CHAPTER 2 -
AVIATION ACTIVITY FORECASTS

INTRODUCTION

FORECAST SUMMARY

The forecast chapter provides a 20-year projection of aviation activity at Ryan Airfield (RYN). Forecasts are an estimate of future activity levels and help guide decision makers in envisioning future airport development. The forecasts are used to determine facility demands and requirements and estimate the timing of demand-driven improvement projects. **Table 2-1** is a summary of the forecasts described in this chapter.

The aviation activity forecast considers the effects of regional socioeconomics, the regional aviation market, and the national aviation market. The forecasts' socioeconomic data is based on the Tucson Metropolitan Statistical Area (MSA), which has the same geographic extent as Pima County. An MSA is a geographical region defined by the U.S. Office of Management and Budget with at least one urbanized area of over 50,000 people. The City of Tucson is the second largest city in the state behind Phoenix. The MSA has had a relatively steady population for the past decade having an average annual growth of 0.8 percent in that time period. The region's population is expected to continue growing at a slightly higher average annual rate of 1 percent over the next 20 years. Economically, the MSA recovered from the Great Recession of 2007 to 2009 and is expected to see growth in income and employment per capita. The MSA Gross Regional Product (GRP) is projected to grow an average of 1.8 percent annually. This economic growth can be largely attributed to the health care industry and the predicted growth of health and personal care retail sales in the Tucson MSA.

Table 2-1: Forecast Summary

Forecast Element	2008	2018	2038	CAGR (2008-2038)
Aircraft Operations[1]	201,048	94,621	121,725	1.3%
Air Carrier	2	0	0	N/A
Air Taxi	4	0	0	N/A
Itinerant GA	66,933	34,859	43,500	1.1%
Local GA	130,899	45,900	64,325	1.7%
Itinerant Military	1,838	1,996	2,000	0.0%
Local Military	1,372	11,866	11,900	0.0%
Based Aircraft[2]	266	256	327	1.2%
Single-Engine Piston[3]	230	189	229	1.0%
Jet & Turboprop	1	1	2	3.5%
Multi-Engine Piston	20	10	4	-4.5%
Helicopter	7	0	0	N/A
Other	8	56	92	2.5%

1) Operations Sources: 2007 and 2018 from Tucson Airport Authority, 2038 = Forecast
2) Based Aircraft Sources: 2008 records from TAF, 2018 data from ADOT via TAA, 2038 = Forecast
3) Single Engine Piston includes experimental and light sport aircraft.
CAGR: Compound Annual Growth Rate

INTRODUCTION TO FORECASTS

Aviation activity forecasts evaluate future demand at an airport. The forecasts have a base year of 2018 and use the Federal Aviation Administration (FAA) fiscal year (October to September). The forecast period is 20 years from the year of analysis with reporting intervals of every five years. Each forecast topic is evaluated using multiple forecasting methods and compared to the 2018 FAA Terminal Area Forecast (TAF), which for this report was released in January 2019. Data from the past ten years (2008 to 2018) is used as the basis of analysis for historical trends. This ten-year period includes periods of economic growth and contraction that allow forecasts to account for the various possible economic conditions and provide a perspective of the economic effects on aviation activity. This chapter is organized into the following sections:

- Introduction to Forecasts
- Community Profile
- Aviation Activity Profile
- General Aviation Forecasts
- Peak Forecasts and Critical Aircraft
- Forecast Summary and FAA Forecast Tables

Table 2-2 describes the data sources used in the forecast.

Table 2-2: Description of Data Sources

Source	Description
FAA Traffic Flow Management System Counts Data (TFMSC)	The TFMSC includes data collected from flight plans. These operations are categorized by aircraft type and used to identify trends in the RYN fleet mix. The advantage of the TFMSC data is its degree of detail and its insights into the itinerant users of RYN. A disadvantage of TFMSC data is that it does not include local operations or operations that did not file a flight plan. As such, the utility of TFMSC data is limited to larger aircraft, including scheduled commercial passenger, cargo, and charter operations, and private business jets.
FAA TAF	The FAA TAF, published in January 2018, provides historical records and forecasts for passenger enplanements, aircraft operations, and based aircraft at RYN. These forecasts serve as a comparison for forecasts prepared as part of this planning effort and provide historical information on aircraft activity.
FAA Aerospace Forecast	The Aerospace Forecast 2018-2038 is a national-level forecast of aviation activity. The Aerospace Forecast helps guide local forecasts by serving as a point of comparison between local trends and national trends.
Pima Prospers – Pima County Comprehensive Plan	Passed in May 2015, the plan is the long-range county plan developed according to state requirements. The plan examines land use concerning development and conservation along with establishing a vision and principles that focus on having healthy people and economy in general. The information in this forecast chapter on the county's population and economy came from *Pima Prospers*.
Socioeconomic Data	Socioeconomic data is provided by data vendor Woods & Poole Inc. (W&P). W&P provides data for gap years in the U.S. Census. The State of Arizona Office of Economic Opportunity (OEO)'s State Demographer's Office produces official population estimates and projections for the State of Arizona and its counties and incorporated places. The United States Office of Management and Budget designates Pima County as the Tucson MSA. OEO population projections for Pima County are used to help forecast demand. ESRI Business Analyst software was used for market analysis. Software provider ESRI maintains an online database of socioeconomic information that can be assessed for specific geographic areas that do not necessarily match the boundaries of U.S. Census Bureau defined areas.
OPSNET	Operations Network (OPSNET) is the source of National Airspace System (NAS) air traffic operations and delay data. The data provides information about Instrument Flight Rules (IFR) and Visual Flight Rules (VFR) operations.
Tucson Airport Authority (TAA)	The TAA provided data on RYN operations by air carrier, air taxi, military and general aviation as well as based aircraft data with support from the Arizona Department of Transportation (ADOT).

COMMUNITY PROFILE

The community profile describes the characteristics of the area that RYN serves. RYN is located within the Tucson MSA, and the MSA consists entirely of Pima County. Key socioeconomic indicators described in this section

contribute to understanding the historical trends at RYN for the past decade, and socioeconomic projections are used to forecast aviation activity.

POPULATION

The State of Arizona's Office of Economic Opportunity (OEO) provides estimates of the state and local population and identifies the economic advantages and disadvantages. The OEO publishes population estimates for the state and counties once a year at the end of the year. Future population projections are published for years ending with 2, 5, and 8. The OEO forecasts population at three different growth rates – low, medium, and high. The medium forecast is selected for this demand forecast because it is referenced in the 2015 Pima County comprehensive plan, *Pima Prospers*.

Table 2-3 shows the historical and forecasted population data from 2008 to 2038 from the OEO. The MSA population has increased at a compound annual growth rate (CAGR) of 0.6 percent between 2008 and 2018. The OEO forecasts the population continuing to grow in the next 20 years at a CAGR of 1 percent.

Table 2-3: Tucson MSA Population

Calendar Year	Population	Percent Change
2008	984,032	-
2013	996,046	1.2%
2018	1,040,840	4.5%
2023	1,099,153	5.6%
2028	1,154,926	5.1%
2033	1,207,878	4.6%
2038	1,257,651	4.1%
CAGR (2008-2018)	0.6%	N/A
CAGR (2018-2038)	1.0%	N/A
CAGR = Compound Annual Growth Rate Source: Arizona Office of Economic Opportunity		

EMPLOYMENT AND ECONOMIC DEVELOPMENT

According to the Journal of Regional Analysis & Policy, *US State and Regional Economic Impact of the 2008/2009 Recession - 2012*, Arizona was among the hardest hit states during the Great Recession, having experienced one of the largest percentages of job loss, -10.76% between 2007-2009, second only to Nevada. The employment rate of the Tucson MSA has grown since the end of the Great Recession of 2007-2009. Based on Woods & Poole data and forecasts, total employment has recovered at an average annual rate of 0.6 percent and is projected to grow at a rate of 1.4 percent for the next 20 years.

Employment per capita had a CAGR of 0 percent between 2008 and 2018 as MSA recovered from the economic downturn. However, employment per capita is forecasted to increase along with total employment and population in the next 20 years. This projected increase indicates that jobs are expected to increase faster than the MSA population. **Table 2-4** presents the total employment and employment per capita.

Table 2-4: Tucson MSA Employment

Calendar Year	Total Employment	Percent Change	Employment per Capita
2008	501,965	-	0.51
2013	490,005	-2.4%	0.49
2018	532,136	8.6%	0.51
2023	575,124	8.1%	0.52
2028	617,383	7.3%	0.53
2033	658,141	6.6%	0.54
2038	696,362	5.8%	0.55
Compound Annual Growth Rates			
2008-2018	0.6%	N/A	0.0%
2018-2038	1.4%	N/A	0.4%
GRP per Capita = GRP / Total Population GRP is inflation-adjusted for 2018 dollars. Sources: Employment: Woods & Poole, Population: Arizona Office of Economic Opportunity			

Top industries by employment and sales are presented in **Table 2-5** and **Table 2-6**. The health care industry overtook state and local government as the top employer in the MSA in 2018 and is forecasted to remain the top employer through 2038.

The *Pima Prospers* comprehensive plan has policies aimed at revitalizing tourism in the region. Geo-tourism and medical tourism are two markets the County is focusing on. These targets are in line with the increased growth of the health care industry employment as well as accommodation and food service remaining consistently in the top five employers in the MSA.

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Table 2-5: Tucson MSA Top 5 Industries by Employment and Sales (2008-2018)

Top 5 Industries by Employment								
Rank	2008		2013			2018		
	Industry	Jobs	Industry	Jobs	Δ	Industry	Jobs	Δ
1	State and Local Gov't	68,748	State and Local Gov't	68,318	-0.6%	Heath Care	71,166	11.3%
2	Heath Care	61,032	Heath Care	63,965	4.8%	State and Local Gov't	68,981	1.0%
3	Retail Trade	54,054	Retail Trade	50,853	-5.9%	Retail Trade	55,968	10.1%
4	Accommodation + Food Serv.	37,323	Accommodation + Food Serv.	37,953	1.7%	Accommodation + Food Serv.	45,223	19.2%
5	Admin + Waste Serv.	36,939	Admin + Waste Serv.	37,079	0.4%	Admin + Waste Serv.	40,233	8.5%
Top 5 Industries by Retail Sales								
Rank	2008		2013			2018		
	Industry	Sales ($M)	Industry	Sales ($M)	Δ	Industry	Sales ($M)	Δ
1	Motor Vehicles	$2,796	Motor Vehicles	$2,731	-2.3%	Motor Vehicles	$3,287	20.4%
2	General Merchandise	$2,216	Food + Bev Retail	$2,221	0.6%	Food + Bev Retail	$2,426	9.3%
3	Food + Bev Retail	$2,208	General Merchandise	$2,175	-1.9%	General Merchandise	$2,306	6.0%
4	Eating + Drinking Places	$1,505	Eating + Drinking Places	$1,572	4.5%	Eating + Drinking Places	$1,939	23.3%
5	Gas Station Retail	$1,403	Gas Station Retail	$1,342	-4.4%	Gas Station Retail	$1,074	-20.0%

Table 2-6: Tucson MSA Top 5 Industries by Employment and Sales (2018-2038)

Top 5 Industries by Employment								
Rank	2018		2028			2038		
	Industry	Jobs	Industry	Jobs	Δ	Industry	Jobs	Δ
1	Heath Care	71,166	Heath Care	89,425	25.7%	Heath Care	108,022	20.8%
2	State and Local Gov't	68,981	State and Local Gov't	79,105	14.7%	State and Local Gov't	84,850	7.3%
3	Retail Trade	55,968	Retail Trade	65,792	17.6%	Retail Trade	75,857	15.3%
4	Accommodation + Food Serv.	45,223	Accommodation + Food Serv.	49,427	9.3%	Admin + Waste Serv.	51,702	11.3%
5	Admin + Waste Serv.	40,233	Admin + Waste Serv.	46,470	15.5%	Accommodation + Food Serv.	51,390	4.0%
Top 5 Industries by Retail Sales								
Rank	2018		2028			2038		
	Industry	Sales ($M)	Industry	Sales ($M)	Δ	Industry	Sales ($M)	Δ
1	Motor Vehicles	$3,287	Motor Vehicles	$3,670	11.7%	Motor Vehicles	$4,008	9.2%
2	Food + Bev Retail	$2,426	General Merchandise	$2,895	25.6%	General Merchandise	$3,423	18.2%
3	General Merchandise	$2,306	Food + Bev Retail	$2,619	8.0%	Food + Bev Retail	$2,808	7.2%
4	Eating + Drinking Places	$1,939	Eating + Drinking Places	$2,309	19.1%	Eating + Drinking Places	$2,748	19.0%
5	Gas Station Retail	$1,074	Health + Personal Care Retail	$1,246	22.0%	Health + Personal Care Retail	$1,439	15.5%

GROSS REGIONAL PRODUCT (GRP)

GRP is the value of goods and services produced by the MSA. The GRP serves as a health index of the area economy, and it changes as the quantity and quality of goods produced changes. The GRP per capita shows the effect of the Great Recession during the 2008-2018 period as GRP returned to slightly above 2008 levels by 2018. Woods & Poole projections show that the GRP will increase at a higher rate than the MSA population. This is an indicator of an increase in production of high value goods and services such as healthcare. Healthcare goods and services produce higher value goods per person relative to industries such as gas station retail. **Table 2-7** shows the MSA GRP from 2008 to 2038.

Table 2-7: Tucson MSA Gross Regional Product

Calendar Year	GRP ($M)	Percent Change	GRP ($M) per Capita
2008	$39,088	--	$0.078
2013	$37,804	-3.3%	$0.077
2018	$39,744	5.1%	$0.075
2023	$43,928	10.5%	$0.076
2028	$48,207	9.7%	$0.078
2033	$52,549	9.0%	$0.080
2038	$56,880	8.2%	$0.082
Compound Annual Growth Rates			
2008-2018	0.2%	N/A	-0.4%
2018-2038	1.8%	N/A	0.4%
GRP per Capita = GRP / Total Population GRP is inflation-adjusted 2018 dollars Sources: Employment: Woods & Poole, Population: Arizona Office of Economic Opportunity			

Analysis of the community profile data shows that socioeconomic indicators have not historically correlated with aviation activity at RYN. However, with planned development of the area around RYN, there is potential for future effects of socioeconomics on aviation demands. The area surrounding RYN is generally less developed compared to other airports that serve the MSA (these airports are describe in the Catchment Areas and Competition section below). RYN is situated along the Ajo Highway, an area that is experiencing growth in housing development. This development has the potential to lead to growth in the number of businesses and other amenities that may draw users to RYN.

CATCHMENT AREAS AND COMPETITION

An airport's catchment area is defined by the proximity of surrounding airports. The RYN catchment area is the area within a 30-minute drive of the airport. Tucson Airport Authority (TAA) records show that 55 percent of aircraft based at RYN are registered to zip codes within a 30-minute drive of the Airport. RYN does serve based and itinerant users that are more than 30 minutes from the Airport; however, the definition of the service area captures the unique aspects that make the area surrounding RYN different from the areas surrounding the other airports. A map of the RYN catchment area and the service areas of nearby airports is shown in **Figure 2-1**.

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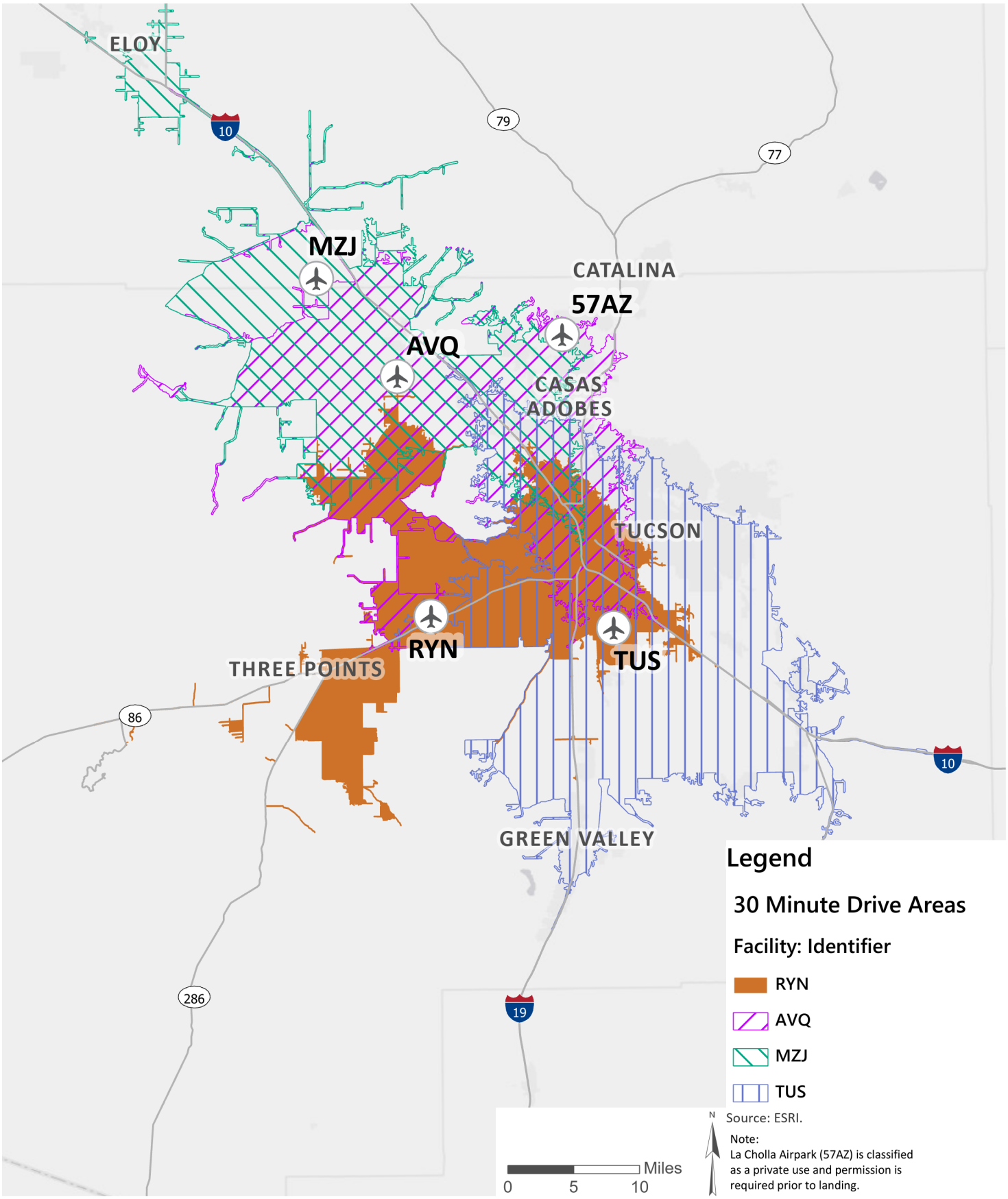

TUCSON AIRPORT AUTHORITY
RYAN AIRFIELD

RYN and Nearby Service Areas

Figure 2-1

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As shown in the map, the proximity of Tucson International Airport (TUS) and Marana Regional Airport (AVQ) to RYN means that their service areas overlap the RYN service area completely at drive times longer than 30 minutes.

Table 2-8: Regional General Aviation Airports

Airport	Characteristics			Primary Markets			
	Primary Runway Length	IAP	Jet A	Large Jets	Small Jets	Turboprops	Piston
Ryan Airfield (RYN)	5,503'x 75'	Precision	Yes*	No	Yes	Yes	Yes
Marana Regional Airport (AVQ)	6,901'x100'	Non-precision	Yes	Yes	Yes	Yes	Yes
Pinal Airpark (MZJ)	6,849'x150'	None	Yes*	No	No	Yes	Yes
Tucson International Airport (TUS)	10,996'x150'	Precision	Yes	Yes	Yes	No	No

* Jet A fuel not always readily available.
IAP = Instrument Approach Procedure.
Precision = vertically and laterally guided.
Non-precision = laterally guided only.
Market determination based on instrumentation, runway length, and fuel availability and other activity (e.g. scheduled commercial, military) that occurs at the airport.
Primary market determination does not indicate that these are the only markets that the airport serves. Rather, it indicates that these are the markets that the Airport is best positioned to serve relative to the competition.
Source: FAA Airport Facilities Directory.

Further assessment and analysis of the General Aviation (GA) market in the area is included in the flight school impact assessment.

AVIATION ACTIVITY PROFILE

The aviation activity profile provides a baseline for forecasts by examining trends in activity at RYN and determines the context for any changes in activation activity. Sources of information used for the profile include FAA data and the TAA. Airport management records for operations and based aircraft were used for forecasting.

GENERAL AVIATION

Itinerant Operations

Itinerant operations are those that originate and terminate at different airports. Operators include student pilots flying in from other airports, business travelers, and recreational pilots. Total GA and Military itinerant operations made up 39 percent of the overall operations at RYN in 2018. Itinerant operations at RYN have decreased at an average annual rate of 6.3 percent. This is a faster rate of decline than the national rate of -2.3 percent CAGR. This is due to the combination of the heavy impact of the Great Recession on Arizona and the loss of the flight school in 2008. The difference between RYN and the national CAGR is because Arizona experienced one of the largest percentages of job loss during the between 2007-2009, second only to Nevada[1]. The cost of GA and the lack of disposable income meant people simply did not have the money to fly.

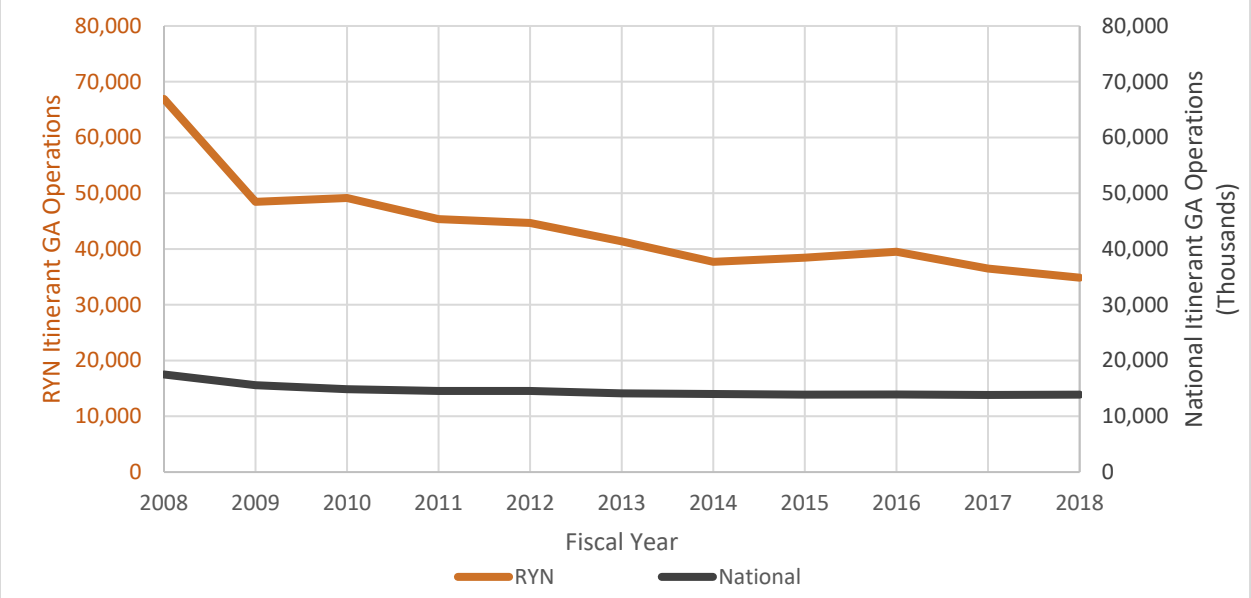
Historic itinerant GA operations are shown in **Table 2-9** and **Figure 2-2**.

Table 2-9: Itinerant General Aviation Operations

Fiscal Year	RYN	% Change	National	% Change
2008	66,933	--	17,492,653	--
2009	48,461	-27.6%	15,571,066	-11.0%
2010	49,144	1.4%	14,863,856	-4.5%
2011	45,347	-7.7%	14,527,903	-2.3%
2012	44,673	-1.5%	14,521,656	0.0%
2013	41,361	-7.4%	14,117,424	-2.8%
2014	37,684	-8.9%	13,978,996	-1.0%
2015	38,446	2.0%	13,886,711	-0.7%
2016	39,510	2.8%	13,904,397	0.1%
2017	36,499	-7.6%	13,838,029	-0.5%
2018	34,859	-4.5%	13,867,845	0.2%
CAGR	-6.3%	N/A	-2.3%	N/A

CAGR: Compound Annual Growth Rate
Source: TAA Provided Data for RYN, 2018 FAA Aerospace Forecast, for National

Figure 2-2: Itinerant General Aviation Operations



Local Operations

Local GA operations are those that originate and terminate at the same airport and are generally performed by pilots practicing landings. Local operations include touch-and-go landings where the aircraft lands, slows, and accelerates to take off without leaving the runway. The control tower counts each touch-and-go as two operations (a landing and a takeoff). Local operations vary based on the level of flight training at the airport and how active the resident GA community is. RYN does not have a flight school following the bankruptcy of the IATA school in 2008, and the specialized service operator (SASO) at RYN offers flight training but is not taking new students as of January 2019.

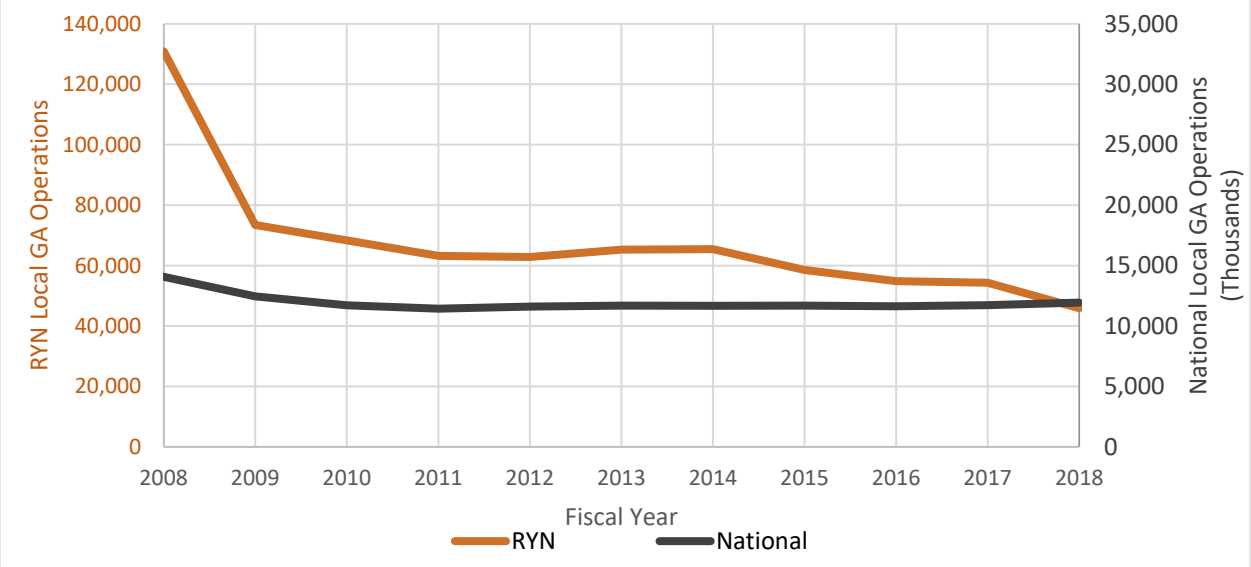
However, flight training by students coming from other airports does occur at RYN, just not to the same degree of operations a training school would have. Like with itinerant GA operations, local GA operations have been hit hard with the combination of the Great Recession and the loss of the flight school. These factors lead to the -9.9 percent CAGR compared to the national -1.6 percent CAGR for local GA operations in the past 10 years. **Table 2-10** and **Figure 2-3** show local GA operations at RYN compared with the national GA operations.

Table 2-10: Local General Aviation Operations

Fiscal Year	RYN	% Change	National	% Change
2008	130,899	--	14,081,157	--
2009	73,420	-43.9%	12,447,957	-11.6%
2010	68,374	-6.9%	11,716,274	-5.9%
2011	63,194	-7.6%	11,437,028	-2.4%
2012	62,858	-0.5%	11,608,306	1.5%
2013	65,297	3.9%	11,688,301	0.7%
2014	65,451	0.2%	11,675,040	-0.1%
2015	58,571	-10.5%	11,691,338	0.1%
2016	54,866	-6.3%	11,632,078	-0.5%
2017	54,309	-1.0%	11,731,596	0.9%
2018	45,900	-15.5%	11,939,102	1.8%
CAGR	-9.9%	N/A	-1.6%	N/A

CAGR: Compound Annual Growth Rate
Source: TAA Provided Data for RYN, 2018 FAA Aerospace Forecast for National

Figure 2-3: Local General Aviation Operations



MILITARY

RYN does not have based military aircraft but is a site of military touch-and-go operations and training flights by helicopters from nearby army bases Fort Huachuca (62 miles southwest) and Silverbell Army Heliport (Pinal Airpark, 27 miles north). Military activity is driven by the needs of the U.S. Department of Defense rather than by economic forces. Therefore, for planning purposes, military operations are projected to remain flat. **Table 2-11** shows the historical military operations at RYN.

Table 2-11: Military Operations

Fiscal Year	Itinerant	Local	Total	% Change
2008	1,838	1,372	3,210	--
2009	1,788	3,499	5,287	64.7%
2010	913	3,277	4,190	-20.7%
2011	1,356	2,090	3,446	-17.8%
2012	3,644	6,100	9,744	182.8%
2013	3,573	11,341	14,914	53.1%
2014	2,190	12,485	14,675	-1.6%
2015	3,433	17,031	20,464	39.4%
2016	2,473	14,010	16,483	-19.5%
2017	1,822	11,780	13,602	-17.5%
2018	1,996	11,866	13,862	1.9%
CAGR	0.8%	24.1%	15.8%	N/A

CAGR: Compound Annual Growth Rate
Source: TAA Provided Data

BASED AIRCRAFT

Based aircraft are aircraft stored in a hangar or apron at RYN and do not include itinerant aircraft temporarily stored there. The FAA categorizes based aircraft as Single-Engine Piston (SEP), Multi-Engine Piston (MEP), Jet aircraft with turbine engines (includes turboprops and turbojets), Helicopters, and Other, which includes experimental sport, glider, and ultralight aircraft.

The total number of aircraft stored at RYN has been increasing, while GA operations have been decreasing. This is because more people are moving their aircraft to RYN at the same time that GA operations have decreased with the loss of the flight school. A flight school would create a large number of operations with a few aircraft as students perform multiple operations daily in the same aircraft. The Arizona Department of Transportation (ADOT) has based aircraft records for RYN going back to 2010.

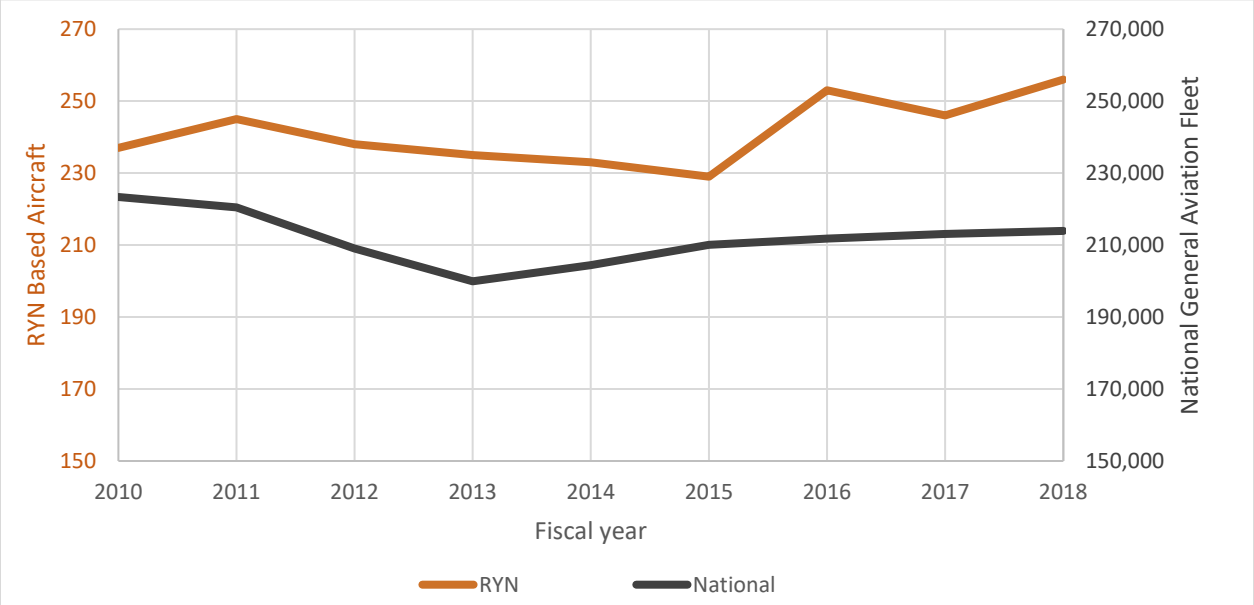
Table 2-12 and **Figure 2-4** show the based aircraft records provided by ADOT from 2010 to 2018. No helicopters have been based at RYN in the past eight years. Note that the historic CAGR is based on an eight-year time period instead of the ten-year time period used for operations due to missing data.

Table 2-12: RYN Based Aircraft

Fiscal Year	SEP	MEP	Jet	Helicopter	Other	Total	%Change
2010	175	14	0	0	46	237*	--
2011	180	15	0	0	48	245*	3.4%
2012	176	12	0	0	49	238*	-2.9%
2013	174	12	0	0	49	235	-1.3%
2014	180	9	0	0	44	233	-0.9%
2015	173	8	1	0	47	229	-1.7%
2016	190	9	1	0	53	253	10.5%
2017	187	10	1	0	48	246	-2.8%
2018	189	10	1	0	56	256	4.1%
CAGR	1.0%	-4.1%	N/A	N/A	2.5%	1.0%	N/A

*Less than 3 unknown aircraft types that were included in the total but not under any aircraft type count.
CAGR: Compound Annual Growth Rate
Source: ADOT records via TAA

Figure 2-4: RYN Based Aircraft



FEDERAL AVIATION ADMINISTRATION TERMINAL AREA FORECAST

The FAA TAF is the official forecast prepared annually by FAA Headquarters for each airport listed in the FAA National Plan of Integrated Airport Systems (NPIAS). The TAF is based on the FAA fiscal year (October to September); therefore, its historical numbers may not match airport records that begin their fiscal year in different months than the FAA. TAF Data comes from the US Department of Transportation (USDOT) T-100 database, Air Traffic Control Tower (ATCT) records, and the Form 5010 that airports submit annually to the FAA. The forecasting methodology used in the TAF is described in the *Forecast Process for 2018 TAF*, which can be found on the FAA TAF website.

The FAA reviews Master Plan forecasts by comparing them to the TAF. Forecasts within 10 percent of the TAF in the five-year period, and within 15 percent of the ten-year period can be approved by the Airports District Office (ADO), while forecasts outside these tolerances may need to go to FAA Headquarters for review. Forecasts for GA airports like RYN may still be approved at the ADO level even if they exceed the TAF tolerances provided the ADO feels that the projections are reasonable.

The TAF forecasts passenger enplanements, operations, and based aircraft. It does not forecast operations by aircraft type, peak activity levels, air cargo volume, or critical aircraft. The TAF used for this forecast was published in February 2019. The TAF prepared for RYN is summarized in **Table 2-13**.

Table 2-13: FAA TAF Summary

Fiscal Year	2018	2023	2028	2033	2038	CAGR
Operations	93,769	87,992	88,380	88,770	89,160	-0.25%
Air Carrier	0	0	0	0	0	N/A
Air Taxi	0	0	0	0	0	N/A
Itinerant GA	34,321	32,138	32,366	32,596	32,826	-0.22%
Itinerant Military	2,244	2,244	2,244	2,244	2,244	0.00%
Local GA	45,610	42,016	42,176	42,336	42,496	-0.35%
Local Military	11,590	11,590	11,590	11,590	11,590	0.00%
Based Aircraft	242	278	317	357	402	2.57%
Single Engine Piston	231	267	306	346	391	2.67%
Jet	1	1	1	1	1	0.00%
Multi Engine Piston	10	10	10	10	10	0.00%
Helicopter	0	0	0	0	0	N/A
Other	0	0	0	0	0	N/A
Other = Light sport aircraft, gliders, experimental aircraft, ultralights Source: 2018 TAF and TAA Provided Data						

While the TAF is a generally reliable information source, most recent trends in the data tend to lag a year behind RYN records. **Table 2-14** shows the differences between TAF data and airport management records in various areas. In terms of GA operations, the TAF underestimates the number of operations relative to airport records, but the TAF has higher military operations. The TAF based aircraft count is also significantly different from that of the RYN records. The difference is due to the larger number of SEP aircraft and having no Other type aircraft at all. The difference in historical data between the airport records and the TAF lead to further differences in the forecasts as they often have different starting points.

Table 2-14: 2018 Airport Management Records and TAF Comparison

Category	TAF	Airport Records	Difference	% Difference
Operations				
Air Taxi	4	4	0	N/A
Itinerant GA	34,321	34,859	538	1.6%
Itinerant Military	2,244	1,996	-248	-11.1%
Local GA	45,610	45,900	290	0.6%
Local Military	11,590	11,866	276	2.4%
Based Aircraft				
Single Engine Piston	231	189	-42	-18%
Jet	1	1	0	0.0%
Multi Engine Piston	10	10	0	0.0%
Helicopter	0	0	0	N/A
Other	0	56	56	N/A

GENERAL AVIATION FORECASTS

FORECASTING TECHNIQUES

Forecasts project future activity based on historical trends and future opportunities. This involves assessing the impacts of market forces on GA activity. The method for evaluating the relationship between variables is known as a correlation analysis.

Correlation measures how closely related two variables are to each other. The stronger the correlation, the more linear the relationship – a positive correlation means two variables increase together, while a negative correlation means two variables decrease together. The strength of the correlation is defined by the correlation coefficient (denoted as "*r*") which ranged in this analysis from 1.0 to -1.0. The stronger the correlation, the closer the correlation coefficient is to the value of 1.0 for positive correlation or -1.0 for negative correlation. A correlation coefficient of zero means two variables are not correlated at all.

However, correlation between two variables should not be the sole factor in determining that growth of one variable is caused by the other. Unrelated factors and additional variables can have an impact on the growth of both variables. One example would be if the growth of luxury product sales correlated to the growth in travel via private aircraft in the community. Purchasing luxury goods does not cause people to fly using private aircraft but does indicate that a third factor is causing both variables to grow. One possibility of a third factor would be growth in income per capita or an event attracting individuals with high net worth to the area. For this reason, multiple socioeconomic variables are assessed to identify trends and relationships.

Each forecasted topic in this chapter first goes through correlation analysis before being examined with three forecasting methods. The results of the correlation analysis help guide the types of forecasting methods selected for testing. Each method is explained and then compared using professional judgment based on known information about RYN, MSA, and national trends, among others.

ITINERANT GENERAL AVIATION OPERATIONS

Methods

Forecasts for itinerant GA aviation use the following methods, which will be further explained below:

- Regression analysis with the 2018 Aerospace Forecast national itinerant GA operations.
- Application of the 2018 Aerospace Forecast growth rate for itinerant GA operations.
- Assumption that RYN will maintain the same local market share of itinerant GA operations.

Itinerant GA operations were found to have a strong positive correlation with national itinerant GA operations, as described in the 2018 Aerospace Forecast, with an $r = 0.98$. Between 2008 and 2018, national itinerant operations decreased 1.6 percent while RYN decreased 6.3 percent. The next following strongest correlation was with that of national local GA operations with an $r = 0.84$. Thus, the forecast reflects the performance results of only a single variable regression analysis with national itinerant GA operations. Therefore, RYN itinerant operations are expected to increase when national operations increase and would similarly decrease if national operations decrease. The regression forecast results in a CAGR of 1.1 percent in the 20-year forecast period, a higher growth rate than that of the 2018 TAF. This 1.1 percent CAGR is derived from the regression equation that ties RYN growth to the growth of national itineration operations.

Applying the 2018 FAA Aerospace Forecast national itinerant GA operations growth rate to the historic data assumes itinerant GA operations at RYN will grow at the same rate as the averaged national rate. The result is a 0.2 percent CAGR for the next 20 years. This result is also higher than the 2018 TAF.

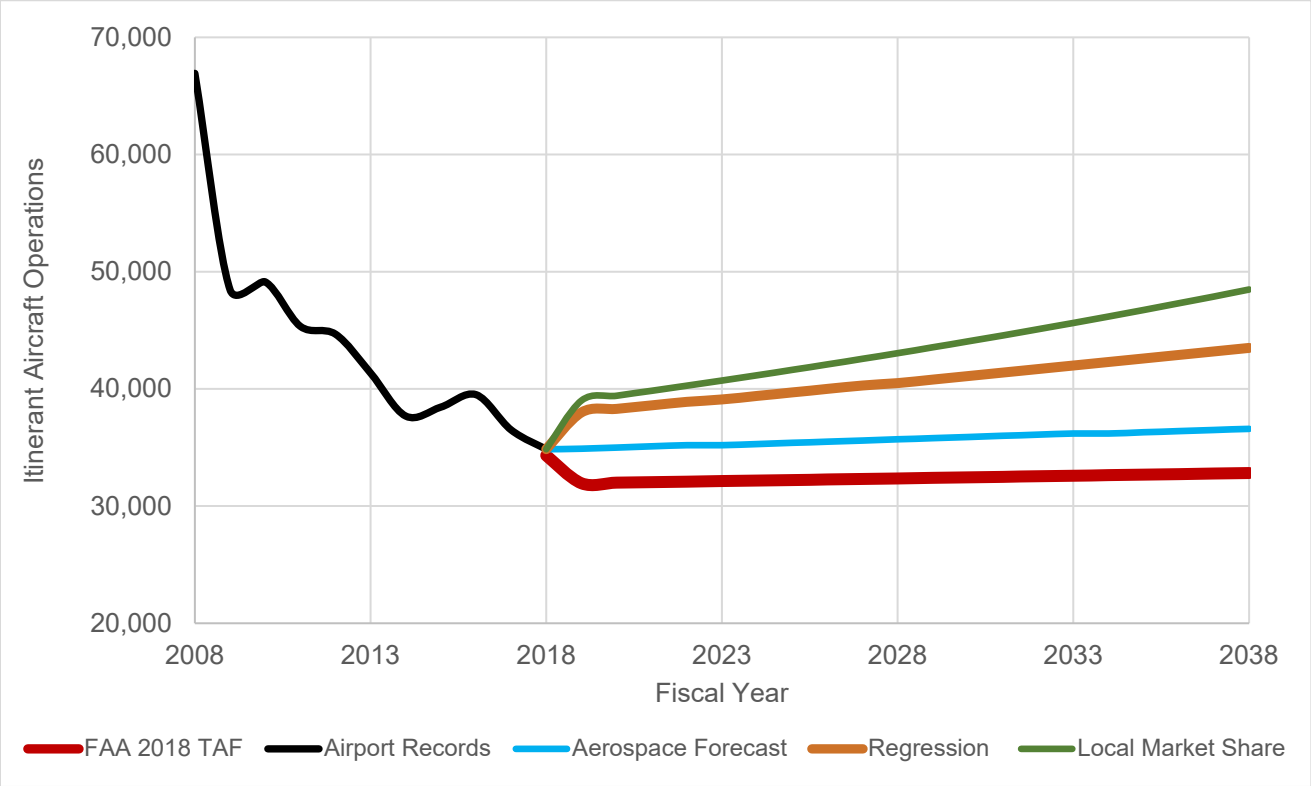
The local market share method assumes that RYN will maintain the same market share percentage of itinerant GA operations occurring among the airports in the catchment area. This considers TUS, AVQ, and Pinal Airpark (MZJ) itinerant GA operations in addition to RYN. This method takes the average percentage of the annual itinerant GA operations taking place at RYN and divides it by the total catchment area itinerant GA operations for the past ten years. This average percentage is then multiplied with the forecasted itinerant GA operations found in each airport's TAF. The 2008-2018 average market share for itinerant GA operations for RYN is 37 percent of catchment area operations. This average is higher than the annual market share percentages since 2013.

The forecasts are compared with the 2018 TAF in **Table 2-15** and **Figure 2-5**.

Table 2-15: Itinerant General Aviation Operations Forecast

Fiscal Year	Regression	Aerospace	Local Market Share	2018 TAF
2018	34,859	34,859	34,859	34,321
2023	39,100	35,200	31,258	32,138
2028	40,500	35,700	33,051	32,366
2033	42,000	36,200	35,029	32,596
2038	43,500	36,600	37,216	32,826
CAGR	1.1%	0.2%	0.3%	-0.2%
CAGR: Compound Annual Growth Rate				

Figure 2-5: Itinerant General Aviation Operations Forecast



Preferred and TAF Comparison

The preferred itinerant operations forecast is the regression analysis, which estimates itinerant GA operations will grow an average 1.1 percent annually. This growth rate exceeds that of less than 0.02 percent projected by the 2018 TAF. This preference of this method over the others is due to the very strong correlation with national itinerant operations. RYN's historically strong correlation indicates that, while RYN has experienced stronger declines in operations compared to national numbers, the trends reflect what is happening nationally. Similarly, the forecast shows RYN itinerant operations increasing at a higher rate than the expected growth in national itinerant operations. Based on the 2018 Aerospace Forecast, total national itinerant GA operations are expected to increase 0.3 percent on average annually. RYN itinerant operations are forecasted to increase an average 1.1 percent annually. This is likely higher due to the relatively low number of itinerant operations at RYN currently. A 1 percent increase for 35,000 operations would mean an additional 3,500 operations.

While the national forecasts shown by the Aerospace method and the TAF are both flat, the relatively stronger growth in RYN reflects the potential growth in housing and business development in the region around RYN. As more businesses and residents move into the area, more leisure and business travel related operations are expected to occur.

The local market share method was not selected because its assumptions can lead to a larger forecast than warranted. By averaging the local market share percentage for the past ten years, the average market share is inflated by the higher share in previous years compared to recent years. Because of higher operations between 2008 and 2012, this method forecasts operations assuming the market share of local itinerant GA operations at RYN would immediately jump from a 34 percent to 37 percent.

Another reason the regression method is preferred over the local market share method is due to itinerant flights not necessarily originating from southern Arizona. Because itinerant flights can originate from out of state, taking national trends into account is an important factor.

The preferred forecast is compared to the TAF in **Table 2-16**.

Table 2-16: Itinerant General Aviation Operations Forecast - TAF Comparison

Fiscal Year	2018 TAF	Regression	Total Difference	% Difference
2018	34,321	34,859	538	0.0%
2023	32,138	39,100	6,962	21.7%
2028	32,366	40,500	8,134	25.1%
2033	32,596	42,000	9,404	28.9%
2038	32,826	43,500	10,674	32.5%
CAGR	-0.2%	1.1%	N/A	N/A
CAGR: Compound Annual Growth Rate				

LOCAL OPERATIONS

Methods

Forecasts for local GA operations use the following methods:

- Two-variable regression analysis with 2018 Aerospace Forecast national itinerant and local GA operations.
- Flight school growth simulation using a three-variable regression analysis with 2018 Aerospace Forecast national local GA operations.
- Assumption of RYN maintaining the same local market share of local GA operations.

Local GA operations were found to have a strong positive correlation with national itinerant GA operations ($r = 0.95$) and local GA operations ($r = 0.94$). The next following strongest correlation was with that of national single engine fleet with an $r = 0.70$. Based on these results, a multivariable regression analysis was performed with different combinations of the three most strongly correlated variables.

The R square is adjusted to take the number of variables used into account as the normal R square increases with every variable added, even if the variable does not increase the strength of the prediction. The highest adjusted R square value for the two-variable regression is 0.89 using national itinerant and local GA operations. The two-variable regression equation used to forecast the operations is as follows:

Two-Variable Regression Equation: $y = m_1(x_1) + m_2(x_2) + b$

y = Local General Aviation Operations, b = Intercept from Regression Analysis

$$y = (14.29 \times \text{National Itinerant GA Operations}) + (8.00 \times \text{National Local GA Operations}) - 236{,}793.28$$

The regression forecast results in a CAGR of 1.8 percent during the 20-year forecast period.

The flight school growth method is based on a three-variable regression that resulted in an adjusted R square value of 0.92 using all three highest correlated variables previously mentioned. This results in a higher CAGR of 3.9 percent in the 20-year forecast period, the highest of all three methods and significantly greater than that of the TAF.

Three-Variable Regression Equation: $y = m_1(x_1) + m_2(x_2) + m_3(x_3) + b$

y = Local General Aviation Operations, b = Intercept from Regression Analysis

$$y = (24.26 \times \text{National Itinerant GA Operations}) + (2.51 \times \text{National Local GA Operations}) + (-1.25 \times \text{National Single Engine Fleet}) - 150{,}837.50$$

Like the itinerant GA forecast, the local market share method assumes that RYN will maintain the same market share percentage of local GA operations occurring among the airports in the catchment area. This considers TUS, AVQ, and MZJ local GA operations in addition to RYN. This method takes the average percentage of the annual local GA operations occurring at RYN and divides it by the local GA operations in the total catchment area for the past ten years. The local historical data is from the TAF. This average percentage is then multiplied with the forecasted local GA operations found in the TAF for each airport. The 2008-2018 average market share for local GA operations for RYN is 41 percent of catchment area operations. The overall catchment area of local GA operations minus RYN is expected to grow an average 1.1 percent annually from 2018 to 2038, and RYN is expected to maintain its market share.

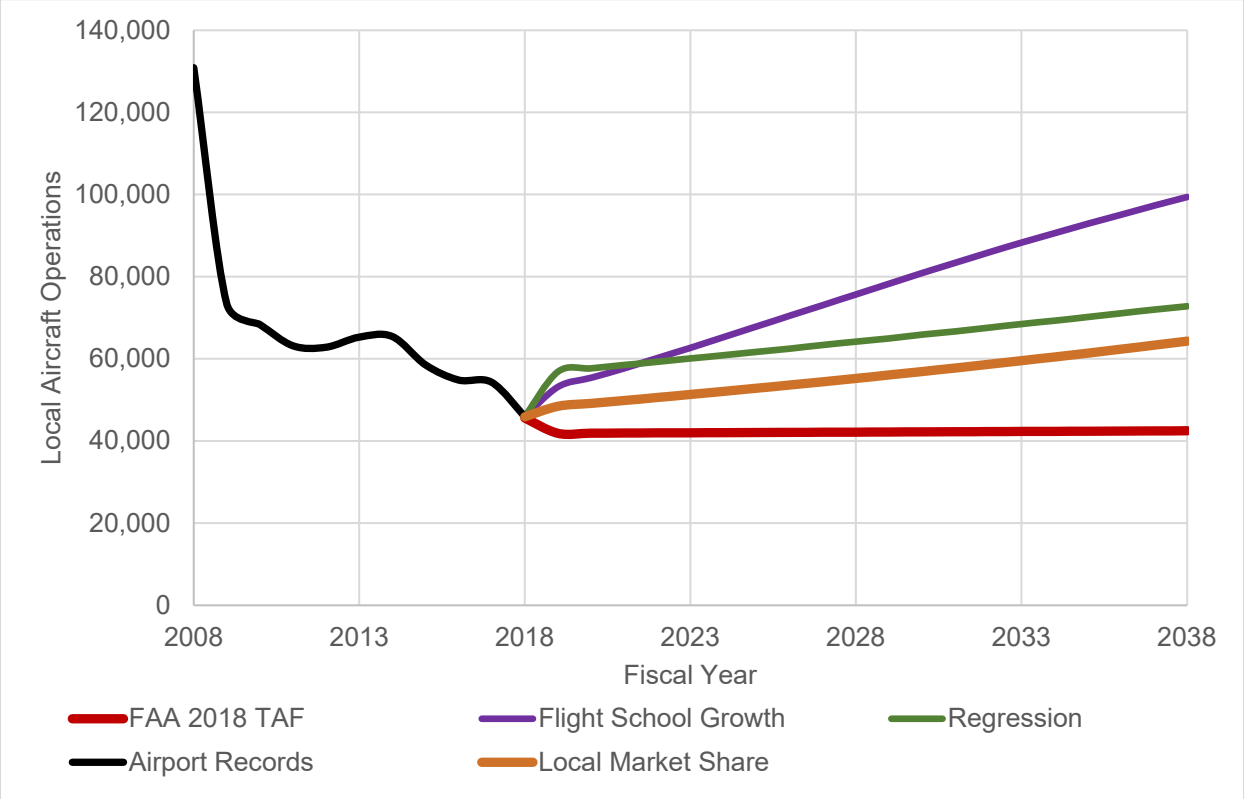
Factors supporting growth in local flight training operations include new residential and commercial development along the recently improved Ajo Way, which will bring new residents and potential aircraft owners and flight students to the area. A second factor is the use of RYN by flight training operations that originate from other airports in the metropolitan area. These flights travel to RYN, proceed to do pattern work, then return to the airport that they came from. Growth in operations and flight instruction at area airports will have an effect on local and itinerant operations at RYN. Lastly, TAA is actively recruiting flight schools. The potential effect of a flight school at RYN is illustrated in **Figure 2-9**.

The forecasts are presented along with the 2018 TAF for comparison in **Table 2-17** and **Figure 2-6**. Note the difference between the airport records operations count used in 2018 and the 2018 TAF estimate of 2018 operations.

Table 2-17: Local General Aviation Operations Forecast

Fiscal Year	Regression	Flight School Growth	Local Market Share	2018 TAF
2018	45,900	45,900	45,900	45,610
2023	60,100	62,700	51,338	42,016
2028	64,200	75,700	55,255	42,176
2033	68,500	88,300	59,569	42,336
2038	72,800	99,400	64,325	42,496
CAGR	2.3%	3.9%	1.7%	-0.4%
CAGR: Compound Annual Growth Rate				

Figure 2-6: Local General Aviation Operations Forecast



Preferred and TAF Comparison

The local market share method is the preferred forecast method for GA operations at RYN. This is because the Southern Arizona region where RYN is located is a preferred flight training area with its abundance of aviation facilities and good flying weather. This method also indirectly accounts for the local socioeconomic conditions as it considers the forecasts of other airports in the catchment area. The TAFs of the other three airports in the market assessment area already factor into the socioeconomic forecasts related to each airport.

The two-variable regression forecast, while having a strong adjusted R squared value (0.89), only accounts for national trends and does not include the unique local characteristics of the Southern Arizona region. Local GA operation numbers are based solely on operations that originate and terminate at the same airport, so having the forecast only factor in national trends would miss any local trends that may affect local GA.

Similarly, the flight school growth method also has a strong correlation with historic local GA operations. However, the resulting projection by the flight school growth is extremely high and is only likely with a source that generates a large number of local GA operations, such as the introduction of a flight school. This method also only accounts for national trends like the two-variable regression method. Thus, this method was not selected as the preferred method.

The preferred forecast is compared to the TAF in **Table 2-18**.

Table 2-18: Local General Aviation Operations Forecast – TAF Comparison

Fiscal Year	2018 TAF	Local Market Share	Total Difference	% Difference
2018	45,610	45,900	290	0.0%
2023	42,016	51,338	9,322	22.2%
2028	42,176	55,255	13,079	31.0%
2033	42,336	59,569	17,233	40.7%
2038	42,496	64,325	21,829	51.4%
CAGR	-0.4%	1.7%	N/A	N/A
CAGR: Compound Annual Growth Rate				

The preferred forecast does not account for the potential return of a flight school at RYN. The subsequent flight school impact assessment explores the range of possible effects on the local operation forecast the flight school(s) may have at RYN.

BASED AIRCRAFT

Methods

Forecasts for based aircraft use the following methods:

- Historical growth rate based on the past eight years of ADOT based aircraft records
- Application of 2018 Aerospace Forecast growth rate for each aircraft type
- Assumption of RYN maintaining the same market share of each aircraft type.

The growth rate method is based on the growth rate of each aircraft type in the past eight years. However, due to the inability to calculate growth rates when involving a jump from zero to any number, some aircraft types use a shorter historical period to calculate growth rates. The 2010-2018 CAGR is applied to the future SEP, MEP, and Other aircraft types. Jets use the 2015-2018 rate as there were no jets based in RYN prior to 2015.

The second method assumes each aircraft type based in RYN will grow at the same rate as the national rate stated in the 2018 FAA Aerospace Forecast. The Aerospace Forecast provides multiple average annual growth rates based on various forecasting periods. The 2018-2028 growth rates were used for the 2019-2028 forecast and the 2018-2038 growth rates were used from 2029 to 2038.

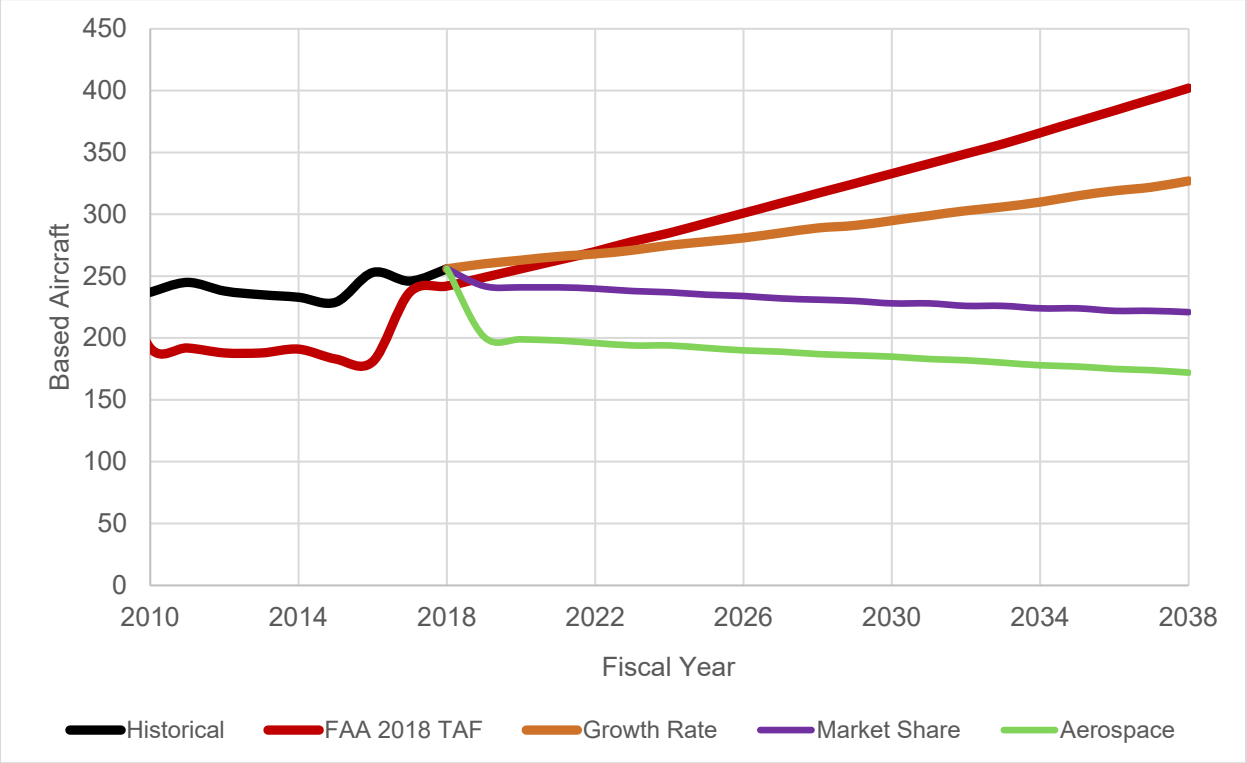
The market share method assumes RYN will maintain the same market share percentage for each aircraft type against the national fleet. The market share is determined by dividing the number of each aircraft type by the national fleet of that aircraft type (from the 2018 Aerospace Forecast) for the past eight years. These percentages are averaged across the eight years and multiplied with the forecasted national fleet data in the 2018 Aerospace Forecast. RYN has 0.14 percent of the SEP and Other market share, 0.08 percent of MEP market share, and less than 0.01 percent of Jet market share. There were no helicopters based in RYN in the past eight years.

Table 2-19 and **Figure 2-7** present the forecasts with the 2018 TAF for comparison.

Table 2-19: Based Aircraft Forecast

Fiscal Year	Growth Rate	Aerospace	Market Share	2018 TAF
2018	256	256	256	242
2023	271	194	238	278
2028	289	187	231	317
2033	306	180	226	357
2038	327	172	221	402
CAGR	1.2%	-2.0%	-0.7%	2.6%
CAGR: Compound Annual Growth Rate				

Figure 2-7: **Based Aircraft Forecast**



Preferred and TAF Comparison

The preferred based aircraft forecast is the growth rate forecast. The market share and aerospace forecasts are excluded due to the low correlation with national indicators ($r < 0.7$ for all). The market share uses the Aerospace Forecast's projected national fleet while the aerospace growth rate method assumes RYN based aircraft will change in tandem with that of the rest of the nation. Another issue with both the aerospace and market share methods is that due to the airport's based aircraft records, the number of experimental and light sport aircraft were manually counted and included in the Other category, which shows a significantly higher number of Other aircraft (56) compared to the Aerospace Forecast (3). This would skew the results for individual based aircraft type forecasts as the Aerospace forecast assumes a very low, almost flat growth rate of 0.01 percent for Other aircraft. In comparison, the growth rate forecast is based solely on the airport's historical records and is consistent on what aircraft are considered SEP verses Other aircraft.

It is also important to note the difference in historical data between the ADOT records and the 2018 TAF. This results in a difference in forecasted based aircraft, with the TAF started at a lower number of total based aircraft but eventually surpassing the preferred forecast due to a more aggressive CAGR forecast. **Table 2-20** shows the difference in the preferred forecast and that of the TAF, and **Table 2-21** shows the preferred forecast broken down by aircraft type.

Table 2-20: Based Aircraft Forecast – TAF Comparison

Fiscal Year	2018 TAF	Growth Rate	Total Difference	% Difference
2018	242	256	14	5.8%
2023	278	271	-7	-2.5%
2028	317	289	-28	-8.8%
2033	357	306	-51	-14.3%
2038	402	327	-75	-18.7%
CAGR	2.6%	1.2%	N/A	N/A
CAGR: Compound Annual Growth Rate				

Table 2-21: Preferred Based Aircraft Forecast by Aircraft Type

Fiscal Year	SEP	MEP	Jet	Helicopter	Other	Total
2018	189	10	1	0	56	256
2023	198	8	2	0	63	271
2028	208	7	2	0	72	289
2033	218	5	2	0	81	306
2038	229	4	2	0	92	327
CAGR	1.0%	-4.5%	3.5%	N/A	2.5%	1.2%
CAGR: Compound Annual Growth Rate						

PEAK FORECASTS AND CRITICAL AIRCRAFT

PEAK PERIOD FORECASTS

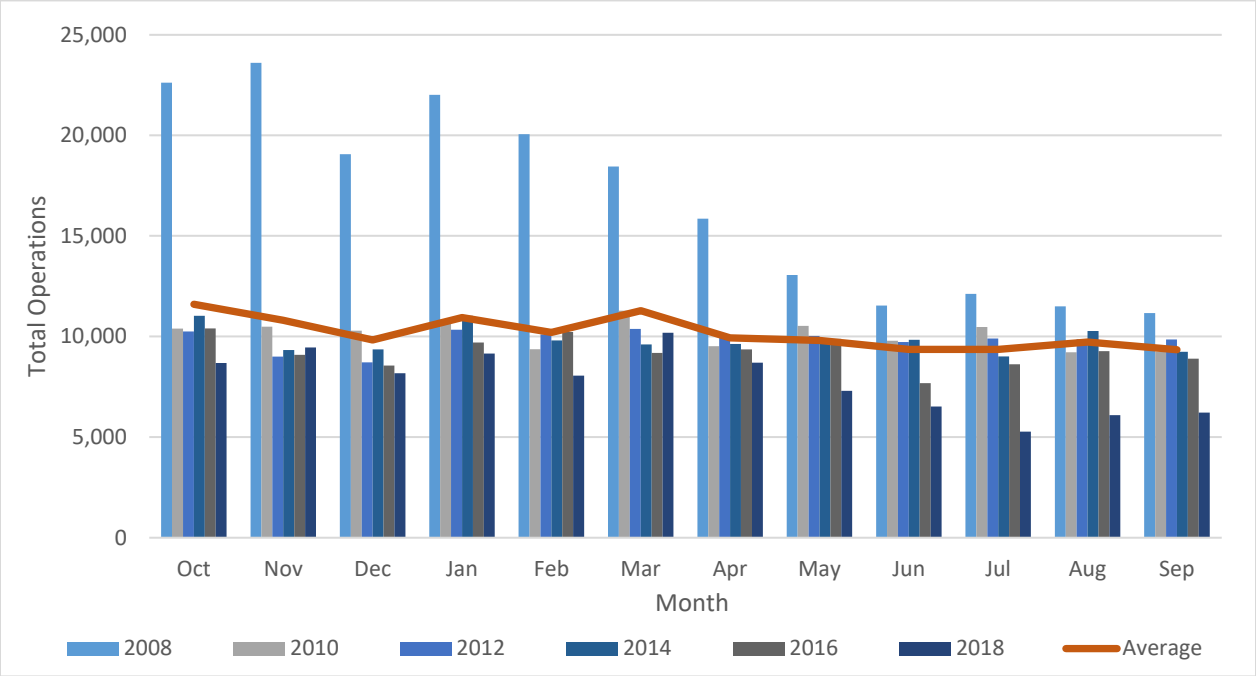
Peak period forecasts estimate when facilities will be at their busiest. Peak forecasts are used to assess the service capacity of airfield facilities and to determine the scale of improvement projects. Improvement projects are based on a typical busy period throughout the year rather than the busiest moment in a year. The forecast uses historical airport records to project future peaks and will need reevaluation if a change in user or aircraft type occurs. Based on the past ten years of data, March has historically been the peak month in operations with an average of 9.2 percent of annual operations. While October has a higher average due to a very high number of operations in fiscal year 2008, March has consistently been the peak month seven out of the past ten years.

The difference in magnitude in fiscal year 2008 is likely due to the presence of the flight school which closed in 2008. **Table 2-22** shows the peak period forecast and **Figure 2-8** shows the historical data used for the forecast.

Table 2-22: Peak Period Operations Forecast

Year	Annual	Peak Month	Peak Day
2018	94,186	8,700	281
2023	112,700	10,500	339
2028	118,200	11,000	355
2033	124,000	11,500	371
2038	129,800	12,100	390
Source: TAA Provided Data, OPSNET			

Figure 2-8: OPSNET Historic Monthly Operations



CRITICAL AIRCRAFT

The critical aircraft is the most demanding type, or group of aircraft with similar characteristics, that operates more than 500 times annually at an airport. The critical aircraft is categorized by the airport reference code (ARC) that is determined by the aircraft approach category (AAC) and the airplane design group (ADG). The critical aircraft is used as a reference to scale and design improvement projects discussed in later chapters of the Master Plan.

The Traffic Flow Management System Counts Data (TFMSC) provides a sample of flights that have filed a flight plan. The proportion of operations for each aircraft in each AAC and ADG were extrapolated to the total number of itinerant GA operations for 2018. **Table 2-23** shows the estimated itinerant operations by ARC based on flight plans recorded in the TFMSC. Based on the number of operations in the TFMSC, the critical aircraft type for RYN in 2018 is ARC B-II.

Table 2-23: 2018 Itinerant Operations by ARC

Reference Code	TFMSC Operations	Itinerant GA Operations		Local GA Operations*	
		% of TFMSC Operations	Operations Estimate	% of TFMSC Operations	Operations Estimate
A-I	1,304	88.9%	30,986	90.74%	41,652
A-II	2	0.1%	48	0.14%	64
B-I	131	8.9%	3,113	9.12%	4,184
B-II	17	1.2%	404	N/A	N/A
C-I	4	0.3%	95	N/A	N/A
C-II	8	0.5%	190	N/A	N/A
C-IV	1	0.1%	24	N/A	N/A
Total	1,467	N/A	34,859	N/A	45,900

*Only ARC A-I, A-II, and B-I type aircraft are considered for Local GA Operations
Source: TFMSC, TAA Provided Data.

An introduction of a flight school would not have an effect on the ARC B-II critical aircraft determination and the developed ALP will reflect B-II design standards. However, due to development around RYN, the ARC D-II design standards identified in the previous Master Plan should be maintained for the planning period. As the area around RYN is experiencing development, the D-II design standards would support future business operations that would attract business jet operations to RYN. Having the D-II design standards in place would allow the airport to plan to accommodate the required facilities in the case of commercial area growth and economic development. The design standards between B-II and D-II are shown in **Table 2-24**.

It is understood that FAA financial participation in capital projects requires airport sponsors to demonstrate that the facilities are being designed for the critical users of the airport. FAA TFMSC records indicate that RYN has not seen operations by approach category D aircraft since 2015; therefore, construction of future facilities up to B-II design standards is likely eligible until more demanding users begin operating more frequently. Improvement alternatives will address how B-II facilities can be planned with consideration for how setbacks and design standards will change if D-II becomes an eligible design standard in the future. The intent of this practice is to avoid siting facilities that will have to be relocated if D-II standards come into effect later, thus requiring an ALP update to reflect the new design standard.

Table 2-24: ARC Design Standards Comparison

Design Standard	B-II	D-II
Runway Width	75 ft	100 ft
RSA Width	150 ft	500 ft
RSA Length	300 ft	1,000 ft
ROFA Length	500 ft	800 ft
ROFA Width	300 ft	1,000 ft
RPZ Area	13.77 Acres	29.465 Acres

FLIGHT SCHOOL IMPACT ASSESSMENT

The forecasts assessed in this chapter do not account for the impact a flight school will have on operations and based aircraft. RYN has previously been home to a flight school and it is possible a flight school will return in the future. The following assessment examines the impact of one or more flight schools being based at RYN will have on the general aviation and based aircraft forecasts.

The presence of a flight training school affects the number of operations and based aircraft at an airport. The introduction of a flight school to RYN will increase operations and based aircraft, and the level of this increase depends on the nature of the flight training operation. Forecasts of training activity employ a scenario-based approach as there is not an existing school at the Airport to survey. As mentioned in the General Aviation section of the forecast chapter's Aviation Activity Profile, the previous flight school at RYN closed in 2008. Local operations fell from just under 131,000 to approximately 73,000. The following steps were performed to estimate flight training activity:

1. Define the average number of annual operations performed by an aircraft operated by a flight school.
2. Define the number and type of aircraft expected to be associated with flight training activity that will be based at RYN.
3. Calculate the number of additional local operations the flight training aircraft will contribute to the total operations.
4. Verify that the itinerant operations forecasts are inclusive of additional demand associated with cross-country flight training flights.

The ratio of training operations to total operations performed per based aircraft is determined by aggregating information from other similar sized airports with flight training. The data analyzed separated fixed-wing and helicopter aircraft types and operations. This allowed ratios for both types of aircraft to be calculated and allows for adjustment to accommodate for the presence of helicopter training.

The size of the training facility is determined by the type of flight school established. There are two sets of federal regulations (Part 61 and Part 141) that define minimum requirements for pilot training and certification. Part 61 allows any FAA approved flight instructor, associated with a flight school or not, to train students. Part 141 defines the curriculum requirements and minimum pass rates for FAA-approved flight schools. Both require the same performance standards for pilot certification, but Part 61 allows for a more flexible schedule but less structured training environment. Thus, a Part 61 training facility is assumed to have less based training aircraft than a Part 141 facility, and aircraft at a Part 61 facility are expected to operate less frequently (on average) than those at a Part 141 facility.

Table 2-25 shows estimates of based aircraft provided by the TAA and shows research data on other Arizona flight training schools. TAA has indicated the possibility of a Part 61 school, a Part 141 school, or both types of schools coming to RYN. It is estimated that the Part 61 flight training facility would add up to 22 fixed-wing aircraft in 2022 and grow to 45 fixed-wing aircraft by 2032.

The Part 141 flight school is expected to add up to 60 fixed-wing aircraft and up to three helicopters in 2024. Should the Part 141 flight school function like similar programs elsewhere in Arizona and the United States, it would aim to establish a large operation at RYN as soon as possible to maximize return on investment and capitalize on the current airline hiring environment.

Table 2-25: Training Operations per Based Aircraft by Aircraft Type

Type	Training Operations/Based Aircraft		Based Aircraft Estimate
	Fixed-Wing	Helicopter	
Part 61	450	1,100	22 Fixed-Wing in 2020, Up to 40 Fixed-Wing in 10 years
Part 141	1,300	1,500	60 Fixed-Wing and 3 Helicopters in 2024

Figure 2-9 and **Table 2-26** show the changes to the preferred civil local operations forecast explored in the forecast chapter. The addition of a flight training facility will create an immediate increase in operations the year the facility is introduced. As training operations are expected to be steady overtime, the growth in non-training operations is due to natural growth created by the factors addressed in the forecast chapter. The highlighted cells in **Table 2-26** indicate the years the more training aircraft are added to the based aircraft count for the preferred forecast.

Figure 2-9: Preferred Civil Local Operations Forecast with Flight Training Operations

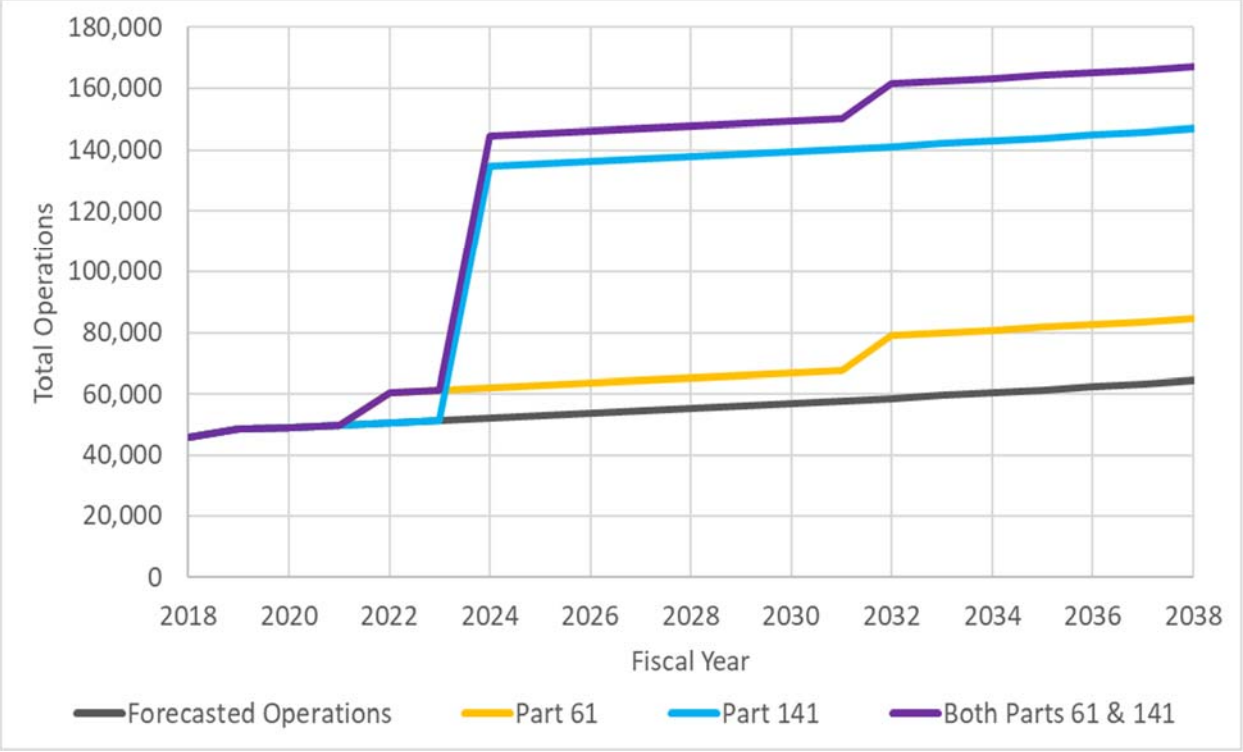


Table 2-26: Total Operations Forecast with Flight Training Operations

Fiscal Year	Forecasted Operations	With Part 61	With Part 141	With Both Parts 61 & 141
2018	45,900	45,900	45,900	45,900
2019	48,470	48,470	48,470	48,470
2020	49,167	49,167	49,167	49,167
2021	49,877	49,877	49,877	49,877
2022	50,600	60,500	50,600	60,500
2023	51,338	61,238	51,338	61,238
2024	52,091	61,991	134,591	144,491
2025	52,858	62,758	135,358	145,258
2026	53,642	63,542	136,142	146,042
2027	54,440	64,340	136,940	146,840
2028	55,255	65,155	137,755	147,655
2029	56,085	65,985	138,585	148,485
2030	56,931	66,831	139,431	149,331
2031	57,793	67,693	140,293	150,193
2032	58,673	78,923	141,173	161,423
2033	59,569	79,819	142,069	162,319
2034	60,483	80,733	142,983	163,233
2035	61,416	81,666	143,916	164,166
2036	62,367	82,617	144,867	165,117
2037	63,336	83,586	145,836	166,086
2038	64,325	84,575	146,825	167,075
CAGR				
5 year	2.26%	5.94%	2.26%	5.94%
10 year	1.87%	3.57%	11.62%	12.39%
15 year	1.75%	3.76%	7.82%	8.79%
20 year	1.70%	3.10%	5.99%	6.67%

Highlighted cells indicate the year(s) training facilities open at RYN or an increase in training aircraft is expected as mentioned by TAA.
"Part 61," "Part 141," and "Both Parts 61 & 141" columns are totals and not in addition to the Forecasted Operations.

The addition of flight training has the potential of more than doubling the total local operations forecasted, depending on the size and number of flight school(s). This is in line with the historic, pre-2009 local operations when RYN before the loss of the previous flight school. The impact of this growth will be explored in the Facility Requirements chapter.

FORECAST SUMMARY AND FAA FORECAST TABLES

The forecast summary is presented in **Figure 2-10** and **Figure 2-11**. Highlights of the forecast are as follows:

- The MSA population is expected to continue growing at an average 1 percent annually.
- The MSA economy is growing with GRP forecasted to grow an average 1.8 percent annually.
- Itinerant GA operations are both strongly correlated with national indicators in the 2018 Aerospace Forecast and are expected to grow at a faster rate than the 2018 TAF. Itinerant GA operations are projected to grow at a CAGR of 1.1 percent.
- While local GA operations are also strongly correlated with national indicators, local socioeconomics have a stronger impact on local GA. Based on the local market share forecasting method, local GA operations are projected to grow at 1.7 percent CAGR.
- Based aircraft counts provided by ADOT differ from that of the 2018 TAF. Historically, RYN based aircraft numbers do not correlate well with the national fleet. The SEP fleet is projected to grow at an average 1 percent annually, while MEP is expected to decrease at a CAGR of 4.5 percent. Both Jets and Other aircraft are expected to grow at CAGR 3.5 percent and 2.5 percent, respectively. There have historically been no helicopters based at RYN, and that is expected to remain so.
- The forecasted critical aircraft type is ARC B-II. However, the ARC D-II design standards identified in the previous Master Plan should be maintained as the MSA grows and increased jet operations become a possibility. The ALP will reflect B-II design standards; however, it may be refined in the future if the design standards change due to use by a more demanding aircraft.

Figure 2-10: Forecast/TAF Comparison

AIRPORT NAME: Ryan Airfield

	Year	Airport Forecast	TAF	AF/TAF (% Difference)
Passenger Enplanements				
Base yr.	2018	0	0	N/A
Base yr. + 5yrs.	2023	0	0	N/A
Base yr. + 10yrs.	2028	0	0	N/A
Base yr. + 15yrs.	2033	0	0	N/A
Commercial Operations				
Base yr.	2018	0	4	N/A
Base yr. + 5yrs.	2023	0	4	N/A
Base yr. + 10yrs.	2028	0	4	N/A
Base yr. + 15yrs.	2033	0	4	N/A
Total Operations				
Base yr.	2018	94,621	93,769	0.9%
Base yr. + 5yrs.	2023	104,338	87,992	18.6%
Base yr. + 10yrs.	2028	109,655	88,380	24.1%
Base yr. + 15yrs.	2033	115,469	88,770	30.1%

NOTES: TAF data is on a U.S. Government fiscal year basis (October through September).

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Figure 2-11: Forecast/TAF Comparison – (Forecast Levels & Growth Rates)

A. Forecast Levels and Growth Rates

AIRPORT NAME: Ryan Airfield — **Specify base year:** 2018

	Base Yr. Level	Base Yr. + 1yr.	Base Yr. + 5yrs.	Base Yr. + 10yrs.	Base Yr. + 15yrs.	Average Annual Compound Growth Rates: Base yr. to +1	Base yr. to +5	Base yr. to +10	Base yr. to +15
Passenger Enplanements									
Air Carrier	0	0	0	0	0	N/A	N/A	N/A	N/A
Commuter	0	0	0	0	0	N/A	N/A	N/A	N/A
TOTAL	0	0	0	0	0	N/A	N/A	N/A	N/A
Operations									
Itinerant									
Air carrier	0	0	0	0	0	N/A	N/A	N/A	N/A
Commuter/air taxi	0	0	0	0	0	N/A	N/A	N/A	N/A
Total Commercial Operations	0	0	0	0	0	N/A	N/A	N/A	N/A
General aviation	34,859	38,000	39,100	40,500	42,000	9.0%	2.3%	1.5%	1.3%
Military	1,996	2,000	2,000	2,000	2,000	0.2%	0.0%	0.0%	0.0%
Local									
General aviation	45,900	48,470	51,338	55,255	59,569	5.6%	2.3%	1.9%	1.8%
Military	11,866	11,900	11,900	11,900	11,900	0.3%	0.1%	0.0%	0.0%
TOTAL OPERATIONS	94,621	100,370	104,338	109,655	115,469	6.1%	2.0%	1.5%	1.3%
Instrument Operations	9,531	10,282	10,544	10,878	11,236	7.9%	2.0%	1.3%	1.1%
Peak Hour Operations	21	0	0	0	0	-100.0%	-100.0%	-100.0%	-100.0%
Cargo/mail (enplaned+deplaned tons)	0	0	0	0	0	N/A	N/A	N/A	N/A
Based Aircraft									
Single Engine (Nonjet)	189	191	198	208	218	1.1%	0.9%	1.0%	1.0%
Multi Engine (Nonjet)	10	10	8	7	5	0.0%	-4.4%	-3.5%	-4.5%
Jet Engine	1	2	2	2	2	100.0%	14.9%	7.2%	4.7%
Helicopter	0	0	0	0	0	N/A	N/A	N/A	N/A
Other	56	57	63	72	81	0.0%	0.0%	0.0%	0.0%
TOTAL	256	260	271	289	306	1.6%	1.1%	1.2%	1.2%

B. Operational Factors

	Base Yr. Level	Base Yr. + 1yr.	Base Yr. + 5yrs.	Base Yr. + 10yrs.	Base Yr. + 15yrs.
Average aircraft size (seats)					
Air carrier	0	0	0	0	0
Commuter	0	0	0	0	0
Average enplaning load factor					
Air carrier	0%	0%	0%	0%	0%
Commuter	0%	0%	0%	0%	0%
GA operations per based aircraft	315	333	334	331	332

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