8 Alternative Scenarios

8.1 Introduction

This Chapter provides a planning-level analysis of issues that may present themselves in the future and how those issues might affect Florida's airport system. Planning for alternative scenarios provides an opportunity for preemptive strategies to be in place should significant changes occur to the state's aviation system. This exercise is conducted for all modes of transportation in the Florida Transportation Plan (FTP) by exploring potential futures impacting transportation as a whole. The FTP Vision Element presents several "what if" scenarios, paired with "could we" solutions. This same concept is carried forward in this alternative scenario analysis.

Several potential impacts to the system were reviewed with the stakeholder groups (see **Chapter 2 – Florida's Aviation History and Identification of Current Issues** and **Appendix A – Stakeholder Outreach**) to identify those expected to have the greatest potential impact on Florida's aviation system. These topics included:

- Aging population
- Autonomous vehicles (on the ground and in the air)
- Competition for space operations
- Customs and immigration
- Electric/alternative fuels
- Stability of oil prices
- Opening of the Cuba market
- Terror threats
- Regulatory stability (federal and state)
- Reliance on tourism
- Resiliency
- Availability of a trained technical workforce
- Sustainability

While it is possible that each of these issues may impact the system in some way, stakeholders identified three major concepts as those for analysis: stability of oil prices, resiliency, and reliance on tourism. It is interesting to note that the effects of these can overlap.

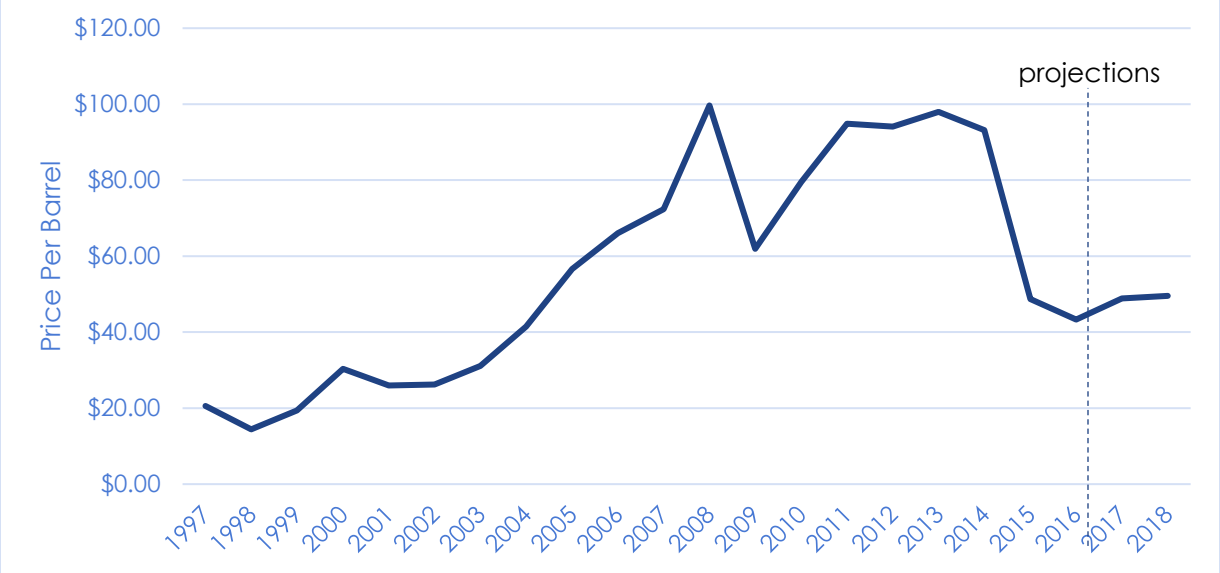
The following evaluates each of these alternative scenarios and their potential impacts on the Florida aviation system.

8.2 Stability of Oil Prices

The price of oil affects all components of the aviation industry, as it is the largest operating expense for aircraft operators. Fluctuations in the oil and gas industry impact commercial service, cargo, and general aviation (GA) operations. Over the past 20 years, the price of oil per

barrel has swung significantly from a low in 1997 of $20.59/barrel to a high of $99.67/barrel in 2008, right before the economic downturn. Since 2008, oil prices have fluctuated but remained high until 2014 when prices dropped below the $50/barrel mark, shown in **Table 8-1**. The *Federal Aviation Administration (FAA) Aerospace Forecast 2017 – 2037* projects the price of oil to rise from around $39/barrel in 2016 to $47 in 2017, and projects a continued rise thereafter to exceed $100 by 2026 and approach $132 by the end of the 20-year forecast period.

Figure 8-1: West Texas Intermediate Crude Oil Price



Source: Short-Term Energy Outlook – U.S. Energy Information Administration

Changes in oil prices can have several impacts on Florida's aviation system, as outlined below by type of operation.

8.2.1 Commercial Service Impacts

As a major cost for airlines, changes in oil prices result in changes in operating costs. To protect themselves against unknown or unexpected spikes in oil prices, many airlines hedge oil prices on at least a portion of their fuel volume. This concept works well for airlines when spikes in oil prices occur as they are paying a consistent price for oil, saving the airlines significant amounts of money compared to other airlines that do not hedge and are forced to pay the higher oil prices. However, when fuel prices drop significantly as they did between 2014 and 2016, airlines that utilized hedging suffered significant losses as the market price of oil dropped far below their hedging price, resulting in a missed opportunity to save on operating costs.

Airlines are employing other cost-saving measures to protect against spikes in fuel price. For example, Delta Air Lines purchased an oil refinery near Philadelphia in 2012 to help offset the risk of higher jet fuel prices. Purchased for $150 million, with an additional $100 million in refurbishments, the cost of acquisition is roughly the cost of a new wide-body plane. Delta estimated they would reduce their annual fuel expense by $300 million once the refinery was in

operation.[1] After significant losses in the first years of operation, the refinery had profitable years in 2014 and 2015, offsetting some of the initial losses.[2] However, industry factors continue to play a large role in the profitability of the refinery, such as the volatile price of crude oil. While the refinery offers Delta control over refining margins, it does not control the price of crude oil which is the largest factor in jet fuel price.

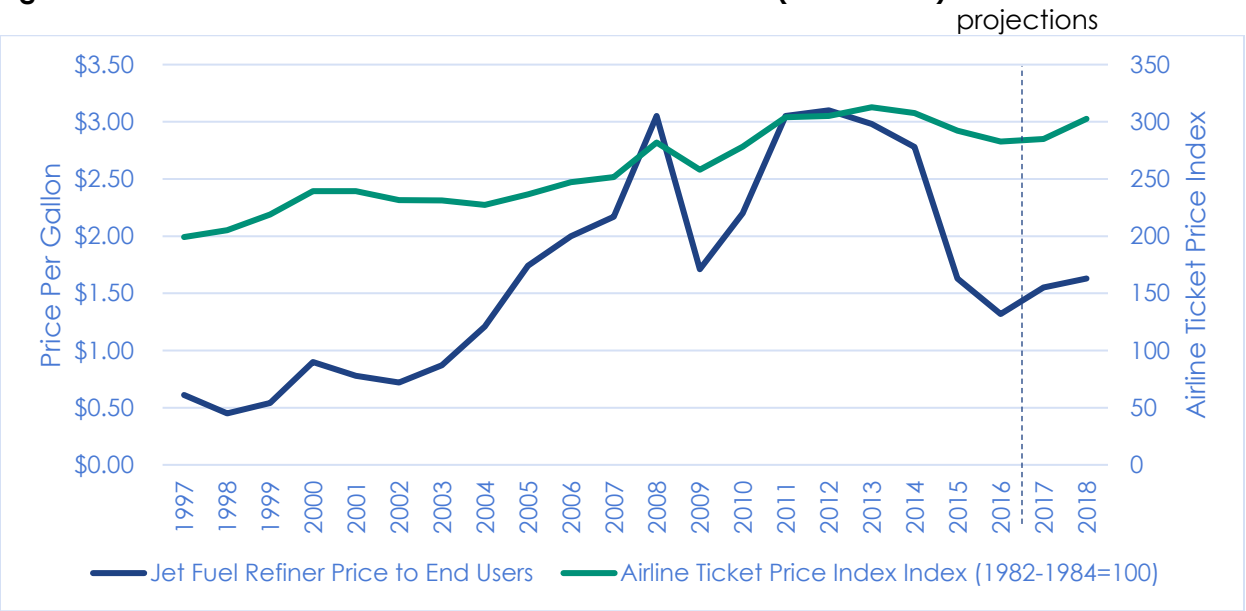
Fluctuations in operating costs can be realized in several connected ways as outlined below.

8.2.1.1 Ticket Prices

The price pattern of jet fuel shown in **Figure 8-2** closely mimics the price trends of oil shown in **Figure 8-1**. When jet fuel prices increase, airlines try to offset some of the increased operational costs by raising airfare prices or implementing amenity fees (seat selection, checked baggage, early check-in, etc.) for the consumer. While not as volatile as the changes in oil and jet fuel prices, there are noticeable fluctuations in airline ticket prices shown in Figure 8-2 that follow the changing fuel price pattern. Alternatively, when fuel prices drop, consumers may or may not reap the benefits. Recent history has shown some airlines pocket their savings and re-invest into their companies, while others have decreased their ticket prices, spurring additional business and expansion of low-cost carriers (LCCs) and ultra-low-cost carriers (ULCCs), such as Southwest Airlines, Frontier Airlines, and Spirit Airlines.[3] A combination of LCCs and ULCCs serve 16 of Florida's commercial service airports, providing an opportunity for continued lower airfares to and from Florida, especially when oil prices are low.[4] However, although LCCs and ULCCs typically provide cheaper airfare, they are not immune to fluctuations in oil prices and changing operating costs can threaten their long term viability. These carriers comprise a large percentage of the total air service provided in the state and as such, their continued success directly impacts the success of Florida's commercial service airports. While the price of oil is a factor in the cost of airfare, it is important to note that ultimately the price is driven more by demand.

[1] http://www.nytimes.com/2012/05/01/business/delta-air-lines-to-buy-refinery.html?mcubz=1
[2] https://www.fool.com/investing/general/2015/08/27/deltas-refinery-bet-is-finally-paying-off.aspx
[3] http://www.businessinsider.com/cheap-oil-is-having-an-impact-on-air-travel-2015-8
[4] https://www.southwest.com/flight/routemap_dyn.html
https://www.spirit.com/RouteMaps.aspx
https://www.flyfrontier.com/plan-and-book/route-map/

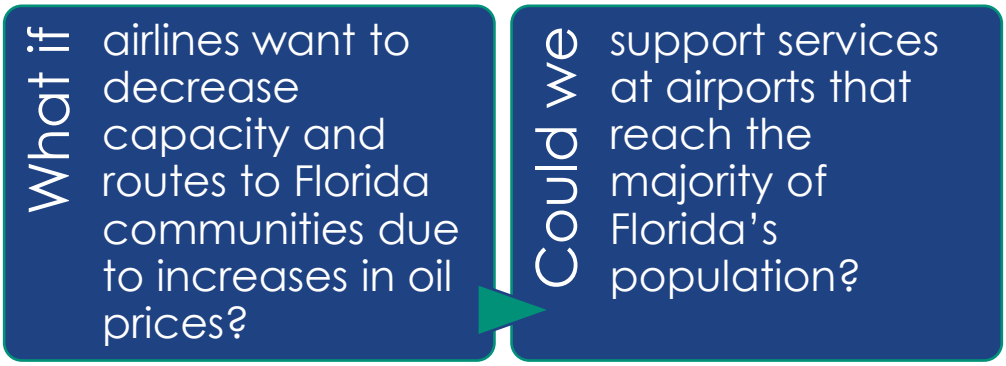
Figure 8-2: Jet Fuel Refiner Price vs. Airline Ticket Price Index (1997 – 2018)



Source: Short-Term Energy Outlook – U.S. Energy Information Administration

8.2.1.2 Airline Capacity

Generally, when oil prices drop, airlines' profits increase (unless they have hedged oil at a higher price) and they may reduce airfares. When airfare rates are reduced, it can spur an increase in air travel demand and put pressure on airlines to increase capacity by increasing the size of their fleet or the number of operations. While an expansion serves airlines well during times when oil prices are low, they risk an expansion backfiring on them when oil prices recover to their higher prices and their profits are lower.[5] The demand for travel to Florida is high, as the state attracts nearly 115 million visitors a year.[6] If airlines increase capacity in areas with high demand, it is possible that the state may benefit from increased tourism and associated economic impacts. Alternatively, if airlines decrease capacity to counter high oil prices, it is possible that routes and frequencies will be reduced, resulting in increased ground-based travel as opposed to air travel.

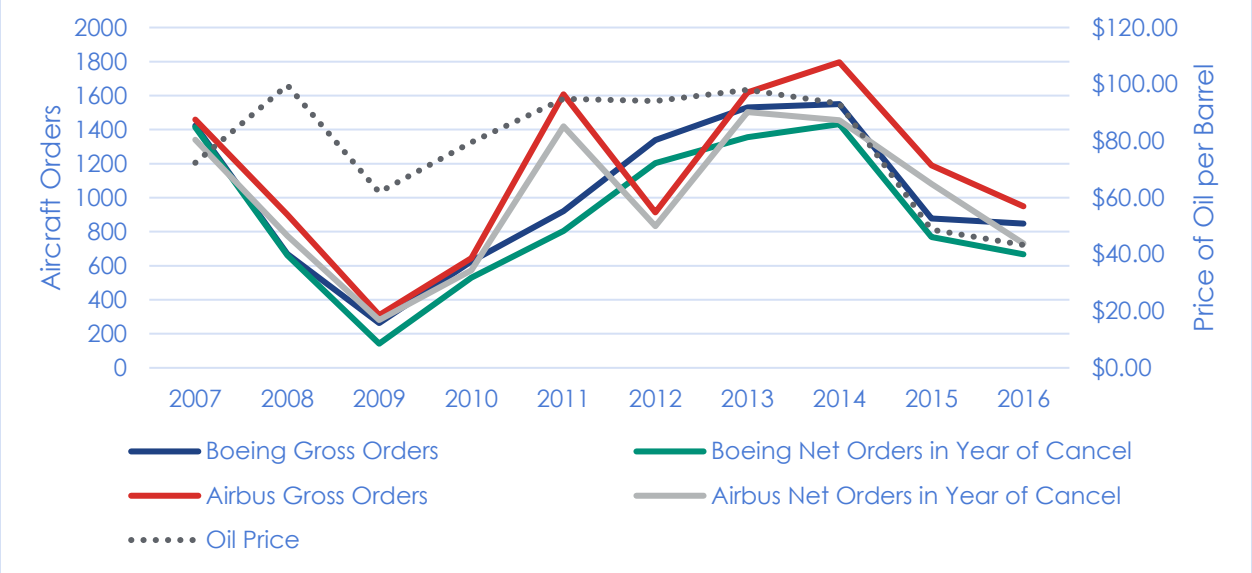


[5] https://www.macquarie.com/id/corporate/expertise/related/china-drives-raw-materials/jet-fuel-price-risk/
[6] https://www.visitflorida.org/resources/research/

8.2.1.3 Changing Airline Fleet

Airlines have placed an emphasis on the replacement of older, less fuel-efficient aircraft with new fuel-efficient aircraft to reduce operating costs over time. This objective is strengthened when oil prices are high and are expected to continue rising. However, when the price of oil plummeted in 2014, some airlines placed holds or cancelled some of their orders with aircraft manufacturers, as it was cheaper for them to continue to operate their older model aircraft (see **Figure 8-3**). Even still, oil prices are bound to rise again and airlines are preparing for that scenario by strategizing the replacement of their older aircraft and growing their fleet in general, despite fluctuations in oil prices.[7] Total 2017 orders for airline manufacturers Airbus and Boeing are not available as of the time of this writing, but will likely show an uptick in total orders. Across the United States (U.S.) travelers will likely see newer aircraft slowly continue to enter the rotation.

Figure 8-3: Airbus and Boeing Orders 2007 – 2016 vs. Oil Price



Source: Short-Term Energy Outlook – U.S. Energy Information Administration; http://www.aircraft.airbus.com/market/orders-deliveries; http://www.boeing.com/commercial/#/orders-deliveries

8.2.2 GA Impacts

While the commercial service market has certainly seen its fair share of changes in response to varying oil prices, the aviation market sector hit the hardest when oil prices rise is the GA community. Much of the GA sector is composed of business users who fly for business purposes and recreational users who fly for enjoyment. When oil prices rise, aircraft fuel prices rise and using business aircraft may no longer be economical. For recreational flyers, the hobby becomes drastically more expensive. The plummet in oil prices beginning in 2014 benefited GA

[7] http://aviationweek.com/commercial-aviation/drop-oil-prices-means-airline-profitability-boost-now

users as their cost of operation was reduced, which spurred additional activity; however, with prices on the uptick, forecasted growth in GA activity is conservative.

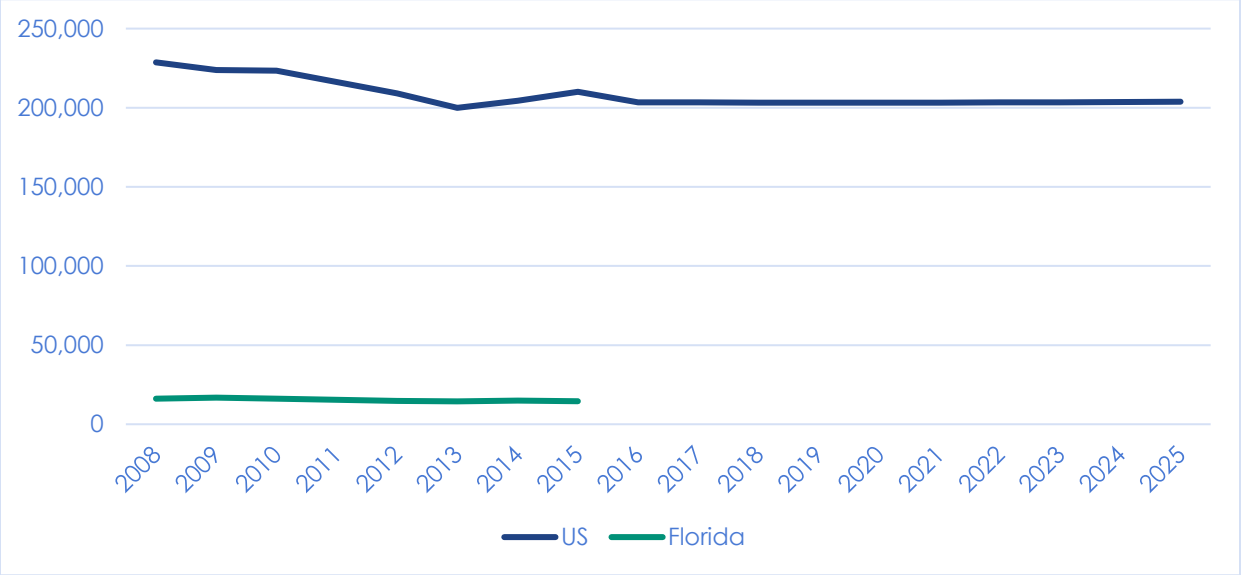
The General Aviation Manufacturers Association's (GAMA's) *2016 Generation Aviation Statistical Databook & 2017 Industry Outlook* provides historical and forecasted GA activity in terms of active aircraft and hours flown. Table 8-1 includes the historical number of active aircraft and hours flown in the U.S. overall and in Florida, specifically. A decrease can be seen in both metrics in the 2008 – 2013 timeframe, with an uptick in both in 2014, likely a result of the drop in oil price. Long-term forecasts are showing a decrease in active aircraft and hours flown beginning in 2016 with a slow rebound through the report's forecast period. **Figure 8-4** and **Figure 8-5** illustrate the changes over time.

Table 8-1: Historical and Forecasted GA Activity from GAMA

Year	Active Aircraft		Hours Flown	
	U.S.	***Florida***	***U.S.***	***Florida***
2008	228,663	16,143	26,009,000	2,382,000
2009	223,877	16,804	23,763,000	2,047,000
2010	223,370	16,126	24,802,000	1,839,000
2012	209,034	14,754	24,403,000	1,958,000
2013	199,927	14,450	22,876,000	1,868,000
2014	204,408	15,028	23,271,000	2,052,000
2015	210,030	14,543	24,142,000	2,034,000
2016	203,425	*	23,300,000	*
2017	203,300	*	23,490,000	*
2018	203,200	*	23,714,000	*
2019	203,185	*	23,956,000	*
2020	203,195	*	24,201,000	*
2021	203,225	*	24,461,000	*
2022	203,340	*	24,708,000	*
2023	203,365	*	24,960,000	*
2024	203,555	*	25,223,000	*
2025	203,745	*	25,513,000	*

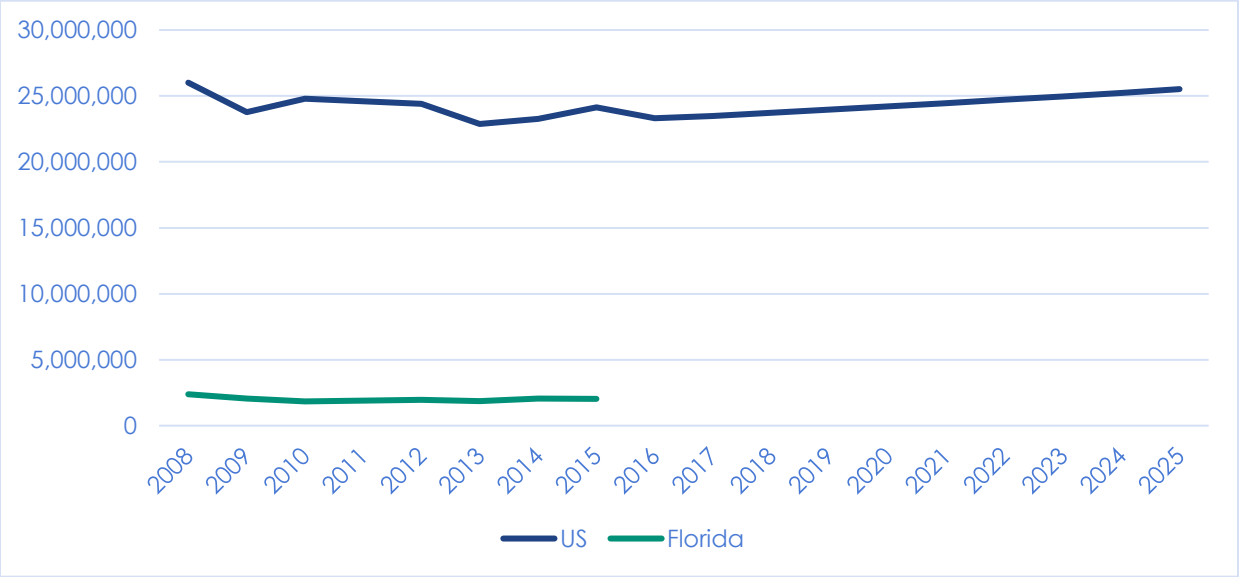
Source: GAMA 2016 General Aviation Statistical Databook & 2017 Industry Outlook
**forecast data not available*

Figure 8-4: Active Aircraft in the U.S. and Florida 2008 – 2025*



Source: GAMA 2016 General Aviation Statistical Databook & 2017 Industry Outlook
**forecast data for Florida not available*

Figure 8-5: Hours Flown in the U.S. and Florida 2008 – 2025*

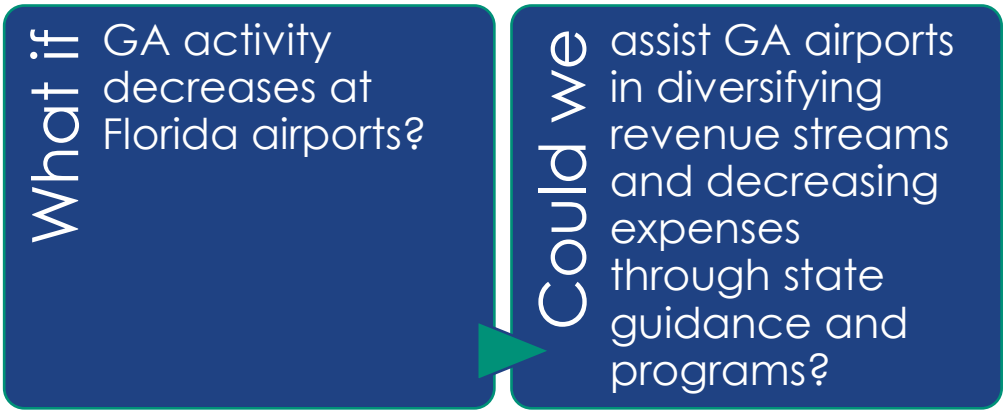


Source: GAMA 2016 General Aviation Statistical Databook & 2017 Industry Outlook
**forecast data for Florida not available*

The *FAA Aerospace Forecast 2017 – 2037* also projects an overall increase in GA hours flown through 2037 (by 0.9% per year) despite the projected oil price increase to $137/barrel at the end of the forecast period. It is important to note that should oil prices rise to a point of discouraging GA activity, it not only will stall activity by current pilots, but also may become a barrier to entry for new pilots and aviation enthusiasts which may further exacerbate the

shortage in pilots, mechanics, and other aviation professionals that are needed to sustain the aviation industry.

In addition to the potential impacts on GA operations, changes in GA aircraft in response to oil price fluctuation can pose a challenge to airport owners and fixed base operators (FBOs) that may see a reduction in fuel sales resulting from newer, more fuel-efficient engines. Since fuel sales often compose a large portion of an airport's revenue stream, a reduction in fuel consumption has the potential to negatively affect airport business. Airports in Florida should consider other potential changes in aircraft technology (such as electric engines) and alternative fuels (such as unleaded aviation gasoline [avgas]) that will require new or retrofitted fueling/charging facilities and policies to keep airports sustainable. The state must also prepare for these advancements, especially as they pertain to its Aviation Grant Program and the State Transportation Trust Fund, which are both funded through fuel taxes.



8.3 Resiliency

The capacity and ability to bounce back or recover during challenging times is a quality that is necessary for long term sustainability. While Florida's airports have played a role in the resiliency of communities, they also face challenges in the form of industry changes that impact their long-term sustainability. Each of these concepts is discussed in greater detail in the following sections.

8.3.1 Community Resiliency

Airports serve many functions, some of which may not be readily recognized by local communities. While highways and road networks are said to be the backbone of our nation's infrastructure network, airports provide access that may not be possible by ground transit. For example, airports are essential for air ambulance and medical transport, emergency response, aerial firefighting, disaster relief, search and rescue, and more. When conditions arise that require quick access, Florida's aviation system provides it. Florida's airports have been critical in the emergency response before and after disasters strike, most recently with Hurricane Irma in 2017 (**Figure 8-6**) and Hurricane Matthew in 2016. Even when air transport is not needed, airports can serve as staging grounds for large fleets of vehicles, including emergency response and utility trucks that are necessary for restoration of power to affected areas. Recently, the Marion County Airport served this role after a large storm came through their local community, housing

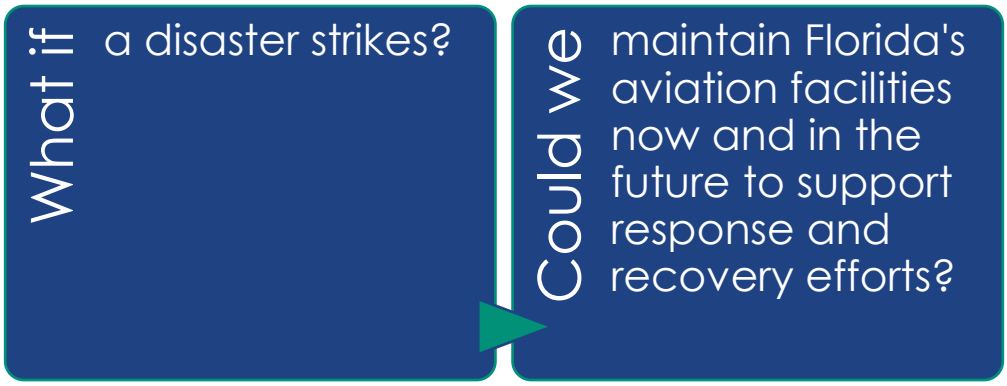
1,200 line trucks and 600 other vehicles. Witham Field in Stuart also served this role during Hurricane Matthew, as seen in **Figure 8-7.**

Figure 8-6: Air Transport of Doctors, Nurses, and other Emergency Response Personnel to Florida before Hurricane Irma Made Landfall

Source: http://www.wftv.com/weather/eye-on-the-tropics/doctors-nurses-travel-to-orlando-before-hurricane-irma-hits/606768480

Figure 8-7: Witham Field in Stuart, Florida Serves as Staging Area for In- and Out-of-State Utility Trucks after Hurricane Matthew

Source: TC Palm – part of the USA Today Network (http://www.tcpalm.com/story/news/local/shaping-our-future/2016/10/14/fpl-hurricane-matthew-outages-lessened-decade-changes-system/91998694/)



8.3.2 Industry Resiliency

In addition to serving critical functions, such as helping Florida's communities remain resilient in challenging times, the aviation system must also be resilient to changes in the industry that threaten the long-term viability of aviation in the state. Some notable industry issues that are impacting Florida aviation include changes in commercial service strategies, GA industry changes, and a diminishing aviation workforce.

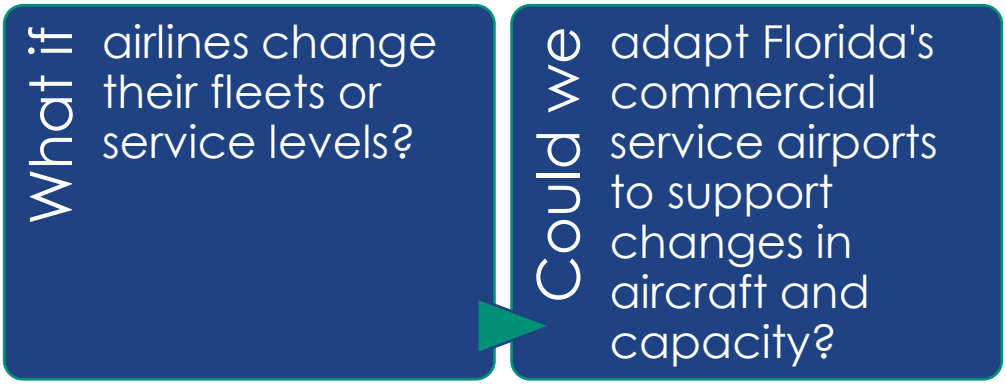
8.3.2.1 Commercial Service

Changes in the commercial service aviation industry are being experienced at some of Florida's commercial service airports. Modifications to airline fleets (changing infrastructure requirements), routes and frequencies (capacity), and fare structures (demand levels) are a few of the major changes taking place across airlines. For example, recent trends in fleet changes include the phasing out of turboprop and smaller regional jet aircraft for larger regional jets (**Figure 8-8**). As smaller commercial aircraft are phased out, some airports are having to adapt their infrastructure to accommodate larger aircraft—including jet bridges, support equipment (tugs, baggage handling), airfield pavement expansion, and "hold rooms," whose size must be increased for a larger number of passengers to clear security.

Figure 8-8: Regional Jet Aircraft

Changes to routes and frequencies can generate capacity issues at commercial service airports that may be undersized (**Figure 8-9**) to handle larger groups of the traveling public (such as those generated with the establishment of new service in a community or additional flight frequencies), or oversized to handle smaller groups of passengers resulting from the loss of a preferred airline's service or establishment of more desirable service at a nearby airport. Other factors impacting capacity include the popularity of LCCs and ULCCs that make air travel possible for a larger population that otherwise would travel by car, bus, or train. The commercial airline industry is fluid and adjustments to service are made frequently. Florida airports' ability to adapt quickly to operational changes is critical for their continued viability.

Figure 8-9: Terminal Over Capacity



8.3.2.2 General Aviation

Several advancements are impacting Florida's GA airports in the near term. Specifically, the increase in activity by new aircraft categories, including experimental and light sport aircraft (LSA) (**Figure 8-10**), very light jets (VLJs) in the corporate market, rotorcraft designs (such as gyrocopters), and aircraft with vertical take-off and landing (VTOL) capabilities. Each of these aircraft types has the potential to significantly impact current infrastructure and future infrastructure needs. Anticipated modifications include minor adjustments, such as additional apron space to major changes in airfield design criteria. Operations by Unmanned Aerial Systems (UAS) have by far exceeded the use of any other new aircraft type. UAS are operating across the state, on and off airport facilities (**Figure 8-11**) for recreational, commercial, educational, and safety purposes. While not as much of an infrastructure concern, these aircraft do pose a threat to the safety of airport operations if not conducted according to federal, state, and local requirements.

Figure 8-10: LSA Example

Figure 8-11: UAS Operating Off-Airport

Additional changes affecting the GA industry include the development and transition of alternative fuels to replace the leaded avgas that is commonly used. It is anticipated that infrastructure modifications will be necessary to accommodate alternative fuel types, such as diesel and automobile gas (MoGas), and a possible increase of Jet-A fuel usage. Modifications may include additional fuel tanks and/or larger tanks at airport fueling facilities. In coordination with the push to eliminate the use of leaded aircraft fuel is the advancement in electric powered aircraft technologies. When electric powered aircraft enter the market, airports will need to consider charging capabilities for aircraft parked on aprons and in hangars.

What if the development and use of new aircraft types accelerates?

Could we prepare Florida's GA airports to meet new infrastructure needs?

8.3.3 Workforce adaptation

The aviation industry has a rapidly growing demand for new workforce additions in the form of pilots, mechanics, air traffic controllers, and more. The overall labor pool has been on the decline for the past 60 years since the baby boom ended.[8] Baby boomers have composed the largest portion of the labor market since the 1960s and many (21.6%) are reaching retirement ages, transitioning out of the labor pool as shown in **Table 8-2.**

Table 8-2: Labor Market Composition

Workforce	Age (years)	2015 (thousands)	Total %	2024 (thousands)	CAGR
Total	16+	156,867	100.0%	163,770	0.54%
Young	16-24	20,611	13.1%	18,498	-1.34%
Emerging	20-24	15,271	9.7%	13,705	-1.34%
Receding	55+	33,860	21.6%	40,575	2.29%

Source: http://onlinepubs.trb.org/Onlinepubs/trnews/trnews304feature.pdf
Note: Assumes 2024 emerging workforce remains constant at 74 percent of young workforce; CAGR = compound annual growth rate

In addition to a shrinking labor pool, other challenges can deter or prevent a potential student or professional from pursuing a career in aviation.

8.3.3.1 Pilots

Although one of the most recognized aviation careers, the high cost of flight training, combined with tuition and living expenses can be a roadblock to students considering a pilot career path. Students enrolled in a collegiate aviation program can spend $150,000 to $200,000 to get their degree and the required flight ratings. The timeframe for completion of their education and licensing can take four to five years. With a relatively low average entry-level salary range of $29,000 to $38,000, repaying student loans can be challenging for graduates.[9] In 2013, the FAA implemented a rule that all first officers of commercial airline flights hold an Air Transport Pilot (ATP) license. This license requires a minimum of 1,500 flight hours. Prior to the 2013 rule, entry-level first officers could be employed with a commercial pilot license requiring 250 hours. This significant increase in flight hours comes at a high cost for prospective commercial pilots (**Figure 8-12**).

Figure 8-12: Commercial Airline Pilots in Flight

[8] http://onlinepubs.trb.org/Onlinepubs/trnews/trnews304feature.pdf
[9] http://onlinepubs.trb.org/Onlinepubs/trnews/trnews304feature.pdf

Further exacerbating the pilot shortage is the mandatory retirement of commercial pilots at age 65 (increased recently from 60). The baby boom produced a significant portion of the current airline pilot pool and those pilots are now quickly approaching retirement. Also impacting pilot availability is the reduction in the number of military aviators that would transition over to the airlines after their service.

Regional airlines are taking the brunt of the pilot shortage as their experienced pilots are transitioning to the mainliners to replace retiring pilots. A lack in entry-level pilots (due in part to the ATP rule) is leaving regional airlines understaffed. Those airlines are being forced to reduce and even eliminate service to airports and major airlines previously served, impacting the availability of air service.

8.3.3.2 Maintenance Technicians

Critical for the safe continued operation of aircraft, aircraft maintenance technicians (**Figure 8-13**) must complete 18 months of practical work experience applicable to either an airframe or power plant rating. If a technician wants to earn both ratings, they must complete a certified aviation maintenance program or demonstrate 30 months of applicable experience. Each rating requires 400 hours of general course work and 750 hours related to airframe or power plant technology. This education can be obtained at several collegiate programs across the country that offer two-year technical degrees in aircraft maintenance. Not only are airlines hiring technician graduates, other industries (such as the automobile industry) are also hiring graduates, creating competition for a limited technician workforce.[10]

Figure 8-13: Aircraft Maintenance Technician Installing Propeller

8.3.3.3 Air Traffic Controllers

Strict medical and psychological screening, age, educational, and work experience requirements limit the potential pool of future air traffic controllers (**Figure 8-14**). A required retirement from active duty at age 56 also contributes to the need for a new generation of controllers. It is expected that nearly 12,000 of the 14,000 current controller workforce will be lost in the next ten years.[11]

Figure 8-14: Air Traffic Controller Monitoring Activity

8.3.3.4

[10] http://onlinepubs.trb.org/Onlinepubs/trnews/trnews304feature.pdf
[11] http://onlinepubs.trb.org/Onlinepubs/trnews/trnews304feature.pdf

8.3.3.5 Airport Operators

The operational requirements of each airport facility vary based on the type of operations supported. For example, airports that serve air carrier operations must meet a variety of strict operational requirements to maintain certification. An airport operator must undergo training in a variety of focus areas, including airfield inspections, pavement maintenance, wildlife control, security, snow removal, and more.

8.3.3.6 Aviation Workforce History

The number of pilot certificates issued by the FAA has generally been on the decline over the last decade or so, especially the number of student pilot certificates, dropping nearly 18,000 since 2007 as shown in **Table 8-3**.[12] A rise in the number of ATP certificates is likely a result of the 2013 rule.

FAA non-pilot certificates issued to the aviation workforce have also declined in many categories, including mechanics, repairmen, ground instructors, and more. In comparison, the number of flight attendant certifications have consistently been on the rise for more than a decade, as shown in **Table 8-4**.

Although pilot and non-pilot certificate numbers are generally decreasing across the country, the number of active FAA certified pilots in Florida (**Table 8-5**) has increased for almost all certificate types, with the exception of recreational, private, and commercial, which aligns with the decrease shown in Table 8-3.

[12] *2016 General Aviation Statistical Databook & 2017 Industry Outlook*

Table 8-3: FAA Pilot Certificates Issued by Category

Year	Student		Private		Commercial		Airline Transport (ATP)		Helicopter (only)		Glider (only)	
	Original	Add'l	Original	Add'l	Original	Add'l	Original	Add'l	Original	Add'l	Original	Add'l
2007	66,953	1,450	20,299	13,970	9,318	9,574	5,918	15,973	4,073	1,041	263	14
2008	61,194	1,507	19,052	14,409	10,595	10,212	5,204	15,658	3,639	930	204	11
2009	54,876	2,006	19,893	14,570	11,350	9,399	3,113	11,605	3,648	1,011	249	10
2010	54,064	1,057	14,988	10,260	8,056	7,778	3,072	10,890	2,686	670	222	8
2011	55,298	857	16,802	10,703	8,559	10,027	4,677	13,694	3,123	894	219	10
2012	54,370	694	16,571	10,720	8,651	9,341	6,396	12,768	2,892	900	180	0
2013	49,566	676	15,776	10,098	8,140	7,922	8,346	13,288	2,888	899	163	1
2014	49,261	698	17,795	11,396	9,803	8,840	7,749	19,481	3,754	1,072	195	5
2015	49,062	590	16,473	11,067	9,211	8,348	6,544	19,823	2,999	957	188	3
Diff. (2007 – 2015)	**- 17,891**	**-860**	**-3,826**	**-2,903**	**-107**	**-1,226**	**+626**	**+3,850**	**-1,074**	**-84**	**-75**	**-11**

Source: GAMA 2016 General Aviation Statistical Databook & 2017 Industry Outlook
Note: additional rating is added to an existing pilot certificate (for example, an instrument rating added to a private certificate).

Table 8-4: FAA Non-Pilot Certificates Issued by Category

Year	Mechanic	Repairman	Parachute Rigger	Ground Instructor	Dispatcher	Flight Navigator	Flight Engineer	Flight Attendant
2007	322,852	40,277	8,186	74,544	19,043	250	54,394	147,013
2008	326,276	41,056	8,248	74,983	19,590	222	53,135	154,671
2009	329,027	41,389	8,362	75,461	20,132	181	51,022	156,741
2010	308,367	41,196	8,009	70,560	16,576	171	48,569	156,368
2011	335,431	40,802	8,491	74,586	21,363	146	47,659	167,037
2012	337,775	40,444	8,474	73,599	21,862	141	46,639	172,357
2013	338,844	39,952	8,491	72,493	22,401	126	45,319	179,531
2014	341,409	39,566	8,702	71,755	23,113	115	43,803	188,936
2015	342,528	39,363	8,846	70,957	23,754	102	42,460	200,319
2016	279,435	34,411	5,851	65,053	19,758	67	35,761	212,607
Diff. (2007 – 2016)	**-40,858**	**-5,619**	**-2,299**	**-9,325**	**+1,679**	**-231**	**-21,995**	**+87,575**

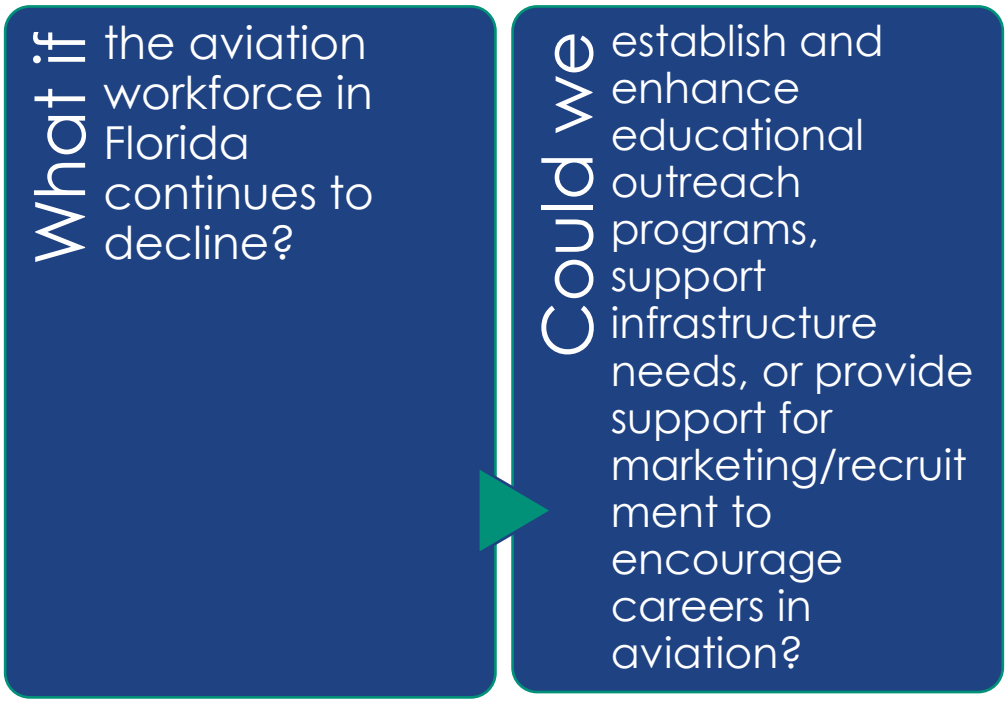
Source: GAMA 2016 General Aviation Statistical Databook & 2017 Industry Outlook

Table 8-5: Active FAA Certified Pilots and Flight Instructors in Florida

Year	Total Pilots	Students	Recreational	Sport	Private	Commercial	Airline Transport	Rotor, Glider, & Balloon	Remote Pilot	Flight Instructor
2007	48,244	7,510	13	137	15,614	10,331	14,639	*	*	8,147
2008	49,991	7,467	13	198	16,307	11,102	14,904	*	*	8,359
2009	48,163	6,543	12	262	15,462	11,000	14,884	*	*	8,638
2010	51,671	10,917	13	316	14,857	10,727	14,841	*	*	8,805
2011	52,037	11,572	11	357	14,490	10,515	15,092	*	*	8,965
2012	52,566	11,946	8	397	14,302	10,336	15,577	*	*	9,138
2013	52,437	12,185	6	434	13,694	9,953	16,165	7,031	*	9,283
2014	52,967	12,501	7	466	13,437	9,786	16,770	6,999	*	9,592
2015	54,254	13,177	7	499	13,552	9,797	17,222	6,984	*	9,904
2016	55,692	13,844	6	544	13,090	9,959	18,249	7,167	1,783	10,183
Diff. (2007 – 2016)	**+7,448**	**+6,334**	**-7**	**+407**	**-2,524**	**-372**	**+3,610**	**+7,167**	**+1,783**	**+2,036**

Source: GAMA General Aviation Statistical Databook & Industry Outlook (2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016)
**info not available*

The shortage in the aviation workforce is not a new issue, but it has been receiving considerable attention recently across industry resources. Organizations such as the American Association of Airport Executives (AAAE) and Airports Council International – North America (ACI-NA) encourage students to pursue careers in aviation and offer student chapters that support networking between current and prospective aviation students and potential employers. Airlines have teamed with aviation programs at universities in the U.S. to offer guaranteed interviews or other placement assistance to encourage students to pursue aviation career paths.[13] State and local organizations, airports, museums, and more host aviation programs for students of varying ages to introduce them to careers in aviation. The military also plays a role in the recruitment of future pilots and mechanics by offering training through military academies and aviation cadet programs.



8.4 Reliance on Tourism

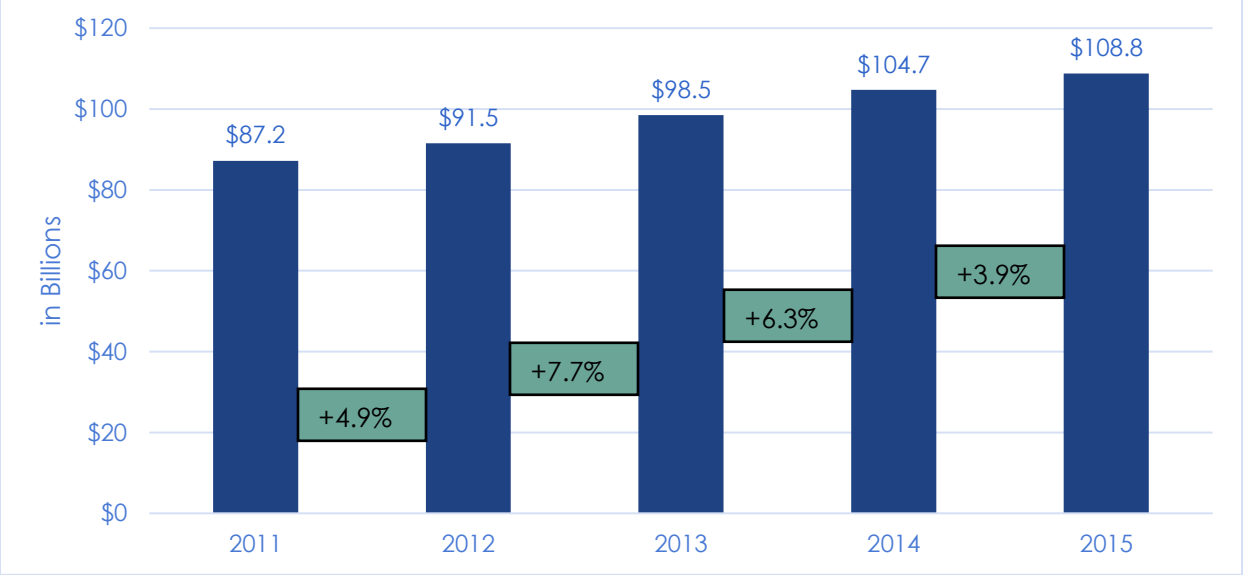
Nearly 150 million visitors traveled to Florida in 2016, generating over $100 billion in tourism spending alone (shown in **Figure 8-15** and **Table 8-6**), and estimates for 2017 are even higher.[14] Nearly 50 percent of all of Florida's visitors arrive by air (**Figure 8-16**). Miami is the second most popular point of entry (all transportation modes) for non-U.S. resident arrivals to the country, behind New York City, with over six million international arrivals in 2016 alone.[15] As a top industry

[13] http://onlinepubs.trb.org/Onlinepubs/trnews/trnews304feature.pdf
[14] http://www.visitfloridamediablog.com/home/florida-facts/research/
[15] U.S. Department of Commerce, ITA, National Travel and Tourism Office from the Summary of International Travel to the U.S. (I-94) Report.

in the state, tourism drives much of Florida's economy and reductions in tourism rates can have a significant impact on revenue for the state's airport system with a decrease in tourists arriving by air (both commercially and privately on GA aircraft). Reductions in tourism activity have the potential to impact commercial service and GA airports with undiversified operations—those catering to large volumes of tourist travelers. Should a drop in tourism rates occur, commercial airports with high concentrations of operations by LCCs and ULCCs will likely be impacted first, as those carriers typically cater to a large concentration of leisure travelers, versus some of the major airlines that typically serve more of a mix in business and leisure travelers.

Conversely, a reduction in service by LCCs or ULCCs will likely result in a reduction in tourism in the state, as they serve a significant portion of the visitors arriving to Florida by air. LCCs provide opportunities for travel to Florida by a larger population pool, driving increasing tourism rates. Continued success of LCCs and ULCCs is necessary for sustained tourism levels.

Figure 8-15: Direct Tourism Spending in Florida (in billions)



Source: The Economic Impact of Out-of-State Visitor Spending in Florida, Tourism Economics

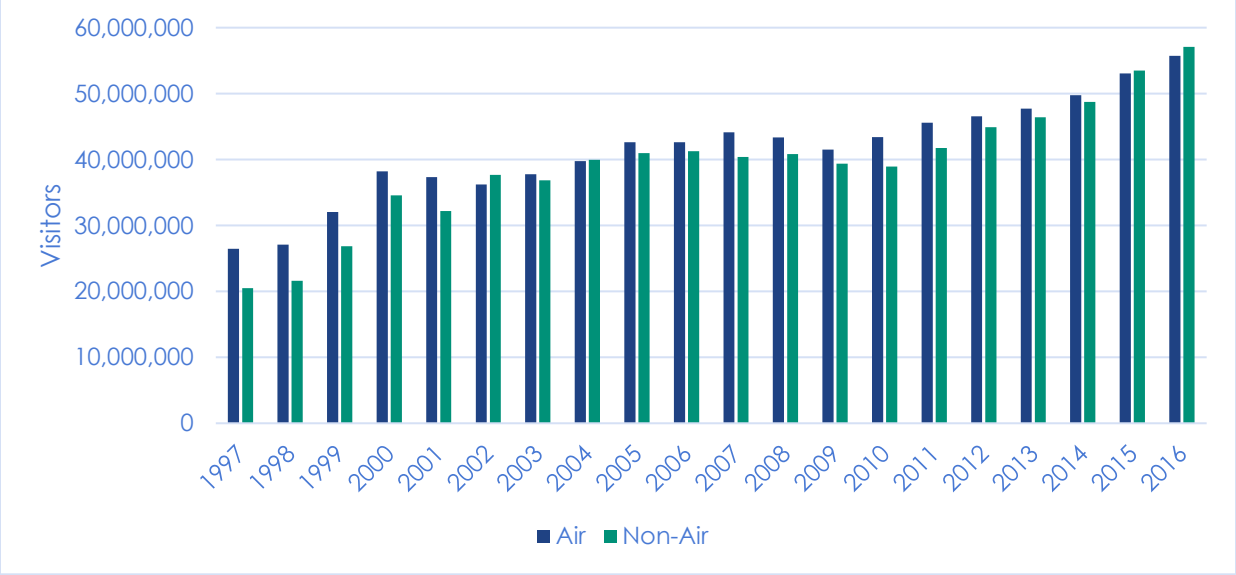
Table 8-6: Historic Visitor Estimates (in millions)

Year	Domestic	Overseas	Canadian	Total
2007	77.3	4.7	2.5	84.5
2008	76.1	5.2	2.9	84.2
2009[1]	71.2	7.0	2.6	80.9
2010	71.2	8.0	3.1	82.3
2011	74.7	9.3	3.3	87.3
2012	77.6	10.4	3.6	91.5

Year	Domestic	Overseas	Canadian	Total
2013[2]	78.8	11.2	4.2	94.1
2014	83.2	11.3	4.0	98.5
2015	91.3	11.4	3.8	106.6
2016	97.9	*11.1*	3.3	*112.4*

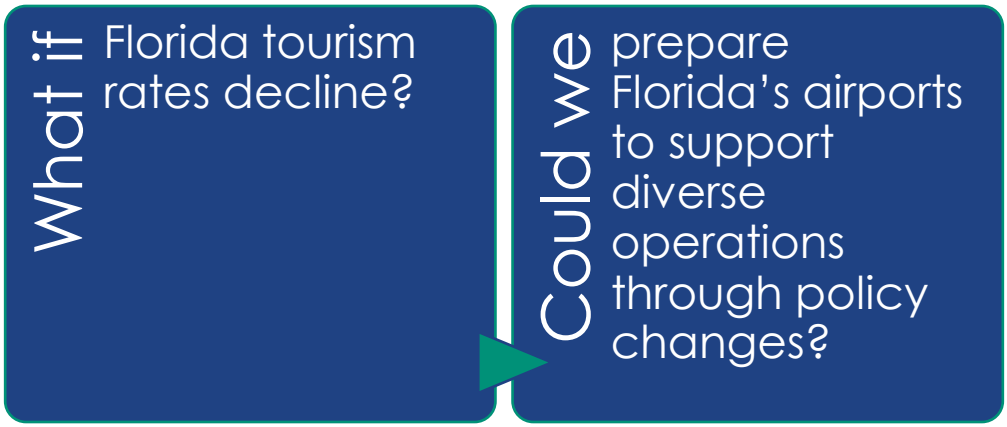
Source: TNS TravelsAmerica; D.K. Shifflet & Associates, Inc; Individual Florida Airports; Statistics Canada; U.S. Department of Commerce, ITA, Tourism Industries; Visa Vue Travel; Diio, LLC aviation data
Note: Figures in italics are preliminary; some figures may not add up due to rounding
[1] VISIT FLORIDA changed its visitor estimation methodology; therefore, estimates made prior to that year are not directly compariable.
[2] In 2013, Statistics Canada implemented a major modernization initiative for the International Travel Survey (ITS) to improve the quality of its data and processes. According to Statistics Canada, any historical data comparisons should be made with caution. Therefore, it is highly likely that most of the year to year change shown for Canada in the table is results from the new methodology.

Figure 8-16: Visitors Arriving to Florida by Air (1997 – 2016)



Source: Florida Department of Transportation Office of Policy Planning (http://www.floridatransportationindicators.org/index.php?chart=11b&view=detail)

Although changes in tourism activity in Florida are not anticipated at this time, it is important that airports plan ahead for shifts in activity so they are best equipped to handle changes. Airports with diversified operations including business/corporate, flight training, emergency operations, etc. will be much better positioned to react to a change in the operational composition at their facilities and operational revenue generated.



8.5 Summary

Planning for alternative scenarios positions Florida's aviation system to adapt quickly and successfully to changing conditions. Aligned efforts at the state, regional, and local levels to identify needs and solutions is a critical component of this preparedness. **Table 8-7** outlines some ways the state may begin the planning process.

Table 8-7: Summary of Example Scenarios

What if…	Could we…	How?
Airlines want to decrease capacity and routes to Florida communities due to increases in oil prices?	Support service at airports that reach the majority of Florida's population?	Work with airports and airlines to identify airports with the largest demand and available capacity, and complete an analysis using GIS to identify those airports that are located in areas accessible to the majority of the state's population. If a reduction in service occurs, maintaining service to at least a portion of Florida's commercial service airports in strategic locations will help provide continued commercial service access to residents and visitors.
GA activity decreases at Florida airports?	Assist GA airports in diversifying revenue streams and decreasing expenses through state guidance and programs?	Continue to update and promote the use of the FDOT *GA Airport Business Plan Guidebook*. Work with external organizations such as Enterprise Florida, Visit Florida, the Department of Economic Opportunity, the Florida Economic Development Councils, and other local, regional, and state entities to diversify Florida's airports' revenue streams. Update the FDOT *Airport Sustainability Guidebook* and continue to develop the FDOT Aviation and Spaceports Office's (ASO's) sustainability program. Form an airport sustainability task force that allows airports and relevant stakeholders the

What if…	Could we…	How?
		opportunity to learn from each other, share best practices and lessons learned, and aid each other in achieving sustainability and financial self-sufficiency. Continue to develop FDOT's overarching sustainability framework, leveraging the ASO's success in formalizing the department's program.
A disaster strikes?	Maintain Florida's aviation facilities now and in the future to support response and recovery efforts?	Conduct a statewide disaster response assessment, identifying those services and facilities needed to make an airport effective during a disaster. A statewide gap analysis should be conducted by airport and minimum disaster response-related infrastructure, equipment, facilities, and services should be identified by airport type (Commercial Service by hub size, GA by ASSET category). Assessments should be reported by individual airport, FDOT District, Continuing Florida Aviation Systems Planning Process (CFASPP) region, and Florida Division of Emergency Management region (http://www.floridadisaster.org/regions/).
Airlines change their fleets or service levels?	Adapt Florida's commercial service airports to support changes in aircraft and capacity?	Proactively coordinate with airline fleet directors and route planners to identify planned fleet changes and associated facility needs. Then, conduct an inventory of the service equipment and infrastructure capabilities of Florida's commercial service airports to identify gaps. Airport sponsors should be notified of any gaps identified at their facility so they may plan for necessary modifications during their capital improvement planning exercises.
The development and use of new aircraft types accelerates?	Prepare Florida's GA airports to meet new infrastructure needs?	Stay abreast of aircraft advancements and proactively identify anticipated infrastructure needs by aircraft type. Encourage airports to consider these needs in capital improvement planning exercises so that when significant volumes of new aircraft types enter the market, they are prepared to accommodate them.
The aviation workforce in Florida continues to decline?	Establish and enhance educational outreach programs, support infrastructure needs, or provide support for marketing/recruitment	Establish a task force with schools, universities, museums, social groups, airports, and other industry partners to inspire and educate students on careers in aviation. Develop programs such as summer camps, workshops, a scholarship fund, and university partnerships that link students with educational and career opportunities in aviation. Existing outreach efforts at Florida's annual Sun 'n Fun and U.S. Sport aviation expos should be continued. Also consider FDOT policy changes that would support infrastructure needs and/or

What if…	Could we…	How?
	to encourage careers in aviation?	marketing/recruitment that would encourage and promote aviation careers throughout Florida.
Florida tourism rates decline?	Prepare Florida's airports to support diverse operations through policy changes?	Identify current users of airports in the system and document their typical operations. Then, consider their use when planning for capital improvements or operational enhancements. A reduction in tourism activity provides airports in the system an opportunity to focus on the needs of other users, supporting their continued operation. When other types of users are supported, airports are able to cater to a more diverse user group which enhances their viability and the viability of Florida's aviation system long-term.