Memorandum

Re: Final Emerging Issues Paper
Decline in General Aviation Activity

This technical memorandum summarizes the decline of General Aviation (GA) and its impacts on the State of Washington.

Introduction

General aviation (GA) encompasses all aviation-related activity except that which is classified by the Federal Aviation Administration (FAA) as military or scheduled air service. GA aircraft include individually-owned aircraft, as well as those used for flight training, medical transport, corporate charters, agricultural operations, and other non-scheduled air service purposes. According to the General Aviation Manufacturer's Association (GAMA), in 2014, the GA industry supported $219 billion in total economic output in the United States and 1.1 million jobs.

In its *2014 General Aviation Statistical Databook & 2015 Industry Outlook*, GAMA also identified the State of Washington ranking 6th in the U.S. in terms of GA's total Gross Domestic Product (GDP) impact per capita, and 10th in terms of total jobs attributable to GA. As of December 31, 2014, the State of Washington had 18,665 certified pilots, 6,052 of which were certified as private aircraft pilots. [1]

This document identifies recent trends in the GA industry such as increasing costs of aircraft ownership, aircraft technological requirements, among others, and their impacts on activity in the State of Washington and the U.S. as a whole. Examples of initiatives that aim to increase the pilot population and make flying more affordable are also examined.

Industry Trends and Outlook

Although the number of active aircraft in the U.S. GA fleet and GA operations have decreased significantly in recent years, the FAA estimates in its *Aerospace Forecast 2015-2035* that total GA hours flown increased slightly from 2013 to 2014. Overall, the GA industry has seen noteworthy decreases in the number of fleet aircraft, hours flown, fuel consumption, and operations in recent years. Between 2000 and 2014, GA operations on the national level have declined at an average annual rate of 3.3 percent. According to the FAA, much of this decline can be attributed to economic conditions and fuel prices. These conditions include both the U.S. and global economic downturn that began in 2008-2009 as well as the general costs of ownership and operation of aircraft such as maintenance, storage, etc.

Fuel Costs

Typically, the most measureable and significant cost associated with GA aircraft ownership is the price of fuel. According to the U.S. Energy Information Administration, both the cost of 100LL aviation gas (AvGas) and Jet have decreased between 2012 and 2014 following significant increases in 2010 and 2011. **Table 1** shows the average annual retail price of Jet A and 100LL AvGas from 2000 to 2014. Although these figures are not adjusted for inflation, the cost of both types of fuel has more than tripled between 2000 and 2014.

Table 1: Historical U.S. Aviation Gas and Jet Fuel Prices

Year	U.S. Aviation Gasoline Retail Sales by Refiners ($ per Gallon)	% Change Previous Year	U.S. Jet Fuel Retail Sales by Refiners ($ per Gallon)	% Change Previous Year
2000	1.31		0.85	
2001	1.32	1.3%	0.72	-14.7%

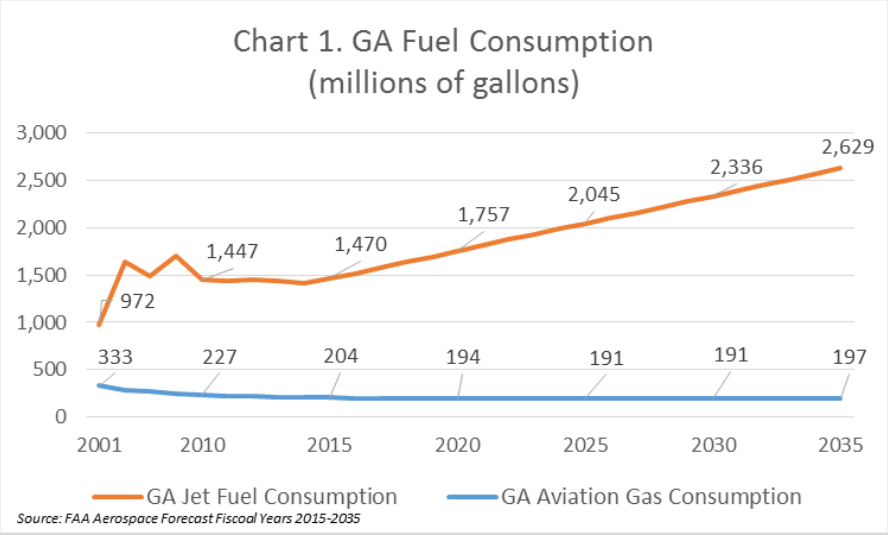
[1] Federal Aviation Administration.

2002	1.29	-2.6%	0.69	-5.4%
2003	1.49	15.9%	0.83	20.6%
2004	1.82	21.8%	1.15	39.3%
2005	2.23	22.6%	1.71	48.6%
2006	2.68	20.2%	1.92	12.3%
2007	2.85	6.2%	2.13	10.9%
2008	3.27	14.9%	2.96	39.2%
2009	2.44	-25.4%	1.66	-44.0%
2010	3.03	24.0%	2.15	29.2%
2011	3.80	25.6%	3.00	39.8%
2012	3.97	4.4%	3.06	2.0%
2013	3.93	-1.0%	2.92	-4.4%
2014	3.99	1.4%	2.70	-7.8%

Source: US Energy Information Administration.

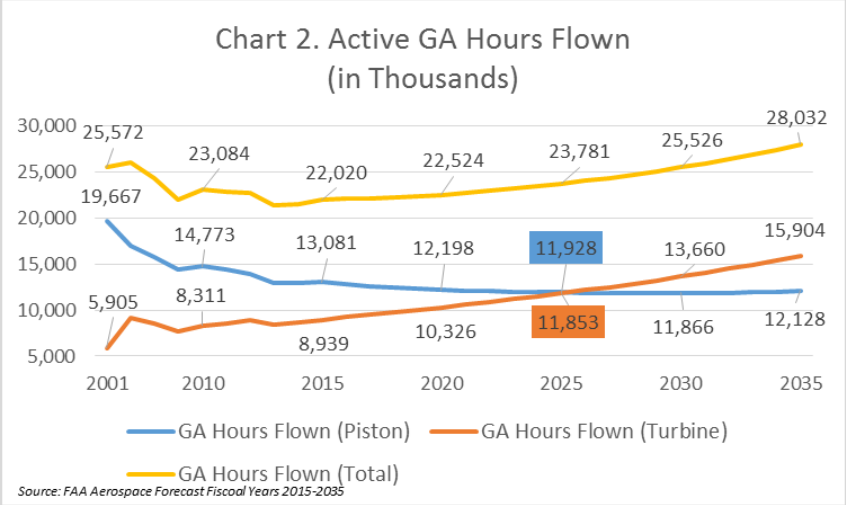
In its *Aerospace Forecast 2015-2035*, the FAA projects Jet fuel prices to increase 2.4% annually from 2014 through 2035, which generally follows the U.S. rate of inflation. This projection suggests that the rapid increase of fuel prices between 2000 and the 2010-2014 period is not likely to be repeated in the long-term. The FAA does not forecast the price of 100LL AvGas, however, it is working with the Environmental Protection Agency (EPA) to replace leaded gas with cleaner burning alternative unleaded fuels. The timing and effect of such a change is unknown at this point.

The FAA does, however, project that the total amount of fuel consumed by the U.S. civil aviation fleet is anticipated to increase 2.3% annually between 2014 and 2035. During that same projection period, total U.S. fleet GA fleet hours flown are anticipated to increase 1.4% annually, while GA operations are anticipated to increase approximately 0.4% annually.[2] Historical and projected fuel consumption for the U.S. general aviation fleet is shown in **Chart 1**.



Historical and projected GA fleet hours flown are shown in **Chart 2**. The trend toward steady growth in fuel consumption but slower growth in hours flown and aircraft operations indicates an anticipated increase in the use of aircraft in the GA sector that use more fuel such as turbo-prop and jet aircraft.

[2] FAA Terminal Area Forecasts July 2015.

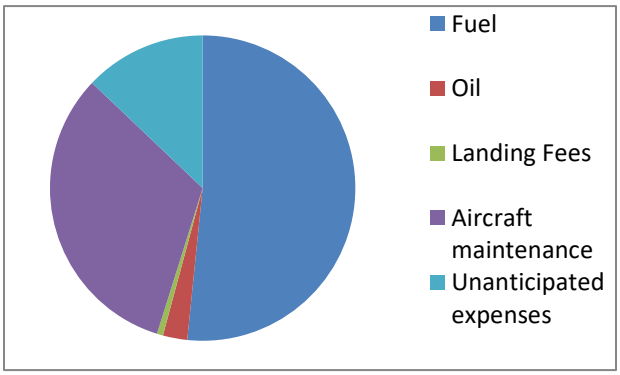


Aircraft Maintenance Costs

In addition to the cost of fuel, there are several types of maintenance costs associated with owning and operating an aircraft. Based on observations at several GA airports, it is not estimated that these expenses have increased as significantly or rapidly as the price of AvGas or Jet fuel. Incorporated into aircraft ownership is the cost of engine oil, regular maintenance inspections (avionics, instruments, etc.), engine overhauls, ramp tie-down or hangar fees, insurance, landing fees, and aircraft accessories. All of these elements impact the cost of aircraft ownership and at varying levels have contributed to the decline of overall GA activity.

According to the Aircraft Owners and Pilots Association (AOPA), the typical annual cost to operate a personal single-piston aircraft (the example provided is a 1975 Cessna 172 Skyhawk that flies 100 hours annually) is broken down accordingly[3]:

- Insurance - $1,200/year
- Hangar lease - $3,000/year
- Fuel - $40 per hour x 100 hours = $4,000/year
- Oil - $2 per hour x 100 hours = $200/year
- Landing Fees = $50/year
- Aircraft maintenance - $2,500/year
- Unanticipated expenses - $1,000/year
- **Total Annual cost/year = $11,950**



The cost of owning and operating an aircraft varies greatly depending on the number of hours flown, whether to store an aircraft in a hangar or on an apron tie-down, type of aircraft, and several other factors. However, according to the FAA, the most rapid decline in total GA hours flown between 2000 and 2014 occurred in 2008 and 2009 when many sectors of the U.S. economy experienced a significant downturn. This trend indicates that although the cost of owning and operating an aircraft is relatively expensive, there is reason to believe that GA activity will rebound as the U.S. economic outlook improves.

[3] AOPA Operating Cost Calculation - http://www.aopa.org/Pilot-Resources/Aircraft-Ownership/Tips-on-Buying-Used-Aircraft/Hypothetical-Operating-Cost-Calculation

Permitted Uses at Airports

Another impact in the GA community has been the FAA's stance on permitted uses for aircraft storage hangars at airports. In July 2014, the FAA issued a notice that specifically identified fabrication and assembly of "homebuilt aircraft" as being an aeronautical use when conducted in aircraft storage hangars at airports. Per the FAA,

> "While building an aircraft results in an aeronautical product, the FAA has not found all stages of the building process to be aeronautical for purposes of hangar use. A large part of the construction process can be and often is conducted off-airport. Only when the various components are assembled into a final functioning aircraft is access to the airfield necessary."[4]

The policy further identified that an airport sponsor would have the authority to designate some areas of an airport for non-aviation use with FAA approval, but that aeronautical facilities of that airport must be dedicated to use for aviation purposes.

The policy explicitly recognizes for the first time "final, active assembly" of aircraft as a protected aeronautical activity. Homebuilders in the past often found themselves unable to rent a hangar because their aircraft were not yet airworthy and their local airport required airworthiness as a prerequisite for hangar rental, which left the homebuilder in the awkward position of being unable to finish the aircraft and transport it to the airport for inspection and flight testing. This new policy eliminates that situation and codifies the aeronautical nature of homebuilding.

Anticipated Impacts of Automatic Dependent Surveillance-Broadcast (ADS-B)

ADS-B is a technology that supports the FAA's Next Generation Air Traffic Control System, or NextGen, which shifts identifying aircraft location and position from ground-based radar to satellite-derived positions. There are two primary types of ADS-B: ADS-B Out and ADS-B In.

ADS-B Out uses a combination of ground stations, aircraft avionics, and the satellite global positioning system (GPS), to provide air traffic controllers with an aircraft's position, altitude, airspeed, and other information critical to ensuring aircraft separation. Because it relies on satellites instead of ground-based radars, ADS-B Out improves the coverage and situational awareness of air traffic controllers, including tracking of aircraft while taxiing at airports with adequate surveillance equipment. The FAA has mandated that aircraft using most controlled airspace in the U.S. be equipped with ADS-B Out by 2020.

ADS-B In, which is optional, generally refers to transmission of weather and traffic information from ground stations into the cockpit, where it can be displayed on ADS-B In panel-mounted avionics or a tablet. The biggest advantage for GA aircraft is from ADS-B In as it allows aircraft to receive and interpret ADSB-Out data from other aircraft. This technology, however, imposes additional equipment and costs on the aircraft owner.[5]

According to AOPA, the cost of ADS-B equipment and installation for most GA aircraft in 2015 was approximately $5,000-$6,000. Due to the high cost, the FAA estimated that just 10 percent of the GA fleet was equipped for ADS-B Out at the end of the 2014 fiscal year. Technology has changed significantly since the FAA mandate was announced in 2010. The introduction of tablets and various applications have made it easier and less expensive to bring weather and other information into the cockpit. At the same time, innovations in the non-certified marketplace have changed the technological landscape. While these may not be solutions in themselves, it could be a strategic direction that could offer ADS-B Out equipage at a significantly lower cost.[6] It would be a great benefit to the general aviation community as a whole if currently non-certified technologies become acceptable substitutions for implementation of ADS-B. This potential cost-savings measure to pilots could reduce the number of aircraft being grounded that are not equipped

[4] EAA News Release, "FAA Releases New Hangar Use Policy". July 24, 2014.
[5] Florida Aviation System Plan – 2035.
[6] AOPA website: http://www.aopa.org/Advocacy/Air-Traffic-Services-,-a-,-Technology/Air-Traffic-Services-Brief-Automatic-Dependent-Surveillance-Broadcast-ADS-B

with certified technology or allow aircraft owners/operators to allocate those savings toward other maintenance costs or fuel.

Impact of Third Class Medical Certifications

In the U.S., medical certifications are required to obtain pilot privileges for a private, commercial, or airline transport license. Each certificate must be issued by a doctor approved by the FAA to a person deemed physically and mentally healthy. The three types of certifications are first class, second class, and third class.

First class certifications pertain to airline transport licenses, second class to commercial pilot licenses, and third class to GA licenses. A third class medical certification is valid for 60 months for pilots under age 40, and 24 months for applicants who are age 40 or older, although there has been a significant push to reform third class medical certification.

In July 2015, a medical reform amendment was added to the Senate Highway Bill in hopes to reform third class medical certification and allow some pilots to fly without the certificate. According to Mark Baker, president of AOPA, reformation of the third class medical certification system would save pilots and the FAA money, boost GA, and stimulate economic activity.[7] At the time that this document was prepared, the amendment had not yet been voted on.

Examples of Growth in GA Activity

Student Pilot License Extensions

Student pilots are important to GA and the aviation industry as a whole. Student pilot numbers had been in decline for many years, but in 2010 the FAA issued a rule that increased the duration of validity for student pilot certificates for pilots under the age of 40 from 36 months to 60 months. As a result, according to statistics compiled by the FAA's Mike Monroney Aeronautical Center, the number of student pilots at the end of 2010 increased by 64.8 percent, or approximately by 47,000 pilots, compared to calendar year end 2009. While the impact of the new rule on the long term trend in student pilots has yet to be fully determined, the number of student pilots slightly increased by 0.2 percent in 2014 from its 2013 level to 120,546. [8]

Reimagined Aircraft

In 2014, AOPA in conjunction with Aviat Aircraft started a program called, "Reimagined Aircraft" in order to allow existing pilots and potential ones an affordable option to fly. The program aims to allow more people the opportunity to fly and become engaged in aviation in ways that are more difficult through singular aircraft ownership.

The program refurbishes aircraft (initial models include the Cessna 150 and 152) and places them into a flying club, partnership, or flight school, and then can be owned and operated for approximately $65/hour, including fuel. According to AOPA's website, "The idea for Reimagined Aircraft grew out of a desire to take a comprehensive approach to growing the pilot population and reverse the rising costs and barriers to flying." Although the number of refurbished aircraft operating in the Reimagined Aircraft program is not yet known, it has the potential to successfully allow more people to fly without all of the costs of individual aircraft ownership.

Summary – Impacts on Washington General Aviation

The preceding sections identify trends that have contributed to a decline in GA-related activity in recent years. Though there has been a slow, steady decline in GA operations, hours flown, and active aircraft in the U.S. fleet since 2000, the economic volatility that occurred in the U.S. from 2008 through 2013 accelerated these declines. As economic stability is slowly being restored, the FAA projects slow, steady growth in the GA industry throughout 2035. The FAA's Aerospace Forecast anticipates volatility in the recreational sector and robust growth in business usage of general aviation. This is evident as the active

[7] http://www.examiner.com/article/medical-certificate-for-pilots-needs-a-reform
[8] FAA Aerospace Forecast Fiscal Years 2015-2035

general aviation piston fleet is projected to increase 0.4 percent annually between 2015 and 2035, compared to 2.4 percent annually for turbine aircraft during that same timeframe. Furthermore, active general aviation hours flown for piston aircraft is projected to decrease 0.5 percent annually from 2014 to 2015, while hours flown for turbine aircraft (turbo-prop and jet) are anticipated to increase 2.2 percent annually during that period. According to the FAA's Terminal Area Forecasts (TAF), growth in the number of GA operations in the State of Washington, however, is anticipated to be nearly three times the national rate. This is likely due to two factors.

The first is that the State of Washington has a disproportionately high number of based aircraft per capita compared with the rest of the U.S. According to the U.S. Census Bureau, the 2014 population of Washington State was 7,061,530 and the population of the U.S. was 318,857,056. Based on estimates identified in the most recent version of the FAA's TAF, there were 5,700 based aircraft in Washington, and 168,299 in the U.S. This translates into one aircraft owned for every 1,239 residents of Washington, and one for every 1,895 in the U.S.

The second factor that likely explains the justification for a healthy GA outlook in the State of Washington is its strong per capita income. The U.S. Census Bureau reported that the average income per person in 2014 for the State of Washington was $30,742 compared with $28,155 for the U.S. as a whole. This denotes a difference of over 9% in favor of Washington, which has the 11th highest per capita income of any state in the U.S.[9] As noted previously, the cost of owning and operating an aircraft is relatively expensive; therefore it is logical that locations with higher incomes would foster a greater propensity toward flying and aircraft ownership. The higher rate of per capita aircraft ownership in the State of Washington confirms this assumption.

Table 2: Comparison of Washington State and U.S. GA Operations

Year	State of WA GA Operations	Change	U.S. GA Operations	Change
2000	2,692,678		87,075,518	
2005	2,653,065	-1.5%	81,127,052	-6.8%
2006	2,572,998	-3.0%	80,150,000	-1.2%
2007	2,616,339	1.7%	80,216,778	0.1%
2008	2,665,594	1.9%	78,051,786	-2.7%
2009	2,558,616	-4.0%	73,630,294	-5.7%
2010	2,476,305	-3.2%	71,262,121	-3.2%
2011	2,415,940	-2.4%	69,930,768	-1.9%
2012	2,394,962	-0.9%	69,607,152	-0.5%
2013	2,316,929	-3.3%	68,838,612	-1.1%
2014*	2,356,006	1.7%	68,719,669	-0.2%
2015*	2,381,987	1.1%	68,963,282	0.4%
2020*	2,496,387	4.8%	70,288,206	1.9%
2025*	2,622,166	5.0%	71,707,396	2.0%
2030*	2,761,147	5.3%	73,237,746	2.1%
2035*	2,915,283	11.2%	74,892,671	4.4%
Change 2000-2015	*-310,691*	*-11.5%*	*-18,112,236*	*-20.8%*
Change 2015-2035	*533,296*	*22.4%*	*5,929,389*	*8.6%*

**Estimate*

Source: FAA Terminal Area Forecast - July 2015

[9] U.S. Census Bureau American FactFinder

The FAA projects that the number of GA operations in the U.S. is anticipated to grow by 8.6% between 2015 and 2035 (0.4% annually). The FAA also forecasts that GA operations in the State of Washington will increase 22.4% during that same timeframe (1.1% annually). Although programs aimed to preserve the existing GA pilot base and to spur growth in the number of new pilots provide an added benefit, aircraft fuel and maintenance costs, medical certifications, ADS-B implementation, economic uncertainty, and other factors will likely curb some of this potential growth. It is anticipated that general aviation operations and activity as an industry in Washington will outperform the U.S. as a whole, however, a steady, more conservative increase is more realistic long-term.