.20%	-2.20%	-2.20%	-2.20%	-2.20%	-2.20%	-2.20%
AAGR 2013-2018	1.12%	1.12%	1.12%	1.12%	1.12%	1.12%	1.12%
AAGR 2018-2023	1.18%	1.18%	1.18%	1.18%	1.18%	1.18%	1.18%
AAGR 2023-2028	1.23%	1.23%	1.23%	1.23%	1.23%	1.23%	1.23%
AAGR 2008-2028	0.32%	0.32%	0.32%	0.32%	0.32%	0.32%	0.32%
GROWTH 2008-2028	6.63%	6.63%	6.63%	6.63%	6.63%	6.63%	6.63%
INCREASE 2008-2028	3,435	340	17	3	2	1	10

Source: The LPA Group Incorporated, September 2009.
AAGR – Average Annual Growth Rate

3.10 AIR CARRIER CHARTER PASSENGER FORECAST

Although the airport has not received scheduled commercial airline service since US Airways Express discontinued service in 2000, several hundred air carrier charter operations are still conducted to and from the airport each year by charter operations (e.g., by NASCAR teams, local corporations, and Wake Forest University athletic events). Thus, the airport continues to use the existing terminal building and count passenger activity.

The FAA records passenger enplanement data, or departing passengers, on the TAF. However, this analysis was focused on identifying all air carrier passenger activity, including enplanements and deplanements, which could be expected throughout the 20-year planning period. The Bureau of Transportation Statistics (BTS) maintains historical passenger activity data for all U.S. air carriers and airports, as shown for Smith Reynolds Airport in **Table 3-22**. By reviewing available BTS data for years without scheduled airline service at INT, an average of six passengers per air carrier operation was calculated (note that this number is low because of the high volume of air carrier aircraft that fly in and out of the airport for maintenance with no passengers, and is solely used for planning purposes). This value was applied to the forecast of air carrier operations through 2028 to determine the forecast shown in **Table 3-23**.

Table 3-22
Historical Air Carrier Charter Passengers (2002-2008)

Year	Arriving Passengers	Departing Passengers	Total Passengers	Air Carrier Operations	Passengers Per Operation
2002	1,134	1,036	2,170	337	6.44
2003	1,235	1,304	2,539	414	6.13
2004	3,141	3,217	6,358	674	9.43
2005	1,165	1,078	2,243	542	4.14
2006	864	716	1,580	398	3.97
2007	1,198	921	2,119	419	5.06
2008	1,718	1,883	3,601	519	6.94
Average Passengers Per Operation			**6.00**		

Sources: BTS database – Air Carriers: T-100 Domestic Market (U.S. Carriers) and FAA Draft 2009 TAF.

Table 3-23
Air Carrier Charter Passenger Forecast

Year	Preferred Operations	Air Carrier Operations	Part 139 Passengers
2008	51,839	519	3,601
2009	44,158	481	2,886
2013	46,391	495	2,969
2018	49,036	503	3,018
2023	51,988	513	3,079
2028	55,274	525	3,149
AAGR 2008-2013	-2.20%	-0.95%	-3.78%
AAGR 2013-2018	1.12%	0.32%	0.32%
AAGR 2018-2023	1.18%	0.40%	0.40%
AAGR 2023-2028	1.23%	0.45%	0.45%
AAGR 2008-2028	0.32%	0.06%	-0.67%
GROWTH 2008-2028	6.63%	1.12%	-12.55%
INCREASE 2008-2028	3,435	6	-452

Source: The LPA Group Incorporated, September 2009.
AAGR – Average Annual Growth Rate

A review of the passenger forecast data reveals that passenger activity at INT is expected to increase from 2009 through 2028; however, passenger activity is not expected to reach 2008 levels through the remainder of the planning period. This forecast was developed with the assumption that commercial service at INT is not expected to resume during the planning period. Despite this assumption, a further review of terminal requirements for commercial service is discussed later within the Facility Requirements chapter.

3.11 FORECAST SUMMARY

In summary, the data and methods used to forecast aviation demand for Smith Reynolds Airport are consistent with those used by the FAA and other airports in the State of North Carolina. The forecasts presented in this chapter, as summarized in **Table 3-24**, are considered to accurately reflect the activity anticipated at INT through 2028, provided that facilities necessary to accommodate the demand are made available. Also per FAA requirements, the comparisons to the TAF for the *Preferred Operations Forecast* and *Preferred Based Aircraft Forecast* are respectively shown in **Tables 3-12** and **3-18**.

Table 3-24
Airport Planning Forecasts
Forecast Levels and Growth Rates

Smith Reynolds Airport, Winston-Salem, North Carolina
Base Year: 2008

	Base Yr. Level 2008	Base Yr. + 1yr. 2009	Base Yr. + 5yrs. 2013	Base Yr. + 10yrs. 2018	Base Yr. + 15yrs. 2023	Base Yr. + 20yrs. 2028	Average Annual Compound Growth Rates: Base yr. to +1 2009	Base yr. to +5 2013	Base yr. to +10 2018	Base yr. to +15 2023	Base yr. to +20 2028
PART 139 PASSENGERS (ENPLANEMENTS + DEPLANEMENTS)											
TOTAL AIR CARRIER PASSENGERS	3,601	2,886	2,969	3,018	3,079	3,149	-19.86%	-3.78%	-1.75%	-1.04%	-0.67%
OPERATIONS											
Itinerant (IT) Operations:											
Air Carrier	519	481	495	503	513	525	-7.32%	-0.95%	-0.31%	-0.08%	0.06%
Air Taxi	2,883	2,549	2,623	2,665	2,720	2,781	-11.59%	-1.88%	-0.78%	-0.39%	-0.18%
GA	33,638	28,563	30,280	32,581	35,113	37,929	-15.09%	-2.08%	-0.32%	0.29%	0.60%
Military	233	446	459	466	476	487	91.42%	14.52%	7.19%	4.88%	3.75%
Total IT Operations	37,273	32,039	33,857	36,216	38,822	41,721	-14.04%	-1.90%	-0.29%	0.27%	0.57%
Local Operations:											
GA	14,452	11,832	12,239	12,520	12,860	13,240	-18.13%	-3.27%	-1.42%	-0.77%	-0.44%
Military	114	287	295	300	306	313	151.75%	20.97%	10.16%	6.81%	5.18%
Total Local Operations	14,566	12,119	12,535	12,821	13,167	13,553	-16.80%	-2.96%	-1.27%	-0.67%	-0.36%
TOTAL OPERATIONS	51,839	44,158	46,391	49,036	51,988	55,274	-14.82%	-2.20%	-0.55%	0.02%	0.32%
Instrument Ops	14,362	12,234	12,882	13,742	14,659	15,637	-14.82%	-2.15%	-0.44%	0.14%	0.43%
Peak Hour Ops	52	44	46	49	52	55	-14.82%	-2.20%	-0.55%	0.02%	0.32%
BASED AIRCRAFT											
Single-Engine Piston	66	66	66	66	66	66	0.00%	-0.09%	0.02%	0.02%	-0.02%
Multi-Engine Piston	13	13	13	13	13	13	0.00%	0.00%	0.00%	0.00%	0.00%
Turboprop	12	12	13	14	15	16	0.00%	1.15%	1.30%	1.35%	1.37%
Jet	18	18	21	24	29	34	0.00%	2.75%	3.10%	3.22%	3.28%
Helicopter	0	0	1	1	2	2	N/A	N/A	N/A	N/A	N/A
TOTAL BASED AC	109	109	113	119	125	131	0.00%	0.75%	0.85%	0.89%	0.92%
OPERATIONAL FACTORS											
Total GA OPBA	476	405	410	414	418	422	-14.82%	-2.93%	-1.39%	-0.86%	-0.59%
Local GA OPBA	134	111	111	108	106	104	-16.80%	-3.68%	-2.10%	-1.55%	-1.27%

Source: The LPA Group Incorporated, September 2009.