McMinnville Municipal Airport
Airport Layout Plan Report

Chapter Three

Aviation Activity Forecasts

CHAPTER THREE
AVIATION ACTIVITY FORECASTS

INTRODUCTION/PURPOSE

The purpose of this chapter is to update the forecasts of aviation activity for the twenty-year planning period addressed in the Airport Layout Plan Update (2002-2022). The updated activity forecasts will provide the basis for estimating future facility needs at MMV. The scope of work for this project suggests use of the most recent Oregon Aviation System Plan (OASP) [16] forecasts (1994-2018), with revision as required, to reflect current conditions. However, airport master plan[17] forecasts (1989-2009) are also available for MMV that reflect more airport-specific detail than is provided in statewide aviation forecasts.

The existing master plan, state aviation system plan forecasts, and current Federal Aviation Administration (FAA) forecasts,[18] will be compared with actual activity data to determine their applicability for use in this planning update. Once the relevance of existing forecasts is determined, a judgment can then be made regarding the need to develop additional projections for the current twenty-year planning period.

Population Trends

Changes in population within an airport's service area often provide a broad indication about trends in airport activity. Although a large number of factors normally affect activities at general aviation airports, changes in population often reflect other economic conditions, which may affect airport activity more directly. However, since it is difficult to identify specific connections between airport activity and individual economic indictors such as growth in personal income, unemployment rates, or business spending, population provides a general indication of an area's economic health. Regions with flat or declining populations often have weak underlying

[16] Oregon Continuous Aviation System Plan, Volume I Inventory and Forecasts (1997, AirTech).
[17] McMinnville Municipal Airport Master Plan 1989-2009 (Wilsey & Ham Pacific)
[18] FAA Terminal Area Forecast (TAF)

economic conditions. In contrast, higher rates of population growth often characterize a growing economy that can stimulate individual and business use of general aviation.

Population growth within McMinnville and Yamhill County has consistently outpaced Oregon's statewide averages over the last twenty years. Between 1980 and 2002, Yamhill County's population increased by 58 percent, which equates an average annual growth rate of 2.1 percent. During the same period, McMinnville's population increased by 100 percent, which equaled an annual average growth rate of 3.2 percent. **Table 3-1** and **Figure 3-1** reflect local population data from the 1980, 1990 and 2000 U.S. Census and a certified estimated for 2002, prepared by Portland State University; MMV's historic based aircraft totals are also depicted during the period (Figure 3-1).

TABLE 3-1
HISTORICAL AREA POPULATION

	1980	1990	2000	2002
City of McMinnville	**14,080**	**17,894**	**26,499**	**28,200**
Overall Growth Percentage	--	+27.1%	+48.1%	+6.4%
Average Annual Growth Rates	--	+2.4%	+4.0%	+3.2%
Yamhill County	**55,332**	**65,551**	**84,992**	**87,500**
Overall Growth Percentage	--	+18.5%	+29.7%	+3.0%
Average Annual Growth Rates	--	+1.7%	+2.6%	+1.5%
McMinnville population as percentage of Yamhill County	*25.5%*	*27.3%*	*31.2%*	*32.2%*

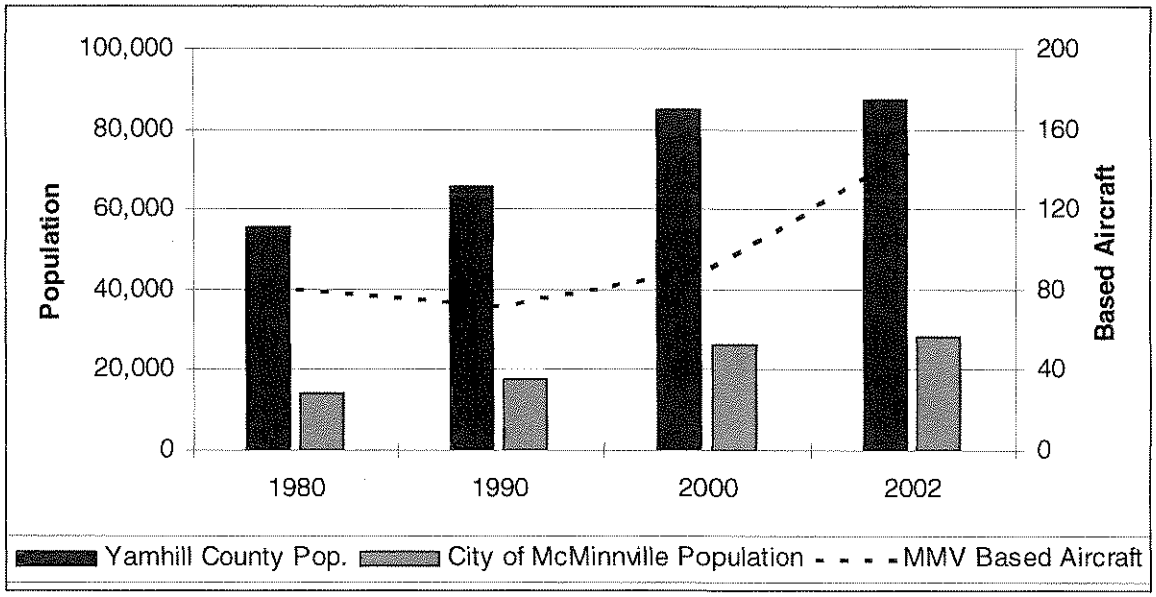
The data indicate that population growth within McMinnville has consistently outpaced the county by one to two percentage points per year. McMinnville's growth rate between 2000 and 2002 was more than double the Yamhill County rate and McMinnville accounted for nearly 68 percent of Yamhill County's net population increase during the two-year period. In recent years, McMinnville has grown from about 25 percent of Yamhill County's population (in 1980) to more than 32 percent in 2002.

The State Office of Economic Analysis (OEA) projects Yamhill County population to grow at an annual average of 1.8 percent between 2000 and 2020; OEA projects Yamhill County's employment to increase at annual rate of 1.6 percent during the same period. The Oregon Department of Administrative Services projects population growth within Yamhill County to increase by approximately 86 percent (1.6 percent annually) between 2000 and 2040, which is well above both the statewide average. It is anticipated that the population within McMinnville

will continue to run slightly ahead of Yamhill County projections based on the community's historic trends and future economic potential.

Although population growth alone does not necessarily provide the basis for determining future airport activity, the expectation of continued population growth in McMinnville and Yamhill County that exceeds statewide averages, suggests a presence of positive economic factors that are often associated with increasing airport activity.

FIGURE 3-1: POPULATION & MMV BASED AIRCRAFT TRENDS



Source: US Census; PSU Center for Population Studies

Economic Conditions

The economy within McMinnville and Yamhill County reflects the region's traditional agricultural and manufacturing base, with strong private education and tourism components. More than one-third of Yamhill County is covered with commercial timber, which has historically supported a thriving wood products industry. Despite significant declines in the lumber and wood products industry, it continues to be primary employer in the region. Yamhill County's wine industry has become a core element in the local economy. According to Yamhill Winery Association data, there are more than 80 wineries and 200 vineyards in Yamhill County, which represents one-third of Oregon's wineries and vineyards.

Local attractions such as the numerous wineries, McMinnville's historic district and the Evergreen Air Museum provide a wide range of opportunities for visitors. In addition to local destinations, a large number of visitors travel through McMinnville enroute from the Portland Metro area to other destinations, including the Oregon Coast. In 1999, nearby Spirit Mountain Casino had approximately 2.8 million visitors, many of whom traveled through McMinnville.[19]

Air transportation is also an important part of the McMinnville economy. According to Oregon Employment Department data, in 1999 the air transportation industry within zip code 97128 consisted of 9 establishments, 303 employees and a payroll of $11,882,730. Although the number of employees within the air transportation industry is relatively low compared to other local leading industries, the total payroll and average pay per employee were among the highest. Evergreen International is the largest aviation-related employer in the county and is one of Oregon's most prominent aviation firms. According to local data, Evergreen International and Evergreen Helicopters had 415 employees in McMinnville in August 2002.

The close proximity to the Portland Metropolitan area has contributed to population growth that is not entirely dependent on employment opportunities within McMinnville or Yamhill County. According to Oregon Employment Department (OED), nearly 20 percent of Yamhill County's work force commutes to the Portland Metro area.[20] Yamhill County's unemployment rate dropped from a high of around 12 percent in 1982 to 4.7 percent in 2000. As noted the OED 2002 Regional Economic Profile: *"...by the early 1990's Yamhill County's jobless rate fell below the state's rate and has remained there. Yamhill will likely continue to see low jobless rates as expansion from the Portland metro area spills into neighboring communities. With Portland having the most diversified economy in the state, Yamhill residents will continue to have access to a large number and variety of jobs."*

The McMinnville Economic Opportunities Analysis[21] study was recently conducted to evaluate the economic opportunities within the community. The study noted that the small town character, quality of life, economic diversity, and the cost and availability of public utilities were among McMinnville's key comparative advantages. Poor access to Interstate 5 and increased congestion along the region's primary travel routes were identified as significant transportation constraints. The study concluded: *"Overall, the comparative advantages [identified in this chapter] suggest that McMinnville will continue to grow at a slightly faster rate than Yamhill County and the northern Willamette Valley region, as it has over the last several decades."*

---

[19] Oregon Tourism Commission data.
[20] 2002 Regional Economic Profile – Region 3 (Oregon Department of Employment)
[21] Draft McMinnville Economic Opportunities Analysis (ECONorthwest, November 2001)

Historic Aviation Activity

The FAA Airport Record Form 5010, dated 10-10-02 lists 140 based aircraft and 63,500 annual operations at MMV for the prior 12 months. Current estimates of based aircraft were provided by airport management for this evaluation. An estimate of current aircraft operations was prepared by the consultant based on a review of based aircraft and fuel delivery data, which is described later in this chapter. Historic activity at MMV is summarized in **Table 3-2**.

TABLE 3-2
SUMMARY OF HISTORICAL AVIATION ACTIVITY (MMV)

Year	Aircraft Operations	Based Aircraft	Operations Per Based Aircraft	Data Source
1980	60,000	80	750	1
1981	23,680	77	308	4,2
1987	54,612	95	575	4,2
1988	56,200	72	781	1
1994	37,663	110	342	4,5
1995	85,970	110	782	4,3
1996	66,406	110	604	4,3
1998	53,238	110	484	4,3
1999	50,564	140	361	4,3
2002	65,961	150	437	7,6

Data Sources/Notes:

1. Airport Master Plan - Base Year Estimates
2. FAA 5010 Airport Record Form (based aircraft)
3. FAA TAF Data (based aircraft)
4. ODA RENS Aircraft Activity Counter Program (aircraft operations)
5. Oregon Continuous Aviation System Plan. Volume 1: Inventory and Forecasts (Based Aircraft Estimate for 1994)
6. Airport (FBO) Estimate (Based AC)
7. Century West Estimate (Aircraft Operations)

Recent historic activity data available for MMV includes estimates of "existing" base-year activity contained in the 1981 and 1990 Airport Master Plans and the 1997 Oregon Aviation System Plan. The FAA Terminal Area Forecast (TAF) also provides historical data for the airport during this period, although the data do not always correspond to other data sources. Data generated through the RENS Aircraft Monitoring Program, conducted by the Oregon Department of Aviation (ODA) was also reviewed.

Overview of MMV Recent Activity

Activity Period: 1980-1988

According to available data, the number of aircraft based at MMV declined from 80 to 72 during this period. A review of aerial photos contained in the 1980 and 1988 master plans indicates that no new hangars were constructed at MMV during this period. This suggests that demand for hangar space may have contributed to the decline in based aircraft at MMV as aircraft may have been relocated to other nearby airports.

The 1988 airport master plan reflected a lower number of based aircraft (compared to the 1987 FAA 5010 form) and a 3 percent increase in aircraft operations over the 1987 RENS count. The cause for the sharp decline (-25%) in based aircraft estimates between 1987 and 1988 cannot be fully verified, although it is assumed that some counting error (overstated in 1987) may have occurred, which was likely combined with an actual departure of several aircraft in search of hangar space or due to other conditions.

RENS activity counts were conducted for two years (1981 and 1987) during this period reflecting a 131 percent increase in aircraft operations between the two counts. The initial activity count (1981) was less than half of the "base year" estimate presented in the 1980 airport master plan. The 1987 activity count coincided with an interim increase in based aircraft, although operations increased at a significantly higher rate.

Activity Period: 1988-1998

According to available data, the number of aircraft based at MMV increased from 72 to 110 during this period. A comparison of aerial photography from 1988 and 1998 shows that three new T-hangars (30 individual units) were constructed during this period. It appears that the significant increase in hangar capacity at MMV was a key factor in the airport's increase in based aircraft. This increase coincided with the sharp growth in local population that also occurred during the 1990s. RENS activity counts were conducted for four years (1994, 1995, 1996 and 1998) during this period reflected an initial decline from the 1987 count, followed by a very sharp (128%) increase, followed again by two declining counts.

Activity Period: 1998-2003

The number of aircraft based at MMV increased by nearly 47 percent during this five-year period. As with the previous ten-year period, the increase in based aircraft coincided with increased hangar availability and population growth. A comparison of 1998 aerial photography

with current conditions indicates that three new T-hangars (28 units); two multi-unit conventional hangars (10 aircraft); and one medium conventional hangar were constructed during this period. Another 10-unit T-hangar has been approved with construction planned for 2004.

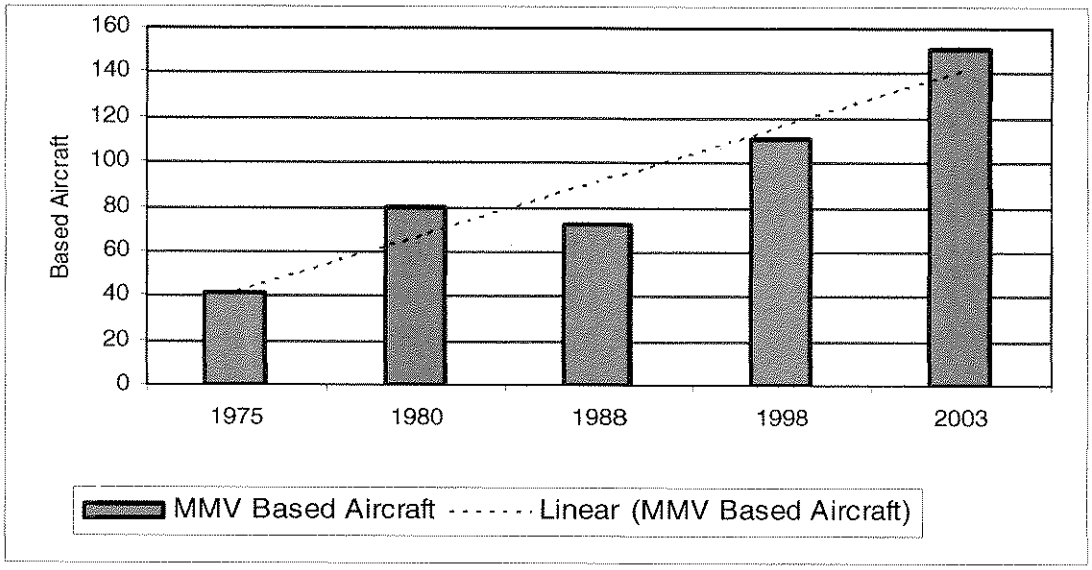
RENS activity counts were conducted for two consecutive years (1998 and 1999) during this period. The counts reflected a 5 percent decline, although the based aircraft estimates generated by FAA for those years showed a sharp increase. An estimate of current aircraft operations was prepared by Century West Engineering based on a review of based aircraft fleet, fuel delivery data, and an adjustment in RENS methodology to account for unpowered aircraft (gliders); the updated estimate of aircraft operations at MMV is 65,961 for 2003.

Based Aircraft

According to airport management estimates, there were 150-based aircraft at MMV in 2003, including 19 aircraft based at Evergreen's facilities adjacent to the airport. Since 1980, based aircraft at MMV increased at an average annual rate of **2.8 percent** (23 years); however, during the last fifteen years (1988 to 2003), MMV based aircraft have increased at an average annual rate of **5.1 percent**. The actual growth for both the 15- and 23-year periods has exceeded the 1988 master plan forecasts by a considerable margin. Recent historic based aircraft levels are depicted in **Figure 3-2**.

In 2003, the airport had two locally based business jets and approximately 19 turbine helicopters. All other based aircraft were single-engine piston, multi-engine piston, gliders or experimental aircraft. The number of aircraft located off the airport at Evergreen International facilities has generally remained between 15 and 25 over the last twenty years and is currently estimated at 19 aircraft. It is noted that Evergreen recently added a Gulfstream IV business jet to their MMV-based fleet. However, the GIV is currently parked on the terminal apron since it is too large to use the existing taxiway between Evergreen's facilities and the runway-taxiway system. The breakdown of current based aircraft at MMV is summarized in **Table 3-3.**

FIGURE 3-2: HISTORIC BASED AIRCRAFT (MMV)



Source: Master Plan, FAA and Airport Mgt Estimates

TABLE 3-3
MMV BASED AIRCRAFT (2003)

Aircraft Type	Aircraft Stored on Airport	Aircraft Stored off Airport (Evergreen Facilities)	**Total**
Single Engine Piston	97	2	**99**
Multi-Engine Piston	9	0	**9**
Turboprop	0	0	**0**
Business Jet	1*	1	**2**
Helicopters	4	15	**19**
Gliders	21	0	**21**
Total	**132**	**19**	**150**

Source: Airport FBO Estimate. * Evergreen G-IV business jet currently parked on main terminal apron.

Aircraft Operations

Aircraft operations estimates are available for MMV for seven separate years between 1981 and 1999 through the Oregon Department of Aviation's automated acoustical (RENS) activity counting program. In the absence of air traffic control tower records, the RENS data generally provides the most reliable estimates of activity for uncontrolled airports. The RENS program

uses a counting device that is triggered by specific noise level (aircraft engine noise) normally associated with an aircraft takeoff. Seasonal on-site data samples are normally collected over a twelve-month period for use in creating statistically derived estimates of operations.

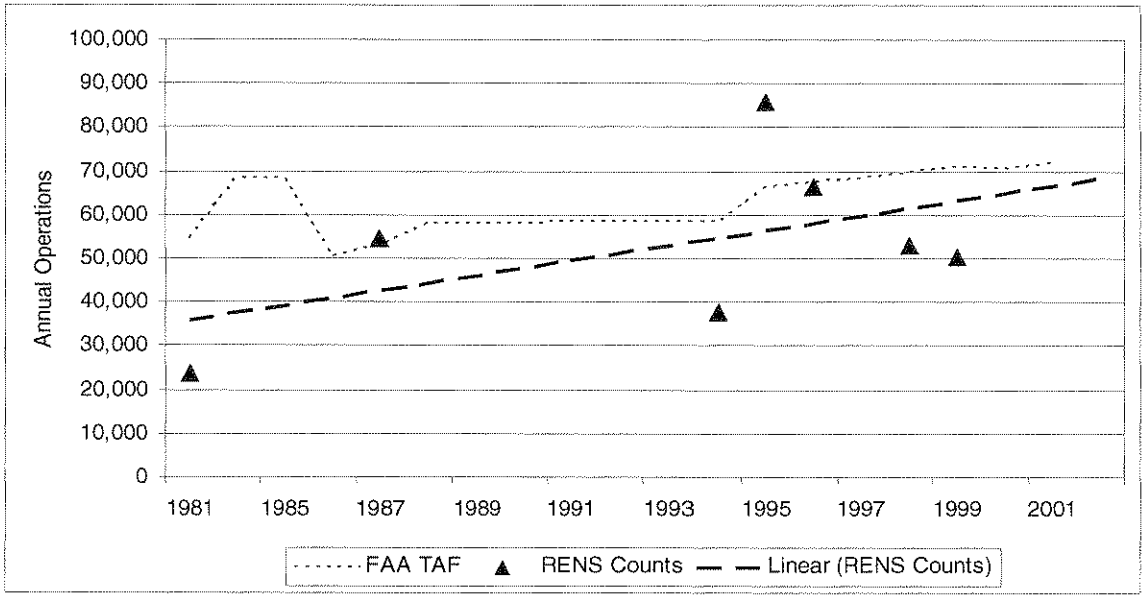
Table 3-4 summarizes all RENS activity counts conducted for MMV since 1981. **Figure 3-3** depicts the RENS counts in relation to historic operations estimates from FAA TAF. The amount of upward and downward variation exhibited in the RENS data suggests that the individual counts may not provide sufficient reliability to precisely estimate aircraft operations at MMV for each individual year. However, when combined, the group of counts provides a broad indication of an upward activity trend (reflected by a linear trend line), which roughly corresponds to other indicators (based aircraft).

TABLE 3-4
SUMMARY OF ODA ACTIVITY COUNTS (MMV)

	1981	1987	1994	1995	1996	1998	1999
Annual Operations	23,680	54,612	37,663	85,970	66,406	53,238	50,564
Net Increase/Decrease Over Prior Count	--	+130.6%	-31.0%	+128.3%	+73.1%	-22.8%	-5.0%

Source: Oregon Department of Aviation, RENS acoustical counts.

FIGURE 3-3: RENS ACTIVITY COUNTS & TAF DATA (MMV)



A summary of the most recent activity count by aircraft type is provided in **Table 3-5**. In 1999, the largest portion of RENS activity at MMV was divided between single-engine aircraft (75 percent) and rotorcraft (18.5 percent). The fixed base operator at MMV estimates that 90 percent of the airport's helicopter operations are generated by nearby helicopter flight training schools.

TABLE 3-5
1999 AIR TRAFFIC ESTIMATES (MMV)

Operations by Type	Annual Estimate	Percent by Type
Single-Engine	37,745	74.6%
Multi-Engine	2,389	4.7%
Jet	389	0.8%
Rotary	9,339	18.5%
Other	702	1.4%
Total Aircraft Operations	**50,564**	**100%**

Source: Oregon Department of Aviation Aircraft Monitoring (RENS) Program (data: 10/99-10/00)

As noted earlier, RENS counts are considered more accurate than anecdotal estimates, however, they are subject to conditions that may contribute to counting anomalies. Any conditions that may contribute to particularly heavy or light flight activity during any of the brief sampling

periods has the potential of skewing the statistical estimates. In addition, at MMV, two specific conditions exist that suggest the RENS counts may be underestimated in the most recent count:

- **Multiple Runway Configuration.** It is difficult for RENS counters to capture activity from multiple runways since the counting device is normally located near the departure end of the primary runway. Although the majority of operations at MMV are on Runway 4/22, Runway 17/35 accommodates glider-related activity and is also used during seasonal crosswind conditions. It is likely that the acoustical counter would capture only full-length takeoffs on Runway 17, since it is normally located near the end of Runway 22. An assumption on runway use percentages may have been factored into the estimates, although with limited airport-specific information available to the RENS technician, it would be difficult to verify the accuracy of any assumptions.

- **Glider Operations.** Since the RENS estimates are based on the number of acoustically recorded events (triggered by engine noise), it is unlikely that glider operations are adequately factored into the activity estimates. The local glider operator currently estimates a total of 2,500 annual departures from Runway 17/35, which equals 10,000 combined operations for the tow aircraft and the gliders. It is estimated that 75 percent of glider operations are on Runway 35, with 25% on Runway 17. Based on the typical location of the counting device (near the end of Runway 22) and the common mid-field departure procedure, it appears that the northbound tow aircraft takeoffs would likely trigger the acoustical counter, although southbound operations would not. It is estimated that approximately 6,250 operations (100 percent of glider operations and 25 percent of the tow aircraft operations) are uncounted, which equals 12.4 percent of the 1999 RENS count.

For the purposes of developing updated forecasts of aircraft activity, the 1999 RENS count data provides a reasonable "base year" which can be adjusted to reflect subsequent events and the glider activity.

Updated Estimate of Aircraft Operations

An estimate of aircraft operations was prepared for 2002 based on a review of fuel delivery records (1998-2002), the most recent RENS activity count (1999), and the current estimate of 150 based aircraft. The following sections provide additional information about recent aviation fuel activity at MMV. The significant increase in based aircraft (+41) and sharply rising fuel delivery volumes (+53,000 gallons) since 1998 indicate that recent activity has grown despite economic and industry downturns widely experienced in 2001 and 2002. These factors

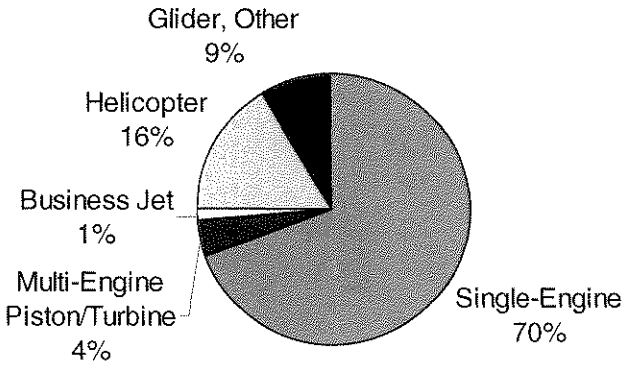
combined with the previously uncounted glider-related activity resulted in an estimate of 65,961 operations for 2002, which is summarized in **Table 3-6** and **Figure 3-4**.

TABLE 3-6
2002 AIR TRAFFIC ESTIMATES (MMV)

Type	Operations	Percent
Single-Engine	45,600	69.1%
Multi-Engine Piston/Turbine	2,930	4.4%
Business Jet	920	1.4%
Helicopter	10,800	16.4%
Glider, Other	5,711	8.7%
Total Aircraft Operations	**65,961**	**100%**

Source: David Miller, AICP/Century West Engineering Estimates

FIGURE 3-4: 2002 AIRPORT OPERATIONS DISTRIBUTION (MMV)



Based on a review of the 1999 RENS count, turbine aircraft operations (business jets, turboprops and turbine helicopters) were estimated at 2,642.[22] This estimate includes the actual RENS count of jet operations (389) and an assumed 20 percent of multi-engine operations and 20 percent of helicopter operations included in the RENS count. It is noted that the majority of helicopters operations at MMV are associated with flight training, and that the majority of aircraft used in basic helicopter flight training are piston powered. The majority (80%) of multi-engine operations were assumed to be generated by piston aircraft since the airport has no based turboprops and nine piston twin-engine aircraft.

AVIATION INDICATORS/INFLUENCES

Aviation Fuel Data

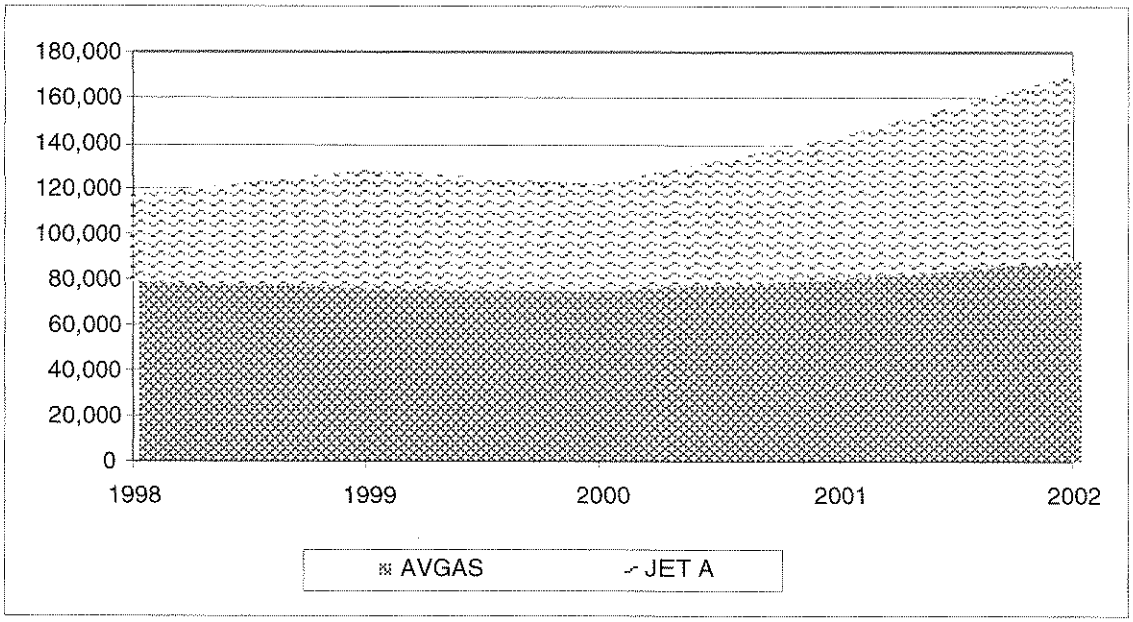
Due to the limited availability of recent activity counts for MMV, a review of aviation fuel deliveries at the airport was conducted for the last four years to help gauge current activity trends. The data summarized in **Table 3-7** and **Figure 3-5** reflects a significant increase (+45%) in aviation fuel deliveries at MMV from 1998 to 2002. Annual aviation gasoline (AVGAS) deliveries have fluctuated between 75,000 and 88,000 gallons during this period, with an overall increase of approximately 11 percent between 1988 and 2002. However, during the same period, jet fuel deliveries at MMV more than doubled (+116%). Jet fuel accounted for nearly half (48%) aviation fuel delivery volume at MMV in 2002, up from less than one-third (33%) in 1998.

TABLE 3-7
AIRPORT FUEL ACTIVITY (MMV)
(GALLONS DELIVERED)

	1998	1999	2000	2001	2002
AVGAS	79,000	76,000	75,000	80,000	88,000
Jet Fuel	38,000	52,000	47,000	63,000	82,000
Total	**117,000**	**128,000**	**122,000**	**143,000**	**170,000**

[22] Estimate of turbine operations David M. Miller, AICP, Century West Engineering.

FIGURE 3-5: AIRPORT FUEL DELIVERIES (MMV)



Recent hangar construction and the associated increase in based aircraft appear to be consistent with increasing AVGAS volume. However, it appears that the increase in jet fuel volume is largely attributed to itinerant activity since the number of turbine-powered aircraft based at MMV did not changed significantly during the period.

According to the FBO, the airport regularly accommodates itinerant Falcon, Gulfstream, and Challenger aircraft that are associated with local area businesses (wineries, hospital, Evergreen Aviation Museum, steel mill, entertainers performing at Spirit Mountain Casino, etc.). The increased jet fuel volume appears to confirm that assessment. Evergreen International currently bases two business jets at MMV (Gulfstream IV and Learjet 35) in addition to other fixed wing aircraft and numerous helicopters. Although Evergreen's fleet includes a large number of turbine aircraft, the majority of their flight activity occurs away from MMV on extended contract assignments. However, Evergreen staff indicated that their business jets average about 5 trips per week combined, (approximately 500 annual operations) at MMV.

A comparison of the recent jet fuel deliveries and RENS counts offers an indication of recent jet fuel usage patterns at MMV. In 1999, a total of 49,500 gallons of jet fuel and an estimated 2,642 turbine operations resulted in an average of 18.7 gallons per turbine operation. Based on the sharp increase in jet fuel consumption and the reported increase in larger business jet activity at MMV, it is assumed that the average gallons-per-operation increased between 1988 and 2002. For purposes of estimating 2002 turbine aircraft operations, the average gallons-per-operation

was increased 20 percent to 22.5 gallons to reflect an increase in the average fuel sale associated with larger aircraft. A total of 82,000 gallons of jet fuel divided by 22.5 gallons equals 3,644 turbine operations. AVGAS averaged about 1.5 gallons per piston aircraft operation in 1999; this utilization was applied to the 2002 AVGAS volume to project piston operations.

Local Hangar Utilization

Table 3-8 highlights the recent growth in based aircraft, which coincided with a significant increase in hangar availability at MMV. The impact of the recent hangar construction is clearly reflected in the changing ratios of available hangar spaces per based aircraft. A review of previous master plans and historic aerial photography indicates that no new hangars were constructed at MMV between 1981 and 1988. Since 1988, 66 new hangar spaces were constructed and the number of based aircraft increased by 83. During a nearly three-fold increase in based aircraft since 1988, the number of aircraft stored outside (apron, tiedown areas, etc) at MMV has increased only marginally.

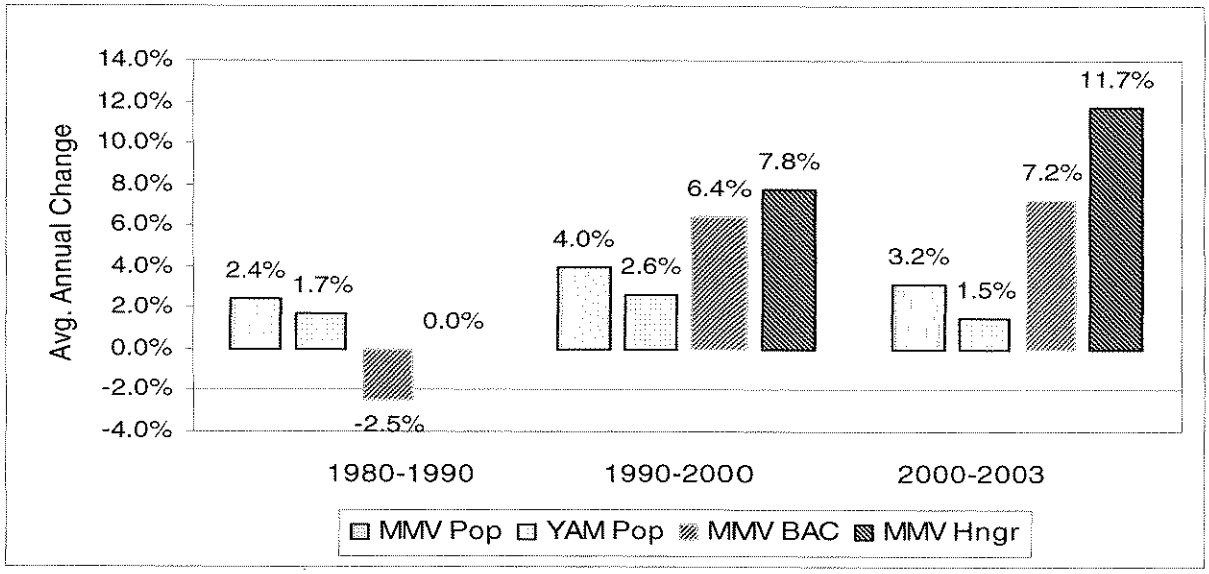
TABLE 3-8
MMV BASED AIRCRAFT & HANGAR UTILIZATION

	1981	1988	1998	2003
Total Based Aircraft	80	72	110	150
Based Aircraft (on airport) [1]	60	49	90	132
Hangar Spaces (on airport)	27	27	57	93
Percentage of Based Aircraft Stored in Hangars	*45%*	*55%*	*63%*	*71%*
Average Number of Based Aircraft per Hangar Space	2.22	1.82	1.58	1.42

Source: Airport master plans, airport data and historical aerial photography. 1. Total excludes aircraft stored off airport at Evergreen facilities.

The 1989 master plan indicated that there was strong correlation between growth in population and based aircraft at the airport in the years 1975-1987. However, during the 1980's when local population increased by nearly 30 percent, the number of based aircraft at MMV actually declined. **Figure 3-6** illustrates the relationships the historic relationships between local and county population, based aircraft and hangar spaces at MMV. While a growing population provides an important underlying foundation for airport activity, the data indicate that increases in based aircraft and hangar spaces at MMV do not consistently correspond with local population growth.

FIGURE 3-6: HISTORICAL AREA POPULATION & AIRPORT ACTIVTY



Regional Hangar Utilization Trends

A review of the based aircraft records[23] for airports located in the Portland Metro Area (including Clark County, Washington) indicates that the number of based aircraft has nearly doubled since 1971 from just below 1,200 to more than 2,300 in 2002. During this thirty year period, several airports have closed, new (private) airports have opened and general aviation has experienced several extended upward and downward periods.

The cumulative increase in hangar capacity within the region reflects an extended period of active construction. In the absence of a rapidly growing general aviation fleet, it is reasonable to assume that the rate of new hangar construction in the local area will moderate as the available capacity is gradually absorbed. Within the Portland Metro area, several airports have significantly increased their based aircraft levels while others have lost aircraft or have remained relatively stable. From a regional perspective, the vacancies that are created when aircraft migrate between airports is a key factory affecting overall demand and the rate of subsequent hangar construction. The following excerpt is from a regional analysis of hangar trends prepared by Aron Faegre and Associates in 2002:

[23] Portland-Vancouver Metro Area - Based Aircraft and Hangar Survey, Aron Faegre (2002).

Newberg/Chehalem Airpark

Chehalem Airport is located approximately 8 nautical miles NNE of McMinnville in Newberg, Oregon. Chehalem Airport is privately owned and is open to the public. FAA Form 5010, dated 4-18-02, identifies the runway as being 2,285 feet long, with 9 based aircraft, and 7,800 annual operations. A telephone call to Dennis Sturdevant, owner of the airport, identifies that there are currently 26 based aircraft. Future plans for the airport are for 8 more hangar spaces. More hangars will be constructed as demand calls for them.

Newberg/Sportsman Airpark

Sportsman Airpark is located approximately 9.5 nautical miles NE of McMinnville in Newberg, Oregon. It is a privately owned airport that is open to the public. FAA Form 5010, dated 4-18-02, identifies the runway length as being 2,745 feet, with 53 based aircraft, and 11,650 annual operations. A telephone discussion with Jerry Dale, the owner of Sportsman Airpark, indicates that there are currently approximately 53 aircraft based at the airport and that plans for future expansion of the airport. The airport has room to construct 150 to 200 hangars, should the demand ever be present for this need. Mr. Dale indicated that new hangars would be built only as demand warrants.

Aurora State Airport

Aurora State Airport is located approximately 16 nautical miles ENE McMinnville alongside Interstate 5, near the city of Aurora, Oregon (Marion County). There has been a rapid growth of activity and based aircraft at Aurora Airport during the past five years. FAA Form 5010, dated 4-18-02, identifies the runway as being 5,004 feet long, with 387 based aircraft, and 73,895 annual operations. Major new hangar developments have been created on private lands adjacent to the airport, with through-the-fence operations then accessing the airfield. In addition, significant aviation-related businesses such as Pacific Avionics, Van's Aircraft, and Artechs (ELT manufacturer), have moved their operations to private property adjacent to the airfield during this same period. The SE quadrant of the airport has approximately 20 acres of land available for hangar or aviation related business development. The airport is becoming a base for more business aviation users, many of whom operate turboprops and light jets.

Hillsboro Airport

Hillsboro Airport is located 22 nautical miles NNE of McMinnville, at the west end of the Portland metropolitan area, in within the city limits of Hillsboro, Oregon (Washington County). The airport is owned by the Port of Portland and is Oregon's second-most active airport, following only behind Portland International Airport. FAA Form 5010, dated 4-18-02, identifies two runways, the longest being 6,600 feet, with a total of 392 based aircraft, and 222,300 annual operations. The Hillsboro area has had rapid economic growth during the past 20 years due to

the large number of high-tech industries (especially Intel Corporation) that have developed large campuses in the area. This has resulted in a large amount of corporate and business aviation activity at the airport. In addition, the airport accommodates extensive airplane and helicopter training and recreational aircraft.

Hillsboro/Stark's Twin Oaks Airpark

Stark's Twin Oaks Airpark is located approximately 16 nautical miles NE of McMinnville near Hillsboro, Oregon in Washington County. It is a privately owned airport that is open to the public. FAA Form 5010, dated 4-18-02, identifies the runway length at 2,465 feet, with 98 based aircraft and 22,195 annual operations. A telephone discussion with Bob Stark, the owner, finds that the most current number of based aircraft is 100. Mr. Stark indicates that plans are underway for the basing of 18 additional aircraft there in the next year and he said the 100 acre property has plenty of room for more hangars, if demand is present for them.

Hubbard/Lenhardt Airpark

Lenhardt Airpark is located approximately 17 miles E of McMinnville, near Hubbard, Oregon (Clackamas County). It is a privately owned airport but is available for public use. It is undergoing significant hangar development projects and is attempting to attract the smaller recreational aircraft as a place for basing their aircraft. FAA Form 5010, dated 4-18-02, identifies the runway as being 3,200 feet long, with 23 based aircraft, and 6,000 per year. In a telephone discussion with Jack Lenhardt, owner of the airport, he stated the most current number of based aircraft is 41 and that hangars for additional aircraft are currently on the drawing boards. He plans to expand to as many as 100 based aircraft in five years.

Mulino Airport

Mulino Airport is located approximately 23 nautical miles E of McMinnville in Mulino, Oregon (Clackamas County). Mulino Airport is owned by the Port of Portland and is open to the public. FAA Form 5010, dated 4-18-02, identifies the runway as being 3,600 feet long, with 53 based aircraft, and 21,300 annual operations.

ASSESSMENT OF EXISTING FORECASTS

A review of existing aviation forecasts for MMV was conducted to identify information that may be useful in projecting future activity. The previous forecasts of based aircraft and aircraft operations are summarized in **Table 3-9** and depicted in **Figure 3-7** and **Figure 3-8.**

1989 Airport Master Plan Forecasts

The 1989 Airport Master Plan[24] provides forecasts of based aircraft and operations through the year 2008. Based aircraft at MMV were forecast to increase from 72 (1988) to 120 by 2008, which represented an annual average increase of **2.59 percent**. As noted earlier, MMV had 150 based aircraft in mid 2003. The increase in based aircraft between 1988 and 2003 averaged **5.1 percent** annually, which was nearly double the master plan forecast rate. The current (2003) number of based aircraft is nearly 26 percent above the 2008 forecast.

Despite underestimating based aircraft growth, the 1988 master plan forecast overestimated aircraft operations at MMV by a considerable margin. Aircraft operations were forecast to increase from 56,200 (1988) to 99,500 by 2008, which represented an annual average increase of **2.9 percent**. It is apparent that the 1988 base year operations data reflected the most recent (1987) RENS count (54,612 operations). However, only two of the subsequent RENS counts were higher than the 1987 count, including the 1995 count (85,970), which was actually above both the 1993 and 1998 forecasts. However, it is important to note that the 1995 count was nearly 20,000 operations above any other activity count conducted at MMV since 1981.

The most recent activity count done in 1999 was approximately 10 percent below 1988 base year operations and 51 percent below the operations forecast for 2008. As noted earlier, an updated operations estimate (65,961) was prepared for 2002. Based on this estimate, actual average annual increase in aircraft operations between 1988 and 2002 was **1.15 percent**. The operations for 2002 were 17 percent above the 1988 master plan base year operations and 34 percent below the forecast for 2008.

The average annual growth rate used in the 1998 master plan based aircraft forecasts reflected the projected annual population growth rate (2.6%) for the City of McMinnville, with annual operations projected to increase at a slightly higher, 2.9 percent annual rate due to the high proportion of itinerant flight training operations at MMV. As it turned out, McMinnville's population growth and MMV's based aircraft growth exceeded the forecast rate, while annual operations lagged well below their forecast rate. Since the two primary activity segments (based aircraft and aircraft operations) performed so differently from the forecasts, it is evident that the master plan forecasts or assumptions are no longer valid for use in forecasting future activity.

[24] McMinnville Municipal Airport Master Plan Update 1989-2009 (Wilsey & Ham Pacific)

Oregon Aviation System Plan (OASP)

The most recent Oregon Aviation System Plan (OASP)[25] forecasts were developed in 1997, using 1994 base data for MMV, with projections made to 2014. The 2000 Oregon Aviation Plan[26] (OAP) extrapolated these forecasts to 2018, but did not include any changes in forecast assumptions.

From a 1994 base year estimate of 110 based aircraft, the OASP projected the number of based aircraft at MMV to increase to 138 by 2014; this projection was subsequently extended to 145 based aircraft by 2018. All of the projected based aircraft numbers are below the current based aircraft estimate at MMV.

The OASP forecasts (1994-2018) represent an increase in based aircraft of 32 percent, which translates into an average annual growth rate of **1.13 percent**. Aircraft operations at MMV were projected to increase from 35,812 (1994) to 46,470 in 2018, which translates into an average annual growth rate of **1.1 percent**. The forecast operations levels are well below recent RENS counts and the updated operations estimate for 2002.

The average annual growth rate used in the OASP forecasts is within a reasonable (low) range of projections normally found at general aviation airports. However, both projections underestimated activity at MMV by a considerable margin. As a result, the OASP forecasts do not reflect current or recent historic conditions at MMV and do not provide a reasonable basis for forecasting in the future.

FAA Terminal Area Forecasts (TAF)

The Federal Aviation Administration (FAA) maintains forecasts for MMV in the Terminal Area Forecast (TAF). The TAF for MMV projects an increase in based aircraft from 140 (2001 base year estimate) to 183 in 2020. This reflects an increase of 31 percent, which translates into an average annual growth rate of **1.4 percent**. The current TAF count of based aircraft (140) is approximately 7 percent below current airport management estimates of 150 based aircraft.

The TAF projects aircraft operations to increase from 70,673 (2001) to 94,062 in 2020. The increase of about 33 percent translates into an average annual growth rate of **1.5 percent** over the twenty-year period. The 2001 base year TAF data for aircraft operations is 70,673, which is 7.1 percent above the updated estimates prepared by Century West Engineering.

---

[25] Oregon Continuous Aviation System Plan, Volume I Inventory and Forecasts (1997, AirTech).
[26] Oregon Aviation Plan, © 2000 Dye Management Group/Century West Engineering.

The TAF forecasts provide a reasonable baseline projection, although the forecasts do not reflect a continuation of the above average growth in based aircraft that has occurred at MMV during the last fifteen years, or the recent increases in aviation fuel sales at the airport. It is recommended that the TAF be used as the baseline (low) forecast for based aircraft and operations at MMV.

TABLE 3-9
EXISTING AVIATION FORECASTS (MMV)

Source	1988	1993	1998	2004	2008	2014	2018	2020
Based Aircraft								
2003 Estimate: 150[1]								
1989 Airport Master Plan *(2.59% AAR)*	72	82	93	--	120	--	--	--
1994 / 2000 OASP *(1.13% AAR)*[3]	--	110*	114*	121	--	138	145	--
TAF *(1.42% AAR: 2001-2020)*	--	--	--	145	153	167	175	183
Aircraft Operations								
2002 Estimate: 65,961[2]								
1989 Airport Master Plan *(2.9% AAR)*	56,200	64,800	74,800	--	99,500	--	--	--
1994 / 2000 OASP *(1.1% AAR)*[3]	--	35,812*	37,100*	39,230	--	44,270	46,470	--
TAF *(1.5% AAR: 2001-2020)*	--	--	--	74,365	79,289	86,675	91,599	94,062

1. Airport Management Records
2. David Miller, AICP/Century West Estimate
3. OASP Forecast Years: 1999, 2004, 2014, 2018; interpolated for intermediate years.

FIGURE 3-7: EXISTING BASED AIRCRAFT FORECASTS (MMV)

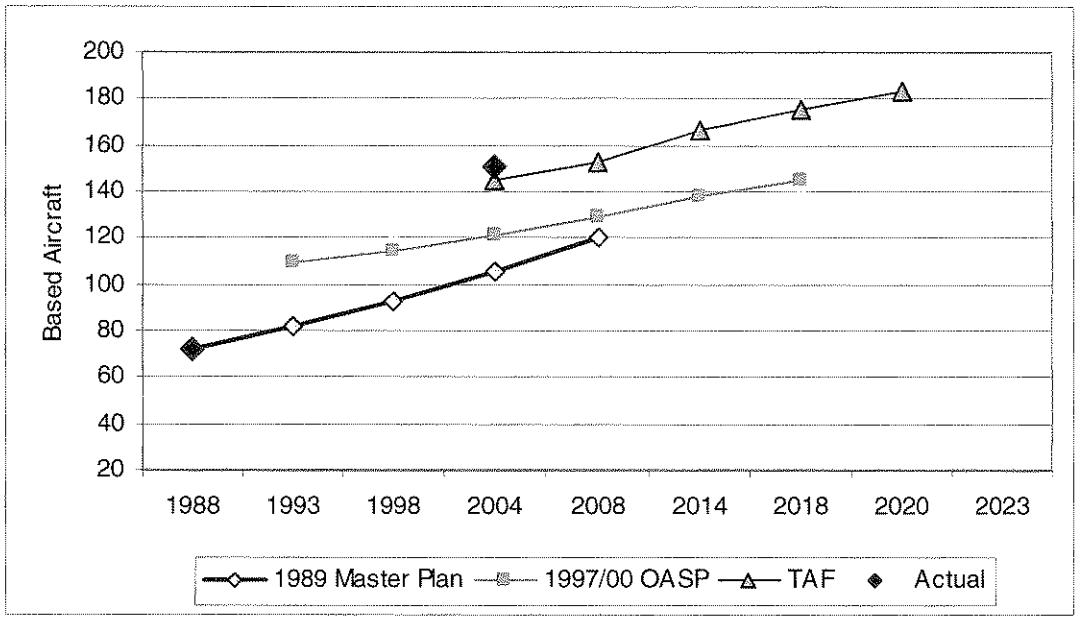
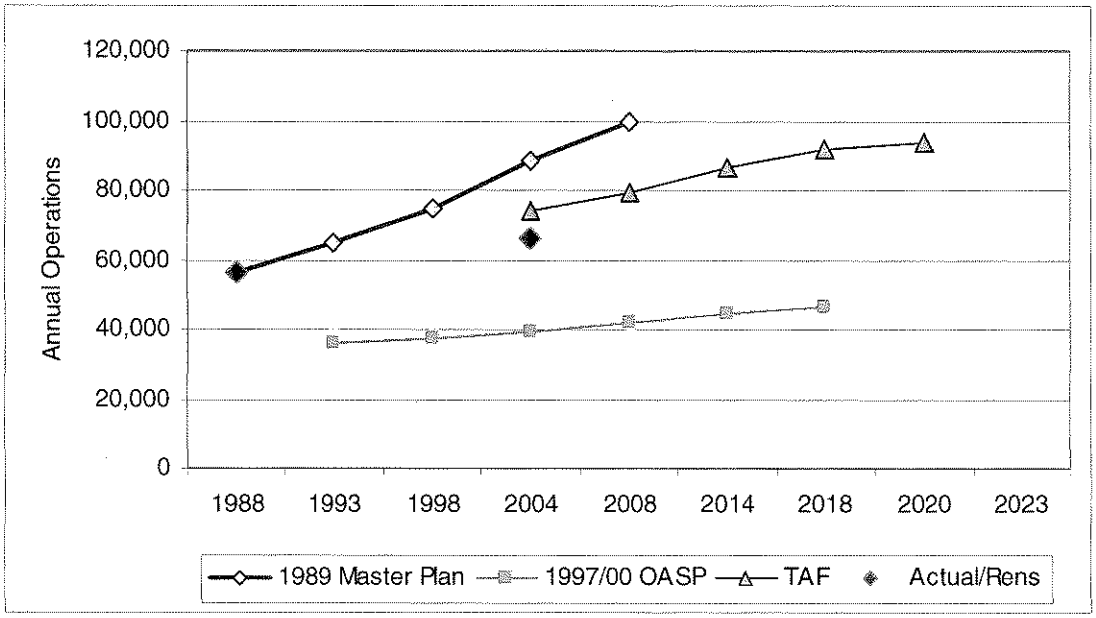


FIGURE 3-8: EXISTING AIRCRAFT OPERATIONS FORECASTS (MMV)



UPDATED FORECASTS

Based on the review of recent historical activity trends at MMV, updated based aircraft, operations and fleet mix forecasts were developed for the twenty-year planning period. The updated forecasts are summarized below and are presented in **Table 3-10 and 3-11** and depicted in **Figures 3-9 and 3-10**, at the end of the chapter. The following information is noted for reference in developing updated aviation forecasts for MMV:

- *The number of based aircraft at MMV increased by 110 percent between 1988 and 2003. This equals an average annual rate of 5.1 percent over the 15-year period.*
- *Annual aircraft operations at MMV increased by 17.4 percent during the 14-year period between 1988 and 2002, or an average of 1.2 percent annually.*
- *Through the first 15 years of the 1988 Airport Master Plan 20-year forecasts, actual growth in based aircraft has exceeded forecast growth by a considerable margin. Aircraft operations have fluctuated above and below the 1990 baseline, but have generally fallen below forecast levels.*
- *The 1997/2000 Oregon Aviation System Plan forecasts of based aircraft and operations are significantly lower than current activity.*
- *The FAA TAF projections of based aircraft are slightly lower than recent historical activity; the TAF operations forecasts are slightly higher than current activity.*
- *The number of hangar spaces constructed at MMV increased by 66 (244 percent) between 1988 and 2003.*
- *71 percent of locally based aircraft (on airport) were stored in hangars at MMV in 2003, up from 27 percent in 1988.*
- *Evergreen International Air typically bases between 15 and 25 aircraft at their facility adjacent to MMV. Most of the aircraft operate on extended contracts and are based in McMinnville for maintenance and between assignments. Evergreen currently has two locally based business jet aircraft including a Learjet 35 and Gulfstream IV. According to Evergreen staff, the business jets operate regularly at MMV with an average of five flights per week.*

- *The fixed base operator (FBO) estimates that 90 percent of the helicopter activity at MMV is related to itinerant flight training from Hillsboro and other nearby airports.*

- *Aviation fuel deliveries at MMV increased 45 percent between 1998 and 2002. Although aviation gasoline (AVGAS) increased moderately (11%), the volume of jet fuel doubled in four years and accounted for nearly 50 percent of the 170,000 gallons of fuel delivered at the airport in 2002.*

- *Glider operations at MMV are currently estimated at 2,500 flights, which equal 10,000 total operations (takeoff and landing) for the gliders and the tow aircraft. There were 21 gliders based at MMV in 2003.*

- *Water service pressure at to the airport had decreased in recent years, which prompted a temporary moratorium on new building construction (including hangars) until water system upgrades could be completed. An upgrade project was completed in 2004.*

- *Between 1990 and 2002, the population of McMinnville and Yamhill County increased at an average annual rate of 3.86 and 2.44 percent respectively.*

- *The State Office of Economic Analysis (OEA) projects Yamhill County population to grow at an annual average of 1.8 percent between 2000 and 2020. It is assumed that McMinnville's growth will continue to run slightly higher than county growth.*

The FAA's long-term aviation forecasts[27] project a very modest increase (0.7% average annual growth) in the active U.S. general aviation fleet between 2003 and 2014. The FAA's forecasts for general aviation hours flown, tower operations and instrument operations also reflect modest annual average growth rates ranging from about 1.1 to 1.5 percent over the next ten years. The outlook for business aviation appears to be somewhat better than for other segments of general aviation. The active fleet of turbine aircraft is projected to grow at 2.8 percent annually, with the business jet fleet increasing at an annual average of 3.6 percent. The forecast for hours flown and aircraft utilization (turbine aircraft) are also expected to increase at rates well above the overall general aviation fleet average.

[27] FAA Aviation Forecasts 2003-2014

Based Aircraft

As noted earlier, historic changes in based aircraft numbers at MMV appear to be strongly affected by the periodic availability of new hangar capacity. This suggests that the airport's ability to attract new based aircraft will continue to be driven largely by the ability to provide additional hangar space when demand exists. However, as noted earlier, until recently, a building moratorium effectively limited new construction at MMV to one previously permitted 10-unit T-hangar (constructed in 2004). It is assumed that hangar construction at MMV during the first five years of the planning period will be affected by the residual effects of the recent moratorium as hangar design, permitting, lease negotiations and construction gradually returns to normal after the development constraint is eliminated. It is also believed that some subtle changes in market demand may have been created by the construction of hangars at other nearby airports during the moratorium and by the residual effect of the "no-build" condition at MMV on the local permitting and construction process.

Over the longer period, it is assumed that cumulative increase in hangar capacity within the MMV service area, particularly during the last ten years, has reached or will soon reach a point of temporary equilibrium between supply and demand. It is anticipated that area-wide demand for new hangar space will slow considerably as the existing supply is absorbed over the next five to ten years. Growth after that period will depend largely on the condition of the economy and the general aviation industry.

Population forecasts are one of the few indicators available that provide a general view of a community's future development direction. Although the relationships between population and airport activity are not always consistent, a comparison of data from 1980-forward, indicates that growth in based aircraft at MMV has run about 15 percent above McMinnville's population growth. At times, airport activity has far outpaced population growth, but there have also been periods in which airport activity declined, while population increased. For the purposes of projecting long-term aviation activity, it appears that applying this historical ratio (1.15) to existing long-term population forecasts (1.8% average annual growth) will provide a reasonable projection of based aircraft, which results in an average annual growth rate of **2.12 percent**. Based on these growth assumptions, based aircraft at MMV are forecast to increase from 150 to 228 by 2023.

Although considerably lower than recent historic growth, this projected growth rate appears to be reasonable based on extended historic trends, the current development constraints for hangars at MMV, and an assessment of the region's existing hangar capacity.

Based Aircraft Fleet Mix

Single engine aircraft accounted for 66 percent of MMV's based aircraft fleet in 2003, up from 53 percent in 1988. It is assumed that the percentage of single-engine aircraft will continue to increase, particularly as other aircraft types are expected to increase at a slower rate, remain steady, or even decline. By 2023, single-engine aircraft are projected to account for 75 percent of MMV's based aircraft total. The growth in single-engine aircraft is projected at 2.8 percent annually.

Multi-engine piston aircraft accounted for 6 percent of MMV based aircraft in 2003. Despite the limited production of new multi-engine piston aircraft and their gradual reduction within the general aviation fleet, the percentage of multi-engine aircraft within MMV's fleet is expected to remain near current levels due to their popularity among local aircraft owners.

MMV had two locally based business jets (Evergreen) in 2003. Based on the airfield capabilities of MMV, the diversity of the local economy, and the current aircraft production trends, it is anticipated that the number of business jets based at MMV will increase to six aircraft during the current planning period.

There wer no turboprop fixed-wing aircraft based at MMV in 2003. For the same reasons noted for business jets, it is anticipated that turboprops (particularly single engine aircraft) will be increasingly based at MMV during the current planning period and are projected to total five aircraft by 2023.

There were 21 gliders based at MMV in 2003. According to the local operator, several gliders will likely be sold over the next few years and a smaller fleet will be maintained (approximately 12 aircraft) long term.

There were four helicopters based (on the airport) at MMV in 2003 and the percentage within the local fleet is expected to decline slightly through the planning period.

Evergreen International normally maintains between 15 and 25 aircraft at their facility adjacent to MMV. The current Evergreen fleet includes 2 business jets, 2 single engine aircraft, and 15 helicopters. The Evergreen fleet at MMV has remained relatively stable over the last twenty years. According to company personnel, it is anticipated that the current mix of aircraft will be maintained for the foreseeable future. For forecasting purposes, it is assumed that the Evergreen aircraft fleet (size and mix) will remain unchanged during the current planning period.

Aircraft Operations

The 2002 estimate of 65,961 operations and 150 based aircraft results in a ratio of 440 operations per based aircraft. An updated projection of annual aircraft operations was prepared by applying gradually increasing utilization ratios (450 to 480 operations per based aircraft) to the updated based aircraft projections for the twenty-year planning period. These ratios reflect both an increasing level of locally based aircraft utilization and a higher level of transient activity than current exists. As noted earlier, the recent doubling of jet fuel sales (without a comparable increase in locally based turbine aircraft) indicates an increase in transient business aviation activity, which also contributes to higher utilization ratios.

Based on the rising utilization ratios, aircraft operations are forecast to increase from 65,921 to 109,440 operations by 2023, which equals an average annual increase of **2.44 percent**. Aircraft operations are projected to increase at a slightly higher rate than based aircraft due to the airport's high level of transient air traffic associated with flight training and business aircraft.

The 1988 master plan forecasts assumed that local operations would account for 45 percent of total airport activity and itinerant operations accounted for 55 percent by the end of the planning period (2008). Local operations include aircraft within the traffic pattern (touch and go); aircraft operating within a 20-mile radius of the airport and aircraft executing simulated instrument approaches or low passes on the runway. A review of current activity indicates that approximately 45 percent of MMV's operations are local and 55 percent itinerant. This percentage is expected to be maintained during the current planning period.

Summary

Based on the updated projection, based aircraft at MMV are forecast to increase from 150 to 228 aircraft (52 percent) during the 20-year planning period. This projection reflects an average annual increase of **2.12 percent**. This projection includes higher rate of growth for single engine aircraft, turboprops and business jets; lower rates of growth for multi-engine aircraft; and a decline in the number of gliders at the airport. Evergreen's fleet of aircraft is expected to continue to fluctuate between 15 and 20 aircraft during the planning period although the current level of 20 aircraft is maintained within the forecasts.

Aircraft operations are forecast to increase at a slightly higher rate (**2.44%**) than based aircraft, due to a gradual increase in aircraft utilization above current levels. The higher utilization (average number of operations per based aircraft) reflects both an increase in transient and locally based aircraft activity.

TABLE 3-10
UPDATED FORECASTS (MMV)

	Base Year 2002/03	2008	2013	2018	2023
FAA TAF					
Based Aircraft					
Single Engine	106	117	126	135	148
Multi Engine	6	6	6	6	7
Jet	2	2	2	2	3
Helicopter	10	10	11	11	12
Other	17	18	20	21	22
Total	141	153	165	175	192*
Aircraft Operations					
Local	28,732	31,194	33,656	36,118	38,627
Itinerant	44,402	48,095	51,788	55,481	59,334
Total	73,134	79,289	85,444	91,599	97,961*
Average Operations per Based Aircraft	*519*	*518*	*518*	*523*	*510*
2003 ALP Forecast (Preferred)					
Single Engine	99	118	134	154	171
Multi Engine Piston	9	10	11	12	13
Turboprop (SE & ME)	0	1	2	4	5
Business Jet	2	3	4	5	6
Helicopter	19	19	19	20	21
Glider	21	16	14	12	12
Total	150	167	184	207	228
Aircraft Operations					
Local	29,682	33,820	38,100	43,780	49,250
Itinerant	36,279	41,330	46,540	53,510	60,190
Total	65,961	75,150	84,640	97,290	109,440
Average Operations per Based Aircraft	*440*	*450*	*460*	*470*	*480*

2004 ALP Forecasts prepared by David M. Miller, AICP/Century West Engineering.
*Extrapolated to 2023 using TAF (2015-2020) growth rate.

FIGURE 3-9: UPDATED BASED AIRCRAFT FORECASTS (MMV)

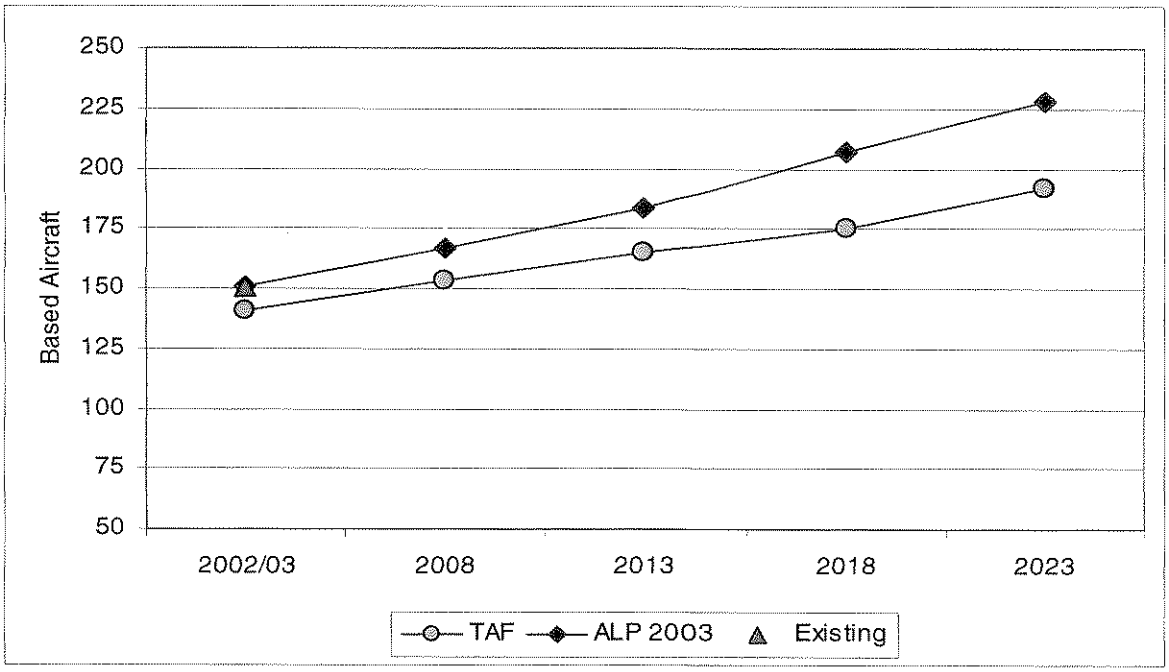
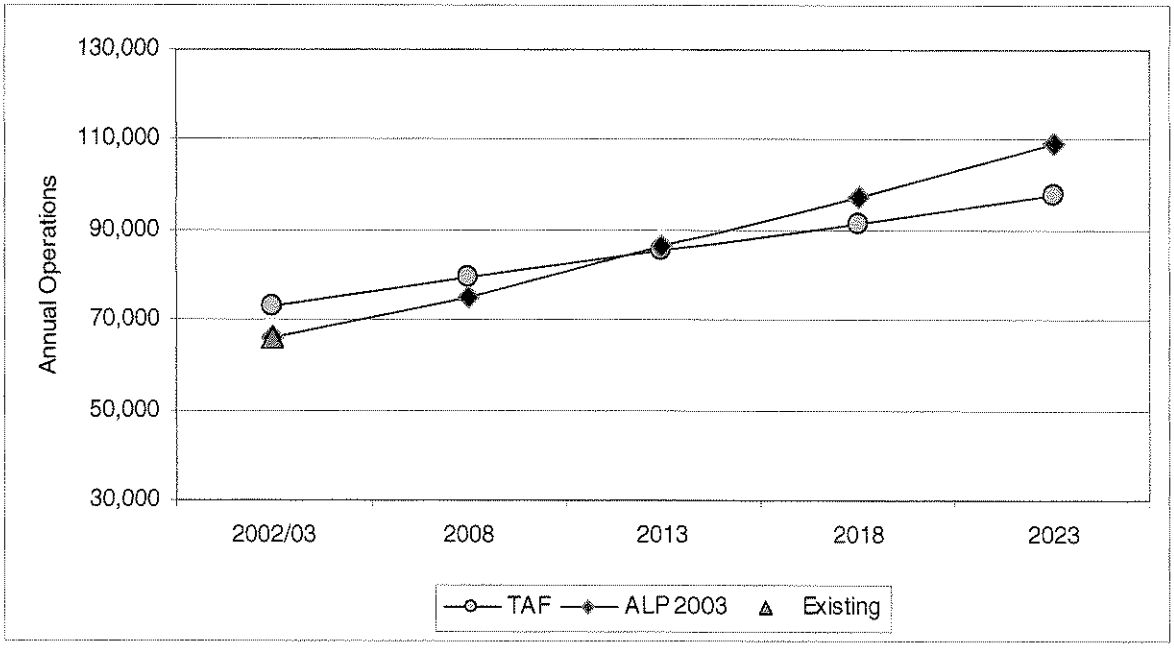


FIGURE 3-10: UPDATED OPERATIONS FORECAST (MMV)



Instrument Approaches

According to FAA data, the number of instrument approaches at MMV typically fluctuates between 300 and 600 per year. However, the approach counts do not reflect the level of instrument flight training, including practice instrument approaches that are terminated before the approach is completed. The FAA TAF projects MMV instrument approaches at a static 437 through 2020. For planning purposes, it is assumed that the current level of instrument approach activity will continue through the planning period. This accounts for approximately 0.6 percent of annual aircraft operations at MMV, which equates to a range of approximately 450 to 700 approaches per year.

Fleet Mix and Design Aircraft

The 1988 Airport Master Plan identified three future "critical aircraft" for MMV based on wingspan, weight, and approach speed. The future airport reference code (ARC) D-III appeared to reflect a combination of the deHavilland Dash 8 (ADG III) and two locally based large business jets (Approach Category D). It does not appear that sufficient Dash 8 or other Design Group III aircraft activity currently exists or is anticipated during the current planning period to justify maintaining the D-III ARC.

However, a review of existing air traffic indicates that large business jet activity (Approach Category C and D) meets the FAA minimum requirements for determining critical aircraft. By FAA definition, the "design aircraft" must have a minimum of 500 itinerant annual operations. C-II and D-II business jet activity is currently estimated at 600 annual operations at MMV. This activity includes all of Evergreen's estimated 500 annual business jet operations (one Gulfstream IV, one Learjet 35) and approximately 100 of the estimated 400 annual transient business jet operations reported by the airport FBO. Design aircraft operations are summarized in **Table 3-11.**

The based aircraft fleet at MMV in 2003 included 66 percent single engine aircraft; 6 percent multi-engine; 13 percent helicopter; 1 percent business jets; and 14 percent gliders. Some changes within the based mix are anticipated, although single engine aircraft will continue to represent the largest portion of based aircraft through the planning period.

Forecast Summary

The updated forecast of aviation activity at MMV is summarized MMV in **Table 3-11**. The preferred forecast of based aircraft represents an annual average growth rate of 2.12 percent over the twenty-year planning period, although growth early in the planning period reflects the short-term increase expected to result from current hangar construction. Aircraft operations are forecast to increase at an average annual rate of 244 percent during the planning period, which reflects gradually rising aircraft utilization levels at the airport. The breakdown between local and itinerant operations is projected to be 45/55 percent. Design aircraft operations (C/D-II aircraft) are projected to account for approximately 1 percent of overall operations at MMV through the twenty year planning period.

TABLE 3-11
PREFERRED FORECAST SUMMARY

	Existing 2002/03	2008	2013	2018	2023
Based Aircraft (on airport)					
Single Engine	99	118	134	154	171
Multi Engine Piston	9	10	11	12	13
Turboprop (SE & ME)	0	1	2	4	5
Business Jet	2	3	4	5	6
Glider	21	16	14	12	12
Rotor	19	19	19	20	21
Subtotal	**150**	**167**	**184**	**207**	**228**
Average Operations per Based Aircraft	*440*	*450*	*460*	*470*	*480*
Aircraft Operations					
Local (45%)	29,682	33,820	38,100	43,780	49,250
Itinerant (55%)	36,279	41,330	46,540	53,510	60,190
Total	65,961	75,150	84,640	97,290	109,440
Design Aircraft Operations (C-II/D-II Business Jet)	600	680	760	880	990