



## MAJOR AIR CARRIER/ REGIONAL CARRIER ACTIVITY

As with most aviation statistics, official FAA enplanement information is typically released two years after the fact; hence the most recent data available was for 1998. Therefore, the June 1998 edition of *The Official Airline Guide* (OAG) was consulted to determine the frequency of air service and types of aircraft operating at each commercial service airport in the State. Nationwide enplanement data is presented in **Table 1M**, while commercial service information for Washington airports is summarized in **Table 1N**.

Of the 17 airports listed in **Table 1N**, 15 were served only by regional airlines and 2 were served by air carrier and regional airlines. Thus, as air carrier activity is only being forecast for airports with scheduled service, commercial service activity was forecast for: Anacortes; Bellingham International; Boeing Field; Friday Harbor; Grant County International; Kenmore Air Harbor (Kenmore); Kenmore Air Harbor (Lake Union); Pangborn Memorial; Pullman/Moscow Regional; Roche Harbor; Rosario Sea Plan Base (SPB); Sequim Valley; Spokane International; Tri Cities; Walla Walla; William R. Fairchild International; and Yakima Air Terminal.

Commercial service activity forecasts may employ a variety of models. As with general aviation activity forecasts, the most common and effective of these is regression analysis. Typically, either enplanements or marketshare are used as the dependent variable in such analysis. The independent variable(s) for these models may include nationwide air carrier and/or commuter enplanements, time, or a demographic metric. However, as trends are seldom linear, the judgement of the forecaster almost always plays a significant role. As the circumstances at each airport varied, efforts for this study employed a variety of techniques and assumptions to produce a realistic set of forecasts.

Once enplanements had been forecast, the number of scheduled departures was determined. Information on departures, aircraft type, and the seating capacity of each aircraft type was obtained from the June 1998 OAG. Cancelled flights and equipment changes were, however, not considered in this model. This information was used to calculate the total available seats at each airport in 1998.

Load factor is the percentage of seats occupied, while boarding load factor is the percentage of seats occupied by passengers enplaning at a given airport. Average boarding load factor was obtained for each airport by dividing annual enplanements for 1998 by the total available seats. Some routes involve intermediary stops between the origin and destination points, with passengers enplaning and deplaning at each stop. As seats may already be filled at these intermediary stops, boarding load factor may be lower than total load factor.

The airline industry is characterized by high fixed costs, which are present whether or not the airline operates. Variable costs, however, are incurred as the airline operates and is generating a revenue stream. Hence, an airline only earns a profit when revenue exceeds both fixed and variable costs, which typically occurs when a 60 percent load factor is achieved. However, when load factor consistently exceeds 60





percent, an increase in aircraft-size may be warranted. Therefore, load factor is a significant indicator as to whether a given route is profitable with the mix of aircraft being flown.





<b>TABLE 1M</b>				
<b>NATIONWIDE AIR CARRIER ACTIVITY</b>				
<b>Year</b>	<b>Air Carrier and Regional Enplanements*</b>	<b>Annual Change</b>	<b>Regional/ Commuter Enplanements*</b>	<b>Annual Change</b>
<b>Historical</b>				
1988	441,200,000		30,100,000	
1989	443,600,000	0.5%	32,100,000	6.6%
1990	456,600,000	2.9%	37,200,000	15.9%
1991	445,900,000	-2.3%	38,700,000	4.0%
1992	464,700,000	4.2%	44,700,000	15.5%
1993	470,400,000	1.2%	49,200,000	10.1%
1994	511,300,000	8.7%	55,300,000	12.4%
1995	531,100,000	3.9%	55,800,000	0.9%
1996	558,100,000	5.1%	60,000,000	7.5%
1997	578,300,000	3.6%	61,600,000	2.7%
1998	589,300,000	1.9%	64,600,000	4.9%
1999 +	611,200,000	3.7%	72,300,000	11.9%
<b>Forecast</b>				
2005	749,900,000	3%	103,000,000	6%
2010	910,400,000	4%	131,700,000	5%
2015 **	1,084,500,000	4%	162,000,000	4%
2020 **	1,265,600,000	3%	192,700,000	4%

\* FAA Forecasts

\*\* Interpolations by BWR using time series analysis to forecast yearly percent increase

+ FAA Estimates





<b>TABLE 1N</b>	
<b>Scheduled Aircraft Serving Washington Airports (excluding SEA-TAC) as per June 1988 OAG (DRAFT)</b>	
<b>WSDOT Forecast Analysis &amp; Economic Impact Analysis Study</b>	
<i>Airport</i>	<i>Aircraft Type</i>
Anacortes	Single-engine aircraft
Bellingham International	de Havilland Dash 8, Embraer Brasilia
Boeing Field	Single engine aircraft, Jet Ranger helicopter
Friday Harbor	Various single and twin-piston propeller aircraft (+10 passenger seats)
Grant County International	de Havilland Dash 8
Kenmore Air Harbor (Lake Union and Kenmore Sea Plane Bases)	de Havilland DHC-2 and DHC-3
Orcas Island	Single-engine aircraft, small twin-engine aircraft
Pangborn Memorial	de Havilland Dash 8
Pullman/Moscow Regional	de Havilland Dash 8
Roche Harbor Sea Plane Base	de Havilland DHC-2 and DHC-3
Rosario Sea Plane Base	de Havilland DHC-2 and DHC-3
Sequim Valley	Single-engine aircraft, small twin-engine aircraft
Spokane International	BAe 146, Beech 1900, Boeing 727, Boeing 737, de Havilland Dash 8, Fokker F28, MD-80
Tri-Cities	Boeing 727, Boeing 737, Canadair Regional Jet, de Havilland Dash 8, Embraer Brasilia
Walla Walla Regional	de Havilland Dash 8
William R. Fairchild International	Single-engine aircraft, de Havilland Dash 8
Yakima Air Terminal	de Havilland Dash 8, Embraer Brasilia

**Source:** Official Airline Guide (OAG).

BWR airline and airport operators – collection of published and non-published flight schedules (November 2000).

In forecasting operations, aircraft were grouped by seating capacity, with an average or predominant seating capacity assigned to each group. These are as follows:

Seating Capacity Range	Average/Predominant Capacity
Fewer than 15	10
15 to 19	19
20 to 39	30
40 to 59	50
60 to 99	80
100 to 150	125

Two variables were used in determining annual departures for each airport: fleet mix and load factor. The percentage of each group of aircraft in the fleet mix at each airport was multiplied by its average capacity and summed to yield average seats per aircraft. Annual departures were forecast for each airport by





dividing forecast enplanements by the average seats per aircraft multiplied by average load factor. Since both fleet mix and load factor were variables, each could be adjusted to achieve reasonable results. The goal was to maximize departures while achieving at least a 60 percent boarding load factor. Annual operations were determined by multiplying annual departures by 2. The number of daily departures assumed daily service on all flights, and were calculated by dividing daily departures by 365. Air carrier enplanements and operations are summarized in **Tables 1O, 1P and 1Q**. Air carrier operations are also depicted in **Exhibits I and J**.

It should be noted that commuter/regional airline forecasts were not conducted separately from those of air carriers. As most commuter airlines are either affiliated with one or more major airlines or actually owned by a major airline, operations are typically seamless. Hence, once there is sufficient demand on a given route, the major carrier often steps in to provide service. The economics of commuter/regional airlines are slightly different than those of major airlines. Turboprop engines are extremely efficient and actually must be geared-down to accommodate a propeller. The maximum landing weights of most of these aircraft is only slightly less than their maximum take off weights, making them ideal aircraft for short routes. Regional jets have gained wider public acceptance than turboprops, which is a factor adding their widespread use. Regional jets, however, are more expensive to operate, but have much longer ranges, lending themselves to long, thin routes. A general rule of thumb in the industry is that turboprops are typically better for stage lengths of 400 miles or less.





<b>TABLE 10 ANNUAL ENPLANEMENTS ON SCHEDULED AIR CARRIERS</b>						
<b>Associated City</b>	<b>Airport</b>	<b>1998*</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>
Anacortes**	Anacortes	7155	7500	7500	8000	8000
Bellingham	Bellingham International	86,990	99,000	102,800	106,700	110,800
Friday Harbor	Friday Harbor	11,505	13,460	16,370	19,070	21,950
Friday Harbor	Friday Harbor SPB	6,190	7,240	8,430	9,830	11,050
Kenmore <sup>+</sup>	Kenmore Air Harbor	14,057	15,100	15,900	16,700	17,600
Seattle - Lake Union <sup>+</sup>	Kenmore Air Harbor	3,500	4,000	4,400	4,800	5,200
Moses Lake	Grant County	10,730	16,400	20,300	24,100	28,000
Orcas Island**	East Sound	9,523	12,400	13,200	15,400	17,300
Pasco	Tri-Cities	192,301	219,300	236,300	253,200	270,100
Port Angeles	William Fairchild	24,878	25,200	24,800	24,500	24,500
Pullman-Moscow, ID	Pullman-Moscow	26,969	30,000	32,000	32,000	34,000
Roche Harbor <sup>+</sup>	Roche Harbor SPB	1,500	1,700	2,000	2,300	2,600
Rosario <sup>+</sup>	Rosario SPB	1,500	1,700	2,000	2,300	2,600
Seattle	Boeing Field	2,818	3,000	3,000	3,000	3,000
Seattle	Seattle-Tacoma International	14,173,752	15,700,000	17,900,000	20,000,000	22,300,000
Sequim	Sequim Valley	750	1,000	1,400	1,800	2,300
Spokane	Spokane International	1,472,901	2,404,200	2,999,800	3,615,300	4,241,200
Walla Walla	Walla Walla	24,194	34,700	40,400	46,200	51,900
Wenatchee	Pangborn Memorial	53,149	83,000	105,400	129,100	153,100
Yakima	Yakima	87,272	98,200	109,200	121,400	135,000

\* Source: FAA APO Terminal Area Forecasts

\*\* Forecasts are based on West Isle Aire Fall and Winter Flight Schedule

<sup>+</sup> Forecasts are based on Kenmore Air Flight Schedule





**Washington State Department of Transportation, Aviation Division**  
**Aviation System Plan - Forecast and Economic Analysis Study**

**TABLE 1Q**  
**SCHEDULED AIR CARRIER ACTIVITY**

Anacortes								
Year	Enplanements	Boarding Load Factor	Seats Per Aircraft					Average Daily Departures
			Less than 15	15-19	20 to 39	40 to 59	60 to 99	
Historic**								
1998	7,155	34%	100%					10
Forecast								
2005	7,500	50%	100%					7
2010	7,500	50%	100%					7
2015	8,000	50%	100%					7
2020	8,000	50%	100%					7

Bellingham International Airport								
Year	Enplanements	Boarding Load Factor	Seats Per Aircraft					Average Daily Departures
			Less than 15	15-19	20 to 39	40 to 59	60 to 99	
Historic*								
1998	86,990	50%	26%		74%			18
Forecast								
2005	99,000	60%	20%		80%			18
2010	102,800	60%	20%		80%			19
2015	106,700	60%	17%		83%			19
2020	110,800	60%	17%		83%			19

Boeing Field								
Year	Enplanements	Boarding Load Factor	Seats Per Aircraft					Average Daily Departures
			Less than 15	15-19	20 to 39	40 to 59	60 to 99	
Historic*								
1998	2,818	64.5%	100%					2
Forecast								
2005	3,000	60.0%	100%					2
2010	3,000	60.0%	100%					2
2015	3,000	60.0%	100%					2
2020	3,000	60.0%	100%					2

East Sound								
Year	Enplanements	Boarding Load Factor	Seats Per Aircraft					Average Daily Departures
			Less than 15	15-19	20 to 39	40 to 59	60 to 99	
Historic**								
1998	9,523	19.2%	100%					19
Forecast								
2005	12,400	30.0%	100%					19
2010	13,200	32.0%	100%					19
2015	15,400	37.0%	100%					19
2020	17,300	42.5%	100%					19

Friday Harbor								
Year	Enplanements	Boarding Load Factor	Seats Per Aircraft					Average Daily Departures
			Less than 15	15-19	20 to 39	40 to 59	60 to 99	
Historic*								
1998	11,505	41.3%	100%					9
Forecast								
2005	13,460	45.0%	100%					11
2010	16,370	50.0%	100%					12
2015	19,070	50.0%	95%	5%				13
2020	21,950	50.0%	90%	10%				15





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Friday Harbor SPB								
Year	Enplanements	Boarding Load Factor	Seats Per Aircraft					Average Daily Departures
			Less than 15	15-19	20 to 39	40 to 59	60 to 99	
Historic*								
1998	6,190	50.0%	100%					10
Forecast								
2005	7,240	50.0%	100%					11
2010	8,430	0.0%	100%					11
2015	9,830	0.0%	100%					11
2020	11,050	41.3%	100%					10

Grant County								
Year	Enplanements	Boarding Load Factor	Seats Per Aircraft					Average Daily Departures
			Less than 15	15-19	20 to 39	40 to 59	60 to 99	
Historic*								
1998	10,730	11.3%			100%			7
Forecast								
2005	16,400	20.0%			100%			7
2010	20,300	25.0%			100%			7
2015	24,100	30.0%			100%			7
2020	28,000	35.0%			100%			7

Kenmore Air Harbor - Kenmore								
Year	Enplanements	Boarding Load Factor	Seats Per Aircraft					Average Daily Departures
			Less than 15	15-19	20 to 39	40 to 59	60 to 99	
Historic*								
1998	14,057	78.1%	100%					8
Forecast								
2005	15,100	80.0%	100%					9
2010	15,900	80.0%	100%					9
2015	16,700	80.0%	100%					10
2020	17,600	80.0%	100%					10

Kenmore Air Harbor - Lake Union								
Year	Enplanements	Boarding Load Factor	Seats Per Aircraft					Average Daily Departures
			Less than 15	15-19	20 to 39	40 to 59	60 to 99	
Historic*								
1998	3,500	14.6%	100%					11
Forecast								
2005	4,000	17.0%	100%					11
2010	4,400	18.0%	100%					11
2015	4,800	19.0%	100%					12
2020	5,200	19.0%	100%					12

Lopez Island								
Year	Enplanements	Boarding Load Factor	Seats Per Aircraft					Average Daily Departures
			Less than 15	15-19	20 to 39	40 to 59	60 to 99	
Historic*								
1998	3,500	17.2%	100%					4
Forecast								
2005	4,000	19.0%	100%					4
2010	4,400	20.0%	100%					5
2015	4,800	22.0%	100%					5
2020	5,200	24.0%	100%					5





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**TABLE 1Q**  
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Pangborn Memorial								
Year	Enplanements	Boarding Load Factor	Seats Per Aircraft					Average Daily Departures
			Less than 15	15-19	20 to 39	40 to 59	60 to 99	
Historic*								
1998	53,149	39.5%			100%			11
Forecast								
2005	83,000	50.0%			100%			15
2010	105,400	60.0%			95%	5%		16
2015	129,100	60.0%			75%	25%		17
2020	153,100	60.0%			50%	50%		17

Pulman-Moscow								
Year	Enplanements	Boarding Load Factor	Seats Per Aircraft					Average Daily Departures
			Less than 15	15-19	20 to 39	40 to 59	60 to 99	
Historic*								
1998	26,969	46.3%			100%			5
Forecast								
2005	30,000	45.0%			100%			6
2010	32,000	45.0%			100%			6
2015	32,000	50.0%			100%			6
2020	34,000	55.0%			100%			6

Roche Harbor SPB								
Year	Enplanements	Boarding Load Factor	Seats Per Aircraft					Average Daily Departures
			Less than 15	15-19	20 to 39	40 to 59	60 to 99	
Historic*								
1998	1,500	17.2%	100%					4
Forecast								
2005	1,700	19.0%	100%					4
2010	2,000	20.0%	100%					5
2015	2,300	22.0%	100%					5
2020	2,600	24.0%	100%					5

Rosario SPB								
Year	Enplanements	Boarding Load Factor	Seats Per Aircraft					Average Daily Departures
			Less than 15	15-19	20 to 39	40 to 59	60 to 99	
Historic*								
1998	1,500	27.8%	100%					2
Forecast								
2005	1,700	30.0%	100%					3
2010	2,000	30.0%	100%					3
2015	2,300	30.0%	100%					4
2020	2,600	30.0%	100%					4

Sequim Valley								
Year	Enplanements	Boarding Load Factor	Seats Per Aircraft					Average Daily Departures
			Less than 15	15-19	20 to 39	40 to 59	60 to 99	
Historic*								
1998	750	34.3%	100%					1
Forecast								
2005	1,000	35.0%	100%					1
2010	1,400	35.0%	100%					2
2015	1,800	40.0%	100%					2
2020	2,300	40.0%	100%					3





**TABLE 1Q**  
**SCHEDULED AIR CARRIER ACTIVITY**

Spokane International									
Year	Enplanements	Boarding Load Factor	Seats Per Aircraft					Average Daily Departures	
			Less than 15	15-19	20 to 39	40 to 59	60 to 99		100 to 150
Historic*									
1998	1,472,901	56.6%		3%	7%		29%	61%	67
Forecast									
2005	2,404,200	60.0%				8%	32%	60%	105
2010	2,999,800	60.0%				10%	30%	60%	132
2015	3,615,300	60.0%				10%	30%	60%	159
2020	4,241,200	65.0%				5%	35%	60%	169

Tri-Cities									
Year	Enplanements	Boarding Load Factor	Seats Per Aircraft					Average Daily Departures	
			Less than 15	15-19	20 to 39	40 to 59	60 to 99		100 to 150
Historic*									
1998	192,301	49.3%			58%	5%		38%	23
Forecast									
2005	219,300	45.0%			55%	15%		30%	22
2010	236,300	47.0%			55%	15%		30%	22
2015	253,200	50.0%			50%	20%		30%	22
2020	270,100	53.0%			50%	20%		30%	22

Walla Walla									
Year	Enplanements	Boarding Load Factor	Seats Per Aircraft					Average Daily Departures	
			Less than 15	15-19	20 to 39	40 to 59	60 to 99		100 to 150
Historic*									
1998	24,194	39.1%			100%				5
Forecast									
2005	34,700	40.0%			100%				8
2010	40,400	40.0%			100%				9
2015	46,200	40.0%			100%				11
2020	51,900	40.0%			100%				12

William Fairchild International Airport									
Year	Enplanements	Boarding Load Factor	Seats Per Aircraft					Average Daily Departures	
			Less than 15	15-19	20 to 39	40 to 59	60 to 99		100 to 150
Historic*									
1998	24,878	33.9%	17%		83%				11
Forecast									
2005	25,200	35.0%	20%		80%				8
2010	24,800	35.0%	10%		90%				7
2015	24,500	35.0%			100%				6
2020	24,500	35.0%			100%				6





**TABLE 1Q**  
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Yakima									
Year	Enplanements	Boarding Load Factor	Seats Per Aircraft						Average Daily Departures
			Less than 15	15-19	20 to 39	40 to 59	60 to 99	100 to 150	
Historic*									
1998	87,272	53.2%			100%				14
Forecast									
2005	98,200	55.0%			100%				16
2010	109,200	60.0%			100%				17
2015	121,400	60.0%			95%	5%			18
2020	135,000	60.0%			90%	10%			19

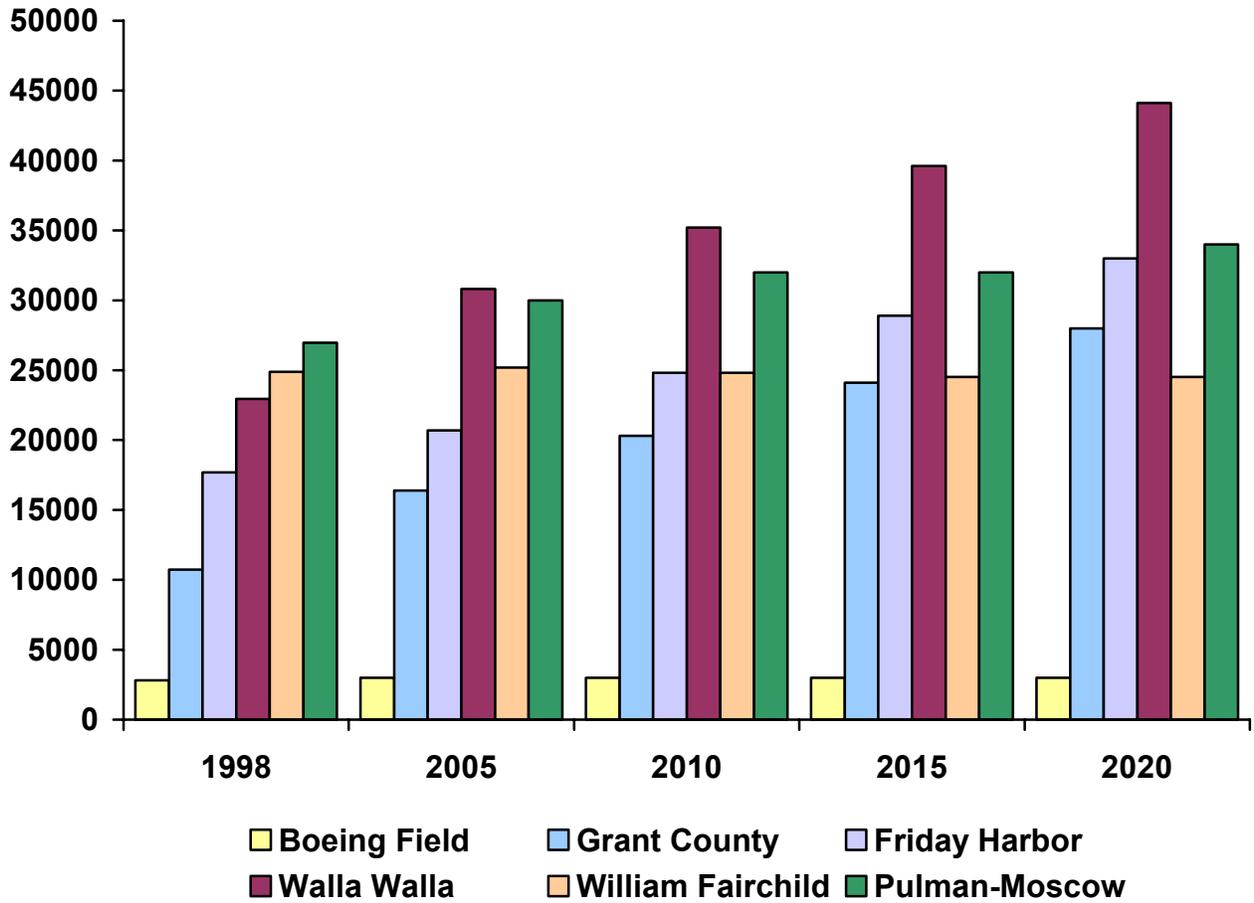
\* Source: Official Airline Guide, June 1998 edition

\*\* Source: West Isle Air Fall Winter Flight Schedule





***Enplanement Forecasts at Airports  
with Scheduled Commercial Service  
for Airports Enplaning Less Than 50,000 PAX***





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