

## CHAPTER TWO FORECASTS

## *ED CARLSON MEMORIAL FIELD- SOUTH LEWIS COUNTY AIRPORT MASTER PLAN UPDATE*

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Forecasting aviation demand is the next step in the planning process for the South Lewis County Airport (Airport). The forecasts presented in this chapter span the 20-year planning window with projections for the following timeframes:

- Near-term (2017)
- Mid-term (2022)
- Long-term (2032)

The types and levels of aviation activity expected during these timeframes will help determine the size and timing of needed airport improvements.

The primary objective of forecasting is to define the magnitude of change that can be expected over time. Because of the cyclical nature of the economy, it is impossible to predict with certainty year-to-year fluctuations in activity when looking 20 years into the future. However, a trend can be established that characterizes long-term potential. While a single line expresses the anticipated growth for each element of aviation activity, actual growth may fluctuate above and below this line. Forecasts serve only as guidelines, and planning must remain flexible to respond to unforeseen changes in aviation activity and resultant facility needs.

The key components of the aviation activity forecasts presented in the chapter include:

- **Based Aircraft.** The number and type of aircraft based at the Airport helps determine the future aircraft hangar, apron, and auto parking facility requirements.
- **Aircraft Operations.** An operation is counted as an aircraft either landing or taking off (i.e., an aircraft landing then taking off counts as two operations). Commercial (air taxi), general aviation, and military aircraft operations are included. The operations forecast helps in analyzing runway capacity and determining runway, taxiway, and navigational aid requirements.
- **Critical Aircraft and Airport Reference Code.** The critical, or design, aircraft is derived from the operational fleet mix (aircraft types). The critical aircraft and its airport reference code determine many airfield design requirements, such as runway and taxiway size and strength, and safety clearances around aircraft movement areas.

The forecasts presented in this chapter are consistent with the Airport's role defined by the Washington State Aviation System Plan. That role is a Community Service Airport, which is one that typically serves medium-sized communities and accommodates a wide range of general aviation types of activity. The South Lewis County Airport is one of 23 airports designated as a community service airport in the state.

## TRENDS AFFECTING AVIATION

A review of trends affecting aviation is a valuable task in the forecasting effort. Numerous trends in national, state, and local general aviation activity as well as area socioeconomic activity may influence aviation demand at the South Lewis County Airport.

## NATIONAL AVIATION TRENDS

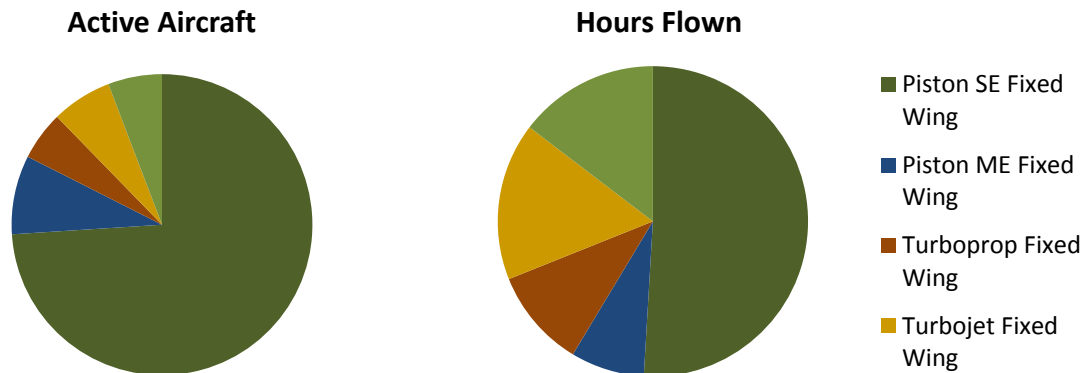
The South Lewis County Airport serves its community, but it also serves the national air transportation system. As a general aviation (GA) airport, trends in the GA segment of the industry are of most interest to Lewis County. General aviation (GA) refers to a wide range of flight activity and, by general definition, is all activity that is not commercial airline or military. GA aircraft types are widely varied, although the majority of general aviation aircraft are piston-powered, fixed-wing airplanes. The FAA tracks the national GA aircraft fleet mix and the number of hours flown by aircraft type—common indicators of change in the GA industry. **Table 2A** shows the nationwide distribution of general aviation aircraft by type and hours flown. **Exhibit 2A** illustrates the disproportionate relationship between active aircraft and hours flown such as the small number of higher performance, more expensive airplanes in the fleet versus their share of the total hours. The reverse is true of piston airplanes that represent nearly  $\frac{3}{4}$  of the active fleet but only fly half of the total hours.

**Table 2A. U.S. GA and Air Taxi Active Fleet and Hours Flown**

Aircraft Type	Active Aircraft	% Fleet	Hours Flown	% Hours Flown	Hours per Aircraft
Piston SE Fixed Wing	135,935	74.0%	11,641,551	50.9%	85.6
Piston ME Fixed Wing	15,600	8.5%	1,754,860	7.7%	112.5
Turboprop Fixed Wing	9,670	5.3%	2,357,408	10.3%	243.8
Turbojet Fixed Wing	11,890	6.5%	3,755,965	16.4%	315.9
Rotorcraft	10,665	5.8%	3,343,721	14.6%	313.5
Total	183,760	100%	22,853,505	100%	124.4
Experimental	24,410	66.1%	1,232,253	70.6%	50.5
Sport Aircraft	6,825	18.5%	330,816	19.0%	48.5
Other	5,675	15.4%	182,058	10.4%	32.1
Total	36,910	100%	1,745,127	100%	47.3

Source: FAA Aerospace Forecast 2013-2033, (dated Mar2013); figures are 2012 estimates.  
 SE=single engine, ME=multi-engine

**Exhibit 2A. Comparison of U.S. GA and Air Taxi Active Fleet versus Hours Flown**



Source: Table 2A Data

While the higher performance, more expensive aircraft are more commonly used for business than personal use, GA aircraft for business use still spans a broad range from small, single-engine aircraft rentals to multiple aircraft corporate fleets supported by dedicated flight crews and mechanics. The business aviation segment of GA grew rapidly in the 1990s and into the first part of the 21<sup>st</sup> century. After September 11, 2001, business aviation grew further due to airline service problems—the additional airline passenger and baggage security imposed and reductions in air service, particularly to smaller communities. Various chartering, leasing, time-sharing, fractional ownership,<sup>1</sup> interchange agreements, partnerships and management

<sup>1</sup> Fractional aircraft ownership is somewhat similar to real estate time-sharing.

contracts emerged, which supported the rapid growth of business aviation until the economic recession set in. The economic recession officially began in late 2007, and consequently, GA activity saw declines in 2008 and 2009. Soaring fuel prices in mid-2008 only reinforced the decline. The recession affected all aspects of GA such as recreational activity, flight training, aircraft production, number of pilots and the hours aircraft were flown. Post-recession recovery of GA traffic has been slow—evident by the continuing decline and subsequent flat to slow growth in the industry.

The General Aviation Manufacturers Association (GAMA) reported that in 2012 worldwide shipments for general aviation airplanes increased for a second year in a row following a three-year decline. However, the increase is attributed to increased shipments in turboprops and single engine piston aircraft shipments while business jets saw a 3.3% decrease. Consequently, general aviation billings saw a slight 1% decrease due to the type of aircraft that made up the growth in shipments.

In the first two quarters of 2013, optimism is returning as total airplane shipments are up 10% over the same period of 2012 and 26% over the same period of 2011. Additionally, general aviation billing for the first two quarters of 2013 is up 26.6% from that of the same period in 2012. Despite the considerable increases in total airplane shipments and general aviation billings, business jet sales declined in the first two quarters of 2013 (4% decrease, or a decline of 12 aircraft, over the same period of 2012). **Table 2B** illustrates the increase between 2012 and 2013.

**Table 2B. Worldwide Aircraft Shipments and Billings Comparison 2012-2013**

	2012 First Two Quarters	2013 First Two Quarters	Percent of Change
Total Piston Airplanes	384	455	18%
Total Turboprop Airplanes	243	276	14%
Business Jets	295	283	-4%
Total Airplane Billings	\$ 8,231,350,004	\$ 10,418,509,437	27%

Source: GAMA

With aircraft shipments and billings turning around, GA flying is expected to show signs of gradual recovery—the most recent activity indicators are showing flat or modest growth. While GA operations at air traffic control towers showed a declining trend in the last few years, GA operations for 2012 increased by 0.6%. The FAA estimates that the active general aviation fleet decreased by 1.2% in 2011, and then remained unchanged in 2012. General aviation flight hours also saw an estimated decrease in 2011 and then flat growth in 2012. A long-term declining trend in the number of student pilots reversed in 2010, with a 64.8% increase, which was largely due to the FAA’s issuance of a rule increasing the duration of certificates for student

pilots under age 40. Two years later, 2012 figures reveal that student pilots increased 1.1% over 2011.

In March 2013, the FAA published its updated forecasts in *FAA Aerospace Forecasts Fiscal Years 2013-2033*. The FAA suggests that the timing and strength of a recovery in aviation demand remains highly uncertain as the operational environment continues to evolve, but that the long-term outlook remains favorable. Business aviation is predicted to show stronger growth than the personal and recreational aviation segments as businesses consider factors such as possible commercial airline flight delays, and safety and security issues. The number of active<sup>2</sup> general aviation and air taxi aircraft is projected to grow 0.5% annually over the next two decades. Annual growth rates vary by type of aircraft and the FAA projects that the more expensive and sophisticated turbine-powered fleet (including helicopters) will grow at an average of 2.8% annually over the next two decades; of that fleet, the turbine jets will see the strongest growth of 3.5% annually. In contrast, the piston-powered aircraft fleet is projected to decrease at 0.2% annually. The FAA cautions its forecasts depend on many unknown factors. Some of these factors include the national and world economies, U.S. unemployment, price of oil, and national fiscal issues.

As the active aircraft fleet grows, the number of general aviation hours flown is projected to increase at 1.5% per year for the same timeframe (2033) , which is a more conservative growth rate than the 2.2% that the FAA projected just a couple of years ago. FAA annual growth rate projections vary for hours flown, from a declining rate of -0.2% for piston aircraft, to a high growth of 4.3% for jet aircraft.

Promising technological developments such as NextGen, coupled with the economic recovery are expected to slow past declines and support positive growth trends. NextGen—short for Next Generation, is a national initiative that is anticipated to modernize aviation. NextGen is already being implemented by airlines and at large air carrier airports. NextGen is transitioning our air traffic management from a ground-based system to a satellite-based system—Global Positioning System (GPS). The basic benefits of NextGen are increased airspace capacity (reduced congestion), enhanced safety and economic benefits. The economic benefit could make doing business in GA airport communities more attractive as it will handle a wide range of aircraft types and eliminate the need for costly instrument landing equipment. The Wide Area Augmentation System (WAAS) available for the last decade augments GPS to provide more precise navigational guidance.

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<sup>2</sup> An active aircraft is one that has a current registration and was flown at least one hour during the calendar year.

## STATE AND LOCAL AVIATION TRENDS

The primary source for discussion of state and local aviation trends is the Long-term Air Transportation Study (LATS) published in July 2009, as part of the Washington Aviation System Plan, and local aviation activity information and data. The LATS was conducted from 2006 to 2009, but much of the base year data taken was from 2005. According to the LATS, “In 2007, general aviation activity in the state accounted for an estimated 950,000 hours flown, making Washington the fourth most active state in the nation behind California, Texas, and Florida.” There are 138 airports in the state airport system with an estimated 8,100 based aircraft (2005). For comparison, the aircraft registry shows 11,038 aircraft registered in the state of Washington. However, the number of aircraft registered can often differ from based aircraft counts, particularly if many of the aircraft are inactive, stored at private airfields, or spend the majority of time at airports outside the state. In 2005, the South Lewis County Airport accounted for an estimated 0.84% of total based aircraft in the state.

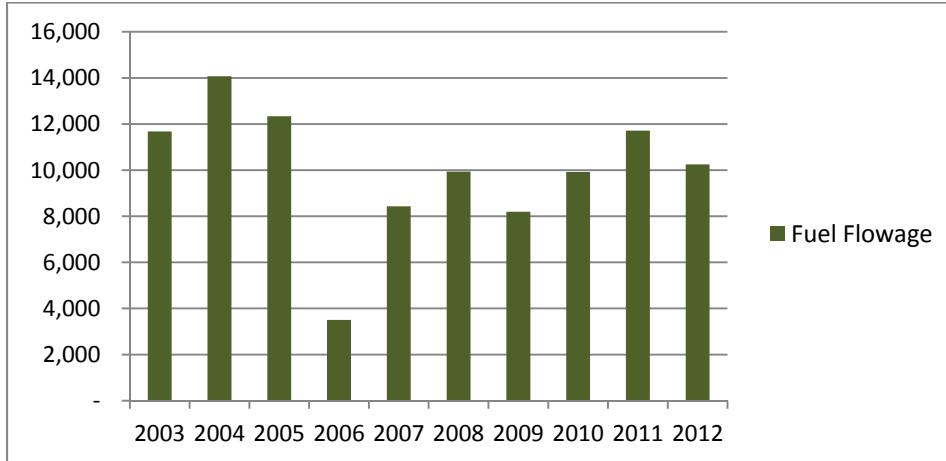
Similar to the FAA’s national forecasts, state airport system plans project aviation demand for their state. The LATS, as part of the Washington Aviation System Plan, projected that statewide based aircraft would grow an estimated 1.49% yearly from its estimated total of 8,100 in 2005, to 9,700 by 2015, and 11,800 by 2030. For the same timeframe, GA operations are projected to grow from 3.0 million (2005) to 4.4 million total operations—an estimated 1.60% yearly, which is slightly above the based aircraft growth rate.

Aviation demand projections for the state can also be extracted from the FAA Terminal Area Forecast (TAF). The TAF includes historical data and forecast demand for airports in the federal airport system like South Lewis County Airport. The FAA TAF is projecting an increase in based aircraft in the state of Washington at an average annual growth rate of 0.9%, less aggressive than the 1.49% growth rates that the LATS projected. However, the FAA projections are more recent and considered the economic recession. According to GA operations in the FAA TAF, operations declined in Washington from 2008 to 2011, but the FAA is projecting growth in operations over the next two decades ranging from 0.7% to 0.9%—also more conservative than the 1.6% growth projected in the LATS.

While airports with an Air Traffic Control Tower (ATCT) have easy access to aviation activity data and can monitor changes, airports without an ATCT like South Lewis County must rely on other sources. Fuel sales records can provide a measure in aviation activity, particularly with changes year to year and month to month. The South Lewis County Airport provides 100LL gas, but Jet A is not available. Consequently, all jet traffic must fuel elsewhere so fuel sales cannot provide a gauge for jet traffic. **Exhibit 2B** shows the aviation gasoline (100LL) levels sold at the Airport in the last ten years. As shown, there are several peaks and valleys in the fuel sales.

However, the last 10 years of fuel sales indicate an average of 10,000 gallons sold annually. Further, the most recent five years of fuel sales—from the beginning of the recession to today’s gradual recovery—indicates that fuel sales still average 10,000 gallons.

**Exhibit 2B. Historical Fuel Flowage at South Lewis County Airport (gallons)**



Source: Lewis County Records 2003 – 2012. Note: County identified possible data errors in 2006.

## SOCIOECONOMIC TRENDS

Airport operations and the number of based aircraft typically respond to the rise and fall of a community’s local population and economy. Higher income in an area may also suggest higher levels of aircraft ownership, pilots per capita, and aircraft use—more discretionary income for personal aviation use and increased business use. Consequently, an understanding of the population trends and other socioeconomic characteristics around South Lewis County Airport is useful for forecasting aviation demand.

**Table 2C** shows that over the last 20 years, the populations of Washington and Lewis County have risen. While the state has outpaced growth in Lewis County, the County grew an average of nearly 1.5% annually from 1990 to 2000, and nearly 1.0% annually from 2000 to 2010.

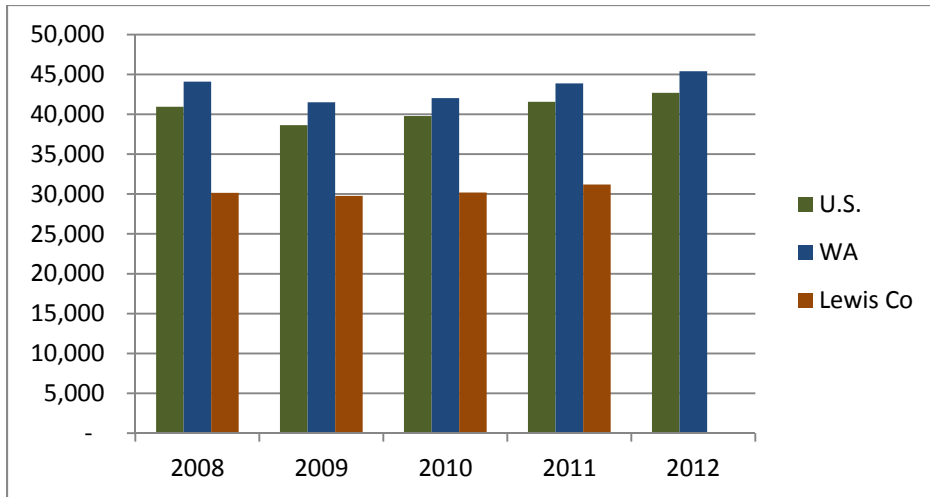
**Table 2C. Historical State and County Population**

	Washington	Lewis County
1990	4,866,692	59,358
2000	5,894,121	68,600
2010	6,724,540	75,455
	Average Annual Growth Rates	
1990-2000	1.93%	1.46%
2000-2010	1.33%	0.96%
1990-2010	1.63%	1.21%

Source: U.S. Census Bureau

Historical income trends for the nation, state and county are presented in **Exhibit 2C**. As illustrated, Washington has been above the national per capita personal income (PCPI) level in recent history, but Lewis County has remained below the national and state PCPI levels.

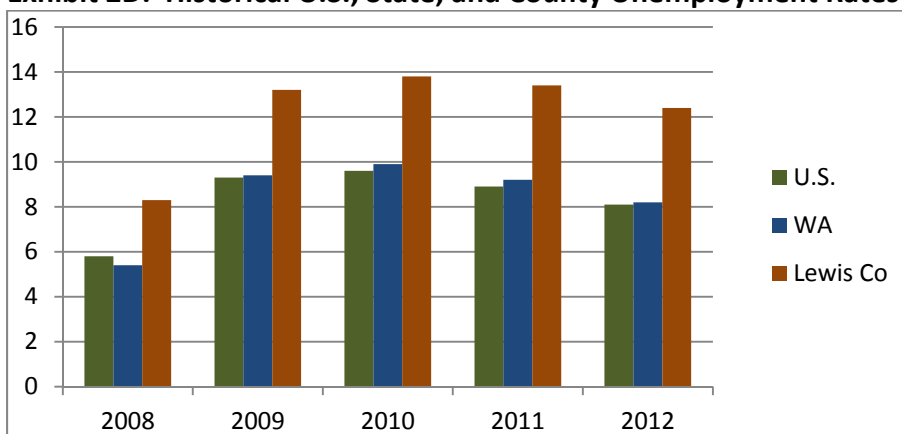
**Exhibit 2C. Historical U.S., State, and County Per Capita Personal Income**



Source: U.S. Department of Commerce, Bureau of Economic Analysis 2013  
 Note: 2012 County Per Capita Personal Income figure not available for 2012

With the recession just beginning in late 2007, **Exhibit 2D** illustrates the low unemployment rates in 2008, the jump in unemployment in 2009, the continued increase in unemployment in 2010, and the gradual improvement thereafter. Monitoring trends in unemployment is important in assessing recovery in the area surrounding the Airport. Flat or slow aviation growth can result when unemployment remains high.

**Exhibit 2D. Historical U.S., State, and County Unemployment Rates (Percentage)**



Source: U.S. Bureau of Labor Statistics 2013

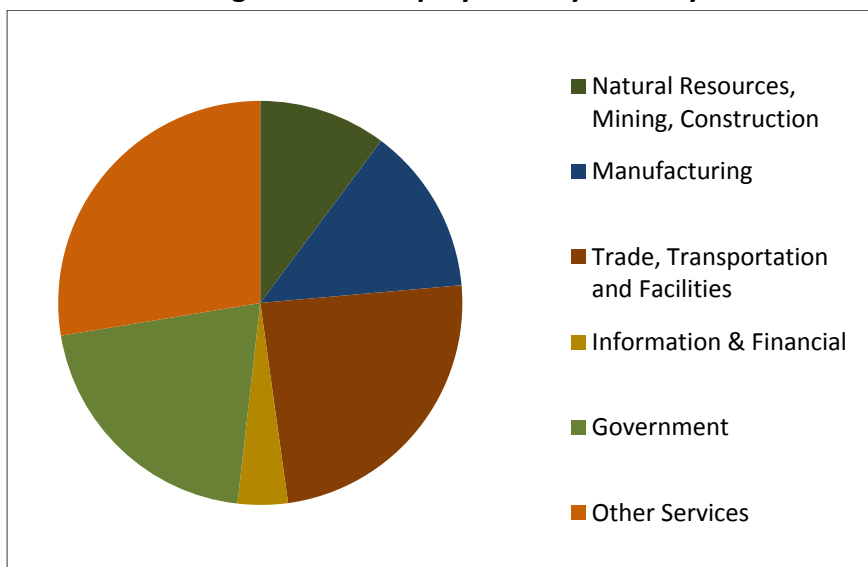
As shown, Lewis County’s unemployment rate has historically run above the state average.



As of July 2013, the unemployment rate was 11.4%<sup>3</sup>, which does indicate continued improvement since 2012’s rate was 12.4%.

While Lewis County’s economy has declined over the past several decades due to “changes in timber and agriculture, including the closing of several mills, the closure of TransAlta coal mine (one of the county’s biggest employers), and the movement of major canning facilities east of the mountains,”<sup>4</sup> the forestry sector still plays a major role in the area’s economy – approximately 75% of Lewis County consists of timberland. Agriculture occupies a major sector of the market, though large-scale agricultural production is disappearing as major food processing plants relocate to less expensive areas outside of Washington.<sup>5</sup> The largest nonagricultural industries in Lewis County are: 1) Other Services; 2) Trade, Transportation and Facilities; and 3) Government (**Exhibit 2E**).

**Exhibit 2E. Nonagricultural Employment by Industry**



Source: Lewis County Comprehensive Plan, 2010

While reviewing historical socioeconomic trends provides a measure of the region’s economic health in the past, future projections are reviewed to assess support for future aviation growth.

**Table 2D** depicts population projections for the state and county published by the Washington State Office of Financial Management in 2012. As shown, the state and county population is projected to increase at an average annual rate of 0.97% and 0.61%, respectively.

<sup>3</sup> Spurr, Kyle. Local Unemployment Increases to 11.4 Percent, The Chronicle, July 25, 2013

<sup>4</sup> Lewis County Comprehensive Plan, December 2010

<sup>5</sup> Lewis County Comprehensive Plan, December 2010

In comparison to the growth projections from 2007 (before the recession), the 2012 published projections are lower. In the 2007 report, both Washington and Lewis County annual growth rates were projected to exceed one percent (1.31% and 1.18%, respectively).

**Table 2D. Population Projections for State and County**

	Washington	Lewis County
2010	6,724,540	75,455
2020	7,411,977	80,385
2030	8,154,193	85,165
	Average Annual Growth Rates	
2010-2030	0.97%	0.61%

*Source: Washington State Office of Financial Management - County Population Projections (2012)*

### BASED AIRCRAFT FORECAST

**Table 2E** lists the FAA records for based aircraft by type from 1990 to 2011; Lewis County provided the 2012 based aircraft count of 47, which is seven aircraft less than the TAF 2011 records due to aircraft sold, relocated, or presently inactive.

The FAA Airport Master Record (Form 5010) reports a total of 48 based aircraft including one jet, which the County stated is no longer at the Airport. The current count of 47 is 63% of the Airport’s peak number of based aircraft—reported as 75 before the recession started.

The FAA defines a based aircraft as one that is active—flown at least one hour per year.

**Table 2E. Historical Based Aircraft at South Lewis County Airport**

Year	Single Engine	Multi-Engine	Jet	Helicopter	Other	Total
1990	30	3	0	0	3	36
1991	30	3	0	0	3	36
1992	36	2	0	0	0	38
1993	36	2	0	0	0	38
1994	36	2	0	0	0	38
1995	36	2	0	0	0	38
1996*	0	0	0	0	0	0
1997	36	2	0	0	0	38
1998	36	2	0	0	0	38
1999	56	4	0	0	4	64
2000	56	4	0	0	4	64
2001	65	3	0	0	4	72
2002	65	3	0	0	4	72
2003	65	3	0	0	4	72
2004	63	3	0	0	4	70
2005	63	3	0	0	4	70
2006	66	2	1	3	3	75
2007	66	2	1	3	3	75
2008	45	6	1	2	3	57
2009	45	6	1	2	3	57
2010	45	6	1	2	0	54
2011	45	6	1	2	0	54
2012	36	6	0	2	3	47

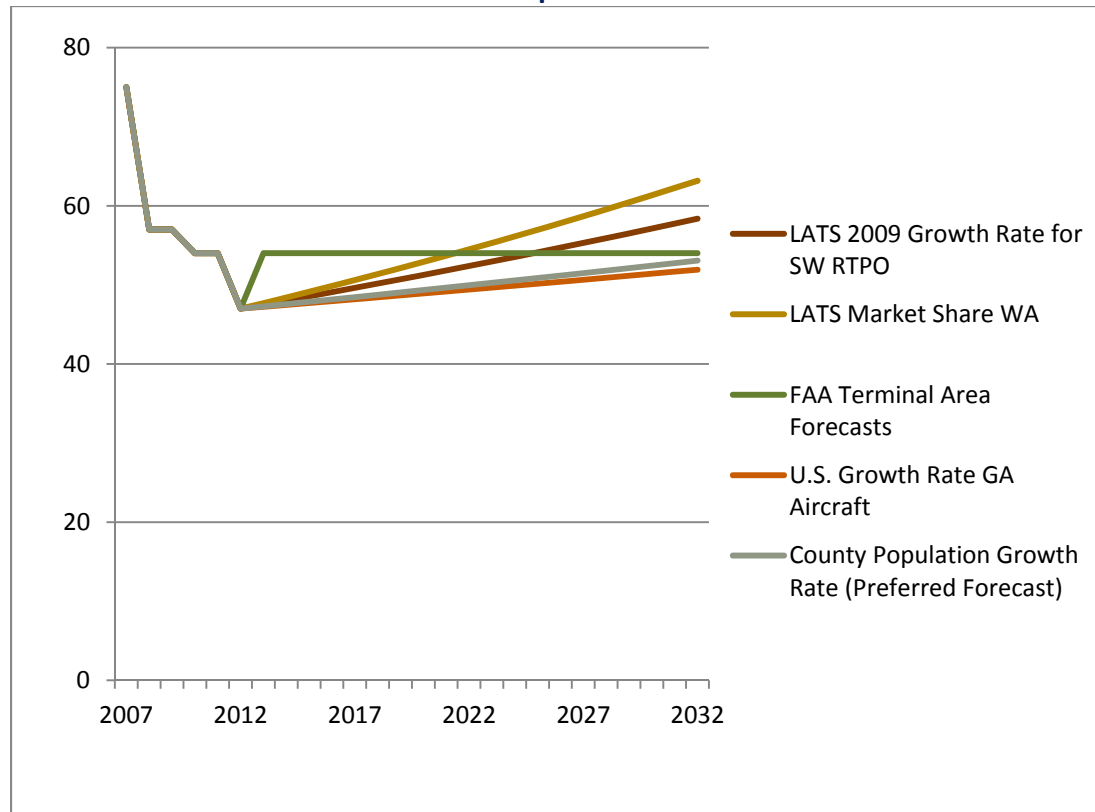
*Source: FAA Terminal Area Forecast (TAF), dated 2012, for TDO historical figures 1990-2011; Lewis County provided estimated figures for 2012. \*No figures reported for 1996 in TAF.*

Using 47 as the existing based aircraft count, various forecasting models are applied. **Exhibit 2F** graphically illustrates the recent historical numbers of based aircraft, along with the projected aircraft at the Airport from 2013 to 2032.

The preferred forecast is the population growth model—descriptions of the forecasting models follow Exhibit 2F.

It is important to note that based aircraft forecasts and the subsequent operations forecast are based on an alignment with GA trends nationally and regionally and in consideration of area socioeconomic conditions. The forecasts also assume that other airports in the region will remain open and continue serving their current market. If a GA airport in the region closes or its facilities/services are reduced, demand is displaced to other airports, which affects the based aircraft and operations at those airports.

## Exhibit 2F. Based Aircraft Forecast Comparison



### LONG TERM AIR TRANSPORTATION STUDY (LATS) REGIONAL GROWTH

In the LATS published in 2009, the projected based aircraft for the Southwest Regional Transportation Organization (RTPO)—which includes South Lewis County Airport—would grow at an average annual rate of 1.09% annually from 2005 to 2030 (327 aircraft to 429 within the regional planning area, which is a reduction in the region’s total market share of the state—dropping from 4.0% market share in 2005 to 3.6% market share in 2030). While the based aircraft count was higher at the time, the existing 47 aircraft count is used for this model. As a result, the based aircraft count by 2032 is projected to reach 58 or an increase of 11 aircraft—the second highest growth of the models presented above. It is recognized that the 2009 Plan used 2005 figures and based on conditions and trends before the numerous economic and aviation industry changes that occurred in recent years.

### LONG TERM AIR TRANSPORTATION STUDY (LATS) MARKET SHARE

The latest airport system plan projected statewide based aircraft to grow at an average annual rate of 1.49%. This model assumes that the South Lewis County Airport will maintain its current market share of the state based aircraft count over the 20-year planning period so the 1.49%

growth rate is applied producing a forecast of 63 based aircraft for the 20-year planning period, which is the highest growth of the forecast models.

#### TERMINAL AREA FORECAST (TAF)

The FAA's most recent forecast for the South Lewis County Airport, published in March 2013, used the 2011 based aircraft figure of 54 as the baseline and projected no growth for the Airport over the next 20 years. Consequently, the forecast in the TAF indicates the Airport will remain at 54 based aircraft by 2032. However, if this zero growth were applied to the Airport's present based aircraft count, then the Airport would show 47 based aircraft for the entire 20-year planning period.

#### U.S. GROWTH RATE FOR GA AIRCRAFT

As described earlier in the National Aviation Trends section, the FAA is forecasting an average growth rate of 0.5% annually for active GA aircraft nationally. This forecast model applies this U.S. growth rate to the South Lewis County Airport's based aircraft. While this model results in the smallest increase in based aircraft of the growth models—increasing from 47 to 52 by 2032, this growth rate is derived from the FAA's most current forecasts for GA released in March 2013.

#### POPULATION GROWTH RATE (PREFERRED)

The preferred forecast follows the Lewis County population growth rate of 0.61%, which is below the Washington state anticipated growth rate of 0.97%. Projected population growth rates were also reviewed for the eight counties adjacent to Lewis County. The average annual growth rate for these eight counties ranged from -0.27% for Wahkiakum County to 0.99% for Pierce County. The average of all eight combined is 0.56%, which is below the projected 0.61% for Lewis County. Considering the FAA and aviation industry projections published more recently are more conservative than projections a couple of years ago, a growth rate of 0.61% is well-aligned with trends and industry expectations for an airport of similar characteristics and serving a community service role in the state airport system. This preferred forecast model results in a based aircraft total of 53 by 2032, which is an increase of six aircraft over 2012. This translates to an average of one additional based aircraft every three years. In comparison, the 53 based aircraft forecast still remains below the 57 reported in 2008 when the economic recession began. Consequently, this forecast model projects that the Airport's recovery to historical highs will be slow and likely not return to peak levels in the 20-year planning period. It is important to note that while projected growth is conservative—aligning well with the most

recent FAA projections—development alternatives presented in a later chapter should consider demand above or below the 20-year projections.

**Table 2F** lists the fleet mix projected for the based aircraft in the next 5-, 10-, and 20-year timeframes.

**Table 2F. Based Aircraft and Fleet Mix Forecast for South Lewis County Airport**

Year	Single Engine	Multi-engine	Jet	Helicopter	Other	Total
2012	36	6	0	2	3	47
2017	37	6	0	2	3	48
2022	38	6	0	2	4	50
2032	38	6	1	3	5	53
Fleet Mix						
2012	77%	13%	0%	4%	6%	100%
2017	77%	13%	0%	4%	6%	100%
2022	76%	12%	1%	4%	7%	100%
2032	74%	11%	1%	5%	9%	100%

*Note: Based aircraft figures and percentages are rounded. One percent of fleet mix for jet produces less than one jet aircraft, but rounded up in long-term as percentage increases.*

## AIRCRAFT OPERATIONS FORECAST

This section starts with a review of historical aircraft operations derived from the FAA TAF records, which breaks down airport operations into air carrier, air taxi, GA, and military; these are further categorized as itinerant or local. According to these records, operations at the South Lewis County Airport include itinerant GA, itinerant military, and local GA. While it is anticipated that the Airport has had a few air taxi operations, these have likely been counted as itinerant GA. IFR records for the last four years show an insignificant number of air taxi operations with a total of six flights (12 operations) in the last four years.

**Table 2G** shows the history of itinerant and local operations from 1990 to 2011 according to the FAA TAF; estimated 2012 operations are from the County to provide a more accurate and updated estimate of existing activity. Itinerant refers to operations departing for or arriving from another destination while local operations include touch-and-go, training and other operations that stay near the airport.

As shown in the table, FAA records indicate military operations remained the same for 20 years. In contrast, GA operations increased every few years with no declines shown where declines actually occurred nationwide—indicating unrealistic historical figures. For example, the economic downturn created significant declines in nationwide GA activity for a few years beginning in 2008 with a gradual recovery in the last year or two for many GA airports. From

the lack of change from year to year at South Lewis County, it is assumed that Airport Master Record and FAA TAF updates assumed no changes in operations. Lack of real knowledge about the aircraft operations at an airport that lacks a control tower and is unattended is not unusual. Consequently, the fuel records presented earlier in Exhibit 2B are the best alternative for reviewing possible operational changes at South Lewis County Airport in the past.

**Table 2G. Historical Aircraft Operations at South Lewis County Airport**

Year	Air Carrier/Air Taxi	Itinerant Operations			Local Operations			TOTAL Operations
		GA	Military	Itinerant Total	GA	Military	Local Total	
1990	0	17,000	1200	18,200	5,500	0	5,500	23,700
1991	0	17,000	1200	18,200	5,500	0	5,500	23,700
1992	0	17,850	1260	19,110	5,775	0	5,775	24,885
1993	0	17,850	1260	19,110	5,775	0	5,775	24,885
1994	0	17,850	1260	19,110	5,775	0	5,775	24,885
1995	0	17,850	1260	19,110	5,775	0	5,775	24,885
1996	0	17,850	1260	19,110	5,775	0	5,775	24,885
1997	0	17,850	1260	19,110	5,775	0	5,775	24,885
1998	0	17,850	1260	19,110	5,775	0	5,775	24,885
1999	0	23,850	1260	25,110	5,775	0	5,775	30,885
2000	0	23,850	1260	25,110	5,775	0	5,775	30,885
2001	0	23,850	1260	25,110	6,353	0	6,353	31,463
2002	0	23,850	1,260	25,110	6,353	0	6,353	31,463
2003	0	23,850	1260	25,110	6,353	0	6,353	31,463
2004	0	23,850	1260	25,110	6,353	0	6,353	31,463
2005	0	23,850	1,260	25,110	6,353	0	6,353	31,463
2006	0	27,250	1,260	28,510	7,853	0	7,853	36,363
2007	0	27,250	1,260	28,510	7,853	0	7,853	36,363
2008	0	27,250	1260	28,510	7,853	0	7,853	36,363
2009	0	27,250	1260	28,510	7,853	0	7,853	36,363
2010	0	27,250	1260	28,510	7,853	0	7,853	36,363
2011	0	27,250	1260	28,510	7,853	0	7,853	36,363
<b>2012</b>	<b>0</b>	<b>11,165</b>	<b>720</b>	<b>11,885</b>	<b>4,380</b>	<b>0</b>	<b>4,380</b>	<b>16,265</b>

Source: Federal Aviation Administration Terminal Area Forecast used for 1990-2011 figures. Lewis County provided 2012 operations estimate (in bold).

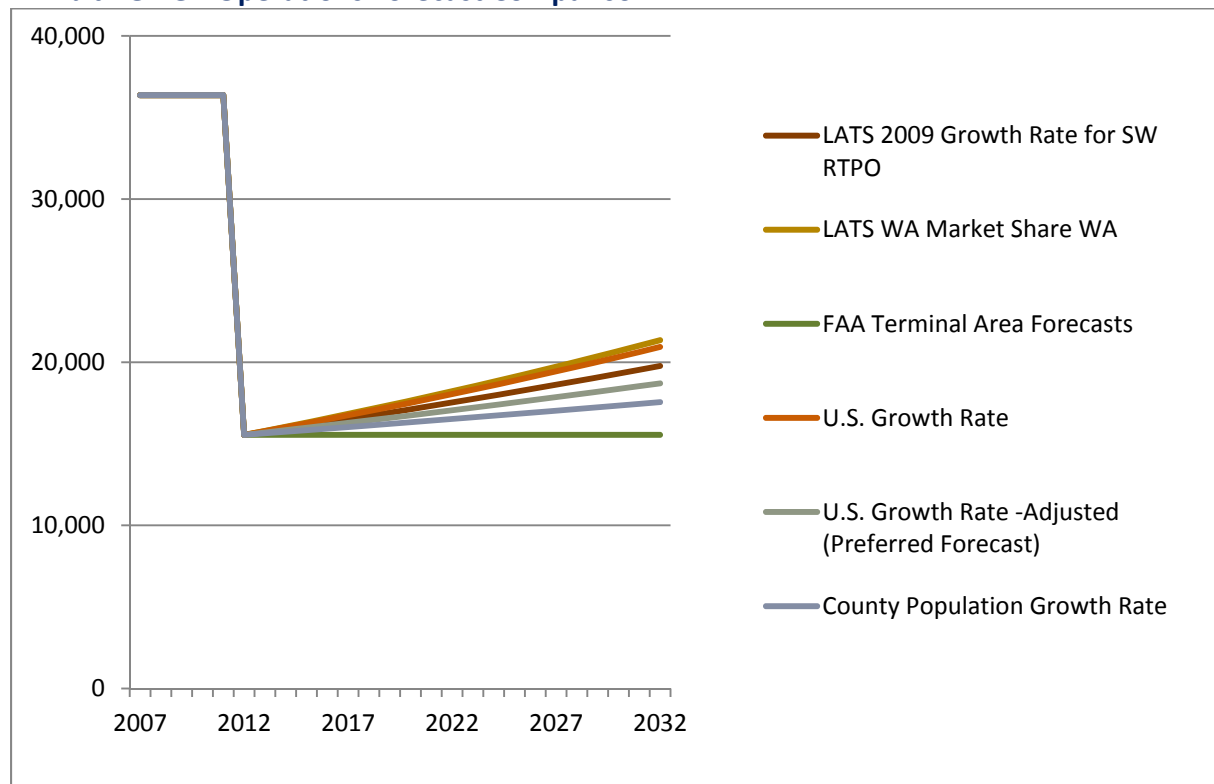
For this master plan, forecasting is limited to GA operations. Future military aircraft operations are difficult to predict, and the FAA typically projects no growth or decline in military aircraft operations in its annual Terminal Area Forecasts and national aerospace forecast. For the South Lewis County Airport, the FAA TAF projects a total of 1,260 military operations in 2013

with no change through the planning period. Lewis County provided a more accurate estimate of annual military operations totaling 720 as presented above in Table 2G.

The aircraft operations forecast section includes total annual operations, local vs. itinerant operations, operational fleet mix, critical aircraft, and airport reference code.

There are various methods for forecasting aircraft operations at GA airports, but some methods such as regression analyses and trend line are often discarded due to unreliable historical information. For this planning study, the operations forecast considered projected growth rates in other relevant forecasts and market share. **Exhibit 2G** compares the forecasting models for operations with a discussion that follows.

**Exhibit 2G. GA Operations Forecast Comparison**



**LONG TERM AIR TRANSPORTATION STUDY (LATS) REGIONAL GROWTH**

In the 2009 LATS, the Southwest Regional Transportation Organization (RTPO)—which includes South Lewis County Airport—projected that GA operations in the region would grow at an average annual rate of 1.21% (higher than the projected 1.09% for based aircraft in the region). In 2005, GA operations in the region were estimated at nearly 117,000 and projected to grow to



over 157,000 by 2030. In 2005, South Lewis County Airport GA operations were reported at nearly 30,203.

Like based aircraft, the LATS projected the SW region's market share declining from 3.9% to 3.4% of total GA operations in the state. This projected decrease in market share is primarily attributed to higher growth projected in the Puget Sound Region, which will increase market share for that part of the state.

Applying the RTPO 1.21% average annual growth rate to the Airport's current estimated GA operations results in an additional 4,200 GA operations annually, or a total of 19,772 GA operations (57 GA operations daily).

#### LONG TERM AIR TRANSPORTATION STUDY (LATS) MARKET SHARE WA

This forecasting model assumes that the South Lewis County Airport will maintain its existing GA market share in the state. This translates to an estimated 21,353 total annual GA operations by 2032, or an average annual growth rate of 1.60%.

#### FAA TERMINAL AREA FORECAST (TAF)

The FAA TAF projects zero growth for the South Lewis County Airport. However, the TAF figures have remained unchanged for several years showing a total of 36,363 annual operations, which consists of 35,103 GA operations plus military operations (1,260). With projected zero growth, the TAF shows the Airport at this same level through 2032. Since Lewis County indicated that a more realistic estimate of current annual operations is 16,265, with 15,545 attributed to GA, this updated GA figure is used for this model. Consequently, this model projects GA operations to remain at 15,545 throughout the 20-year planning period.

#### U.S. GROWTH RATE FOR GA HOURS FLOWN

This forecasting model applies the FAA projected growth rate of 1.5% annually for general aviation hours to the Airport's existing GA operations. However, as mentioned earlier, the 1.5% is an average among the GA aircraft fleet with piston hours flown expected to decrease initially and then rebound while jet hours are projected to grow substantially (4.3% annually). LSA hours are expected to grow at 3.3% annually. Applying the 1.5% growth rate results in 20,937 GA operations annually by 2032, or an increase of 5,392 (nearly 15 more GA operations daily).

#### POPULATION GROWTH

Population for Lewis County Airport is projected to increase at 0.61% annually. This model applies the 0.61% growth rate, resulting in a total of 17,556 GA operations by the end of the 20-

year planning period. This growth rate is the most conservative of the growth models, outside of the no growth scenario from the FAA TAF. However, it falls below what is projected for GA activity regionally and nationally.

**U.S. GROWTH RATE FOR GA HOURS FLOWN – ADJUSTED/REDUCED JET PORTION (PREFERRED FORECAST)**

This forecasting model applies the FAA projected growth rate for general aviation hours, but with an adjusted/reduced value of the projected jet growth. The FAA’s 1.5% growth includes piston, turboprop, jet and rotorcraft hours flown, with the projected growth in jet hours flown at 4.3% annually, which substantially contributes to the 1.5% average since growth in piston, turboprop and rotorcraft hours flown is all lower. Consequently, this model reduces the weighted value of the growth in jet hours flown in the GA fleet, producing an average growth rate for GA operations of approximately 0.93% annually. This growth results in an increase in GA operations from the current 15,545 to 18,706 GA operations by 2032. This is an increase of 3,161 operations (nearly 9 more GA operations daily).

This model is the preferred forecast. While it is above the FAA TAF’s projection of zero growth, it projects a gradual recovery in GA activity over the planning period that is much less aggressive than the LATS projected growth, which included pre-recession baseline activity and forecasts.

**Table 2H** presents the Airport’s forecast of operations. The GA itinerant and local operations split is presently estimated at 72% and 28%, respectively. This split is anticipated to generally remain the same as both are expected to gradually recover to past activity levels.

**Table 2H. Aircraft Operations Forecast for South Lewis County Airport**

Year	Itinerant Operations				Local Operations			Total Operations
	Air Carrier/Air Taxi	GA	Military	Total Itinerant	Civil	Military	Total Local	
2012	0	11,165	720	11,885	4,380	0	4,380	16,265
2017	0	11,694	720	12,414	4,587	0	4,587	17,001
2022	0	12,248	720	12,968	4,805	0	4,805	17,772
2032	0	13,435	720	14,155	5,271	0	5,271	19,426

**OPERATIONS FLEET MIX FORECAST**

The Airport's current operations fleet mix is 92% piston, 4% turboprop, and 4% rotorcraft. Jet operations are less than 0.5% due to the close proximity of Chehalis-Centralia Airport and the jet services available there. These are typical FAA fleet mix categories. The Airport’s operations

fleet mix is not the same as its based aircraft fleet mix. One reason is that the operations include those by transient aircraft—those based at other airports—as well as operations by aircraft based at the Airport. Another reason is that different aircraft types are typically flown different amounts. While nationally piston aircraft have a declining share of operations, the South Lewis County Airport is expected to continue to maintain piston operations at 92% since this is the Airport’s primary market.

While a slight shift in the operations fleet mix is anticipated during the planning period, it is not substantial enough to change the percentage split over the planning period.

### PEAK AIRCRAFT OPERATIONS FORECAST

Historical fuel flowage shows July is the peak month for aviation activity at the Airport with a range of 16.6% to nearly 23% of total annual operations. Over the last two years, the peak month fuel flowage averaged 17% of annual operations. As airport activity fluctuates from month to month, day to day, and hour to hour, airside and landside facilities should be designed to accommodate peak levels of use. Peak demand is usually expressed as “Peak Month” (the month in a calendar year when the highest level of activity occurs), “Design Day” (the average daily level of activity during the Peak Month), and “Design Hour” (the busiest hour within the Design Day).

The design day is calculated by dividing the peak month by 31 days, which translates to nearly 89 operations on average in July. The design hour is estimated to be 15% of the peak day, consistent with guidance in FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay*. The peak operations forecast appears in **Table 2I**.

**Table 2I. Peak Operations Forecast for South Lewis County Airport**

	2012	2017	2022	2032
Annual Operations	16,265	17,001	17,772	19,426
Peak Month (17% of Annual)	2,765	2,890	3,021	3,302
Design Day	89	93	97	107
Design Hour (15% of Peak Day)	13	14	15	16

Note: Historical fuel flowage data indicates that peak month activity has ranged from 16.6% to 23% of annual operations. Average of peak month fuel flowage for the last two years is 17%, which is used for this table.

### INSTRUMENT OPERATIONS FORECAST

The Airport presently serves a low number of instrument operations. **Table 2J** lists the existing and forecast operations for the planning period. As shown, the percentage of IFR operations is anticipated to grow. With limited data available, online IFR data for the Airport from

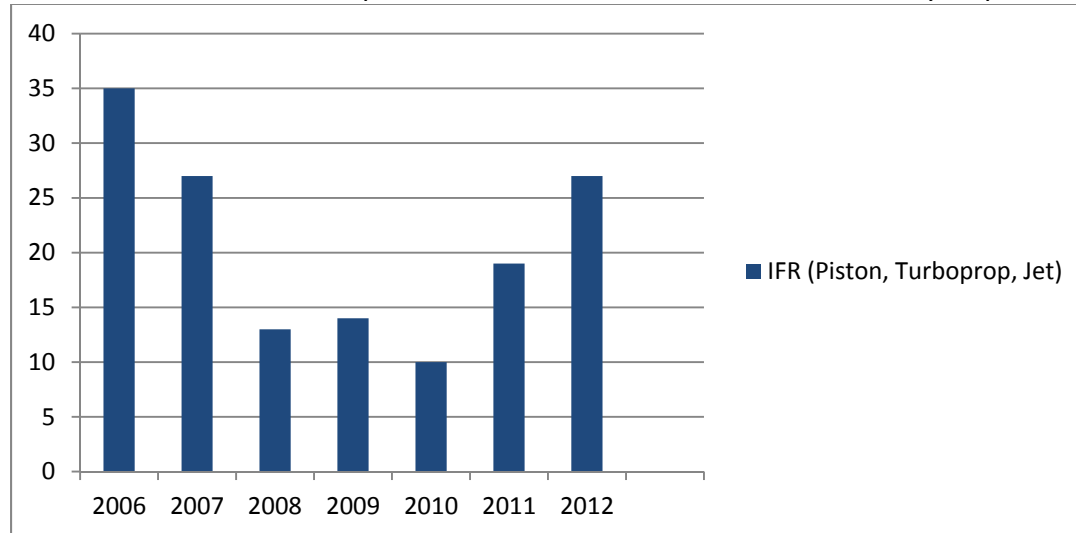
[www.AirportIQ.com](http://www.AirportIQ.com) was downloaded. Since IFR flight plans are routinely cancelled before arriving at the Airport, the 27 IFR operations listed in the GCR database for the Airport is assumed to represent 10% of the year’s IFR operations. **Exhibit 2H** illustrates the fluctuation in the recorded IFR operations since 2006.

**Table 2J. Instrument Operations Forecast for South Lewis County Airport**

	2012	2017	2022	2032
Annual Instrument Operations	270	323	391	505
Percentage of Total Operations	1.7%	1.9%	2.2%	2.6%

Note: IFR operations estimated at 1.7% of total operations for 2012 based on IFR flight plans routinely cancelled before arriving at the Airport.

**Exhibit 2H. Recorded IFR Operations 2006-2012 for South Lewis County Airport**



Source: [www.AirportIQ.com](http://www.AirportIQ.com), Data Center, GA Detailed Report

**CRITICAL AIRCRAFT AND AIRPORT REFERENCE CODE**

This section on critical aircraft and Airport Reference Code is important to the subsequent chapter on Airport Facility Requirements, since airport design requirements are addressed. According to FAA criteria, an airport’s design is based on the characteristics of the critical aircraft, which is the most demanding aircraft that uses the airport “regularly” or “substantially.” The FAA defines regular or substantial use as at least 500 annual itinerant operations. The Airport Reference Code (ARC) is the main criterion for determining applicable FAA airport design standards for dimensions such as runway and shoulder widths; separations of runways, taxiways, and taxilanes; and cleared areas. However, new FAA guidance provides

guidance for runway design codes and taxiway design groups, for example, by providing standards to serve different design aircraft on different runways and taxiways.

The Airport Reference Code is defined by the Aircraft Approach Category and the Airplane Design Group of the critical aircraft. The Aircraft Approach Category is determined by the approach speed, or 1.3 times the stall speed of the aircraft in its landing configuration at its maximum landing weight. The letters A, B, C, D, and E represent the Aircraft Approach Category. The Airplane Design Group of the aircraft is based on the wingspan or tail height, and is defined by Roman numerals I, II, III, IV, V and VI.

**Table 2K** shows the ARC component definitions and typical aircraft that meet these definitions.

**Table 2K. Airport Reference Code (ARC) Components**

<b>Approach Category</b>	<b>Approach Speed</b>	<b>Typical Aircraft</b>
A	Less than 91 knots	Cessna 150, 172, 206, Beech Bonanza
B	91 to 120 knots	King Air, Piper Navajo, Gulfstream I
C	121 to 140 knots	Boeing 727, 737, Learjet, Challenger
D	141 to 165 knots	Boeing 747, Gulfstream V
<b>Airplane Design Group</b>	<b>Wingspan</b>	<b>Typical Aircraft</b>
I	Less than 49 feet	King Air, Cessna 150, 172, 206, Gates Learjet, Beech Bonanza
II	49 to 78 feet	King Air, Super King Air, Cessna Citation, Dassault Falcon, Gulfstream I, Challenger
III	79 to 117 feet	Boeing 727, 737, DC-3, DC-6, Gulfstream V
<i>Airplane Design Group may be determined by tail height, if more demanding than wingspan:</i>		
<b>Airplane Design Group</b>	<b>Tail Height</b>	
I	Less than 20 feet	
II	20 to 29 feet	
III	30 to 44 feet	

*Source: FAA AC 150/5300-13A, Airport Design. Notes: 1) The above ARC information represents the Airport's highest runway design code, which is defined by the above as well as visibility minimums. 2) Aircraft Approach Category E (166 knots or more) and Airplane Design Groups IV, V, and VI (118 feet or more) are not shown.*

The current critical aircraft at the South Lewis County Airport is the Aero Commander 690. The Aero Commander 690 is categorized as “small,” having a maximum takeoff weight under 12,500 pounds. The ARC for this aircraft is B-I. There are numerous other aircraft operating at the Airport today that are also in ARC B-I such as the Cessna 182, Beech Baron, Piper PA31. A-I aircraft operate routinely at the Airport, but do not represent the design family of aircraft as they have slower approach speeds, but similar wingspans. Aircraft operating at the Airport that fall within ADG II include ARC A-II and B-II. Total combined ADG II operations by aircraft such as

the King Air (B-II) and Pilatus (A-II) are estimated to remain below 500 annual itinerant operations in the near-term (through 2017), but expected to surpass the 500 operations threshold by the intermediate term (2022). Consequently, the ARC is forecast to be B-II by 2022 with the critical aircraft identified as the King Air.

More discussion of the ARC is presented in Chapter 3, Requirements.