Chapter 2: Aviation Forecasts

Overview

This chapter contains aviation demand forecasts for the Pullman Moscow Regional Airport (PUW). Aviation demand forecasts use a sophisticated analytical process to anticipate what will happen at the airport in the future. Forecasts are an important step in the master planning process. Ultimately, they form the basis for future demand-driven improvements. They also provide data from which to estimate current and future "off-airport" impacts such as noise and over-flight traffic. Aviation demand forecasts provide value to the larger community, and are often incorporated by reference into other studies and policy decisions. This chapter presents aviation demand forecasts over the 20-year planning horizon from 2010 through 2030. It is organized as follows:

The FAA's ***National Plan of Integrated Airport Systems*** (NPIAS) categorizes Pullman Moscow Regional Airport as a "Primary Non-hub Airport." The NPIAS defines a Non-hub Primary as a commercial service airport that has more than 10,000 annual enplanements. The 2011-2015 NPIAS reported that there are 244 non-hub primary airports that together account for 3% of all enplanements nationwide. The NPIAS identifies existing and proposed airports that are significant to the national air transportation system. It contains estimates of costs of airport development projects eligible for federal aid that are needed to meet aviation demand over the next five years.

Passenger enplanements are passengers boarding commercial service aircraft departing from PUW. Enplanements do not include airline crew that do not produce revenue or incur aviation related fees such as Passenger Facility Charges (PFCs). The terms "boardings" and "enplanements are used interchangeably in this chapter.

2.1 Airline Passenger Forecasts
2.2 Airline Operations
2.3 Based Aircraft Forecasts
2.4 Non-Scheduled Forecasts
2.5 Summary and TAF Comparison

2.1 Airline Passenger Forecasts

The airline passenger forecast describes the expectations for future scheduled commercial passenger airline service at PUW. The airline passenger forecast is particularly important to this master plan because significant emphasis is placed on meeting FAA airport design standards required by the Bombardier Q400 airplane operated by Horizon Air. Additionally, there is a direct connection between commercial passenger service and federal funding. In 2010, the airport received $1 million per year through FAA annual entitlements as well as a per passenger facility charge currently set at $4.50 per enplaned passenger. This section considers historic trends, previous studies, and an indpendent analysis in formulating the airline passenger service forecast recommendations.

Table 2-1: Travel Frequency

Year	Boardings
1990	35,320
1991	30,680
1992	32,960
1993	31,987
1994	36,851
1995	36,622
1996	37,687
1997	34,283
1998	28,524
1999	34,858
2000	33,221
2001	28,291
2002	27,794
2003	24,596
2004	20,980
2005	22,874
2006	23,838
2007	24,856
2008	32,108
2009	32,443

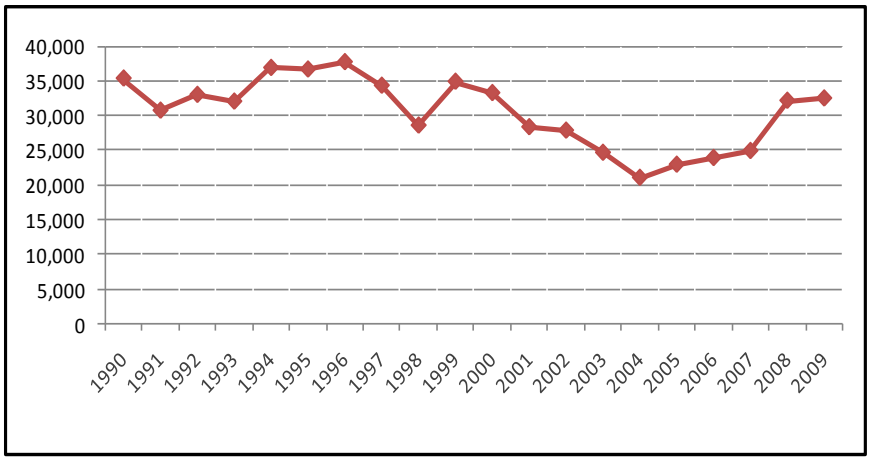
Source: 1990-1999: Prior master plans; 2000-2009 Air Carrier Activity Information System

Historical Perspective

As shown in **Table 2-1** and **Exhibit 2-1**, PUW averaged just over 30,500 annual enplanements between 1990 and 2009. Passenger volume has remained consistent in the first 10 years, and then enplanements declined between 1999 and 2004. Since 2004, PUW has experienced a period of sustained recovery. Horizon Air was the sole provider of scheduled airline service at PUW between 1990 and 2009. Beginning in 2010, Horizon Air combines passengers at PUW with those of Lewiston for its flights to Seattle and Boise.

The increase in passenger boardings since 2007 runs counter to the national trend. Nationally, enplanement numbers have declined since the U.S. economy entered a recession in 2008. During this same period, many regional airports experienced a reductions or elimination of scheduled commercial passenger airline service as air carriers reduced their available seat capacity. Enplanement growth at PUW was aided when Horizon Air transitioned from the 37-seat Q-200 to the 76-seat Q-400 without reducing flight frequency.

Exhibit 2-1: PUW Annual Enplanements from 1990–2009



Previous Studies

Several previous studies have assessed passenger boardings at PUW. This section summarizes those studies and the context in which they were conducted. The results are consolidated in **Table 2-2** below for comparison.

Table 2-2: Previous Forecast Summary

Calendar Year	TAF[1]	FAA AF[2]	LATS[3]	IASP[4]	AMP P1 (2007)[5]
2009 (actual)	33,516	33,516	33,516	33,516	33,516
2015	37,103	38,868	29,100	28,437[5]	36,214
2020	41,095	43,976	32,000	30,933[5]	45,346
2030	50,471	52,932	37,800	36,601[6]	71,274[6]

1. Terminal Area Forecast – Federal Aviation Administration, 2009). TAF values apply federal fiscal year.
2. Aerospace Forecast – Federal Aviation Administration, 2010-2030
3. Washington Aviation System Plan, Long-Term Air Transportation Study (Washington Department of Transportation, July 2009)
4. Idaho Airport System Plan, Individual Airport Summary – Pullman-Moscow Regional Airport (Idaho Transportation Department, Division of Aeronautics, 2009)
5. Pullman-Moscow Regional Airport, Master Plan Phase 1 – Airspace (Mead & Hunt, Inc, July 2007)
6. Projection interpolated between published forecast intervals.
7. Projection extrapolated beyond published forecast period using the end-period growth rates.

- **Terminal Area Forecast (TAF) 2009–2030 (FAA, December 2009)** – The TAF is the FAA's official forecast for airports included in the National Plan of Integrated Airport Systems—NPIAS. The TAF is used primarily to support federal budgeting and planning needs. The FAA uses the TAF as a benchmark for comparing and approving master plans and other forecasts for individual airports. The TAF projects that PUW's annual enplanements will reach 50,471 by 2030. The TAF assumes a compounded annualized growth rate (CAGR) of 2.05% through 2015, followed by a progressively increasing CARG of 2.05% to 2.08% between 2015 to 2020.

- **Aerospace Forecasts FY 2010–2030 (FAA, March 2010)** – The FAA Aerospace Forecast is a macro forecast for aviation activity in the US. It provides details about growth within the individual aviation segments as opposed to specific airport activity. The Aerospace Forecast projects that regional seats per mile will increase from 55 (2009) to 65 (2030) with a corresponding increase in average trip length

from 457 miles to 588 miles. This means that regional carriers will continue the transition to larger airplanes flying longer segments. The forecast makes note of significant growth in the 70 to 90 seat airplane group, and corresponding retirement of 50-seat regional jets. It also notes an anticipated decline in service between city pairs that are less than 750 miles apart. Air travel on the whole is expected to recover over 2009 and 2010 with a return to profitability driven by a return in corporate travelers and ability to raise fares. Nationwide, enplanements are projected to increase 0.4% in 2010 and 2.6% thereafter.

- **Long-Term Air Transportation Study (LATS) (Washington Department of Transportation, July 2009)** The LATS study also uses a 2030 planning year horizon. It projects Washington passenger enplanements will increase at a 2.5% CAGR while airline operations will increase at a 2.1% CAGR. It notes that Seattle and Spokane account for 96% of Washington's total enplanements. This ratio is expected to remain through the study period, leaving small communities at risk of losing scheduled commercial passenger airline service. It also notes that the peak passenger demand at PUW may reach 93% of its terminal capacity within the forecast horizon. The threshold to begin planning work is 60% of capacity so PUW's passenger terminal may need to be evaluated for expansion. PUW's enplanements are projected to increase to 37,800 by 2030. The LATS report projected 26,200 enplanements at PUW in 2010. PUW's 2010 enplanements are anticipated to exceed those experienced in 2009 (32,443). The analysis used in the study was completed in 2005, before Horizon Air converted to the larger Q400 aircraft.

- **Idaho Airport System Plan (Idaho Transportation Department, 2008)** – Idaho's plan includes an individual airport summary report for PUW since Idaho entities participate in the airport's operation. The plan projects an increase in PUW enplanements of 1.70% per year during the planning horizon. The report uses a 2007 base year volume of 24,856 enplanements and projects 34,800 enplanements by 2027.

- **Airport Master Plan, Phase 1 – *Airspace Feasibility* (Mead & Hunt, 2007)** – The majority of the forecasting effort for this document was completed ahead of the U.S. recession in 2005 and 2006. The report projected that the planned conversion to larger aircraft would help stimulate local travel demand. It also included better all-weather approaches that had several positive impacts. It removed constraints and was expected to recapture leaked passengers and prompt the addition of new service. To model these changes, the Phase 1 report applied a 3.06% CAGR between 2005 and 2010 followed by a more aggressive 4.62% CAGR associated with improved facilities. The Phase 1 forecast projected 28,897 enplanements in 2010 and 56,874 enplanements by 2025.

Independent Analysis

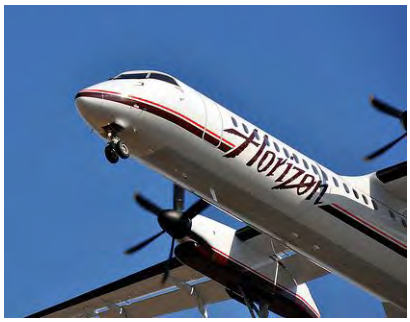
The independent analysis was conducted specifically for this master plan, and used a variety of models to estimate future passenger enplanements at PUW. The analysis first considered the primary influences and evaluated various regression and share models. It then assessed the specific airline market dynamics in place and defined several scenarios before making a final recommendation.

Primary Demand Influences

Many factors influence passenger travel demand and the level of interest by airlines for serving that demand. Most are beyond the control of the individual airport operator including the overall airline strategy, economic cycles, and community composition. Nonetheless, they do impact demand at the airport and are part of the calculation process. This plan identifies the following primary demand influences for PUW.

- **Proximity to Spokane and Lewiston** — PUW-area travelers have a great deal of choice in selecting an airport. Spokane is 75 miles north and Lewiston is 35 miles south. Spokane has a greater choice of airlines, flight frequency, and destinations. However, it's less convenient for travelers who travel to Seattle or Boise or for those using the Alaska Air network due to driving distance to access Spokane. Lewiston offers a Delta hub-connection at the Salt Lake City.
- **Proximity to Population and Employment Centers** — Although PUW is located between competing airports, PUW's location is central to the Pullman-Moscow population and its employment centers, making it the most convenient airport for passengers in these communities. The area's ability to attract new business and residents is well-documented and is expected to improve over the 20-year forecast horizon.
- **Social and Economic characteristics** — The population around PUW includes a highly transient university population, and has a median age lower than the U.S. average. The area's economy is concentrated in growing industries including technology and medical services. These social characteristics likely contribute to the higher propensity of the area's population to travel. This directly influences passenger choice between PUW and Lewiston with PUW having a clear advantage for both travelers and airlines alike.
- **PUW's Airport Infrastructure** — Reliability is another consideration often cited by the local population for choosing an airport. During the winter months when weather-related cancellations and delays are higher at PUW, demand shifts to other airports. An airline market analysis revealed that many passengers opt to travel on the Horizon/Alaska network from Spokane or Lewiston where travel costs and routings are similar. PUW will likely retain a large portion of this leaked travel segment over time as infrastructure and technology improvements make air service more reliable.

- **Increasing Fleet Size** — The size of the airplanes serving regional airports has been increasing since 2001. Flight segment lengths have also increased. The emerging business model across the industry aims to improve the profit margin by transporting more passengers over longer distances. The move by Horizon to the Q400 aircraft is a reflection of an industry wide shift to larger aircraft. The change to the Q400 is an indicator that service will increase at PUW over time.



Alaska/Horizon Air Q400

Competing Airline Strategies — The corporate structure of Horizon Airlines, its relationship to Alaska Airlines and competition between airlines all impact demand forecasts. Horizon's route choices and marketing will be made by Alaska Air beginning in 2011. Alaska's influence over Horizon is expected to increase over time, and could lead to the elimination of the Horizon brand name. If that happens, the linked service between Pullman and Lewiston will receive a critical review for operability and profitability. This scenario could mean reduced service for each airport, withdrawal from one airport or potentially a withdrawal from both airports. If withdrawal is considered from one airport, PUW may have an advantage. Alaska/Horizon might consider PUW's accessibility as a natural barrier to entry for small jet operators. This is especially true if the new entrant carriers at Lewiston draw significant passenger volume from its network. Alternatively, PUW's facilities could be perceived as less advantageous than Lewiston's if Alaska/Horizon has concerns about service reliability. Finally, in the current consolidated environment, a merger between Alaska and another large carrier seems likely during the 20-year forecast period of this plan.

Regression Models

Regression modeling, including time trend extrapolation, involves comparing one or more independent variables with a dependent variable. Here, the model was used to establish a correlation between independent variables including population, employment and income with the dependent variable of passenger enplanements. Forecasts of passenger enplanements can then be projected as a factor of the independent variables. The key to regression modeling is identifying a reasonably reliable degree of historic correlation between the independent and dependent variables. At PUW, like other single-airline or low volume airports, the correlation between passenger boardings and the standard independent variables was poor. The highest correlation was found with increases and decreases in flight frequency. Here, minor changes have significant results on reporting activity within any given reporting period. As a result, regression models have not been carried forward for further consideration.

Share Analysis

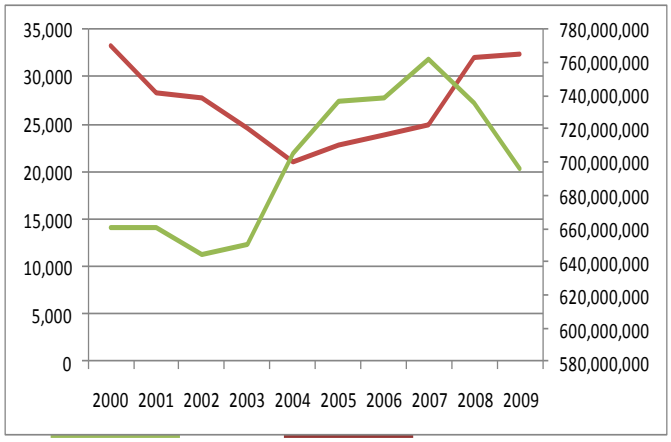
This macro-forecasting technique involves assessing PUW's specific activity as a function of a larger market share. The 1999 Master Plan correlated PUW's boardings with those of the Seattle-Tacoma International Airport (Sea-Tac). As with the regression models and those of the prior master plan, no trend can be shown to exist (**Exhibit 2-1**). The same conclusion can be drawn when comparing PUW's enplanements with enplanements for the state of Washington and national enplanements for the U.S. (**Table 2-3** below).

Table 2-3: Historic Passenger Enplanements

CY	Airport Boardings			
	PUW	SEA-TAC	WA State	Total US
2000	33,221	13,853,299		660,222,828
2001	28,291	13,978,247	15,155,648	660,222,828
2002	27,794	12,752,655	14,819,257	643,776,534
2003	24,569	12,974,543	14,980,580	650,808,785
2004	20,980	13,910,447	16,124,519	705,306,663
2005	22,874	14,253,934	16,501,336	736,162,135
2006	23,838	14,603,413	16,956,698	738,364,097
2007	24,856	15,117,907	17,903,549	762,282,686
2008	32,108	15,963,252	18,360,850	735,296,907
2009	32,443	14,911,310	17,680,430	695,908,763

Source: Air Carrier Activity Information System (ACAIS) database
US PUW

Exhibit 2-2: Annual Enplanements (PUW vs. total US)



Market Assessment

Mead & Hunt conducted an airline market assessment in 2006 and again in 2010. Those reports provide detailed insight as to what is occurring within PUW's potential passenger pool (see **Appendix C,** *Market Outlook and Airline Assessment).* **Exhibit 2-3** depicts PUW's catchment area—the geographic area it serves. The catchment area is based on drive-time to PUW and competing airports. It is bordered to the south by Lewiston and to the north by Spokane. It is comprised of 30 zip codes and has a population of approximately 78,000 (2009). Passengers within the catchment area should utilize PUW. Passengers opting to use another airport are described as being "leaked" or "diverted". **Exhibit 2-4** shows the catchment areas current airport use, whereby PUW retains 26% of the aggregate demand. Just over half (52%) opt to use Spokane International Airport (GEG).

Exhibit 2-3: PUW Catchment Area

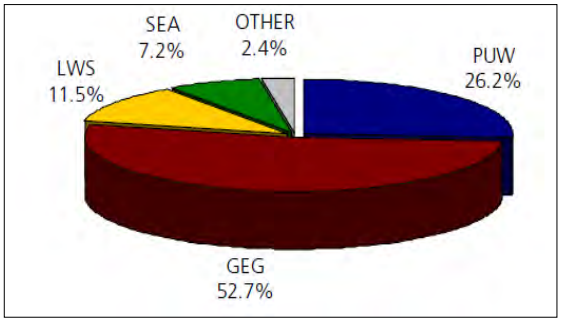


Exhibit 2-4: Current Use in Catchment Area

Table 2-4: Airport Use – Domestic and International Comparison				
Rank	Originating Airport	Passengers	2009 %	2006 %
Domestic				
1	Spokane, WA	117,431	53	55
2	Pullman-Moscow, WA	59,020	27	27
3	Lewiston, WA	27,030	12	12
4	Seattle, WA	12,892	6	5
5	Other	4,840	2	1
Subtotal		**221,213**	**100**	**100**
International				
1	Spokane, WA	17,395	50	50
2	Pullman-Moscow, WA	7,912	23	23
3	Seattle, WA	5,611	16	21
4	Lewiston, WA	2,357	7	5
5	Other	1,234	4	1
Subtotal		**34,509**	**100**	**100**
Domestic and International				
1	Spokane, WA	134,826	53	55
2	Pullman-Moscow, WA	66,932	26	27
3	Lewiston, WA	29,387	12	12
4	Seattle, WA	18,503	7	6
5	Other	6,074	2	1
Total		**255,722**	**100**	**100**

Other airports include PDX, BOI, PSC, YKM, EAT, ALW

Table 2-4 details passengers by domestic and international itineraries. 27% of domestic and 23% of international travelers used PUW. Retention has changed little since the previous analysis conducted in 2006.

The market assessment provides a basis for estimating the area's passenger travel market in terms of both its population and their propensity to use air transportation. It identifies the most popular destinations and routes. Forecasts for the catchment area can be assessed as a function of population that cannot be reliably predicted for PUW alone. Catchment area forecasts using this model assume that the propensity to travel measured in terms of trips generated per person, remains constant, and that the catchment area's population grows 0.93% annually. PUW-specific forecasts can then be estimated as a percent of the retained catchment area passenger demand. Airport developments which improve reliability may enhance retention over time, which further improves with additional airline service. **Table 2-5** summarizes projected catchment area enplanements and PUW-specific enplanements for current retention (26%) and recaptures 5% and 10% of catchment area enplanements, respectively.

Table 2-5: Market-based Enplanement Forecasts					
Forecast Year[1]	Catchment Population[2]	Catchment Enplanements[3]	PUW 26% Capture	PUW 31% Capture	PUW 36% Capture
2010	78,725	129,050	32,745[4]	40,006	46,458
2015	82,455	135,164	35,143	41,901	48,659
2020	86,361	141,567	36,807	43,866	50,964
2025	90,452	148,273	38,851	45,965	53,378
2030	94,737	155,297	40,377	48,142	55,907

1. Calendar Year
2. Constant 1.64 PUW enplanements per person based on CY 2009.
3. Applies a capture of 25.37% reflective of CY 2009 retainage based on 32,443 PUW enplanements and 78,000 catchment area population.

Source: Woods & Poole Economics

Forecasting Scenarios

Based on the information available, the following three scenarios are considered as 20-year possibilities that airport management should consider in planning contingencies moving forward.

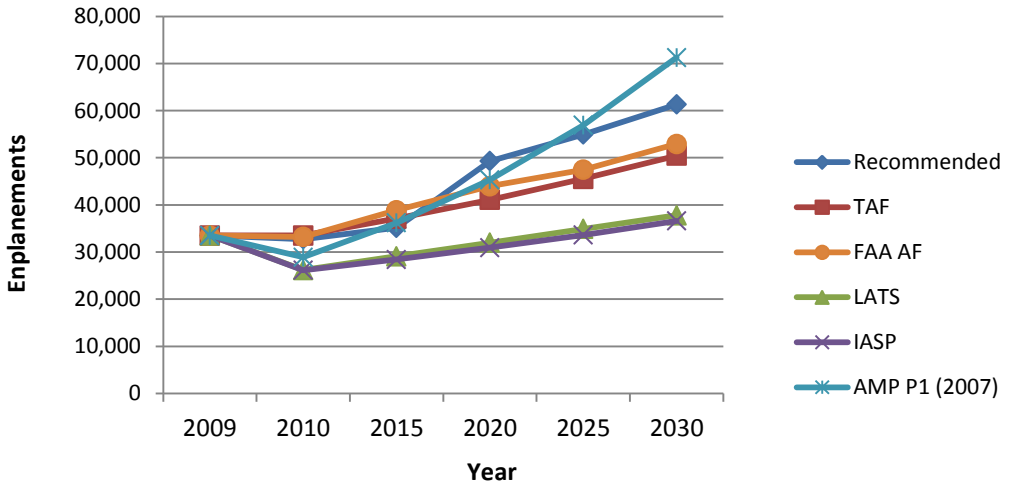
- **Airline Scenario 1, *Status Quo*—** This scenario assumes that catchment area passengers will increase over time as a function of population growth and that PUW's share of passengers will remain 26% over the forecast horizon.
- **Airline Scenario 2, *5% Market Recapture*—**PUW is able to recapture 5% of its leaked market share by making airport improvements that improve reliability and the associated passenger perceptions.
- **Airline Scenario 3, *10% Market Recapture*—**PUW recaptures 10% of its leaked market share. In this case, airline operators recognize improved reliability and stimulate additional growth through a combination of schedule and frequency improvements, marketing, and service to additional markets.

Additional scenarios are also recognized that include market share recapture greater than 10% as well as the potential for reduced, disrupted, and discontinued airline service. Recapture above 10% may be possible with successful airline experimentation. Recapture above 10% can also occur during a forecast scenario of greater than 20 years as the service continues to build off its own success. Discontinuation is also a possibility given the dependence of PUW on a single regional carrier operating a single airplane-type.

Recommended Passenger Enplanement Forecast

This master plan recommends the selection of a hybrid of the three market-based scenarios described above where Scenario 1 is applied to the short term before airfield improvements and Scenario 2 is applied immediately following those improvements. **Exhibit 2-5** identifies the master plan preferred forecasts in comparison with others discussed in this section.

Exhibit 2-5: Enplanement Forecast Comparison



Year	Recommended	TAF	FAA AF	LATS	IASP	AMP P1 (2007)
2009	33,516	33,516	33,516	33,516	33,516	33,516
2010	32,745	33,516	33,214	26,200	26,138	28,897
2015	35,143	37,103	38,868	29,100	28,437	36,214
2020	49,286*	41,095	43,976	32,000	30,933	45,346
2025	54,933*	45,536	47,475	34,900	33,608	56,888
2030	61,307*	50,471	33,516	37,800	36,601	71,274

**Assumes new runway available by 2016*

1. *Terminal Area Forecast – (Federal Aviation Administration, 2009). TAF values apply federal fiscal year.*
2. *Aerospace Forecast – Federal Aviation Administration, 2010-2030*
3. *Washington Aviation System Plan, Long-Term Air Transportation Study (Washington Department of Transportation, July 2009)*
4. *Idaho Airport System Plan, Individual Airport Summary – Pullman-Moscow Regional Airport (Idaho Transportation Department, Division of Aeronautics, 2009)*
5. *Pullman-Moscow Regional Airport, Master Plan Phase 1 – Airspace (Mead & Hunt, Inc, July 2007)*
6. *Projection interpolated between published forecast intervals.*
7. *Projection extrapolated beyond published forecast period using the end-period growth rates.*

2.2 Airline Operations

Airline operations are normally projected as a function of average seat capacity and average load factor--the percentage of seats that are filled. Since PUW has a single airline operating a single airplane-type, the calculation was relatively straightforward using the recommended enplanement forecasts of **Exhibit 2-5**. It is anticipated that aircraft seating capacity will remain constant. It is anticipated that the airline will continue to operate out of PUW to the Seattle and Boise markets as a tag service with Lewiston. No new carriers are expected at PUW during this period.

Load Factor Analysis

Load factor (LF) is a measure of how much an airline's carrying capacity is used. Load factor is measured in terms of passenger miles flown as a percentage of seats available. Currently, PUW conducts five daily "turns", or arrival/departure cycles, on its airline apron. The current schedule includes three daily arrivals from Seattle, two daily departures to Seattle, a one-stop [Lewiston] departure to Boise, a one-stop [Lewiston] departure to Seattle, and a one-stop [Lewiston] arrival from Boise. One of the Seattle arrivals deplanes at PUW and continues to Lewiston (LWS), but does not board any outbound passengers from PUW. Because all of the Horizon flights operating at PUW are combined with passengers going to or from LWS, some assumptions must be made with respect to the combined PUW-LWS service. In particular, LWS's contribution to average load factor over time must be assigned a value. The following two scenarios were considered in this regard:

- **LF Analysis Scenario 1, *Combined PUW-LWS Service*** – This scenario assumes that Horizon will continue to operate its PUW-LWS service as a single, combined market. The main benefit in doing this is to retain service to a market that may not be viable if decoupled. In this scenario, it is anticipated that LWS passengers would account for 42.66% of the combined enplanements based on PUW's current 26% retention of its market share. PUW's recapture of up to 10% of its diverted market would result in a decrease of LWS's proportionate share to 35% by 2030. The existing flight schedule could accommodate the combined demand through 2020, after which, an additional "turn" (2 daily operations) would be required. When combined with the daily departures to LWS that do not load passengers, a total of 4,380 operations at PUW would be necessary to support Scenario 1.

- **LF Analysis Scenario 2, *Alaska Consolidation to PUW*** – This scenario assumes that Horizon will proceed with its efforts to eliminate the combined service, choosing to consolidate its operation at PUW after 2010 and before 2015. The analysis assumes that half of the LWS passengers will commute to PUW, and the other half will elect to use another airport, airline, or transportation mode. Although enplanements at PUW would increase considerably, the combined reduction in total

passengers would likely result in a reduction in aircraft operations in the short term. The four daily flights between the two airports would also be eliminated. In this scenario, total air carrier operations at PUW are estimated to be about 1,000 fewer than Scenario 1 by year 2030.

Table 2-6: Load Factor Analysis Scenarios

Load Factor (LF) Analysis Scenario 1, Combined PUW-LWS Service

Year	Enplanements			Average Annual Seats			Load Factor	Operations		
	PUW	LWS*	Combined	2 daily departures	3 daily departures	4 daily departures		Boarding Ops	Non-boarding Ops	Total Ops
2010	32,745	24,358	57,103		83,220		68.62%	2,190	1,460	3,650
2015	35,143	26,142	61,274		83,220		73.64%	2,190	1,460	3,650
2020	43,886	27,380	71,266		83,220		85.64%	2,190	1,460	3,650
2025	49,533	28,677	78,210			110,960	70.49%	2,920	1,460	4,380
2030	55,907	30,036	85,943			110,960	77.45%	2,920	1,460	4,380

* LWS boardings account for 42.66% of combined PUW-LWS boardings based on 26% PUW catchment area capture of Table 2-4 through forecast pe
Non-boarding operations consist of 2 daily departures to LWS that do not load passengers at PUW times 2 (to include landings in the operations va
Flights require a minimum load factor of 65% for departures.

Load Factor (LF) Analysis Scenario 2, Alaska Service Consolidates at PUW

Year	PUW	LWS*	Combined	2 daily departures	3 daily depar-tures	4 daily departures	Load Factor	Boarding Ops	Non-boarding Ops	Total Ops
2010	32,745	24,358	57,103		83,220		68.62%	2,190	1,460	3,650
2015	48,214	0	48,214	55,480			86.90%	1,460	0	1,460
2020	57,576	0	57,576		83,220		69.19%	2,190	0	2,190
2025	63,872	0	63,872		83,220		76.75%	2,190	0	2,190
2030	70,925	0	70,925			110,960	63.92%	2,920	0	2,920

* LWS boardings account for 29% of combined PUW-LWS boardings based on 26% PUW catchment area capture of Table 2-3 through 2010 prior to consolidation at PUW. 50% of LWS's Alaska network passengers will board at PUW following Alaska station consolidation; the rest will either board at another airport or use another airline network. PUW's passenger values increase. PUW non-boarding operations are discontinued after 2010 following Alaska station consolidation. Flights require a minimum load factor of 65% for departures.

Air Carrier Operations Summary and Recommendations

This master plan projects that air carrier operations will increase from 4,000 operations in 2010 to 4,380 operations by 2030 (**Table 2-7** adjacent) over the 20-year horizon. The projection is based on the load factor analysis of the previous section and the need to apply conservative planning principals forming an adequate response to growth. For comparison, the FAA TAF is a straight-line 4,000 operations over the same period.

Table 2-7: Air Carrier Operations Forecast

Year	Air Carrier Operations
2010	4,000
2015	4,092
2020	4,186
2025	4,282
2030	4,380

2.3 Based Aircraft Forecasts

The FAA defines based aircraft as those that are "operational and air worthy" and typically based at the facility for a majority of the year. Projections of based aircraft are used primarily to plan hangar and apron development, as well as other landside facilities such as vehicle parking. They also provide a means for estimating the number of operations being conducted by based aircraft. This section will review PUW's current and past volume of based aircraft, the various factors that influence demand for based aircraft and previously published forecasts of based aircraft at PUW. Based on these factors, a recommended forecast for based aircraft will be presented for use in this plan along with the rationale behind it.

Historical Perspective

The number of aircraft based at PUW has changed only modestly over the last 20 years. Data from the 1999 Master Plan, the LATS Study, and other sources show slightly different numbers for any given year, but all fall into the same general range as indicated by the TAF. Single-engine aircraft dominate the based aircraft fleet mix. Since 1997, the airport has added three singles engine, two turbo-props, and three jets. **Table 2-8** summarizes the historic based aircraft record by aircraft category.

Table 2-8: Historic Based Aircraft by Category

Year	Single Engine	Multi Engine	Turbo Prop	Turbo Jet	Helicopter	Total
1997	53	7	0	0	0	60
1998	55	6	3	0	1	65
1999	55	6	3	0	1	65
2000	55	6	3	0	1	65
2001	55	6	3	0	1	65
2002	55	7	1	1	0	64
2003	55	7	1	1	0	64
2004	56	7	1	1	0	65
2005	56	7	2	3	0	68
2006	58	7	2	3	0	70
2007	59	7	2	3	0	71
2008	58	7	2	3	0	70
2009	57	7	2	3	0	69

Sources: PUW, WSASP Database 2010 Airport Facilities Report, 1999 Pullman-Moscow Regional Airport Master Plan Update.

Demand Influences

Demand, or the desire to base an airplane at an airport, is normally assessed in terms of "natural" or "unconstrained" demand. That differentiation is important because PUW's space available for aircraft

storage is fully occupied with limited opportunity for expansion beyond one or two airplanes. Although the airport is near capacity, this master plan asserts that the limitation is only now fully realized and that the existing composition of based aircraft is, in fact, a realistic reflection of "unconstrained" demand. The ability to accommodate additional airplanes is non-existent until some development constraints are resolved and new airplane storage capacity is added.

Outside of capacity, the primary influences on demand are differentiated by the aviation segment and can be summarized as follows:

- **Facilities and Services Available**— Factors such as runway length, instrument approaches, lighting, and weather aids directly influence the type of activity that can be reasonably accommodated. The airfield factors are key for business and corporate operators in particular given their more demanding operational needs. Maintenance services, fuel, and availability of Airport Rescue and Firefighting (ARFF) are also attractive to many airplane owners. The facilities and services available at PUW capture a majority of airplane owners in the vicinity.

- **Proximity to Other Airports**— Airports compete with each other if the driving time between them is 30 to 60 minutes and either airport meets that owner's basic requirements. In this case, airplane owners make a value decision where the total cost is usually a primary consideration. Large business operators may evaluate and compare PUW with LWS for example, while smaller airplane owners may also consider Port of Whitman (S94), located 22 miles northwest of PUW.

- **Economic Makeup of Locality**— Based aircraft projections are calculated through a combination of the demand from business and personal use. A business looking to establish a presence in the Pullman-Moscow region may assess the aviation access requirements in addition to other business needs in the community such as available labor and proximity to related businesses. The area has been acknowledged by both government and trade organizations as a top location to live, work, and establish a business. In terms of private airplane owners, projections for based aircraft are a function of the size of the population and the prevalence for aircraft ownership. PUW will have more based aircraft than competing airports given its proximity to the region's population, business, economic, and education centers.

- **Regulation and Cost**— Regulatory changes often drive the cost for owning and operating aircraft. For example, airplane certification and inspection is highly regulated for purposes of enhancing safety. Should these requirements increase, they may translate into higher costs for aircraft parts and maintenance. Regulatory changes within the past decade have increased the cost of ownership and made fractional aircraft ownership a reality. This trend is accelerating the growth of business jets, charter services, and potentially a new generation of very light jets (VLJs). Most recently, many

states have enacted new taxes on aviation users for registration, fuel, parts, and services. Higher regulatory costs tend to disproportionately impact operators of small airplanes in terms of long-term trends in the national fleet mix.

- **National Trends**—Long-term trends will be reflected in future volume and mix of aircraft across all airports. The most significant trends include:
  - Consistent long-term growth of business and corporate jet airplanes
  - Continued rapid expansion of the helicopter fleet
  - Continued decline in light piston airplanes with some potential for recovery in the long term; and
  - The anticipated emergence and growth of unmanned aerial vehicles (UAVs) into civil applications

Attrition of Older Aircraft—PUW's current based aircraft fleet is comprised primarily of single-engine piston aircraft. Most of these aircraft are more than 35 years old. On a national scale, they are retiring at a much faster rate than their newer generation replacements. PUW should anticipate an evolving fleet mix in favor of larger turbine airplanes over the planning period. Although the mix will most certainly evolve this way, light piston airplanes will continue to dominate the based fleet mix through planning year 2030 and beyond.

Review of Published Forecasts

Based aircraft projections for PUW range from 78 to 105 as summarized in **Table 2-9**.

Table 2-9: Currently Published PUW Forecasts of Based Aircraft

Year	TAF[1]	LATS[2]	IASP[3]	AMP-P1[4]
2010	72	69[5]	69[5]	74
2015	74	77[6]	72[6]	81
2020	76	85[6]	75[6]	88
2025	78	95[6]	79[6]	96
2030	78	105	82[7]	104[7]

1. *Terminal Area Forecast (FAA, 2009). TAF values apply federal fiscal year.*
2. *Exhibit ES-17, Washington Aviation System Plan, Long-Term Air Transportation Study (Washington Department of Transportation, July 2009)*
3. *Idaho Airport System Plan, Individual Airport Summary - Pullman-Moscow Regional Airport (Idaho Transportation Department, Division of Aeronautics, 2008)*
4. *Pullman-Moscow Regional Airport, Master Plan Phase 1 – Airspace (Mead & Hunt, Inc, July 2007)*
5. *Number of based aircraft as of September 2010.*
6. *Value interpreted between reported values using percent growth method.*
7. *Value extrapolated beyond reported value using percent growth method.*

Independent Analysis and Forecast Recommendation

Forecasts using time-trend analysis, population growth models, national based aircraft fleet growth, and national fleet mix trends were also prepared and are summarized in **Table 2-10**.

Table 2-10: Forecasts using other Methodology

Year	Time Trend[1]	Population Growth[2]	National GA Inventory Growth[3]	National Growth by A/C Class[4]
2010	70	69	69	69
2015	73	72	72	70
2020	77	76	75	71
2025	81	79	79	73
2030	85	83	83	77

1. *Time trend for total based aircraft based on data contained in Table 2-6.*
2. *Population Growth assumes constant number of based aircraft per person, applying an annualized growth rate of 0.93%.*
3. *National GA Inventory Growth applies the national growth rate of 0.9% for the entire U.S. Fleet (FAA Aerospace Forecasts FY 2010-2030).*
4. *National Growth by Aircraft Class applies the national growth rate applied to turbo-jets, turbo-props, helicopters (assuming one based helicopter by 2015), and piston airplanes (FAA Aerospace Forecasts FY 2010-2030).*

The forecast range for based aircraft is between 77 and 85 if the Phase 1 and LATS projections are removed. This is a fairly narrow margin with a difference of only 10%. It is noted that the Phase 1 forecast was entirely centered on turbo-props and turbo-jets with only a cursory review of the single and multi-engine piston fleet. It is also likely that Washington State's LATS system plan copied the Phase 1 recommendation and extrapolated the forecast to fit that's study's planning horizon. Given the narrow range of the remaining projections, this master plan recommends the most aggressive forecast, the time-trend analysis (85 based aircraft by 2030), to ensure conservative planning principals are applied during the facility requirements stage of the plan. Aircraft mix will likely play the most significant role in that effort.

Based Aircraft Mix

The determination of based aircraft mix analyzed and compared PUW's current mix with the US GA fleet and then allocated this ratio based on the total 2030 forecast from the previous section. **Exhibit 2-6** includes the based aircraft mix for PUW in comparison with the entire US general aviation fleet. Note that the projection is for growth in all of the airplane categories that use PUW. Growth in piston aircraft favors single engine piston as an anticipated result of the new LSA classification while multi-engine piston airplanes are projected to remain constant through the 20-year forecast period **Table 2-11**.

Exhibit 2-6: Fleet Mix Forecast

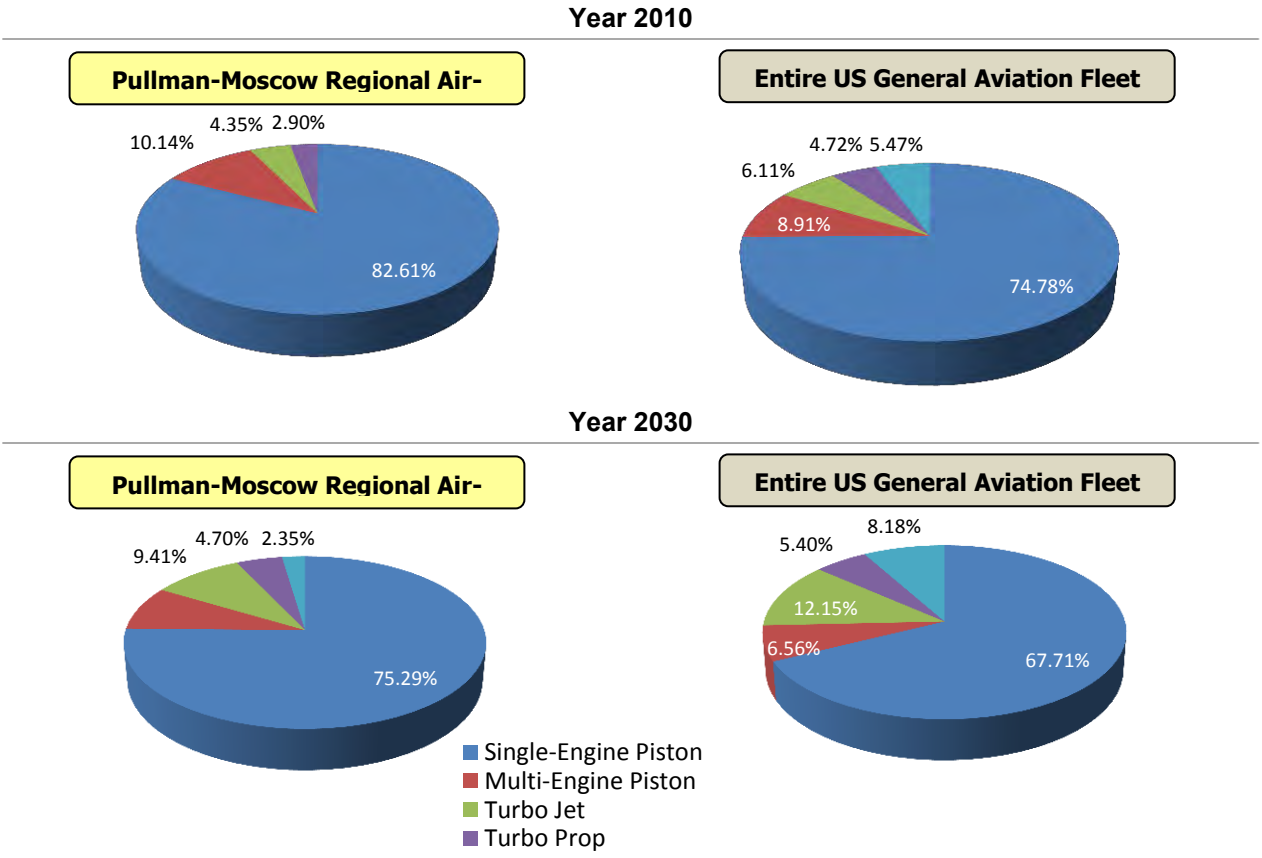


Table 2-11: PUW Fleet Mix

Year	SEP[1]	MEP[2]	TJ[3]	TP[4]	HC[5]	TOTAL
2010	57	7	3	2	0	69
2015	59	7	4	2	1	73
2020	60	7	5	3	2	77
2025	62	7	6	3	2	80
2030	64	7	8	4	2	85

1. *Single-engine piston airplane accounts for all light airplanes and light sport aircraft (LSA).*
2. *Multi-engine piston*
3. *Turbo-jet airplanes*
4. *Turbo-prop airplanes*
5. *Helicopter/rotorcraft both turbine and piston engine*

2.4 Forecasts of Non-Scheduled Operations

Non-scheduled operations are all aviation operations other than scheduled air service. This classification forms the majority of operations at PUW and includes air charters, air taxis, general aviation and military operations. Unlike the air carrier operations, which can be projected with a reasonable degree of probability, non-scheduled operations fluctuate.

Part 121 Air Charter

Part 121 Air Charter operations are a distinct segment of PUW's operational profile because of the size of the aircraft that are involved, and the demands these larger aircraft have on airport facilities. The charter flights are usually tied directly to sporting events at the two universities: Washington State University (WSU) and the University of Idaho (UI). The charter flights transport the two universities and their opponents to sporting events. Home games also tend to draw large private airplanes and air taxi operations to the airport. This results in apron congestion and a high volume of pedestrian traffic from loading and unloading aircraft.

Both area schools, and many of the inbound schools, bid and renew charter contracts every one to three years and air carrier operators typically fulfill these contracts. This results in the use of aircraft such as the Bombardier Q400, Airbus 319, Boeing 737, and in some instances Boeing 757 and 767 aircraft. Both the WSU and UI charter contracts specify PUW's use. Alternative airports such as Lewiston (LWS) or Spokane (GEG) are used as needed due to limited ramp space, inclement weather or high temperatures, and the climb limitations imposed by PUW's surrounding topography.

In 2008 there were 62 annual operations and 2009 there were 42 annual operations (31 and 21 departures respectively) by large turbo-jet aircraft at PUW for sport-related charter flights. Estimated 140-150 annual operations used alternate airports. This master plan will assume a constant number of sporting events and charter flights over the planning horizon. It also anticipates that airport improvements will be completed by 2016 and will assist greatly in recapturing nearly all of the intended PUW charter activity. It is anticipated that the aircraft mix will remain evenly split between Large Turbo-Prop or Regional Jets and Large Turbo-Jet aircraft, with 757 and 767 sized aircraft continuing to utilize alternate airports. PUW's Air Charter Forecast is shown in **Table 2-12**.

Table 2-12: Part 121 Air Charter Operations and Aircraft Mix Forecast				
Year	Large Turbo-Prop & Regional Jets (Bombardier Q400 & RJ)	Large Turbo-Jet (Boeing 737)	Diverted Flights (GEG/LWS)	Total
2010	22	50	152	224
2015	30	60	134	224
2020	116	104	4	224
2025	116	104	4	224
2030	116	104	4	224

Year 2020 numbers assume new runway alignment completion by 2016

Air Taxi and General Aviation

Air Taxi (AT) and General Aviation (GA) represent the majority of aircraft operations at PUW. The range of activities includes, but is not limited to:

- Personal use aviation for recreation and business;
- Flight training;
- Business and corporate aviation;
- Air ambulance and other emergency service;
- Aircraft maintenance; and
- On-demand air taxi service.

Aircraft types range from single-engine piston airplanes to large corporate jet aircraft. For consistency with FAA forecasts, operations in this category are divided into itinerant (operations between airports) and local (flight operations within the general vicinity of PUW).

PUW does not have a control tower, and there are no reliable counts of annual operations from which to accurately assess historical activity. The estimates of activity included in the FAA TAF were reviewed to assess the volume of activity since 1990. The TAF shows an increase in itinerant operations, and a decline in local operations. This is generally consistent with activity profiles for comparable airports.

The TAF projects that total GA operations will increase from 25,000 (2008) to 26,941 (2030) with all of the increase applied to itinerant operations (0.63% per year) and no change in local activity. The Washington State LATS projects that GA operations statewide will increase at a CAGR of 1.6%, but has a lower projection for the Palouse region of 0.63%. Meanwhile, the Idaho State Aviation System Plan projects that operations at PUW will increase from 30,000 to 82,000 between 2007 and 2027 (4.68% annualized CAGR).

An independent analysis was conducted using a 2010 starting projection of 25,000 total general aviation operations, broken into 13,000 transient and 12,000 local operations. The first analysis applied the population growth rate of 0.93% to the transient segment and zero growth in local operations. This

resulted in total general aviation operations projections of 28,000 by 2030. The second applied a ratio of 362 operations per based aircraft to derive a 2030 projection of 31,000 total general aviation operations.

The master plan recommendation assumes total operations will increase from 25,000 to 35,000, with the growth mostly by itinerant operations, as shown in **Table 2-13**. It is assumed that this level of activity has been experienced and exceeded at PUW within the past 20 years, and that the major change affecting planning outcomes is the continued shift to transient operations and larger aircraft. The total operations by airplane classification are identified in **Table 2-14**.

Table 2-13: Non-Scheduled General Aviation Operations Forecast

Year	Itinerant	Local	Total
2010	13,000	12,000	25,000
2015	15,450	12,050	27,500
2020	17,920	12,080	30,000
2025	20,350	12,150	32,500
2030	22,700	12,300	35,000

Table 2-14: General Aviation Operations by Aircraft Type (Itinerant/Local)

Aircraft Type	2010	2015	2020	2025	2030
Single-Engine Piston	10,400/10,800	12,220/10,800	14,000/10,800	15,450/10,800	16,800/10,800
Multi-Engine Piston	390/1,200	374/1,200	320/1,200	270/1,200	230/1,200
Large Turbo Jet[1]	520/0	690/0	900/0	1,140/0	1,400/0
Med Turbo Jet[2]	910/0	1,162/0	1,430/0	1,880/0	2,310/0
Turbo Prop	780/0	1,000/0	1,260/0	1,580/0	1,900/0
Helicopter	0/0	4/50	10/80	30/150	60/300
TOTAL	25,000	27,500	30,000	32,500	35,000

1. Large Turbo Jet examples include but are not limited to; Boeing 737 series, Airbus A320 series, CRJ-900, Cessna Citation X, and Bombardier Global Express.

2. Medium Turbo Jet examples include but are not limited to: Beech Premier I, Cessna Citation II, Dassault Falcon 20, Learjet 40, and Raytheon Hawker 800

Military/Government

PUW experiences a small number of itinerant military/government operations. The TAF applies a flat 80 annual itinerant military/government operations which will be applied to the master plan.

2.5 Forecasts Summary and TAF Comparison

For reference, **Table 2-15** contains a summary of all aviation forecasts described in this chapter. **Table 2-16** compares the master plan's forecast with the current (2009) FAA TAF.

Table 2-15: Aviation Forecast Summary

	2010	2015	2020	2025	2030
Annual Passenger Enplanements	32,745	35,143	49,286	54,933	61,307
Annual Aircraft Operations	29,152	31,762	34,486	37,082	39,680
Commercial Scheduled Airline	4,000	4,092	4,186	4,282	4,380
Part 121 Air Charter	72	90	220	220	220
Itinerant Military	80	80	80	80	80
General Aviation	25,000	27,500	30,000	32,500	35,000
Itinerant	13,000	15,450	17,920	20,350	22,700
Local	12,000	12,050	12,080	12,150	12,300
Based Aircraft	69	73	77	80	85
Single-engine piston	57	59	60	62	64
Multi-engine piston	7	7	7	7	7
Turbo jet	3	4	5	6	8
Turbo prop	2	2	3	3	4
Helicopter	0	1	2	2	2

Table 2-16: Comparing Airport Planning (AP) and TAF Forecast

	Year	Airport Forecast	TAF	AF/TAF (% Difference)
Passenger Enplanements				
Base year	2010	32,745	33,516	-2.3%
Base year plus 5 years	2015	35,143	37,103	-5.3%
Base year plus 10 years	2020	49,286*	41,095	19.9%
Base year plus 15 years	2025	61,307*	50,471	20.6%
Commercial Operations				
Base year	2010	4,000	4,000	0.0%
Base year plus 5 years	2015	4,092	4,000	2.3%
Base year plus 10 years	2020	4,186	4,000	4.7%
Base year plus 15 years	2025	4,380	4,000	9.5%
Total Operations				
Base year	2010	29,110	29,522	-1.4%
Base year plus 5 years	2015	31,712	29,961	5.8%
Base year plus 10 years	2020	34,486*	30,412	13.4%
Base year plus 15 years	2025	37,082*	31,357	20.1%

TAF data is on a U.S. Government fiscal year basis (October through September).
AF/TAF (% Difference) column has embedded formulas.

**Reflects new runway in use after 2015*