CHAPTER 3 **AVIATION DEMAND FORECAST**

3

AVIATION DEMAND FORECAST

INTRODUCTION

The purpose of this chapter is to develop forecasts of aviation activity for the William R. Fairchild International Airport (CLM) which is classified as a commercial service airport by the Federal Aviation Administration (FAA) and the Washington State Department of Transportation, Aviation Division (WSDOT Aviation). These forecasts will be a key element in the airport planning process. They are used for determining future airport requirements, analyzing alternative development plans, assessing the possible environmental effects of proposed plans, and determining the economic implications of future growth and development. These are prepared for the short-, intermediate-, and long-range time frames using 2007 as a base year with certain elements such as based aircraft being updated during field surveys in 2008. In the case of this forecast, a 50-year forecast has been added to the forecast process to help guide the Port of Port Angeles in decisions regarding use of airport property for non-aviation related, but revenue generating uses. With the uncertainty regarding continued use of Runway 13/31 the Port is interested in the possibility of using the land on the airport's north side in a more productive manner that may or may not be aviation dependent. This could involve opening land up for light industrial or commercial purposes. These uses would help to enhance the airport's cash flow, leading to enhanced ability to support aviation related development. However, to assure that changes of this type do not detract from their primary mission to provide aviation facilities sufficient to meet the community's needs as well as to assure compliance with the Federal obligations associated with the Airport Improvement program, it is important that the Port have full knowledge regarding the demand for aviation uses beyond twenty years. This information will help to assure the Port that actions taken do not limit the airport's growth potential in the future. By extending the forecasts thirty years beyond the period typically covered in a master plan, they can achieve a longer range vision of their needs and make smarter decisions regarding land that may be determined to be non-essential to their aviation mission. The forecasts presented for the fifty year time frame will serve as the basis for this important decision-making Forecast will be presented in five year increments from 2012 to 2027 as well as for the year 2057.

AIRCRAFT ACTIVITY MEASURES

While the nature and scope of aviation demand can vary among airports depending on the facility's role and level of activity, the activity indicators reviewed during the demand forecasting process are generally the same. For CLM, the aviation demand forecasting effort addresses the following elements:

- **Commercial Aviation Activity**
  - Enplaned passengers
  - Scheduled air carrier operations
  - Peaking characteristics (for both passengers and operations)
  - Commercial aircraft fleet mix
- **Air Cargo Activity**
  - Enplaned cargo tonnage
  - Annual scheduled air cargo operations
  - Peaking characteristics
  - Cargo fleet mix by type
- **General Aviation Activity**
  - Based aircraft (both total number and fleet mix)
  - Annual operations (both local and itinerant)
  - Peaking characteristics
- **Military Activity**
- **Operational Characteristics**
  - Annual instrument operations
  - Peak-period forecasts for peak month, design day, and design hour
  - Annual operations by aircraft type
- **Critical Aircraft and Operations Activity**
  - Critical aircraft (aircraft or composite group of aircraft if applicable)
  - Critical aircraft operations

SUMMARY OF ACTIVITY

The forecasts of aviation activity presented herein examine the potential for aviation growth at the William R. Fairchild International Airport through the year 2057. These forecasts form the basis for most of the airport development decisions that are to be made over the master planning period. Consequently they must be reviewed and approved by the Federal Aviation Administration prior to their use as a planning base. A summary of the results of the forecasting process is contained in Exhibit 3-1.

Exhibit 3-1: Summary of Forecasts

	2007	2012	2017	2022	2027	2057
Commercial Operations						
Enplaned Passengers						
Annual Enplaned Passengers	15,860	16,866	17,937	19,079	20,295	29,463
Total Annual Passengers	31,720	33,732	35,875	38,158	40,590	58,926
Annual Commercial Operations	6,205	6,205	6,205	6,205	6,205	8,184
Air Cargo Activity						
Annual Enplaned Tonnage	519	659	807	967	1,165	3,035
Annual Operations	624	624	624	624	728	2,066
General Aviation Activity						
Based Aircraft[1]	**98**	**104**	**111**	**119**	**126**	**192**
Single Engine Piston	92	94	94	95	95	115
Multi Engine Piston	6	7	9	12	15	29
Turbojet	0	2	6	8	11	38
Rotor	0	1	2	4	5	10
General Aviation Operations	**46,100**	**49,506**	**52,390**	**55,003**	**57,861**	**78,771**
Peaking Characteristics						
Enplaned Passengers						
Peak Month	1,269	1,349	1,435	1,526	1,624	2,357
Average Day/Peak Month	41	44	46	49	52	76
Peak Hour	8	9	9	10	10	15
Commercial Operations						
Peak Month	496	476	462	452	451	655
Average Day/Peak Month	16	15	15	15	15	21
Peak Hour	2	2	2	2	2	3
General Aviation Operations						
Peak Month	4,610	4,951	5,239	5,500	5,786	7,877
Average Day/Peak Month	149	160	169	177	187	254
Peak Hour	22	24	25	27	28	38
Total Operations[2]						
Air Carrier	6,205	6,205	6,205	6,205	6,205	8,184
Air Cargo	624	624	624	624	728	2,066
General Aviation	46,100	49,506	52,390	55,003	57,861	78,771
Military	675	675	675	675	675	675
Total Operations	**53,604**	**57,010**	**59,894**	**62,507**	**65,469**	**89,696**

[1] The based aircraft inventory is taken from an FBO survey and airport management records search conducted in August 2008. The numbers differ from those shown on the FAA's 5010 forms but are being used since they are the most current available.

[2] Operations counts are taken from FAA records as published in the Terminal Area Forecast (TAF) published in August 2008. The referenced TAF uses historical data through the year 2007.

FORECAST OF COMMERCIAL ACTIVITY

Commercial service at the William R. Fairchild International Airport consists of scheduled regional air carrier service provided by Kenmore Air. In this analysis forecasts will be prepared for;

- **Enplaned Passengers**: Enplaned passengers are defined as those that are boarding the aircraft at the airport. Enplaned passenger levels are doubled to calculate the total number of passengers using the airport. Using the enplaned passengers in airport planning is the common practice. The forecasts are used to program terminal area requirements, assess the state of the commercial service and develop assumptions as to the evolution of the size of commercial aircraft to be used as well as to project the number of daily flights to be offered in the future.
- **Commercial Airline Fleet Mix:** Based on the number of enplaned passengers forecast, the airport planner can make assumptions regarding the size of aircraft likely to be assigned to the market. These assumptions are made using industry information, aircraft availability information and information received from the airlines. The type of aircraft (or airline fleet) being used in service to Port Angeles will be used to help determine the airport's critical aircraft, terminal apron needs and aircraft parking and maneuvering requirements at the terminal.
- **Airline Operations:** The number of annual operations made by the air carrier is important in determining potential service levels, assessing potential community impacts (both positive and negative), and other factors.

The following pages present the results of our forecast of commercial service activity at the William R. Fairchild International Airport.

Commercial Airline Service Area

CLM is the only airport on the Olympic Peninsula where commercial airline service is available. A commercial service assessment conducted by the Port of Port Angeles in 2004 determined that the airport's passenger catchment area (see Exhibit 3-2) included the entire northern part of the peninsula encompassing most of Clallam and Jefferson Counties. People from the region that do not use the service available at CLM must drive a minimum of 130 miles (two and a half hours) to Seattle Tacoma International for their service.

Exhibit 3-2: Commercial Airline Service Area

Source: Research and Summary Action Plan, Mead & Hunt 2004

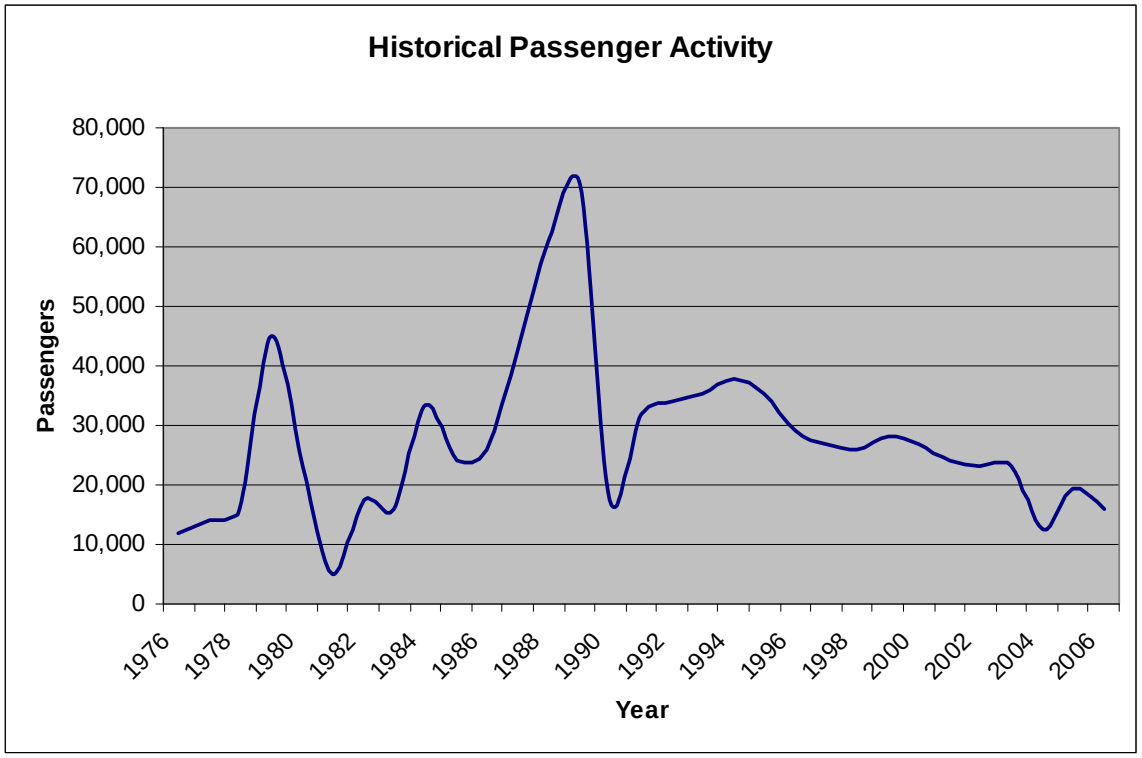
Current Commercial Service in Port Angeles

Airline service at CLM is currently offered by Kenmore Airlines, using 9-seat Cessna Caravan aircraft. In August of 2008, Kenmore was offering 6 daily flights to and from the King County International Airport/Boeing Field in Seattle, WA. Passengers proceeding to other destinations by air are shuttled from Boeing Field to Seattle Tacoma International by van. This service has been in effect since 2006 and more than 15,000 passengers were enplaned in 2006.

Prior to the initiation of service by Kenmore Air, CLM was served by Horizon Air operating 35 passenger Q200 aircraft. Horizon suspended service in 2003 citing low

passenger yields and hence low profit margins for their airplanes. This is evidenced in the historical passenger levels at CLM as depicted on Exhibit 3-3. As is shown, passenger levels peaked in the early 1990s but have fallen ever since. This decrease is attributed to the slow erosion of service that was being offered and appears to have resulted in a trend to have local passengers drive to SEA instead of using the commercial airlines at CLM.

Exhibit 3-3: Historical Enplaned Passenger Levels



Source: Historical Port Records

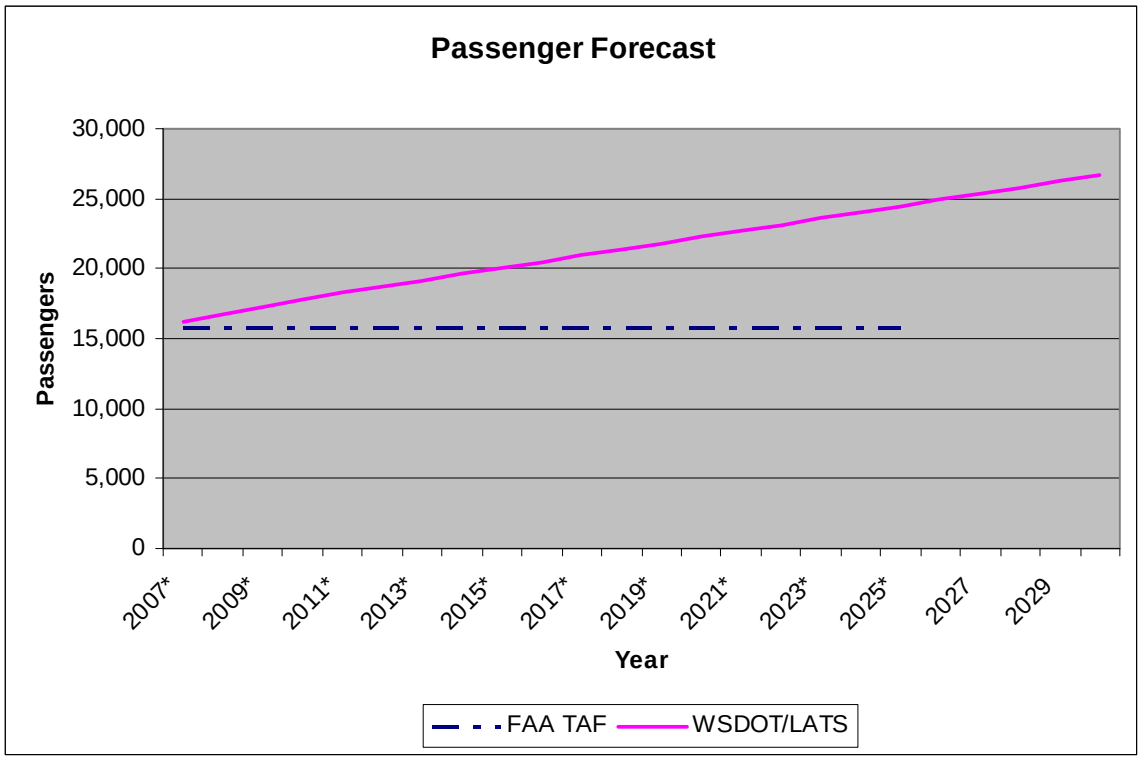
As seen in this graph of historical passenger levels, it is impossible to identify any service or growth trends from the data. Therefore, traditional forecasting techniques such as trend analysis or regression analyses are not useful in developing projections of future activity at CLM. Other techniques will need to be employed in the forecasts of passengers, as discussed in the next section.

Enplaned Passenger Forecast

The first step in forecasting enplaned passengers is to review the work that has been prepared by others for the William R. Fairchild International Airport. In this instance we have forecasts that have been prepared by the FAA as part of their Terminal Area Forecasts (TAF) dated 2007 and the Washington State Department of Transportation, Aviation Division's Long-term Air Transportation Study (WSDOT LATS) forecast prepared in 2007. As is shown, the terminal area forecast was prepared in a manner that was not sensitive to the changes that may occur at Port Angeles. Consequently, the TAF reflects an expectation of no growth at the airport. This is not uncommon at non-towered

Exhibit 3-4: Forecasts of Enplaned Passengers – TAF and LATS

Year	TAF Forecast	WSDOT LATS Forecast
2006	15,860	15,860
2012	15,849	18,703
2017	15,849	20,926
2022	15,849	23,150
2027	15,849	25,374



airports like CLM since the TAF is prepared using a top-down methodology where forecasts are prepared on a national and regional basis and allocated to the individual airports./ The distribution methodology relies on the past records submitted to FAA by the airport and no attempt to forecast growth is done. The result appears to be a flat line forecast for activity at the airport. However the TAF forecasts are routinely updated when individual master plans are prepared and approved. It can be expected that after FAA acceptance of this forecast, the projections in the TAF will be adjusted to reflect the numbers approved herein. WSDOT, on the other hand projected that passenger levels will continue to grow in the future as population levels increase and economic conditions continue to get better. The LATS indicates an expected increase to 25,374 annual enplanements. The projected rate of growth is approximately 2.3% per year.

From the information shown in Exhibit 3-4 it is clear that historically, commercial airline service and passenger levels at CLM were inconsistent. Fluctuations in usage from year to year range from a high of more than 70,000 enplanements in 1990 to a low of fewer than 6,000 in 1981. The number of passengers at CLM is highly dependent on the airlines' schedule, consistency and reliability of service, price and other factors. Given this background, our analyses failed to identify any consistent trends that could be used for forecasting. Therefore the traditional methodologies such as trend analysis and regression analyses were deemed to be unreliable. However, several forecasting techniques can be used. These are associated with population growth or growth in a larger market with the total growth applied to the Airport. The following enplaned passenger forecast models were tested.

- **Population Growth Model:** The State of Washington Office of Financial Management (OFM) prepares projections of population growth for each county within the state. This forecast model used the growth rates applied to the counties of Clallam and Jefferson, which were identified as the service area for commercial service at Port Angeles. The OFM has prepared low, medium and high growth scenarios for the area. Using these same growth rates, applied to the passenger levels, produced forecasts of passenger growth consistent with the population growth expected in the service area. Since population is a commonly accepted indicator of potential passenger growth, this model is determined to be worth consideration as a forecasting tool.
- **Average Market Share Model:** The number of enplaned passengers at CLM was compared with the total enplaned passenger levels for all commercial service

airports within the FAA's Northwest Mountain Region. The result was that CLM enplaned approximately 0.024% of the total passengers within the region in 2007. This percentage was applied to the forecasts for passenger growth within the region to produce a forecast of passenger growth for CLM. This model is felt to be acceptable since it assumes that CLM passengers will increase at a rate no lower than the average within the region.

- **Potential Market Share Model:** An alternative Market share model has been developed that compares CLM's current market share with the potential passenger levels identified in the 2004 Research and Market Summary Report. This report identified that the catchment area identified in Exhibit 3-2 was generating at least 126,000 passengers. Most of these were driving to Seattle to access the airlines at SEATAC International Airport. This model is prepared with the assumption that should service be improved at CLM, portions of these passengers could be attracted to CLM. This model assumes that, over time, the air carriers operating at Port Angeles will capture increasing percentages of the passengers who currently drive to Seattle.

The results of these projection methods are shown in the following exhibit. As shown, the differences between the projections resulting from the low, medium or high population models are slight. The static market share projection results in a higher forecast but is still within reasonable expectations. However, using a static share of the Northwest Mountain Region's overall growth in passenger levels has been rejected since Port Angeles' passenger levels haven't demonstrated that they are as much influenced by national or regional factors as they are by the consistency and level of service coupled with local economic conditions. Likewise, the forecast derived from the analysis of the potential market share is felt to represent a scenario that could result from increased and improved service at CLM rather than to be used as the basis for future planning. For this reason we are not considering this model for our official forecast but are including it for a consideration as the potential upper limit to growth at Port Angeles. Therefore, the forecasts that were derived from the population based models have been given a higher level of consideration in this analysis. The reasons can be summarized as;

1. The towns and cities within CLM's service area are becoming more popular destination and retirement areas. This is not only increasing the region's population but is also attracting people with more disposable income and a higher propensity to travel.

2. As has been shown, historical passenger levels have fluctuated based on numerous factors, none of which involved the level of population. Once an acceptable service level was established by an airline, the passenger levels have stabilized. It is therefore felt that with consistency in service, passengers should show a relationship to population growth.
3. Given the alternatives to air transportation for travelers in Port Angeles and the relatively low cost of flights being offered at the current time, it is assumed that more passengers will discover and use the service to Boeing Field as part of their travel planning.

Exhibit 3-5: Summary of Enplaned Passenger Forecasts

Year	Population Models				Market Share Models	
	Low	Medium	High	Average	Static	Potential
2007	15,860	15,860	15,860	**15,860**	15,860	15,860
2012	16,628	16,985	16,985	**16,866**	18,076	98,585
2017	17,433	18,190	18,190	**17,937**	20,480	132,454
2022	18,277	19,480	19,480	**19,079**	23,229	173,696
2027	19,162	20,862	20,862	**20,295**	26,377	223,689
2057	25,446	31,472	31,472	**29,463**	56,573	443,747

Considering these factors, the projection selected as the preferred forecast for this planning effort assumes that the population of the community is the most dependable factor on which to base an estimate of the number of enplaned passengers. By using an average of the high, medium and low population projections, we are able to reflect a growth rate that considers an increase in the number of passengers per 1,000 people that is likely to occur over time. Additionally, this forecast compares favorably with those developed in the LATS study, which resulted in a forecast of 25,374 passengers by 2027.

Commercial Airline Operations Forecast

An aircraft operation is defined as either a take-off or a landing; thus each flight is comprised of two operations. Forecasting operations relies on determining the historical average number of commercial enplaned passengers per scheduled aircraft departure, projects changes in this ratio, and applies these changes to the forecast of enplaned passengers.

A direct relationship exists between the number of passenger carrier operations and the level of passenger enplanements. The average number of passengers on a departing airplane helps determine the frequency of flights and/or the size of the aircraft that is used on that route. This relationship is measured using a passenger load factor, which is typically expressed as a percentage of seats filled per departing aircraft. If a carrier has a high load factor, say 70 to 80 percent, it may choose to increase the number of flights or use an aircraft with greater seating capacity.

Forecasts of future passenger carrier activity were prepared based on the enplanement forecast presented earlier and assumptions of future aircraft seating capacity and load factors. Based on the relatively low level of passengers forecast and the findings of the Research and Action Plan for air carrier service prepared for the Port of Port Angeles in 2004, it is assumed that service will continue to be offered in much the same manner as it is today. Given the lack of commercial aircraft with fewer than 30 passenger seats it is likely that the small aircraft will remain the airports primary carrier throughout the planning horizon.

In addition, by using 9-passenger or less aircraft size, service can be offered from the non-secure facility at CLM into a non-secure facility at BFI. Any increase in aircraft size will result in a need to provide a higher level of security on both ends of the trip, adding cost and time to the experience, thereby diminishing service levels. The passenger carrier operation forecast for CLM is predicated upon the following assumptions:

- Enplaned passenger load factors will grow at rates consistent with FAA long-range forecasts. The FAA's long-range growth rates equate to an average annual increase of 0.52 percent annually from 2000 to 2012 and 0.41 percent annually from 2013 to 2025.
- Aircraft seating capacity will remain unchanged throughout the forecast period. While the FAA projects the regional/commuter fleet seating capacity to grow over time, the modest increase in load factor at CLM over the forecast period does not appear to warrant the significant increase in capacity that would result from a change 30-seat or larger aircraft.
- Nationally, there is a clear trend to increase the number of seats available per regional carrier aircraft. This trend is reflected in the FAA Long-Range Aerospace Forecasts – Fiscal Years 2015, 2020 and 2025. However, the retention of a 9-seat aircraft fleet at CLM throughout the forecast period is assumed to

support a possible increase in the frequency of scheduled flights as load factors grow rather than offering the same or even fewer flights by larger aircraft.

- For reasons driven by CLM's geographic location, local demographics, and airline operational characteristics, it is believed the airport will continue to feed passengers through the King County International Airport/Boeing Field.

The actual development of the forecast of scheduled carrier operations has been determined from the ratio of passenger enplanements per operation using the following methodology:

- Determine passengers enplaned per departure (total enplaned passengers / total departures).
- Determine the load factor (enplaned passengers per departure / aircraft seating capacity).
- Project changes in the enplaned passenger load factor – referring to FAA growth rates.
- Calculate the number of enplaned passengers per departure for each forecast year (future load factor X aircraft seating capacity).
- Calculate future departures (total enplaned passengers / enplaned passengers per departure).
- Double future departures to calculate total operations

Using this forecast method results in an apparent decrease in air carrier operations that results from the assumed increases in load factors to be realized over time. This perceived decrease in service does not mean that it is anticipated that airline service will decrease over time, only that the airline will continue to balance loads and operations in an attempt to maximize their operations. The forecast of annual scheduled passenger carrier operations shown in Exhibit 3-6 includes an adjusted forecast of operations that reflects a continuation of today's service levels over the next twenty-years.

Exhibit 3-6: Scheduled Passenger Carrier Operations

Year	Annual Enplaned Passengers	Seats/ Departure	Load Factor	PAX/ Departure	Annual Departures	Annual Operations	Forecast Annual Operations
2007	15,860	9	57%	3	3,102	6,205	6,205
2012	16,866	9	63%	6	2,975	5,949	6,205
2017	17,937	9	69%	6	2,888	5,777	6,205
2022	19,079	9	75%	7	2,826	5,653	6,205
2027	20,295	9	80%	7	2,819	5,637	6,205
2057	29,463	9	80%	7	4,092	8,184	8,184

This forecast compares favorably with that produced for the LATS study. In that document, air carrier operations at CLM were forecasted to be 6,278 in 2012, 6,617 in 2017, 6,973 in 2022 and 7,315 in 2027. While these are higher than the forecast from this report, the low levels are reflective of the continuation of service at CLM, albeit at a level befitting the Kenmore Air model.

AIR CARGO ACTIVITY

Air cargo service at CLM consists of daily flights by FEDEX using a Cessna Caravan and daily flights by UPS (using a contractor) operating similar aircraft. In 2005 the Port reported that 519 tons of cargo was enplaned by these carriers. According to Phase II of WSDOT LATS, this represents 0.09% of the total at all of the state's airports. In the case of CLM, the LATS analysis projected air freight volumes to grow from 519 tons in 2005 to 1,272 tons in 2030 for an average growth rate of 3.6 percent per year. Exhibit 3-7 shows these numbers.

Exhibit 3-7: Air Cargo Forecast WSDOT LATS

Forecast Year	Tons
2005	519
2015	743
2025	1,063
2030	1,272

In preparing this forecast, it was seen that there was a lack of reliable historical data available for cargo at CLM so no trends could be established. Given that the service area for air cargo could be assumed to be the same as that for air carrier activity (Clallam and Jefferson Counties), the 3.6 percent growth rate exceeds that which is projected for population in the area (1.38% annually.) If this rate is applied the total annual tonnage projections would be 711 tons by 2030. However, given the relatively low annual volumes registered and the fact that we only have a single year of historical data to work with, we recommend adopting the LATS based forecast for future planning. This allows for consideration of market growth as well as population growth without the risk of overly committing resources at the airport due to the resulting levels. Given this, the air cargo forecast for CLM is projected to grow at a rate of 3.6% per year through 2057, as shown in Exhibit 3-8.

Exhibit 3-8: Air Cargo Activity Forecast

Year	Annual Tons	Annual Operations	Tons/ Operation
2007	519	624	0.83
2012	659	624	1.06
2017	807	624	1.29
2022	967	624	1.55
2027	1,165	728	1.60
2057	3,305	2,066	1.60

As the amount of annual enplaned tonnage increases, the cargo carriers will need to either increase the carrying capacity of the aircraft that they use to serve CLM or increase the number of daily flights to and from the airport. If they continue to use the Cessna Caravan Super Cargomaster in this market they will need to increase the number of daily flights. Since the payload capacity of the Super Cargomaster is 1.6 tons, the number of annual flights for 2027 would increase to 728 and by 2057 the annual operations would be approximately 2,066. Presently there are a number of aircraft being used for cargo purposes that are capable of hauling more than 6 tons per operation and therefore could be used in Port Angeles. However, discussions with the cargo carriers using CLM show that cargo service is expected to continue to be linked to the carriers' hub operation at either the Seattle-Tacoma International Airport or Boeing Field and that they would increase the number of flights rather than increase the size of the aircraft. Therefore, for this analysis, the forecast assumes that the regional cargo carriers will continue to operate small, dependable aircraft such as the Cessna Caravan Super Cargomaster and increase their daily flights to two per day. Once the carriers are operating more than two per day, they will consider moving to a larger aircraft or adding an additional destination (possibly Spokane) to their route system.

GENERAL AVIATION ACTIVITY

This section includes an analysis of national trends in general aviation such as the changes in aircraft design, ownership and technology and an assessment of how these are likely to impact growth in aviation at CLM. Following this the report will focus on regional and local conditions such as those detailed in WSDOT LATS and changes anticipated in the population of Clallam and Jefferson Counties. From these factors, a new forecast of based aircraft and general aviation operations will be prepared for CLM.

Service Area

A total of five regional airports have the capability to compete with CLM for general aviation activity. These are Forks Municipal, Jefferson County International, Quillayute, Sekiu, and Sequim Valley. Exhibit 3-9 and Exhibit 3-10 on the following page identifies these airports. As shown, the CLM service area for general aviation is quite a bit different from that for commercial service. In fact, the service area is limited to portions of Clallam County, with Jefferson County residents having access to facilities closer to their homes.

Exhibit 3-9: Airport Service Area Airports

Airport	Ownership	NPIAS Role	WSDOT LATS
Forks Municipal	Public	N/A	Local Community <10 Aircraft
Jefferson County International	Public	GA	Local Community >10 Aircraft
Quillayute	Public	GA	Recreation or Remote
Sekiu	Public	N/A	Local Community <10 Aircraft
Sequim Valley	Private	N/A	Recreation or Remote
Wm. R. Fairchild International	Public	CS-P	Commercial Service

Source: WSDOT LATS

CS-P Commercial Service – Primary
GA General Aviation
N/A Non-NPIAS Airport

Exhibit 3-10: Airport Service Area Airports Map

Trends in General Aviation

In order to forecast the future of general aviation activity at CLM, it is necessary to understand the trends in the national GA Market that could influence this future. This section provides a general discussion of current trends in general aviation with a focus on the types of aircraft being manufactured and aircraft production rates. The following paragraphs describe these trends and provide an overview of their primary features.

Very Light Jets

Very Light Jets (VLJ's) are defined as a new type of small jet aircraft that generally weigh less than 10,000 pounds and cost between $1 and $4 million. Several aircraft manufacturers have announced plans to build the VLJ's. Exhibit 3-11 presents a list of some of these manufacturers and describes their proposed aircraft.

Exhibit 3-11: Proposed Very Light Jet Aircraft

Manufacturer	Model	Seating	Maximum Takeoff Weight (pounds)	Projected Price (millions)
Adam Air	A700	6	9,350	$2.45
Cessna	Mustang	6	8,645	$2.54
Diamond	D-Jet	5	5,000 (est.)	$1.38
Eclipse	500	6	5,995	$1.6
Embraer	Phenom	6 to 8	9,700	$2.98
Epic	Elite Jet	6 to 8	7,700	$2.35
HondaJet	Honda Jet	7 to 8	9,960 (est.)	$3.65
Piper	Piper Jet	6	NA	$2.2

Source: Manufacturers' Data compiled by URS

These aircraft are currently in various stages of development. Some are at the conceptual level, while others are in production with finished aircraft being delivered to customers. As of January 1, 2008, the only VLJ's certified by the FAA and delivered to customers were the Eclipse 500 (98 aircraft delivered) and the Cessna Mustang (45 aircraft delivered). The Embraer Phenom 100 is expected to achieve FAA certification sometime in 2008. The remaining aircraft are expected to achieve certification within the next few years although some, ultimately, may not make it to production.

A study conducted by the United States General Accounting Office (GAO) in 2007 compiled forecasts of VLJ's by a variety of sources including aircraft manufacturers, aircraft component manufacturers, consultants and the FAA. The report found that the forecasts predict that between 3,000 and 7,500 VLJ's will be delivered to customers in the period between 2016 and 2025.

The individual forecasts vary by a factor of 2.5 reflecting the high degree of uncertainty over the success of this category of aircraft and the fact that a significant number of these aircraft are being marketed to the air taxi market. The air taxi market provides on-demand hiring of aircraft and crew for point-to-point transportation. The market is not new and currently consists of numerous companies filling a niche for air transportation that is not provided by schedule commercial air service. However, what is new is the anticipated change in the economies of air taxi service that could be provided by VLJs, due to their lower acquisition and operating costs compared to traditional business jets. It

is anticipated that the VLJ could bring the cost of air taxi services to a broader market, thereby stimulating demand for air taxi services.

The number of VLJ aircraft that will enter the industry in the next few years depends on how many manufacturers actually bring their aircraft to market. However, it should be noted that Eclipse and Cessna delivered nearly 150 VLJ's to customers in less than six months of production during the latter part of 2007. This suggests that since thousands of these aircraft are on order, several hundred could be delivered to customers annually during the next few years.

VLJ and Air Taxi Services

New companies, such as DayJet, have been started based on the idea of using VLJ's specifically for air taxi services offering "per seat, on demand" service. This means that the customer pays only for the "seat cost" of the trip not the entire "aircraft cost". Consequently, the cost to the customer varies depending on the level of flexibility the customer has regarding schedule. Nonetheless, the seat cost is still expected to be more than the cost of a passenger ticket using traditional scheduled airline service.

Dayjet intends to use existing FBO facilities at smaller airports and to provide a "branded" service that stimulates customers demand beyond the traditional users of air taxi services. They believe that their focus on smaller markets that are currently underserved by direct point-to-point air carriers will enable their cost premium to be justified by the elimination of overnight stays and their associated costs for business travelers. The ultimate success of this business model is yet to be proven in the air taxi market.

Other companies have proposed similar service. For example, the former Chairman and Chief Executive Officer of American Airlines, Robert Crandall, is proposing a company called "Pogo" that will provide air taxi service using VLJs. Pogo is targeting short-haul trips of less than 500 miles and intends to begin in the Northeast United States where they believe the highest concentration of potential customers live and work. Pogo intends to launch operations in 2008 using a fleet of VLJ's and to expand geographically as they acquire additional aircraft.

As of February 2008, Dayjet is the only company operating on the basis of providing air taxi services using VLJs. The company is using the Eclipse 500 to provide per seat, on-demand service to certain airports in Florida, Georgia, Alabama and South Carolina.

There are certain characteristics of these on-demand air taxi services using VLJ's that make them more suitable for Eastern US markets than for those in the west. The first characteristic is the limited range of VLJ aircraft. Most aircraft have ranges of 1,000 to 1,300 miles. Furthermore, many of these ranges are maximum values that are attained with minimum payload. Ranges with more realistic payloads are shorter. Consequently, these aircraft are better suited to short-haul trips than larger, traditional business jets. This makes them less appealing to many Western US markets where the typical trip lengths are longer.

Second, certain studies have examined the issue of "connectivity' (i.e., the ability to fly directly from one commercial service airport to another). These studies examined the number of commercial service airports within 300 to 600 miles of other commercial service airports in the 48 contiguous states that did not have direct air service.

The study found that the highest concentration of passenger markets with poor connectivity were concentrated in the Southeast United States with Georgia being the highest. Other areas with poor connectivity were Texas and the upper Midwest to Northeast states extending from Michigan to New York. Western US markets generally had better connectivity due to the fewer number of markets and the greater average distances between them.

Finally, the concentration of potential markets in the Western US as compared to the eastern US markets makes them less suitable for the types of air taxi services being proposed by the VLJ air taxi operators. The implication of these factors is that the Western US will probably be the last part of the country to receive service by VLJ air taxi service.

It should be noted however that the demand for VLJ's is not tied exclusively to air taxi operators. VLJ's have been ordered by all segments of the general aviation market including corporations and individuals. Thousands of orders have been placed for these aircraft. The actual market for the VLJ will ultimately depend on the success of their economics (i.e., their ability to maintain low acquisition and operational costs).

Fractional Aircraft Ownership

Another trend cited as a potential growth factor in general aviation is the fractional aircraft ownership program. These programs allow individuals or businesses to purchase partial ownership of an aircraft; usually business jets. The purchaser receives access to the aircraft for an established number of flight hours, in direct proportion to the percentage of the aircraft that they purchase. Companies offer a wide range of ownership percentages thereby allowing the purchase of small or larger number of flight hours.

The benefit of these programs is that they allow companies that could not previously take advantage of the convenience of private aircraft ownership to get into the market at a lower cost than buying an aircraft outright. The primary disadvantage of the programs is that the owner is responsible for a proportional share of all costs associated with the aircraft including insurance, maintenance, etc. and they cannot use the aircraft beyond their allotted flight hours. Numerous companies such as Netjets, Flight Options, Flexjets and Citation Shares provide fractional aircraft ownership.

In additional to fractional ownership there are companies that sell access cards that provide access to a pre-defined number of flight hours on an aircraft without requiring that the purchaser become part owner of an aircraft. This enables customers to avoid certain costs that are incurred when becoming a fractional owner and usually enables access to aircraft at a lower total cost than purchasing a fractional share. Access cards are typically suitable for individuals who need fewer total hours of flight time.

The growth of fractional jet ownership and access cards has stimulated the market for business jets in recent years. Exhibit 3-12 below presents the number of aircraft and fractional aircraft owners in recent years as compiled by the General Aviation Manufacturers Association (GAMA).

Exhibit 3-12: Fractional Aircraft and Ownership

Year	Fractional Aircraft Fleet	Percent Growth	Fractional Share Owners	Percent Growth
2001	689	-	3,601	-
2002	780	13.2%	4,244	17.9%
2003	826	5.9%	4,516	6.4%
2004	870	5.3%	4,765	5.5%
2005	945	8.6%	4,828	1.3%
2006	984	4.1%	4,863	0.7%
2007	1,030	4.7%	5,168	6.3%

Source: General Aviation Manufacturers Association, 2008.

As the table indicates, the fractional aircraft market has experienced positive growth during recent years and now accounts for over a thousand aircraft with over five thousand owners. These aircraft tend to have high utilization rates and tend to be concentrated in the business jet category.

General Aviation - Aircraft Production

Exhibit 3-13 presents the total number of general aviation aircraft manufactured worldwide from 2005 through 2007. As the table indicates, total shipments have been increasing, but the fastest growth is occurring in the business jet category. This reflects the continued growth of corporate aviation, as well as business jets used in fractional aircraft ownership programs.

Exhibit 3-13: General Aviation Aircraft Manufactured Worldwide

	2005	2006	2007	2005/2006 Change	2006/2007 Change
Pistons	2,465	2,755	2,675	11.8%	-2.90%
Turboprops	365	412	459	12.9%	11.40%
Business Jets	750	886	1,138	18.1%	28.40%
Total Shipments	3,580	4,053	4,272	13.2%	5.40%

Source: General Aviation Manufacturers Association, 2008.

This data suggests that turboprop and jet aircraft will comprise a greater proportion of the overall general aviation fleet in the future.

Another factor to consider is the average age of general aviation aircraft. According to data from GAMA, the average age of piston aircraft is approaching 40 years, while the average age of a multi-engine turboprop is over 27 years and the average age of a multi-engine jet aircraft is 16 years. This suggests that the number of piston aircraft being retired will accelerate in future years as they reach the end of their useful lives. Again this suggests that turboprop and jet aircraft will continue to increase as a proportion of the total general aviation fleet.

Implications of Fuel Price Increase on General Aviation Activity

In recent years, general aviation has experienced a significant increase in the cost of fuel, consistent with increases seen in other sectors of the transportation industry. Between mid-2006 and mid-2008, the average price of a barrel of oil increased from approximately $73 to $146. During the same time period, the national average cost of aviation fuels increased as shown in Exhibit 3-14.

Exhibit 3-14: Average Fuel Price Comparison (2006 vs. 2008)

Fuel	July 2006	July 2008	Percent Change
100LL	$4.30	$5.62	31%
JetA	$4.09	$6.01	47%
MoGas	$3.23	$4.44	37%
Oil Price/Barrel	$73.20	$145.50	99%

Source: AirNav.com

The "at the pump" cost of aviation fuel is a complex issue and not driven solely by the price of oil. The size of the general aviation fuel market is but a fraction of that for surface vehicles. The refining capacity devoted to the aviation fuel market is small, and reported to be on the decline. In addition, it is becoming increasingly difficult for FBOs to buy fuel in quantities related directly to their needs while suppliers continue to increase the required size of fuel deliveries. This increases FBO costs due to the larger storage capacity required, fuel inventory carrying costs and slower fuel turnover.

As of late August 2008, aviation fuel prices in the Pacific Northwest were comparable to prices nationally (see Exhibit 3-15). At Port Angeles however, fuel prices are higher due to the need to transport it long distances by truck. Currently the FBO takes delivery from a distribution point in the Tacoma area and their deliveries must take surface transportation as opposed to using the ferry system. This adds to the cost of fuel at the airport. Given this fuel situation, general aviation activity at Port Angeles has tended to

be business oriented rather than training or recreational in nature. This results in an operational environment that is less subject to the vagaries of fuel prices.

Exhibit 3-15: Average Fuel Price by Region (August 2008)

Region	100LL	JetA	MoGas
Alaska	$6.03	$6.36	$5.58
Central	$5.41	$5.62	$4.49
Eastern	$5.69	$6.02	$4.36
Great Lakes	$5.53	$5.82	$4.44
New England	$5.81	$6.13	$4.61
Northwest Mountain	**$5.63**	**$5.81**	**$4.52**
Southern	$5.66	$5.86	$4.44
Southwest	$5.41	$5.62	$4.47
Western-Pacific	$5.61	$5.86	Not Available
Nationwide Average	**$5.58**	**$5.82**	**$4.53**

Source: AirNav.com

At present, fuel prices continue to fluctuate, however it is generally accepted that the cost of avgas is unlikely to return to historic levels. How the general aviation industry may respond to this new paradigm is the subject of this discussion.

The Aircraft Owners and Pilots Association (AOPA) recently published a set of aviation activity statistics comparing the first quarter of 2008 with the same period in 2007. This comparison is particularly telling as it covers the same time period during which the most rapid increase in fuel prices occurred. The AOPA activity comparison is presented in Exhibit 3-16.

The AOPA data indicates that flight activity is down by four to five percent over the 12-month period, resulting in an expected decrease in fuel consumption. While student, private and Certified Flight Instructor (CFI) license issuances were down, Commercial, Air Transport Pilot (ATP) and Instrument Ratings were all up significantly. It is these ratings that support the airline and corporate/business segments of the aviation industry. In addition, Sport Pilot Certificates increased 61 percent over the same period. Sport Pilot certificate holders are licensed to fly Light Sport Aircraft (LSA) – a recently established category of small one and two-passenger aircraft geared to the recreational market.

Exhibit 3-16: Comparison of Aviation Activity Indicators – Q1 2007 v. Q1 2008

	Q1 2007	Q1 2008	% Change	Change
Flight Activity				
Air Traffic Control Centers	1,984,928	1,885,596	-5%	-99,332
Control Towers	7,509,856	7,190,757	-4%	-319,099
Gallons Avgas Sold (in 000s)	47,397	38,746	-18%	-8,651
Pilot Certification				
Total Student Issuances	15,809	13,569	-14%	-2,240
Private Issuances	5,346	4,732	-11%	-614
Commercial Issuances	2,538	3,003	18%	465
ATP Issuances	1,561	1,808	16%	247
CFI Issuances	1,218	1,192	-2%	-26
Instrument Ratings Issued	6,028	6,551	9%	523
Aircraft Shipment & Registration				
GA Shipments	628	558	-11%	-70
Total A/C Reg. Apps.	11,015	9,661	-12%	-1,354
Aviation Safety				
GA Accidents	284	252	-11%	-32
Sport Pilot Certificates				
Sport Pilot Certificates Held	3,935	6,345	61%	2,410

Source: Aircraft Owners and Pilot's Association

Discussions within the general aviation community cite the lack of innovation within the aviation industry as contributing to general aviation's decline. The majority of general aviation aircraft flying today represent aircraft technologies developed in the 1950s and 1960s. Aircraft manufacturers need to apply updated designs and materials to the manufacture of their aircraft. For example, whereas an older 2-seat Cessna 152 can cruise 350 nautical miles at 107 knots while burning 7 gallons of fuel per hour, a newer similar-sized composite Diamond Katana (DA20-C1) can cruise 547 nautical miles at 138 knots while burning 5.5 gallons per hour. The late-1990's design aircraft flies farther, faster and more economically than the older design Cessna. For the same trip, the Katana could arrive sooner at 60 percent of the fuel cost of the Cessna 152. However, total ownership costs still needs to be considered as a new Katana will cost over four times the cost of a used Cessna 152.

General aviation's response to increased fuel costs is expected to range from pilots employing fuel saving practices in aircraft operation, such as leaning fuel mixtures and reducing operating speeds, to the production of lighter, more fuel efficient aircraft by manufacturers. However, the fuel consumption rate will not be the sole determining factor in the future of general aviation as it is just one element in the total overall cost of aircraft operation and ownership. Alternative fuels, fractional ownership and the relative cost relationship between air and surface transport will be some of the factors that will shape the future of general aviation.

Business/corporate aviation will continue to play a valuable role to the business community. Many areas of the country do not have scheduled air service, and those that do are seeing airlines reduce capacity and schedules. The relative cost effectiveness of business aviation is likely to retain its advantages when comparing additional costs associated with surface transport including travel time and expenses. Using aircraft, a company may send a team of executives into a community, conduct business, and return home in the same day. In comparison, the cost of an overnight business trip for multiple individuals relying on surface transportation will consume more time.

No doubt the higher prices will have an effect on the overall level of activity. However, the AOPA statistics offer a glimpse into the potential direction the general aviation industry may be moving. For the purposes of this Master Plan, the scenario assumed for general aviation in light of rising fuel prices is as follows:

- Business aviation will continue to grow and remain an important component of general aviation. The efficiencies provided by air transport and the benefits of business aircraft ownership will help offset higher operating costs. This is supported by the marked increase in the number of business jet operations at CLM over the past three-years. A combination of factors has contributed to this increase. First, there is a very strong business climate in the community led by the boat building sector. This sector draws corporate jets to the airport while the individual boats are under construction. Since this industry is expected to maintain economic stability, this sector of airport operations is likely to remain healthy as well. Second, Port Angeles is more than 130 miles (two and a half hours) from Seattle-Tacoma International Airport which is the closest alternative for major commercial service. Business jet users will continue to need direct access to the airport since air carrier service is not direct to CLM from their originating cities.

- The number of older technology two- to four-seat aircraft that comprise the bulk of the general aviation fleet will decline somewhat over time. Some of these aircraft will be replaced by newer technology aircraft as well as new, cheaper to operate Light Sport Aircraft. Those older aircraft that remain will likely fly fewer hours. However, considering the total cost of ownership and operation, fuel cost alone may not be the total determinant in whether or not the aircraft remain part of the active general aviation fleet. AT CLM the general aviation fleet is a mixture of recreational and private aircraft, but due to the community's relative isolation from other population centers as well as the difficulties involved in using the surface access system, GA is expected to continue to grow for business rather than locally generated purposes.
- Over time, there will be a divergence in the general aviation industry, with business/corporate flying representing one end of the spectrum, and the Sport Pilot flying a Light Sport Aircraft (LSA) representing a large portion of the private recreational flying at the other end. Over time there will be fewer and fewer of those aircraft that have historically represented the main-stay of the general aviation fleet. This trend is expected to be evident at CLM, for the previously sited reasons.

The impact of the above scenario will impact the aviation demand forecasts presented below but whether an aircraft is an older Cessna 172 or a new LSA it will generate operations and require its own parking/storage space. Business/corporate aviation will likely continue to place the greatest demand on the airport facilities. It is assumed that, over time, the general aviation fleet will make the necessary adjustments to the new operating environment.

Given these trends in the general aviation market, the question is – will based aircraft or general aviation operations at William R. Fairchild International Airport be affected by the trends that are influencing the national scene? As discussed, the initial impacts of the VLJ will likely be felt in the eastern United States. Therefore, early phases of general aviation development will not need to provide space for these aircraft beyond an occasional transient hangar or tiedown rental. Longer term, there will likely be more activity by these aircraft at the airport as the market matures and the aircraft production increases. Nonetheless, the indicators are that Western Washington will not be an active destination for the types of services that are currently envisioned for VLJ aircraft until at least the long term period (15 to 20 years). Certainly at CLM it can be expected that the

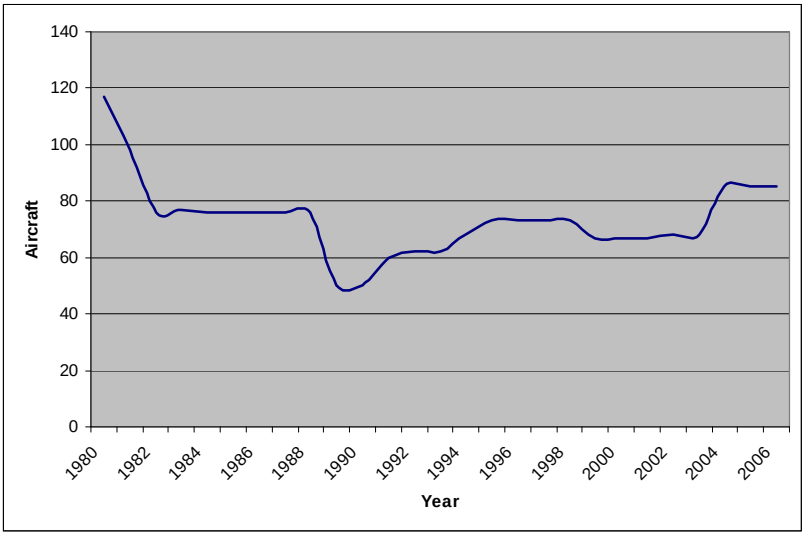
VLJ will be an occasional user of the airport over the planning horizon. This is expected to be in support of charter service from other regional (west coast) communities. The possibility of having VLJ aircraft based at CLM or in service by scheduled carriers has not been considered in this report.

The impact of fractional ownership is much more likely to have a positive impact on based aircraft at CLM. Given the population growth and economic development activity that is occurring in Clallam and Jefferson County, fractional ownership of jet aircraft is likely to become more common in Port Angeles. The nature of the anticipated business and economic growth in the region seems to be focused on the smaller firms that are the natural market for this concept.

Finally, the growth in emphasis on jet powered aircraft in the national general aviation fleet is seen as very relevant to CLM. As the only airport on the Northern Olympic Peninsula with adequate runway length, navigational aids, all weather capability and services to serve jet aircraft, CLM will undoubtedly continue to be the home of choice for high performance jet and turboprop aircraft in this region. The continued growth of the region will undoubtedly be accompanied by (and supported by) increase corporate aviation activity at CLM.

General Aviation Forecast

Exhibit 3-17: Historical Based Aircraft



With this data as background, forecasts can be produced for general aviation growth at Port Angeles. In this respect two factors will be examined. The first will be the number and type of based aircraft that will call CLM home over the next twenty years. The second will be forecasts of

operations by general aviation aircraft.

Forecast of Based Aircraft

Historical records of the number of aircraft that have been based at the William R. Fairchild International Airport since 1980 were examined as part of this master plan. The following graph shows the fluctuations that have been experienced in the number of based aircraft at CLM over time. As with historical passenger levels there is no clear pattern evident through an examination of these records. In fact, when they are examined statistically, the result is that almost no growth in based aircraft can be projected for CLM based on the long term trends. However, over the last 15 years there has been a steady trend upward at CLM and this is statistically significant and can be used as the basis for generating a forecast.

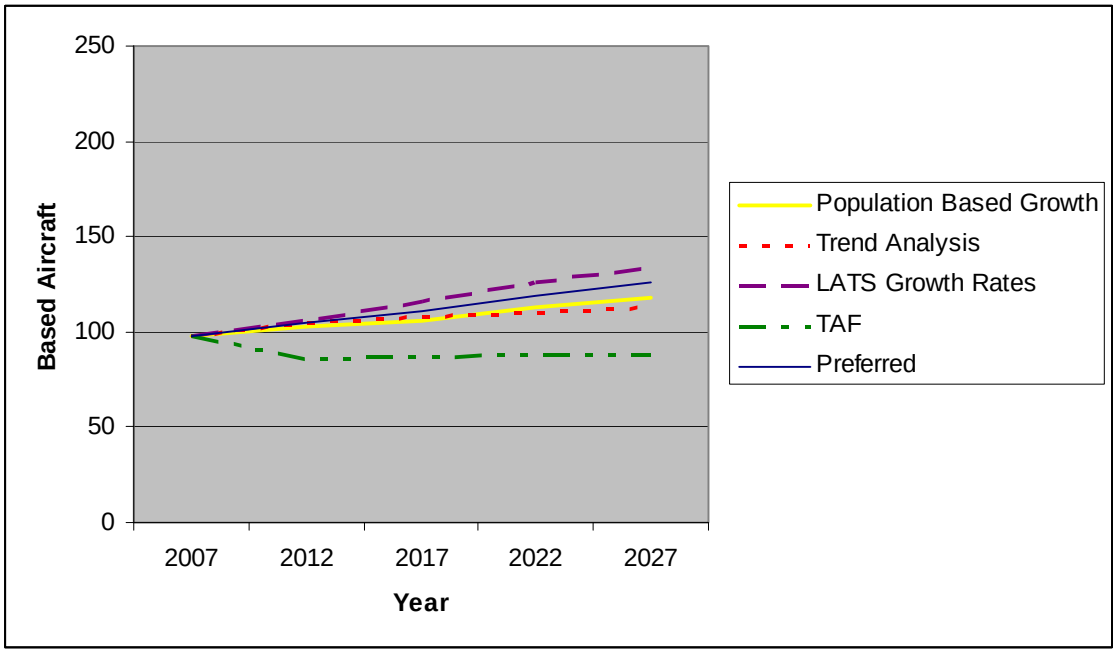
Under this Master Plan, various demand forecast modeling techniques were considered for projecting based aircraft. Standard regression analyses were discounted as a viable approach as any model that relies on historical relationships with any independent variable such as population have proven to have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

- **FAA Terminal Area Forecast:** FAA based aircraft forecasts for 2007 through 2025 contained in the Terminal Area Forecasts for CLM were evaluated. Under the FAA TAF model, based aircraft are expected to remain static through 2025 with a zero percent growth rate. Extrapolating this model to 2027 results in the based aircraft level remaining at 86 over the entire forecast period. Since this number is less than the actual 98 aircraft currently based at CLM, using this as the basis for forecasting was rejected.
- **WSDOT LATS Market Share:** Forecasts for the Olympic Peninsula prepared under the WSDOT LATS provide the most recent comprehensive, up-to-date analysis of regional aviation demand in the airport service area based on a wide variety of aviation, social and economic factors. WSDOT LATS based aircraft and operations forecasts for the region provided the foundation for market share allocations of activity to CLM. To account for the fact that the LATS forecasts were produced two years ago using 2006 data as a base, it was decided that while the actual forecast may be dated, applying the growth rate from LATS to the actual 2007 based aircraft number would produce a reliable projection of future growth.

- **Trend Analysis:** This technique used the trend exhibited over the past 15 years to project future activity levels. Since the relationship being tested is simply between the year and the based aircraft, there is no real "causality" implied with the use of the technique. This merely extends the trend into the future without examining the factors that cause the growth. It is felt that this technique should not be used as the basis for forecasting but we have included it as a "base line" with which to check the results of other methods.
- **Population Based Growth:** Although testing the historical relationship between area population and based aircraft resulted in a finding that the relationship between the two was not very strong historically, it is assumed that area population is typically the strongest force behind based aircraft at an airport. Therefore, we have produced a forecast of based aircraft that uses the growth rate that the state has produced for population growth applied to current based aircraft counts. We will use this forecast to reflect local growth conditions.

Exhibit 3-18: Based Aircraft Forecasts

Year	Population Based Growth	Trend Analysis	LATS Growth Rates	TAF	Preferred
2007	98	98	98	98	98
2012	103	105	106	86	104
2017	105	108	116	87	111
2022	113	110	126	88	119
2027	118	113	134	88	126
2057	156	115	229	93	192



Source: URS Corp.
Note: Based aircraft are reported as 84 in the CLM FAA 5010 Form.
The actual number in summer 2008 is 98.

Exhibit 3-18 shows the results of these projections for based aircraft at CLM. In reviewing these and considering the factors discussed in the preceding, we have determined that the preferred forecast for based aircraft at CLM should combine the growth rates that were used in developing the LATS with the growth that can be expected based solely on area population growth. The LATS growth rates included factors that reflected the expectations within the entire state's aviation system combined with the DOT's expectations as to how the growth would be distributed within regions of the state

and finally to the individual airports while the population based forecast relies solely on the State OFM's projections for growth in Clallam County. This combination results in a forecast of continued growth at CLM at a rate that is sustainable and is consistent with the national trends discussed in preceding sections.

Based Aircraft Fleet Mix

The current based aircraft fleet at Port Angeles consists entirely of small piston engine aircraft with 94 percent being single engine and six percent multi engine. It is expected that this fleet will evolve based on changes in the aircraft manufacturing, delivery and use trends being experienced nationally. Naturally the fleet will continue to be dominated by small private aircraft used as personal or business aircraft. However, the increasing reliance on jet aircraft will be felt in Port Angeles as the population and economy continues to evolve. The forecast of based aircraft fleet is based on the following;

- **Single-Engine/Piston (SEP)**: This category is assumed to include both traditional single-engine piston aircraft as well as the newer Light Sport Aircraft (LSA). It is assumed that an increasing percentage of future SEP aircraft based at the airport will fall into the LSA category.
- **Multi-Engine (ME)**: The Multi-Engine category is composed of both twin-engine piston and turboprop aircraft. However, the *FAA Aerospace Forecasts 2008 to 2025* project multi-engine fixed wing piston powered aircraft to decline at an annual rate of 0.9 percent.
- **Turbojet:** This category includes both traditional business/corporate jet aircraft, as well as the new Very Light Jets (VLJ). By 2025, the FAA expects VLJs to annually accumulate approximately 2.5 times the number of flight hours as non-VLJ turbojet aircraft nationwide. This level of growth is not expected at CLM.
- **Rotor:** The Rotor category includes both piston and turbine-powered rotorcraft. However, piston-powered rotorcraft constitutes only a small percentage of the general aviation fleet and the FAA does expect the number of these aircraft to grow over time.

The FAA Aerospace Forecasts note that the Light Sport Aircraft and VLJs are expected to make significant in-roads into the low and high ends of the general aviation fleet through 2025. Although these aircraft do not have their own specific categories in the fleet mix forecasts, it is assumed that they will represent an increasing percentage of the aircraft in the SEP and Turbojet categories.

The based aircraft fleet mix forecast for CLM uses current figures and considers the findings and conclusions of the WSDOT LATS study combined with research into the evolution of general aviation in the United States. The fleet mix percentages for CLM were applied to the based aircraft forecast for the airport. The recommended CLM fleet mix forecast for benchmark years is presented below.

Exhibit 3-19: Fleet Mix Forecast

Year	SEP		MEP		Turbo Jet		Rotor		Total	
	%	#	%	#	%	#	%	#	%	#
2007	94%	92	6%	6	0%	0	0%	0	100%	98
2012	90%	94	7%	7	2%	2	1%	1	100%	104
2017	85%	94	8%	9	5%	6	2%	2	100%	111
2022	80%	95	10%	12	7%	8	3%	4	100%	119
2027	75%	95	12%	15	9%	11	4%	5	100%	126
2057	60%	115	15%	29	20%	38	5%	10	100%	192

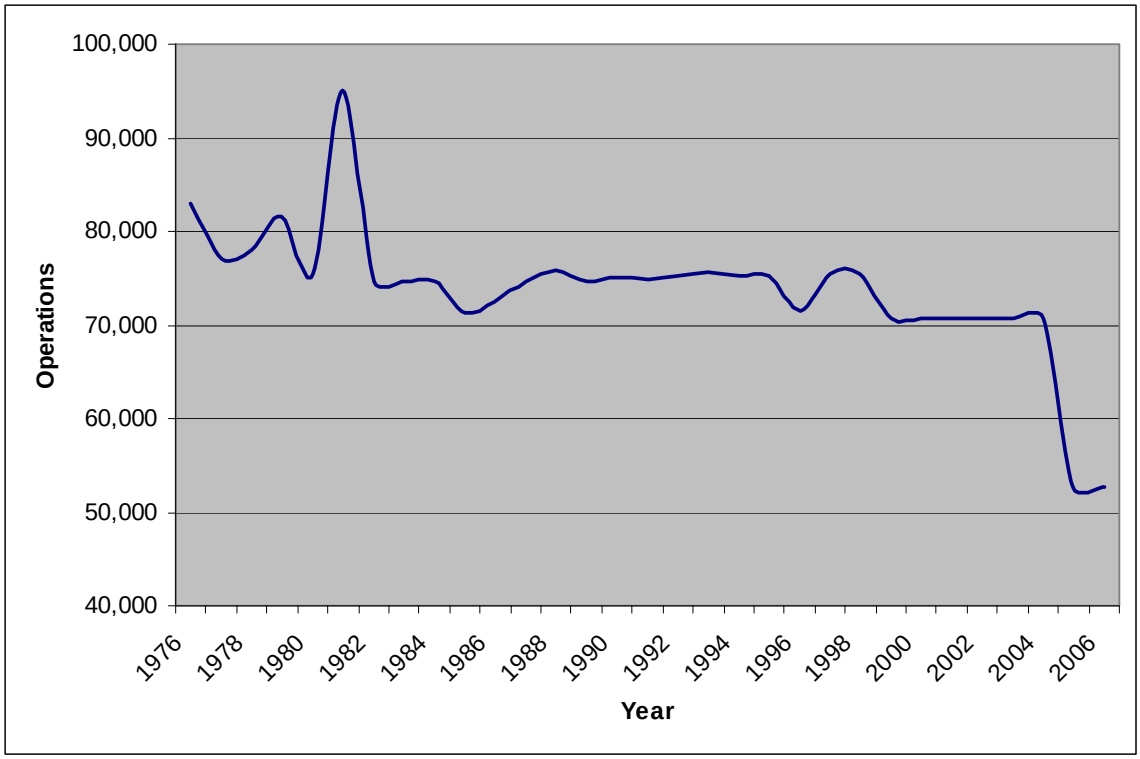
Source: URS Corp

Note: Aircraft type and totals as inventoried in Summer 2008

General Aviation Operations

As with most activity indicators at Port Angeles, the historical records for general aviation operations do not exhibit any long term, definable pattern of either growth or reduction. In fact, as is shown on the following graph, the number of general aviation operations have shown annual fluctuations but remained relatively stable from 1984 through 2005. Between 2005 and 2006 a drop of roughly 20,000 annual operations was recorded. This drop is attributed to the overall economic downturn experienced in the Clallam County region and is seen as a short-term phenomenon. Therefore our forecast will need to rely on techniques that consider this historical record, but do not under estimate the growth rate based on this same record.

Exhibit 3-20: Historical Operation Activity



As discussed, the WSDOT LATS study represents the most recent, comprehensive forecast of aviation activity in the state of Washington. In the study, aviation activity was forecasts through 2030 for each region and airport in the State. Under LATS, aircraft operations at CLM are anticipated to grow from 46,100 in 2005 to 54,615 by 2030. This represents an average annual growth rate over the forecast period of 0.8 percent per year.

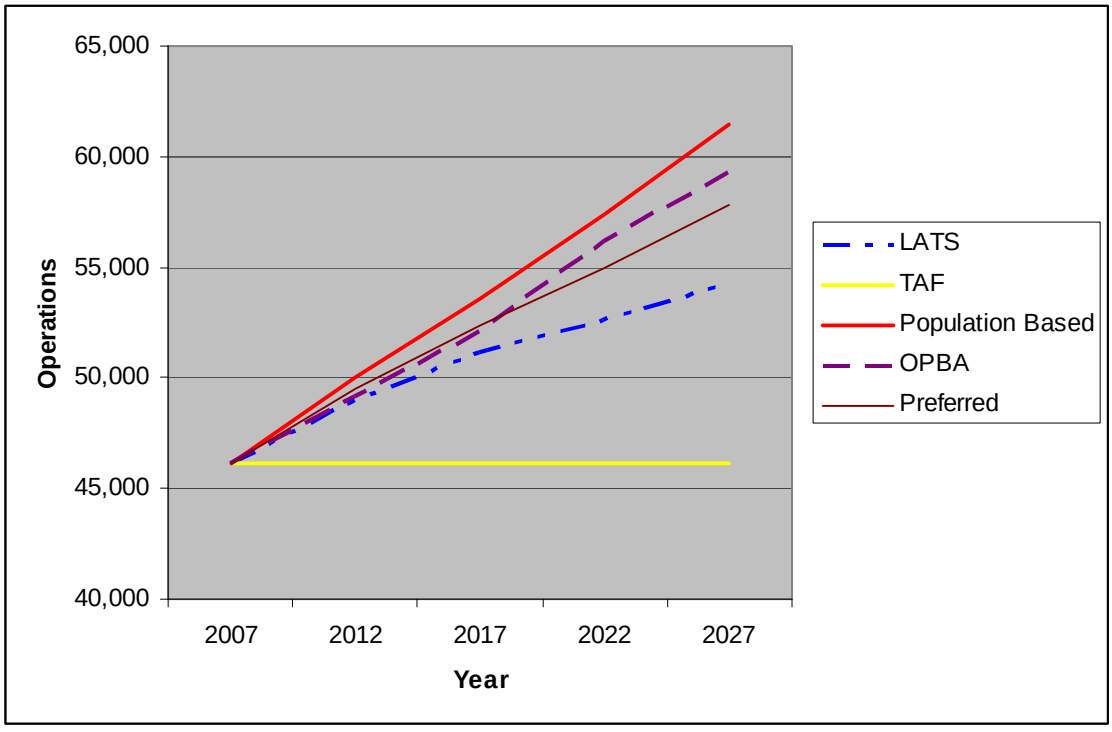
In addition to the LATS, the FAA TAF has produced general aviation operations forecast for CLM. These suggest no growth in operations activity through 2025 for a zero percent annual growth rate.

In addition, we generated new forecasts using the population growth rate that was developed by the State. By applying this growth rate it was determined the impact that the economic situation in Clallam County had on overall operations could be neutralized and the changes in that economy could be reflected in the forecast.

The final forecasting technique that was used relied on applying a factor for Operations per Based Aircraft to the based aircraft forest presented in the previous section. This technique is being used as a baseline for comparing the others. Forecasts generated by using operations per based aircraft alone are generally unreliable. The alternative operations forecasts for CLM are presented in Exhibit 3-21. As shown the preferred forecast for general aviation activity at the airport is a hybrid of the forecast prepared as part of the WSDOT LATS Study and the Population Based Model prepared in this report.

Exhibit 3-21: Aircraft Operations Forecast

Year	LATS	TAF	Population Based	Operations Per Based Aircraft	Preferred Forecast
2007	46,100	46,100	46,100	46,100	46,100
2012	48,960	46,100	50,051	49,203	49,506
2017	51,178	46,100	53,601	52,130	52,390
2022	52,602	46,100	57,403	56,138	55,003
2027	54,246	46,100	61,475	59,296	57,861
2057	66,063	46,100	91,478	90,655	78,771



Source: URS Corp

This was selected because the LATS model was developed using a base year of 2005 and therefore tended to concentrate on historical aviation related activity indicators without giving adequate attention to the impact that the growing population will have on activity. As the population grows and economic conditions improve, aircraft ownership and usage will follow. The hybrid methodology accounts for both historical factors as well as considering likely changes in the future.

Military Operations

Between 1989 and 2006, total military operations at CLM averaged 674 annually, all of which were classified as itinerant. In forecasting future military operations levels, it has been assumed that they would remain a low percentage of total airport activity and that they would average 675 per year, all itinerant.

Operations by Aircraft Type

The forecast of future operations by aircraft type at CLM was prepared using historical information, data collected during interviews with airport users, and analysis of trends in both national and regional aviation as presented in preceding sections of this report. The forecast anticipates the continued use of the Cessna Caravan, or similar turbo-prop aircraft in providing the air carrier and air cargo service at CLM but anticipates a continued increase in the use of turbojet aircraft in the general aviation sector over the long-term. A special effort was made to analyze the current activity at the airport in order to best anticipate the future aircraft types. Since CLM, does not have an Airport Traffic Control Tower (ATCT), an alternative means of data collection was used. For this study, a three-year record of flight tracking data was obtained from FlightAware, an aviation software and data services company that is based in Houston, Texas. FlightAware provides flight tracking of private and commercial flights at airports throughout the United States. The FlightAware data used in this analysis reflects flight plans that were filed to/from CLM from September 2005 through September 2008.

This flight tracking data does not include flights that occur during visual conditions or for any flight for which flight plans weren't filed and is not a complete record of all flights at CLM during this three-year period. In the absence of ATCT records however, the data reflects the best available information on actual flight activity by transient aircraft at CLM.

The flight plan data recorded more than 18,000 aircraft arrivals and/or departures at CLM over the three year period. This averages approximately 6,000 per year, or 11% of the airport's total annual operations. FlightAware data is reputed to accurately record nearly 95 percent of flights where flight plans were filed. The other five percent are aircraft operations where the owners have requested that the flight information not be reported for privacy reasons. Therefore there is good reason to believe that the recorded numbers actually understate the number of jet aircraft using CLM. However, a variety of conclusions were drawn from this data including;

- During the survey period 567 business jet operations were recorded, equivalent to more than 189 per year. With the added 5 percent this is equivalent to 198 annual jet operations
- Business jet operations were equal to approximately 0.37 percent of total airport operations. The types of jets that used CLM during the period included a mixture of types ranging from Boeing 737 (10 per year) to small business jets such as the Lear 60 and HS 125.

Exhibit 3-22 shows the jet operations recorded at CLM during the 3-year period. It also shows an average annual operations level for each aircraft type.

Exhibit 3-22: Historical Operations by Jet Aircraft

Aircraft Type	Number of Operations	Annual Average	FAA Classification
Boeing 737 - All	29	10	CIII
Boeing 747	1	0	DIV
Cessna Citation - 500 series	258	86	BII
Cessna Citation - 600 series	41	14	BII
Cessna Citation - 700 series	22	7	BII
Canadair Challenger 300 series	2	1	CII
Canadair Challenger 600 series	21	7	CIII
Embraer ERJ 135	2	1	CIII
Eclipse 500	1	0	CII
Dassault Falcon 900	2	1	BII
Dassault Falcon 20	2	1	BII
Dassault Falcon 50	11	4	BII
Gulfstream G200	5	2	DII
Gulfstream G300	6	2	CII
Gulfstream G400	24	8	DII
Hawker Siddley 125	47	16	CI
Fairchild Dornier 328JET	2	1	CI
Lear 23	3	1	CI
Lear 24	1	0	CI
Lear 25	3	1	CI
Lear 31	13	4	DI
Lear 35	26	9	DI
Lear 40	4	1	DI
Lear 45	28	9	DI
Lear 60	12	4	CI
Other	13	4	
Total	588	196	

As can be seen from this recorded data, it can be seen that the majority of the jets using CLM were classified as BII with the Cessna Citation series being the primary user. The actual breakdown of jet activity as recorded in FlightAware is;

- Class D-IV aircraft showed an average of 0.17%. However, the operations recorded were by Boeing 747 aircraft and they never physically landed at the airport. They were engaged in instrument check flights using the ILS.
- C-III aircraft such as the Boeing 737 series did use CLM but in very small numbers. This is not expected to increase over time.
- D-II aircraft such as the Grumman Gulfstream GII and GIV used the airport regularly, as evidenced by the increased need for aircraft parking ramp to accommodate them overnight. These aircraft are likely to represent an increasing number of the jets using CLM. Since the boat building business continues to be strong in Port Angeles it can be assumed that the customer's visiting the plant to monitor progress on the construction of their vessels will continue to use high end corporate aircraft on their trips to Port Angels. The lack of direct air service to the community combined with the community's location relative to the remainder of the state makes the use of corporate aircraft the most efficient means of visiting for these individuals.
- C-II aircraft such as the Eclipse or the Gulfstream III are recorded as comprising about 1.4% of the fleet. This category is not likely to increase in any substantial manner.

As stated, the B-II aircraft were over 50 percent of all jet activity at the airport during the recorded period. Given that the types of aircraft that are classified as B-II, it seems likely that they will continue to be heavily used at CLM in the future.

The D-I category jets such as the Lear jets represented about 12% of the total jet activity while the C-I category (HS125, Dornier) registered 15% These light jets will continue to be present in the fleet but cannot be expected to grow in dominance.

Using this information, future operations were forecast by aircraft type. These forecasts have been made based on the following assumptions

- Future operations at Port Angeles will reflect the continued use of small turboprop aircraft in providing the air carrier and air cargo service but will account for a potential for an increasing use of turbojet aircraft in the general aviation fleet.
- Of the business jet aircraft recorded, 90 percent are classified as DII, CII CI, or DI aircraft. Nine percent are CII and the remaining one percent is very large jets such as the Boeing 747 or 737 operations that were recorded. It should be noted that the 747 did not land at CLM but rather made an approach using the ILS for testing purposes.
- The segment of the jet population at CLM that is in Design Group II is growing the fastest, based on the information available from FlightAware and through observational and anecdotal evidence. This is supported by the national trends in general aviation manufacturing and use.
- Turboprop and jet operations are all itinerant at CLM since training is minimal at CLM for these aircraft.
- Among non-jet aircraft using CLM it is expected that the majority of flights (93% in 2005) will continue to be by single engine aircraft. Single-engine piston aircraft are the most likely to perform local or training operations. Because of the nature of training activities, with one aircraft performing numerous touch and go procedures during their training, local operations will be approximately 80 percent of all single engine piston operations.
- Multi-engine piston aircraft are more likely to conduct itinerant operations due to their range as well as the expense of operation. For these aircraft, it is assumed that 80 percent of their operations will be itinerant with 20 percent training occurring.

The Master Plan and Airport Layout Plan prepared in 1997 designated the B-II class as the critical aircraft. At the present time the critical aircraft is B-I represented by twin engine piston aircraft such as the Cessna 400 series, the Beech Baron and King Air B100 with increasing use by the small business jets such as the Cessna Citation (B-II). This increasing use is evidenced by the information from FlightAware, that showed that close to 200 annual operations by jet aircraft in the B-II, C-I, D-I, C-II and D-II categories were recorded between 2005 and 2008. This is supported by the observed conditions at CLM during that same time frame. Airport management and the FBO have noted increasing use by heavy business jets such as the Grumman Gulfstream II, III and IV aircraft as well as the Bombardier Global Express. It is reported that 1 operation per week occurs by

these aircraft and the number requiring overnight parking on the airport's transient apron prompted the strengthening of two positions to support 60,000 pound aircraft.

For these reasons we assume that while the critical aircraft is expected to continue to be the small business aircraft such as the King Air. Over time this will transition to the B-II represented by the Cessna Citation. This transition is expected to occur prior to 2017. Over the next twenty years these jets are expected to increase operations to 3,347. During this same time period, operations performed by D-II category jets will continue to increase but these will not reach the level where they will be classified as the critical aircraft within 20 years.

Exhibit 3-23: Annual Operations by Aircraft Type

Operations By Type	Typical Aircraft	2007	2012	2017	2022	2027	2057	Aircraft Design Group	Max. Take-Off Weight (lbs)
Single Engine Piston	***Cessna 172***	***49,584***	***51,879***	***53,605***	***54,506***	***55,321***	***64,581***	***A-I***	***2,450***
- Local		39,667	41,503	42,884	43,605	44,257	51,665		
- Itinerant		9,917	10,376	10,721	10,901	11,064	12,916		
Multi-Engine Piston	***Cessna 421***	***3,216***	***3,421***	***3,534***	***3,438***	***3,470***	***4,036***	***B-I***	***3,100***
- Local		643	684	707	688	694	807		
- Itinerant		2,573	2,736	2,827	2,750	2,776	3,229		
Total Turbines		***268***	***627***	***1,497***	***3,125***	***5,238***	***13,454***		
Light Business Jet	***HS 125***	***41***	***105***	***267***	***572***	***995***	***2,583***	***C-I***	***15,100***
- Local		0	0	0	0	0	0		
- Itinerant		41	105	267	572	995	2,583		
Light Business Jet	***Learjets***	***32***	***92***	***234***	***506***	***890***	***2,032***	***D-I***	***23,500***
- Local		0	0	0	0	0	0		
- Itinerant		32	92	234	506	890	2,032		
Medium Business Jets	***Cessna Citations***	***153***	***359***	***858***	***1,788***	***3,006***	***7,938***	***B-II***	***10,700***
- Local		0	0	0	0	0	0		
- Itinerant		153	359	858	1,788	3,006	7,938		
Medium Business Jets	***Falcons***	***4***	***9***	***21***	***44***	***73***	***188***	***C-II***	***15,100***
- Local		0	0	0	0	0	0		
- Itinerant		4	9	21	44	73	188		
Medium Business Jets	***G-II, GIV***	***13***	***31***	***74***	***153***	***220***	***579***	***D-II***	***73,200***
- Local		0	0	0	0	0	0		
- Itinerant		13	31	74	153	220	579		
Other Jets	***Boeing 737***	***24***	***31***	***45***	***63***	***52***	***135***	***Misc***	***150,000***
- Local		0	0	0	0	0	0		
- Itinerant		24	31	45	63	52	135		
Rotorcraft	***Robinson R22***	***536***	***1,140***	***1,497***	***1,563***	***1,964***	***8,073***	***N/A***	***9,000/ 1,300***
- Local		0	0	0	0	0	0		
- Itinerant		536	1,140	1,497	1,563	1,964	8,073		
Total Operations		***53,604***	***57,010***	***59,894***	***62,507***	**65,469**	**89,696**		
- Local		40,310	42,187	43,591	44,292	44,951	52,472		
- Itinerant		13,054	14,293	15,111	15,320	15,930	24,541		

PEAKING

Peaking forecasts are prepared to determine the maximum hourly operations demand the runway system is expected to experience. At airports without an Air Traffic Control Tower (ATCT) actual operations statistics are not available from which to develop peaking forecasts. In these instances, average values based on observations at a wide variety of airports are used. In this regard, we have estimated peak period operations based on the following;

Peak Month: The Peak Month represents the month of the year when the greatest number of operations (either a take-off or landing) occur. For small airports the peak month is generally experienced during the summer, when VFR weather makes it most conducive to fly. A Peak Month value of 10 percent of total annual operations is used to reflect the elevated activity experience during this time (normal month equals 8 percent of the year).

Exhibit 3-24: Peaking

Year	Annual Operations	Peak Month	ADPM	Peak Hour
2007	53,604	5,360	173	26
2012	57,010	5,701	184	28
2017	59,894	5,989	193	29
2022	62,507	6,251	202	30
2027	65,469	6,547	211	32
2057	89,696	8,970	289	43

Average Day/Peak Month: The Average Day calculation divides the Peak Month operations, cited above, by 31 days to yield an average daily operations figure.

Peak Hour: The Peak Hour calculation is used to determine the maximum number of operations the runway is expected to accommodate during the busiest one hour period of the Average Day of the Peak Month. The Peak Hour forecast is 15 percent of Average Day/Peak Month operations.

INSTRUMENT OPERATIONS

An instrument operation at an airport is defined as any arrival or departure from an airport by aircraft operating in accordance with an Instrument Flight Rule (IFR) flight plan or with the provision of IFR separation from other aircraft by a terminal control facility; or any contact with the ATCT by aircraft operating under an IFR Flight plan. Instrument operations can be conducted at any time, regardless of meteorological conditions. Actual instrument approaches, however, are defined as instrument operations conducted during instrument meteorological conditions. Instrument meteorological conditions exist when the cloud ceiling is less than 1,000 feet above ground level (AGL) and/or visibility is less than three miles. Instrument approach statistics are normally compiled by an Airport Traffic Control Tower (ATCT).

At CLM there are no records for the historical number of instrument approaches at the airport. It is assumed for this forecast that all of the air carrier and air cargo operations would file flight plans as would the high end general aviation activity, including all jet traffic. The following exhibit shows the forecast for instrument operations for CLM based on these assumptions.

Exhibit 3-25: Forecasted Instrument Operations

Year	Annual Operations	Instrument Operations
2007	53,604	7,060
2012	57,010	8,314
2017	59,894	11,020
2022	62,507	14,529
2027	65,469	19,084
2057	89,969	33,881

SUMMARY OF FORECASTS

The forecasts for CLM have shown that the airport is likely to continue to grow in a manner that keeps pace with local economic and population growth as forecast by the State of Washington. Commercial service to and from Seattle will continue to be available to the residents using aircraft with fewer than 10 seats. However, if the carrier serving CLM can capture the total potential demand that exists within the service area the level of passengers and flights could increase dramatically.

Cargo activity at the airport will also continue to grow at a rate equivalent to the increases in population and economic activity (the two factors that commonly drive the need for air

freight and small packages). Aircraft that are used for transport will eventually include a mixture of Cessna Caravan aircraft and larger sized cargo craft such as the F27 or ATR 72.

Through the foreseeable future however, CLM will remain an airport where the primary activity will be performed by general aviation aircraft. The mix of aircraft will likely continue to be dominated by single-engine piston airplanes, with a gradual conversion from traditional small aircraft to the emerging Light Sport Aircraft (LSA). These will be increasingly used by the local pilots in the conduct of their business and pleasure flying.

Perhaps the fastest growing segment of the GA activity will continue to be operations by corporate aircraft. Businesses in Port Angeles and Clallam County are increasingly attracting a customer base that is able to travel by private jet and as operations related to the boat building industry show, these result is a substantial number of operations. This demonstrates why the small business jet is expected to be the critical aircraft through the period covered in this forecast.

Exhibit 3-26 shows a summary of the forecasts prepared in this document for quick review. These will be used in subsequent sections of this plan to;

1. Allow for safe operation by the critical aircraft.
2. Permit facility expansion to handle anticipated increases in demand
3. Assess the potential changes in community impacts associated with improvements at the airport, and
4. Develop a Capital Improvement Program.

Exhibit 3-26: Summary of Forecasts

	2007	2012	2017	2022	2027	2057
Commercial Operations						
Enplaned Passengers						
Annual Enplaned Passengers	15,860	16,866	17,937	19,079	20,295	29,463
Total Annual Passengers	31,720	33,732	35,875	38,158	40,590	58,926
Annual Commercial Operations	6,205	6,205	6,205	6,205	6,205	8,184
Air Cargo Activity						
Annual Enplaned Tonnage	519	659	807	967	1,165	3,035
Annual Operations	624	624	624	624	728	2,066
General Aviation Activity						
Based Aircraft	**98**	**104**	**111**	**119**	**126**	**192**
Single Engine Piston	92	94	94	95	95	115
Multi Engine Piston	6	7	9	12	15	29
Turbojet	0	2	6	8	11	38
Rotor	0	1	2	4	5	10
General Aviation Operations	**46,100**	**49,506**	**52,390**	**55,003**	**57,861**	**78,771**
Total Operations						
Air Carrier	6,205	6,205	6,205	6,205	6,205	8,184
Air Cargo	624	624	624	624	728	2,066
General Aviation	46,100	49,506	52,390	55,003	57,861	78,771
Military	675	675	675	675	675	675
Total Operations	**53,604**	**57,010**	**59,894**	**62,507**	**65,469**	**89,696**