2021

ADOT

ARIZONA AVIATION ECONOMIC IMPACT STUDY

Technical Report

OCTOBER 2021

Table of Contents

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Table of Tables

Table of Figures

Chapter 1. Introduction and Data Collection

Arizona's strong and diverse economy is centered around industries such as tourism, manufacturing, and aerospace and defense, with historical activities in agriculture and mining still important in rural areas of the state. With nearly 114,000 square miles of land and a population of more than 7.3 million, Arizona presents residents and visitors with a broad spectrum of experiences to enjoy, ranging from the amenities of large, urban cities to the solitude and recreation offered by remote desert and wilderness areas. Arizona hosts major sporting events throughout the year including the Waste Management Phoenix Open, Cactus League Spring Training, and Fiesta Bowl. Northern Arizona is home to Grand Canyon National Park—the second-busiest national park in the United States which annually welcomes 5.9 million visitors from around the globe. With much of the state averaging 300 days of sunshine per year, residents and visitors have ample opportunity to enjoy all that Arizona has to offer. This helped Arizona add 120,000 new residents between 2018 and 2019 (1.7% growth) to become the nation's third-fastest growing state.

The aviation industry plays an essential role in the Arizona economy by meeting the vital transportation and logistics services needs of the state's diverse commercial/industrial base, rapidly growing population, and thriving tourism industry. Companies that rely on aviation to transport people and goods as part of their business operations stimulate economic activity that supports jobs at the state's 67 publicly owned, public-use airports as well as aviation-related businesses. Visitors entering through Arizona's airport system spend money on transportation, lodging, food, and entertainment. These activities generate successive waves of spending and additional jobs that radiate throughout the state. Aviation is an integral engine of Arizona's economy and is a critical component of attracting, retaining, and supporting the businesses that form the foundation of the state's economic well-being.

The Arizona Department of Transportation (ADOT) Aeronautics Group initiated the 2021 Arizona Aviation Economic Impact Study (2021 Arizona AEIS) to evaluate the economic and social benefits of the state's airport system. A similar economic analysis was initiated in the 1980s, and updates have continued over the past 30 years. The most recent prior study for the ADOT Aeronautics Group was completed in 2013 (based on data from 2011), which provides an opportunity to compare changes in economic activity associated with aviation over time.

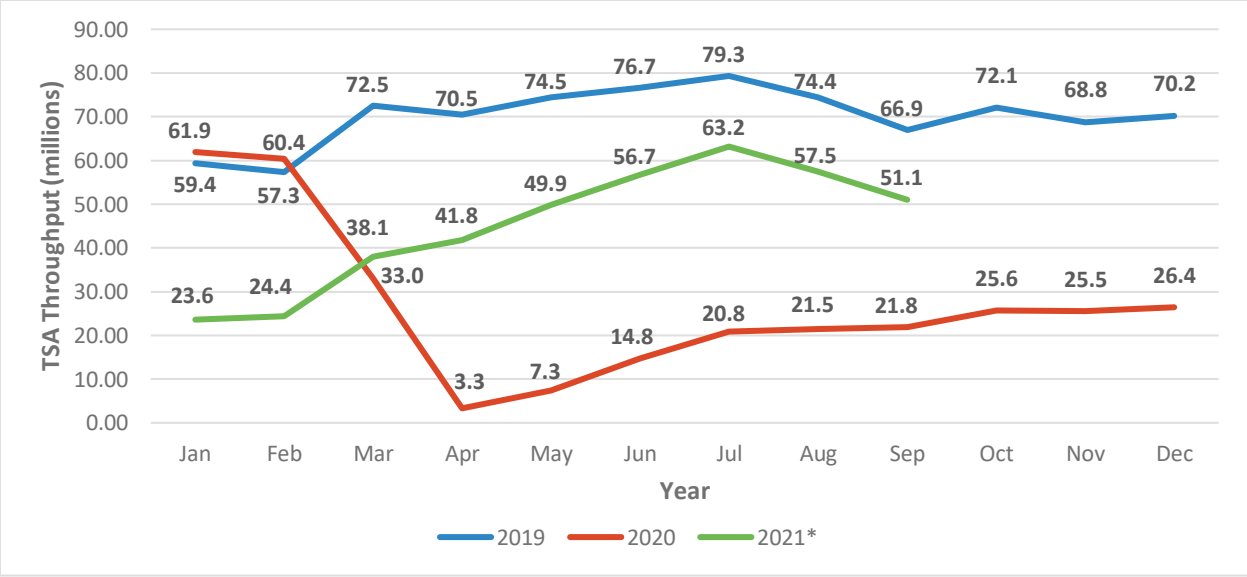
Study Timeframe and Impacts of COVID-19

The ADOT Aeronautics Group planned and programmed the 2021 Arizona AEIS following completion of the *State Aviation System Plan (SASP) Update* in 2018, and the study was initiated in mid-2020. Economic impact studies typically reflect full calendar year data; therefore, the study base year was selected as 2019. Use of 2019 as the study base year is also important as the worldwide COVID-19 pandemic took hold in the United States in March 2020, which had a significant impact on aviation and the economy. Commercial aviation was particularly hard-hit, with passenger levels falling to a fraction of activity levels witnessed during the same months of 2019. As shown in **Figure 1.1**, the Transportation Security Administration (TSA) screened 66.9 million passengers in the United States in September 2019. One year later in September 2020—the same month as when the 2021 Arizona AEIS kicked-off—the TSA screened 21.8 million passengers for a year-over-year decrease of 67.4%. Commercial passenger screenings steadily increased through July 2021 before trending back downward.[1]

1 TSA Checkpoint Travel Numbers (Current Year versus Prior Year(s)/Same Weekday). Available online at https://www.tsa.gov/coronavirus/passenger-throughput (accessed in February and October 2021).

However, this downward trend is likely at least partially attributable to factors outside of the COVID-19 pandemic (e.g., the end of the summer travel season), as a similar pattern is apparent in 2019. These data indicate that passenger volumes are rising at the national level, but air travel continues to remain well below pre-pandemic levels at the time of this writing in October 2021. Arizona's commercial aviation industry has fared better than the nation as whole. TSA passenger screening throughputs at all Arizona airports were 53.0% lower in January 2021 relative to January 2019, compared to 60.3% nationally.[2] That delta shrunk significant by September 2021, with Arizona passenger throughputs down just 6.6% from September 2019 (compared to 23.7% nationally).[3]

Figure 1.1. TSA Passenger Throughput (Total United States), 2019 - 2021



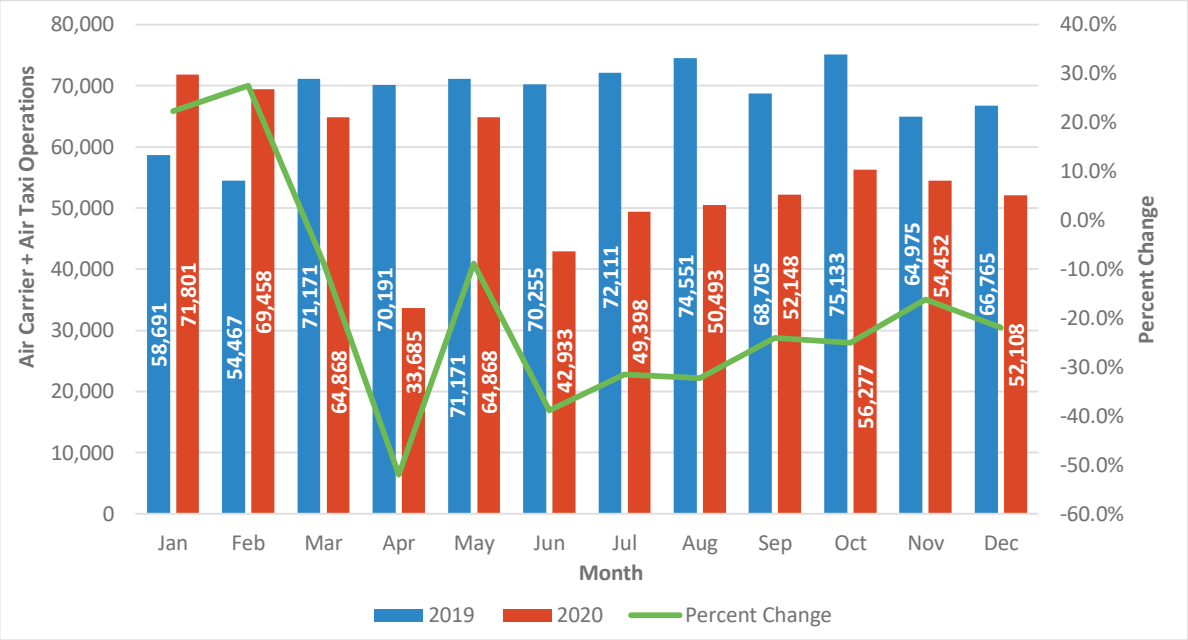
**Note: Data only available through September 2021 at the time of this writing (October 2021). Source: TSA 2021*

While TSA throughput data provide a more accurate indication of commercial passenger activity, comparing air taxi and air carrier operations can indicate how COVID-19 has impacted this segment of the aviation industry. **Figure 1.2** shows the number of air carrier and air taxi operations recorded at Arizona's 11 airports with air traffic control towers in 2019 and 2020. In January and February, operations were 22.3% and 27.5% higher in 2020 than 2019. The trend quickly reversed in March 2020, with operations falling 8.9% below those experienced in March 2019. The trend reached its nadir in April, with 2020 air carrier and air taxi operations falling 52.0% below activity levels witnessed during the same month in 2019. Operations improved in May, before falling again in June 2020. For the remainder of the year, total air carrier and air taxi operations in 2020 hovered between 16.2% and 32.3% (respectively) below those witnessed in 2019.

2 TSA data as complied by Airlines for America (A4A) (February 2021). "Tracking the Impacts of COVID-19". Available online at https://www.airlines.org/dataset/impact-of-covid19-data-updates/# (accessed February 2021).

3 TSA data as complied by A4A (October 2021). "Emerging from the Pandemic". Available online at https://www.airlines.org/dataset/impact-of-covid19-data-updates/# (accessed October 2021).

Figure 1.2. Air Carrier and Air Taxi Operations at Arizona Towered Airports, 2019 vs. 2020



Source: Federal Aviation Administration (FAA) Air Traffic Activity System (ATADS) 2021 (accessed February 2021)

Table 1.1 shows all air carrier and air taxi operations recorded at towered Arizona airports between January 2019 and August 2021, as well as 2019 versus 2020 and 2019 versus 2021 percent differences. Like depicted in **Figure 1.2** above, operations were 22.3% and 27.5% higher in January and February 2020 (respectively) as compared to the same months in 2019. Operations continued to be well below 2019 levels through the remainder of 2020, although the situation showed some improvement over time. By January 2021, air taxi and air carrier operations were 16.7% below those recorded in January 2019, and only 4.3% below pre-pandemic levels in February 2021. While the percent difference between 2019 and 2021 operations has varied since that time, the situation has significantly improved since the height of the pandemic witnessed through much of 2020.

Table 1.1. Air Carrier and Air Taxi Operations at Arizona Towered Airports, 2019 vs. 2020 vs. 2021

Month	Air Taxi and Air Carrier Operations (no.)			Percent Difference (%)	
	2019	2020	2021	2019 vs. 2020	2019 vs. 2021
January	58,691	71,801	48,899	22.3%	-16.7%
February	54,467	69,458	52,104	27.5%	-4.3%
March	71,171	64,868	65,211	-8.9%	-8.4%
April	70,191	33,685	62,943	-52.0%	-10.3%
May	70,009	36,849	65,496	-47.4%	-6.4%
June	70,255	42,933	65,573	-38.9%	-6.7%
July	72,111	49,398	61,228	-31.5%	-15.1%

Month	Air Taxi and Air Carrier Operations (no.)			Percent Difference (%)	
	2019	2020	2021	2019 vs. 2020	2019 vs. 2021
August	74,551	50,493	61,245	-32.3%	-17.8%
September	68,705	52,148	*Data unavailable	-24.1%	*Data unavailable
October	75,133	56,277		-25.1%	
November	64,975	54,452		-16.2%	
December	66,765	52,108		-22.0%	

**Note: August 2021 is the last full month of data available at the time of this writing in October 2021.*
Source: FAA ATADS 2021 (accessed October 2021)

These trends may imply that Arizona aviation was not as hard-hit by the COVID-19 pandemic as some other areas of the country—although it is very important to recognize that TSA passenger throughputs and operations are very different metrics. Since the beginning of the COVID-19 pandemic, air carriers have "right-sized" aircraft to keep load factors high—meaning that fewer passengers are traveling on each aircraft even if the number of operations (representing one takeoff or landing) are the same. Furthermore, air cargo operations have outpaced passenger service by a large margin. A4A reports that U.S. air cargo traffic was 21.9% higher in May 2021 compared to May 2019 in terms of revenue ton miles (RTMs), while passenger traffic in terms of revenue passenger miles (RPMs) was 28.7% lower during that same period.[4] As such, an uptick in air cargo operations was likely responsible for at least a portion of the activity growth reported in **Figure 1.2** and **Table 1.1**.

Regardless of these important considerations, this also points to another crucial fact when discussing the potential impacts of the COVID-19 pandemic on the aviation industry: it is simply too early to understand the full breadth of the issue and resulting economic impact. In terms of economic indicators and their relationship to aviation, final historical data for elements such as gross domestic product (GDP), population, and economic activity lag the actual year. As such, the changes that occurred in 2020 were not fully reflected in most historical data available during the 2021 Arizona AEIS. While the final impacts are yet unknown, as of September 2021, IHS Markit projected a 3.4% contraction in world real GDP in 2020—far worse than witnessed during the previous economic downturn of 2008-2009.

The situation surrounding COVID-19 is fluid and continually evolving, with new virus strains identified just as vaccinations began to be deployed worldwide in December 2020. This creates challenges in both dealing with the current situation and projecting recovery scenarios. The duration of the pandemic, additional government actions, and passenger/consumer responses will all be key questions that impact the severity; extent; and types of short-, mid-, and long-term impacts caused by the COVID-19 virus. The Airport Consultants Council (ACC) originally projected one scenario in which recovery was witnessed by the end of summer 2020 as global travel restrictions were expected to be lifted. While some travel restrictions were initially lifted, many new restrictions were put in place again in various parts of the world. Many countries closed their borders to U.S. citizens including Canada, most member states of the European Union, and many Asian counties. Among other restrictions, the Center for Disease Control and Prevention (CDC) announced that all air passengers traveling to the United States from abroad would be required to take a COVID-19 test within 72 hours of departure and provide proof of a negative test result prior to boarding starting on January 26, 2021. More broadly, the CDC continues to strongly advise against any nonessential travel.

4 Ibid.

Other recovery scenarios project a geographically uneven recovery, with a return to pre-COVID-19 passenger traffic by mid- to late-2022. In mid-2020, both Delta Air Lines and The Boeing Company projected a three-year recovery period. A4A reports an anticipated return to 2019 passenger volumes by 2024. This scenario specifically recognizes the important role that business travel plays in airlines' return to profitability, which continues to be the most significantly affected segment of air travel. In late summer 2021, corporate ticket sales were approximately 60% below 2019 levels, and many corporations and their employees have chosen to limit or even prohibit business travel.[5] Until vaccines are widely implemented around the globe and virus transmission rates decline significantly, it is unlikely that commercial aviation or the entire world economy will see a return to pre-pandemic levels.

It is also important to recognize that various segments of the aviation industry have been affected differently. Low- and ultra-low-cost carriers primarily serving leisure travelers, such as Southwest Airlines, Spirit Airlines, and others, have announced new services to tourist destinations to offset ongoing softness in business travel. Allegiant and Spirit are also the only two carriers deploying additional capacity, with 24.2% and 13.7% additional available seat miles respectively in October 2021 versus October 2019. In February 2021, A4A reported that air cargo demands reached an all-time high in the third quarter of 2020.[6] U.S. freight and mail transported by air grew 9.1% between 2020 and 2021 (ending June of each year) to reach 23,957 million pounds.[7] The growth is largely attributable to exploding growth in e-commerce and the need to quickly transport vaccines and medical supplies globally. Some carriers have employed unique strategies to meet these new demands. For example, Alaska Airlines converted the passenger cabins of five Boeing 737-900 aircraft to carry air cargo. Delta Air Lines now flies cargo-enabled passenger jets to 70 destinations. These converted passenger jets and dedicated freighters are playing an important role in the global response to the COVID-19 virus, with one industry executive for Air Bridge Cargo noting, "Air cargo solutions have never been more important than they are now to global health services." This includes vaccine distribution, which must be handled with great care and requires climate-controlled conditions to ensure the viability of the COVID-19 vaccine. Behaviors that emerged during the COVID-19 pandemic may also spur further advancements in unmanned aerial systems (UAS) as consumers show increasing comfort with and preference for at-home deliveries for all types of durable and non-durable goods including, but certainly not limited to, groceries and pharmaceuticals. UAS are also being used to distribute much-needed medical supplies to remote areas difficult to reach by ground transportation.

Similarly, COVID-19 has impacted different types of airports in various ways. Large hub airports, which have historically served the overwhelming majority of U.S. passenger traffic, have been slowest to recover. These airports are hardest hit by reductions in business travel, international flight restrictions, and significantly reduced willingness to travel for nonessential purposes. Further, passengers now show a much higher interest in nonstop service, thereby reducing transit passenger traffic and associated economic activities at some hub airports. Small and non-hub airports have experienced more stability as passengers choose smaller and less crowded facilities, although traffic is still down at most commercial service airport in the United States.

5 Airlines Reporting Corporation data as complied by A4A (October 2021). "Emerging from the Pandemic". Available online at https://www.airlines.org/dataset/impact-of-covid19-data-updates/# (accessed October 2021).

6 A4A (February 2021).

7 Bureau of Transportation Statistics (October 2021). "Airline Activity: National Summary (U.S. Flights). Available online at https://www.transtats.bts.gov/ (accessed October 2021).

As a result of these passenger preferences, airlines are predicted to consolidate hubs,[8] and fleet mixes are already changing.[9] General aviation has fared significantly better than commercial service throughout the COVID-19 pandemic. Many general aviation airports have experienced an uptick in activity levels. Flight training and recreational flying have grown. Many pilots have more time to fly with work-from-home schedules and fewer alternative leisure activities from which to choose due to social distancing requirements. Corporate/business activity is also up as executives chose to lower their potential exposure to COVID-19 on scheduled commercial service flights.

Nationally, the federal government demonstrated its commitment to air travel and aviation by recognizing its critical role in the economy through funding provided by the Coronavirus Aid, Relief, and Economic Security Act (CARES Act). Signed into law on March 27, 2020, the CARES Act included $10 billion for airports eligible to receive federal funding. The subsequent Coronavirus Response and Relief Supplemental Appropriations Act, 2021 (CRRSAA), signed into law on December 27, 2020, included $2 billion for airports. Both packages also provided relief to airlines and airline contractors to support employees and businesses involved in the aviation industry. The American Rescue Plan of 2021 (ARPA), signed into law on March 22, 2021, included an additional $8 billion for eligible airports to "prevent, prepare for, and respond to COVID-19-related impacts."[10] Federal relief dollars have, in part, provided 100% federal matches to Airport Improvement Program (AIP) grants. These federal funds continue to flow through state and local economies in the form of supplier purchases and the re-spending of worker income, generating economic impacts that extend into broader economies. While the lasting impacts of the COVID-19 pandemic are unknown and challenging to estimate, aviation will continue to be an important contributor to Arizona's economy and the transportation system as the United States addresses and recovers from the COVID-19 pandemic.

Study Components

The primary focus of the 2021 Arizona AEIS is to determine the economic impact of Arizona's airport system. The actual process to calculate the impacts is summarized in a later section, but generally involves gathering data or key inputs that directly contribute to an airport's economic impact, threading these through a nationally recognized input-output economic model, summarizing the results by airport, and then aggregating to the statewide level. For each airport, the economic impacts stimulated by the following three broad classes of economic activity are evaluated: (1) on-airport activity by employees and business tenants; (2) capital investments or construction expenditures; and (3) spending by out-of-state visitors entering Arizona through the airport system. Each airport's economic impact results are provided for use in communicating the value of its contributions to the county and state stakeholders. Additionally, results are presented at the county level, as county-level economic indicators are used to more accurately reflect how money generated through direct on-airport activities and visitor spending flows through local, county, and ultimately statewide economies.

The study also includes economic analyses of specific aviation activities that are important to Arizona's economy. Case studies of individual world-class aviation-related businesses are provided to exemplify how the nation and world rely on Arizona airports and the aviation businesses they support. These world-class aviation businesses offer unique opportunities for skydiving, aviation educational programs/flight training, glider soaring, and others. The 2021 Arizona AEIS also analyzed the business benefits that accrue to Arizona

8 Hotle, Susan and Stacey Mumbower (March 2021). "The Impact of COVID-19 on Domestic U.S. Air Travel Operations and Commercial Airport Service." Transportation Research Interdisciplinary Perspectives, Volume 9. Available online at https://doi.org/10.1016/j.trip.2020.100277 (accessed February 2021).

9 Pallini, Thomas (July 2020). "Even More Iconic Planes Are Disappearing from the Sky Earlier Than Planned as the Coronavirus Continues to Wreak Airline Havoc." Business Insider. Available online at https://www.businessinsider.com/coronavirus-havoc-forces-airlines-to-retire-iconic-planes-sooner-2020-3 (accessed February 2021).

10 FAA (August 2021). "Airport Rescue Grants". Available online at https://www.faa.gov/airports/airport_rescue_grants/ (accessed October 2021).

from the many non-aviation-related industries that rely on aviation to transport employees, clients, and goods by air. Finally, revenue generated in the form of taxes paid from aviation activities and operations are quantified to determine the contributions that airports generate for the state and demonstrate how investments into the airport system yield immense benefits.

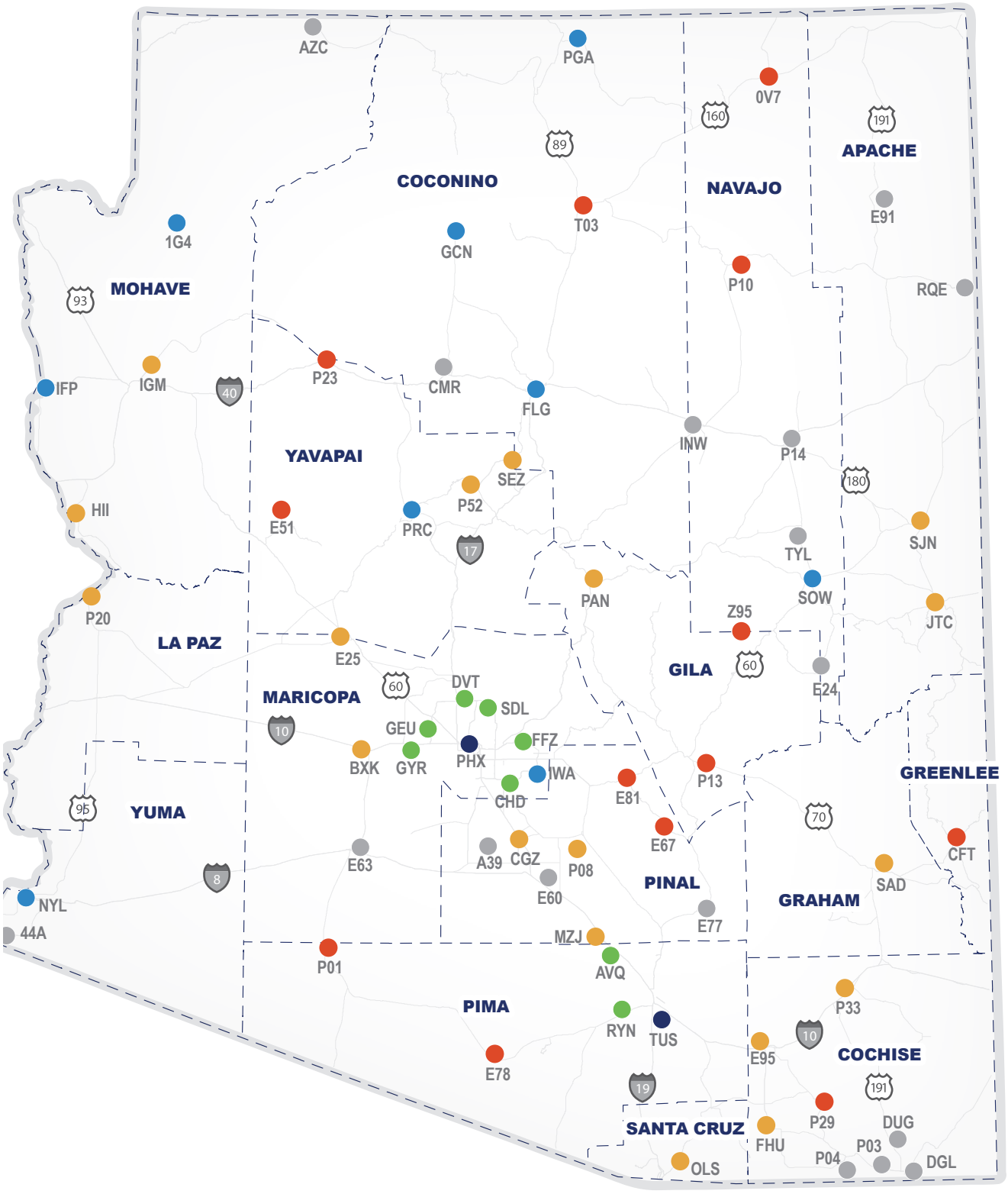
Purpose, Benefits, and Study Tools

The results of the 2021 Arizona AEIS are designed to provide information to ADOT, airport owners/sponsors, and aviation system users regarding the value and substantial contributions of the state aviation system. This information can then be communicated out to the general public, policymakers, and stakeholders. The results support decision-making regarding airport operations; investment in maintenance and expansion (as needed); and help increase recognition of the mobility, safety, security, and other quality of life benefits derived from airport and aviation-related activities. Tax revenues to city, county, and state jurisdictions are generated as a result of airport and aviation-specific economic activities. A community's support for its airport also pays dividends in terms of support for airport-compatible land use zoning and enforcement. This is a key element in enhancing the safety of people and property in the sky and on the ground, as well as minimizing nuisance issues associated with aircraft operations. Finally, the 2021 Arizona AEIS forecasts future revenues into the State Aviation Fund which are designed to support the ADOT Aeronautics Group's long-term investment planning efforts.

Arizona Airport System

Arizona's public use airport system consists of 67 airports that range in size from Phoenix Sky Harbor International (PHX) and Tucson International (TUS) airports to small general aviation airports supporting remote and rural areas of vast geographic boundaries. **Figure 1.1** depicts the airports included in the 2021 Arizona AEIS. The airports are depicted according to classifications from the *2018 SASP Update* that stratify airports in terms of the six roles they serve in the statewide system.

Figure 1.3. Arizona's Public Use Airport System



Source: ADOT Aeronautics Group 2018

Arizona's 67 publicly owned, public-use airports are located throughout the state, with all 15 counties having at least one system airport. **Table 1.2** reflects the system airports, their associated county, and state classification as established during the 2018 SASP Update.

Table 1.2. System Airports, Counties, and Classifications

Associated City	Airport Name	FAA ID	County	State Classification
Ajo	Eric Marcus Municipal	P01	Pima	GA-Basic
Bagdad	Bagdad	E51	Yavapai	GA-Basic
Benson	Benson Municipal	E95	Cochise	GA-Community
Bisbee	Bisbee Municipal	P04	Cochise	GA-Rural
Buckeye	Buckeye Municipal	BXK	Maricopa	GA-Community
Bullhead City	Laughlin/Bullhead Int'l	IFP	Mohave	Commercial-National
Casa Grande	Casa Grande Municipal	CGZ	Pinal	GA-Community
Chandler	Chandler Municipal	CHD	Maricopa	Reliever
Chinle	Chinle Municipal	E91	Apache	GA-Rural
Cibecue	Cibecue	Z95	Navajo	GA-Basic
Clifton	Greenlee County	CFT	Greenlee	GA-Basic
Colorado City	Colorado City Municipal	AZC	Mohave	GA-Rural
Coolidge	Coolidge Municipal	P08	Pinal	GA-Community
Cottonwood	Cottonwood Municipal	P52	Yavapai	GA-Community
Douglas	Bisbee-Douglas Int'l	DUG	Cochise	GA-Rural
Douglas	Cochise College	P03	Cochise	GA-Rural
Douglas	Douglas Municipal	DGL	Cochise	GA-Rural
Eloy	Eloy Municipal	E60	Pinal	GA-Rural
Flagstaff	Flagstaff Pulliam	FLG	Coconino	Commercial-National
Gila Bend	Gila Bend Municipal	E63	Maricopa	GA-Rural
Glendale	Glendale Municipal	GEU	Maricopa	Reliever
Globe	San Carlos Apache	P13	Gila	GA-Basic
Goodyear	Phoenix Goodyear	GYR	Maricopa	Reliever
Grand Canyon	Grand Canyon National Park	GCN	Coconino	Commercial-National
Holbrook	Holbrook Municipal	P14	Navajo	GA-Rural
Kayenta	Kayenta	0V7	Navajo	GA-Basic
Kearny	Kearny	E67	Pinal	GA-Basic
Kingman	Kingman	IGM	Mohave	GA-Community
Lake Havasu City	Lake Havasu City	HII	Mohave	GA-Community
Marana	Marana Regional	AVQ	Pima	Reliever
Marana	Pinal Airpark	MZJ	Pinal	GA-Community
Maricopa	Ak Chin Regional	A39	Pinal	GA-Rural
Mesa	Falcon Field	FFZ	Maricopa	Reliever

Associated City	Airport Name	FAA ID	County	State Classification
Nogales	Nogales International	OLS	Santa Cruz	GA-Community
Page	Page Municipal	PGA	Coconino	Commercial-National
Parker	Avi Suquilla	P20	La Paz	GA-Community
Payson	Payson	PAN	Gila	GA-Community
Peach Springs	Grand Canyon West	1G4	Mohave	Commercial-National
Phoenix	Phoenix Deer Valley	DVT	Maricopa	Reliever
Phoenix	Phoenix Sky Harbor International	PHX	Maricopa	Commercial-International
Phoenix	Phoenix-Mesa Gateway	IWA	Maricopa	Commercial-National
Polacca	Polacca	P10	Navajo	GA-Basic
Prescott	Prescott Regional Airport - Ernest A. Love Field	PRC	Yavapai	Commercial-National
Safford	Safford Regional	SAD	Graham	GA-Community
San Luis	Rolle Airfield	44A	Yuma	GA-Rural
San Manuel	San Manuel	E77	Pinal	GA-Rural
Scottsdale	Scottsdale	SDL	Maricopa	Reliever
Sedona	Sedona	SEZ	Yavapai	GA-Community
Seligman	Seligman	P23	Yavapai	GA-Basic
Sells	Sells	E78	Pima	GA-Basic
Show Low	Show Low Regional	SOW	Navajo	Commercial-National
Sierra Vista	Sierra Vista Municipal-Libby Army Airfield	FHU	Cochise	GA-Community
Springerville	Springerville Municipal	JTC	Apache	GA-Community
St. Johns	St. Johns Industrial Air Park	SJN	Apache	GA-Community
Superior	Superior	E81	Pinal	GA-Basic
Taylor	Taylor	TYL	Navajo	GA-Rural
Tombstone	Tombstone Municipal	P29	Cochise	GA-Basic
Tuba City	Tuba City	T03	Coconino	GA-Basic
Tucson	Ryan Field	RYN	Pima	Reliever
Tucson	Tucson International	TUS	Pima	Commercial-International
Whiteriver	Whiteriver	E24	Navajo	GA-Rural
Wickenburg	Wickenburg Municipal	E25	Maricopa	GA-Community
Willcox	Cochise County	P33	Cochise	GA-Community
Williams	H.A. Clark Memorial Field	CMR	Coconino	GA-Rural
Window Rock	Window Rock	RQE	Apache	GA-Rural
Winslow	Winslow-Lindbergh Regional	INW	Navajo	GA-Rural
Yuma	Yuma International	NYL	Yuma	Commercial-National

Source: ADOT Aeronautics Group 2018

Fifty-nine of the 67 airports are included in the FAA's National Plan of Integrated Airport Systems (NPIAS). Inclusion in the NPIAS provides an opportunity for airports to receive federal funding through the AIP for eligible projects. All Arizona public-use airports are eligible for state funding through Airport Development Grants and the Airport Pavement Preservation Program (APPP), with funding coming from the State Aviation Fund (for additional details about state funding for airports, see **Chapter 3. Key Aviation Activities and Impacts to the State Aviation Fund**).

It is important to note that eight of the 67 airports recently completed aviation economic impact studies independently or as part of larger master planning studies (see **Table 1.3**). Given their relatively recent completion, the results of their existing studies were incorporated into the 2021 Arizona AEIS to provide continuity with previously published economic impacts and to leverage prior data collection efforts. In these cases, impacts were updated to the 2019 study year of the 2021 Arizona AEIS (as warranted) in accordance with the methodology provided in **Appendix D. Incorporation of Existing Economic Impact Studies.** The updated results of these previous efforts are presented in all airport-specific, county-level, and statewide tables through this report unless specifically noted otherwise. Accordingly, the data collection process described in the following section encompassed 59 state system airports.

Table 1.3. Airports with Existing Economic Impact Studies

Associated City	Airport	FAAID	Data Year
Eloy	Eloy Municipal	E60	2019
Goodyear	Phoenix Goodyear	GYR	2016
Lake Havasu City	Lake Havasu City	HII	2019
Mesa	Falcon Field	FFZ	2018
Phoenix	Phoenix Deer Valley	DVT	2016
Phoenix	Phoenix Sky Harbor	PHX	2016
Tucson	Ryan Field	RYN	2017
Tucson	Tucson International	TUS	2017

Source: Kimley-Horn 2020

Notably, both Commercial Service-International airports, Phoenix Sky Harbor International (PHX) and Tucson International (TUS), also operate Reliever airports including Phoenix Deer Valley Airport (DVT), Phoenix Goodyear Airport (GYR), and Ryan Field (RYN). The sponsors of these major "airport systems," the City of Phoenix (COP) Aviation Department and Tucson Airport Authority (TAA), both recently conducted economic impact studies for the five airports in their combined systems. The 2021 Arizona AEIS team directly coordinated with the COP Aviation Department and TAA to obtain data used to update their airports' economic impacts to the 2019 study year and approve the final published results. Please reference **Appendix D. Incorporation of Existing Economic Impact Studies** for additional details about this process.

Data Collection

Data collection is essential to any airport economic impact analysis. The accuracy of the data collected and ultimately compiled affects the end results, and it is critical that a thorough, proven approach is utilized to successfully complete the process. Surveys served as the primary data source for the 2021 Arizona AEIS. Two surveys were implemented to gather airport-specific data for activities generating direct on-airport impacts and some aspects of off-airport visitor spending.

These two surveys included:

- Airport Manager Survey
- Airport Tenant Survey

These surveys are discussed below.

AIRPORT MANAGER SURVEY

Airport manager surveys were distributed to the contacts provided by the ADOT Aeronautics Group for the 59 system airports included in the scope of the data collection process. The survey was provided in a fillable PDF format. The Airport Manager Survey requested data as follows:

- Airport administration and related contact information
- Employment (calendar year [CY] 2019)
  - Airport sponsor employment by type (full-time vs. part-time and function of employees)
  - Annual wages and benefits to all airport sponsor employees (CY 2019)
  - Number of individuals and/or companies outsourced or on contract by type (full-time vs. part-time, function of contractor, and contract value)
- Expenditures
  - Airport capital improvements including federal, state, and local funding (2016-2019)
  - Operating budget (CY 2019)
- Revenue generation
  - Sources and amounts of revenue generation by type
- Airport activities
  - Estimated number and percent of 2019 operations by type and total
  - Percentage of 2019 transient (non-local) general aviation traffic
  - Average number of passengers (including pilots) for each 2019 transient general aviation operation
  - Average length of stay for general aviation visitors in 2019
  - Frequency of various aviation-related activities including (but not limited to) recreational flying, agricultural spraying, corporate/business activities, aerial/wildland firefighting, search and rescue, medical flights, military, and law enforcement activities
- Impacts of the COVID-19 pandemic on their business (2020 results compared to 2019)
  - Estimated ranking of overall impact
  - Changes in revenues
  - Impact on specific activity segments
  - Change in operational activity
  - Change in employment
- Airport tenants and other business users (businesses that base aircraft, non-local businesses that frequently use the airport, and local businesses known to rely on the airport)

- Contact information
- Main product/service
- Estimated number of employees

Airports were also requested to provide additional information to improve the accuracy of the study results, as best as possible and available such as:

- Capital Improvement Supplement which requested information on capital projects and expenditures in CY 2019 by individual project
- Most recent audited financial statement
- Most recent capital improvement program

AIRPORT TENANT SURVEY

Based on information provided by airport personnel through the Airport Manager Survey, Airport Tenant Surveys were distributed to all on-airport businesses with employees working on an Arizona state system airport. Surveys were distributed where possible during in-person site visits and electronically to all tenants identified through virtual site visits.

Through the Airport Manager Survey and subsequent follow-up efforts, approximately 400 on-airport business tenants were identified at Arizona airports.[11] Each of these tenants received the Tenant Survey via email to obtain data for the 2021 Arizona AEIS. The survey was provided in a fillable PDF format as well as a quick response (QR) code that directed the user to an online survey. Each on-airport tenant was contacted a minimum of three times via a combination of in-person visit, phone call, and/or email to obtain the number of full- and part-time on-airport employees and other key data points needed for the analysis. The Airport Tenant Survey requested data as follows:

- Business name, airport they operate at, and related contact information
- Type of business
- Number of employees
- Total annual sales/revenues
- Expenditures
  - Annual payroll for airport employees
  - Total rent paid
  - Property taxes paid
  - Sales and use tax paid
  - Information on additional economic benefits provided by business to community
- Impacts of the COVID-19 pandemic on their business (2020 results compared to 2019)
  - Estimated ranking of overall impact
  - Changes in operations and revenues

11 Note this figure does not include tenants at some of Arizona's busiest commercial service and general aviation airports including Phoenix Sky Harbor International (PHX), Tucson International (TUS), Phoenix Deer Valley (DVT), and Phoenix Goodyear (GYR) airports; Ryan Field; and Falcon Field (FFZ). As noted previously, the economic impacts of these airports were incorporated into the 2021 Arizona AEIS results; accordingly, tenant data were neither separately obtained nor evaluated.

SITE VISITS

While surveys served as the primary vehicle to obtain data to support the 2021 Arizona AEIS analysis, site visits provided an opportunity to ensure consistency among the responses, clarify any questions, and increase the airport manager and tenant response rates. On-site visits enhance the data collection efforts in terms of quality and reliability of data received. Site visits were conducted both in-person and virtually with airport managers or representatives for nearly all system airports. The in-person visits were determined in coordination with ADOT Aeronautics Group staff in consideration of the types and level of activity at airports. The airports receiving in-person visits included all Commercial Service-National airports,[12] Reliever facilities without existing studies, and half of all remaining general aviation airports (Community, Basic, and Rural).[13] Airports were selected based on the presence of on-airport business tenants and other aviation activities that potentially generate significant economic impacts.

Table 1.4 reports the outcome of airport manager data collection efforts by airport, including the type of site visit performed (in-person or virtual) and the response received. A response of "Yes" indicates the airport returned a completed Airport Manager Survey and "No" indicates a survey was not returned. A total of eight airports were unresponsive to all outreach efforts including emails and phone calls, one airport submitted data but later rescinded participation,[14] and one GA-Rural airport declined participation. Economic impacts for these airports were estimated through a process described in **Appendix C. 2021 Arizona AEIS Study Methodology**.

Table 1.4. Airport Manager Data Collection Outcomes

Associated City	Airport	FAA ID	Site Visit Type	Manager Response
Commercial-International				
Phoenix	Phoenix Sky Harbor	PHX	NA	Use existing study
Tucson	Tucson International	TUS	NA	Use existing study
Commercial-National				
Bullhead City	Laughlin/Bullhead Int'l	IFP	In-person	Yes
Flagstaff	Flagstaff Pulliam	FLG	In-person	Yes
Grand Canyon	Grand Canyon National Park	GCN	In-person	Yes
Page	Page Municipal	PGA	In-person	Yes
Peach Springs	Grand Canyon West	1G4	In-person	Yes
Phoenix	Phoenix-Mesa Gateway	IWA	In-person	Yes
Prescott	Prescott Regional Airport - Ernest A. Love Field	PRC	In-person	Yes
Show Low	Show Low Regional	SOW	In-person	Yes
Yuma	Yuma International	NYL	Virtual	Yes

12 Excluding Yuma International Airport (NYL), which declined a site visit due to COVID-19 restrictions.

13 Ak Chin Regional Airport (A39) did have an in-person visit; however, the sponsor later determined that the data could not be included in the study and is thus reported as "Nonresponsive" in the table below.

14 See note above regarding Ak Chin Regional Airport (A39).

Associated City	Airport	FAA ID	Site Visit Type	Manager Response
Reliever				
Chandler	Chandler Municipal	CHD	In-person	Yes
Glendale	Glendale Municipal	GEU	In-person	Yes
Marana	Marana Regional	AVQ	In-person	Yes
Scottsdale	Scottsdale	SDL	In-person	Yes
Phoenix	Phoenix Deer Valley	DVT	NA	Use existing study
Tucson	Ryan Field	RYN	NA	Use existing study
Goodyear	Phoenix Goodyear	GYR	NA	Use existing study
Mesa	Falcon Field	FFZ	NA	Use existing study
GA-Community				
Casa Grande	Casa Grande Municipal	CGZ	In-person	Yes
Coolidge	Coolidge Municipal	P08	In-person	Yes
Cottonwood	Cottonwood Municipal	P52	In-person	Yes
Kingman	Kingman	IGM	In-person	Yes
Marana	Pinal Airpark	MZJ	In-person	Yes
Payson	Payson	PAN	In-person	Yes
Safford	Safford Regional	SAD	In-person	Yes
Sedona	Sedona	SEZ	In-person	Yes
Sierra Vista	Sierra Vista Municipal-Libby Army Airfield	FHU	In-person	Yes
Buckeye	Buckeye Municipal	BXK	Virtual	Yes
Nogales	Nogales International	OLS	Virtual	Yes
Parker	Avi Suquilla	P20	Virtual	Yes
Springerville	Springerville Municipal	JTC	Virtual	Yes
St. Johns	St. Johns Industrial Air Park	SJN	Virtual	Yes
Wickenburg	Wickenburg Municipal	E25	Virtual	Yes
Willcox	Cochise County	P33	Virtual	Yes
Benson	Benson Municipal	E95	NA	Nonresponsive
Lake Havasu City	Lake Havasu City	HII	NA	Use existing study
GA-Basic				
Ajo	Eric Marcus Municipal	P01	Virtual	Yes
Bagdad	Bagdad	E51	Virtual	Yes
Cibecue	Cibecue	Z95	Virtual	Yes
Clifton	Greenlee County	CFT	Virtual	Yes
Kayenta	Kayenta	0V7	Virtual	Yes
Kearny	Kearny	E67	Virtual	Yes
Polacca	Polacca	P10	Virtual	Yes
Seligman	Seligman	P23	Virtual	Yes

Associated City	Airport	FAA ID	Site Visit Type	Manager Response
Superior	Superior	E81	Virtual	Yes
Tombstone	Tombstone Municipal	P29	Virtual	Yes
Globe	San Carlos Apache	P13	NA	Nonresponsive
Sells	Sells	E78	NA	Nonresponsive
Tuba City	Tuba City	T03	NA	Nonresponsive
GA-Rural				
Maricopa	Ak Chin Regional	A39	In-person	Nonresponsive
Colorado City	Colorado City Municipal	AZC	Virtual	Yes
Douglas	Bisbee-Douglas International	DUG	Virtual	Yes
Douglas	Cochise College	P03	Virtual	Yes
Douglas	Douglas Municipal	DGL	Virtual	Yes
Holbrook	Holbrook Municipal	P14	Virtual	Yes
San Luis	Rolle Airfield	44A	Virtual	Yes
San Manuel	San Manuel	E77	Virtual	Yes
Whiteriver	Whiteriver	E24	Virtual	Yes
Williams	H.A. Clark Memorial Field	CMR	Virtual	Yes
Eloy	Eloy Municipal	E60	In-person	Use existing study
Bisbee	Bisbee Municipal	P04	NA	Nonresponsive
Chinle	Chinle Municipal	E91	NA	Nonresponsive
Gila Bend	Gila Bend Municipal	E63	NA	Declined
Taylor	Taylor	TYL	NA	Yes
Window Rock	Window Rock	RQE	NA	Nonresponsive
Winslow*	Winslow-Lindbergh Regional	INW	NA	Yes

**Note: Winslow-Lindbergh Regional Airport (INW) was identified for an on-site visit; however, the airport did not respond to site visit requests. Source: Kimley-Horn 2020*

Table 1.5 summarizes the outcome of airport manager data collection efforts by Arizona state classification. Of the 67 airports within the scope of the study, 50 airport managers/administrators provided data to the study team, eight airports had existing economic impact studies for incorporation into the study results, eight airports did not provide data for analysis, and one airport declined to participate.

Table 1.5. Airport Manager Data Collection Outcomes

Data Received	50
Commercial-National	9
Reliever	4
GA-Community	16
GA-Basic	10
GA-Rural	11

Use Existing Study	**8**
Commercial-International	2
Reliever	4
GA-Community	1
GA-Rural	1
Nonresponsive	**8**
GA-Community	1
GA-Basic	3
GA-Rural	4
Declined to Participate	**1**
GA-Rural	1
Total System	**67**

Source: Kimley-Horn 2020

Overview of Economic Impact Modeling

An overarching goal of the 2021 Arizona AEIS was measuring how economic activity at each of the 67 airports ultimately stimulated the Arizona economy in 2019. This section provides an overview of economic impact analysis terminology, the models used to assess the economic impacts of the Arizona airports, and the process for creating the inputs for these models.

ECONOMIC IMPACT ANALYSIS TERMINOLOGY AND CONCEPTS

As defined in **Table 1.6**, the core economic indicators assessed in the analysis were economic activity (or output), jobs, earnings, and taxes.

Table 1.6. Economic Indicators of the 2021 Arizona AEIS

Economic Indicators		Description
	**Jobs**	To produce their goods and services, companies must hire and retain employees. This indicator measures the number of workers required to support a given level of sales activity within a given economy.
	**Earnings**	Earnings or labor income captures the wages and compensation paid to workers.
	**Economic Activity (Output)**	Economic activity or output represents the value of sales that occur in the Arizona economy that are ultimately attributable to on-airport activity, capital improvement expenditures, and visitor spending.
	**Taxes**	Economic activity triggers the generation of corporate and personal taxes at the county and state levels.

Source: IHS Markit 2021

Referring to **Figure 1.4**, the 2021 Arizona AEIS measured how these economic indicators were stimulated on three levels of economic impact: direct, indirect, and induced. **Direct impacts** are those resulting from the initial economic activity occurring from either:

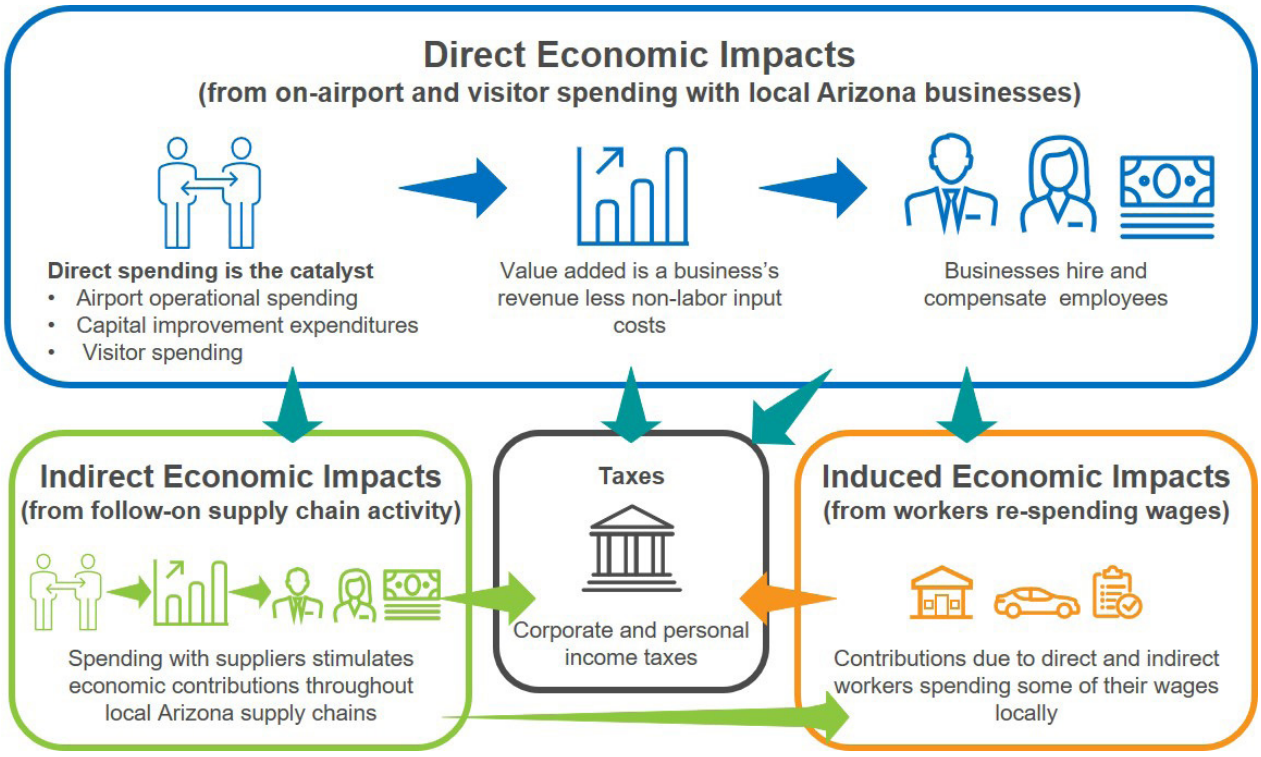
- On-airport operational spending
- On-airport capital improvement expenditures
- Visitor spending (e.g., local transportation, lodging, meals, entertainment, etc.)

This initial spending helps businesses hire and retain employees (the blue box in **Figure 1.4**).

Direct businesses that receive that initial operational and capital improvement spending, in turn, must source required inputs from their supply and service networks, which triggers indirect impacts. For example, assume an airport hires a local construction firm to conduct a capital improvement project (a direct impact). The construction firm then sources cement from a supplier (an indirect impact). That, in turn, helps the cement company hire and pay its employees, and so on (the green box in **Figure 1.4**). This process iterates through the remaining tiers of the Arizona extended supply chain.

The direct and indirect companies pay wages to their employees. The employees, in turn, spend large portions of their incomes in the Arizona economy on consumer purchases, housing, etc. This triggers the third economic impact cycle known as induced impacts (the orange box in **Figure 1.4**). Total economic impacts are derived by summing the direct, indirect, and induced impacts. Along the way, the direct, indirect, and induced activity generates both corporate and personal taxes at the county, state, and federal levels.

Figure 1.4. The Three Economic Impact Cycles



Source: IHS Markit 2021

The following section describes the process for modeling how direct on-airport operational spending, on-airport capital improvement expenditures, and visitor spending flow through the Arizona economy.

ECONOMIC IMPACT MODEL DEVELOPMENT

Sixteen customized economic impact models were built using data sourced from IMPLAN: a state-level model and one for each of the state's 15 counties. As shown in **Table 1.7**, the economic impacts of 59 airports were assessed using the corresponding county models.[15] The inputs for airports were also aggregated and run through the state model. To derive the final results, the county-level results were then calibrated to match the state-level results. Please reference **Appendix C. 2021 Arizona AEIS Study Methodology** for additional details about this process.

Table 1.7. Alignment of Economic Impact Models to Arizona Airports

Model Name	Airports Analyzed with the Model
Arizona State	The aggregate inputs from all airports
Apache County	Chinle Municipal, Springerville Municipal, St. Johns Industrial Air Park, Window Rock
Cochise County	Benson Municipal, Bisbee Municipal, Bisbee-Douglas International, Cochise College, Cochise County, Douglas Municipal, Sierra Vista Municipal-Libby Army Airfield, Tombstone Municipal
Coconino County	Flagstaff Pulliam, Grand Canyon National Park, Page Municipal, Tuba City, H.A. Clark Memorial Field
Gila County	San Carlos Apache, Payson
Graham County	Safford Regional
Greenlee County	Greenlee County
La Paz County	Avi Suquilla
Maricopa County	Buckeye Municipal, Chandler Municipal, Gila Bend Municipal, Glendale Municipal, Phoenix-Mesa Gateway, Scottsdale, Wickenburg Municipal
Mohave County	Laughlin/Bullhead International, Colorado City Municipal, Kingman, Grand Canyon West
Navajo County	Cibecue, Holbrook Municipal, Kayenta, Polacca, Show Low Regional, Taylor, Whiteriver, Winslow-Lindbergh Regional
Pima County	Eric Marcus Municipal, Marana Regional, Sells
Pinal County	Casa Grande Municipal, Coolidge Municipal, Kearny, Pinal Airpark, Ak Chin Regional, San Manuel, Superior
Santa Cruz County	Nogales International
Yavapai County	Bagdad, Cottonwood Municipal, Prescott Regional Airport - Ernest A. Love Field, Sedona, Seligman
Yuma County	Rolle Airfield, Yuma International

Source: IHS Markit 2021

15 The remaining eight airports listed in **Table 1.3** were not processed through the county models.

For these 59 airports, the level of spending for each class of direct economic activity was assigned to the corresponding industries in the county economic impact models. For example, construction spending at the Scottsdale Airport was assigned to the construction industry in the Maricopa County model. The models were then used to calculate the resultant direct, indirect, and induced impacts for economic activity, jobs, earnings, and taxes. The 2019 projections for the eight airports with existing studies were then layered into these results to determine the overall economic impact of Arizona's 67 public use airports.

The following sections summarize the steps used to create the on-airport spending estimates used as model inputs for assessing the economic impacts at the 59 airports, the general methodology used to estimate 2019 economic impacts for the airports with existing studies, and the approach for determining visitor spending inputs for the models.

ON-AIRPORT ACTIVITY METHODOLOGY

Data for the airports that responded to the Airport Manager and Airport Tenant surveys were categorized based on the following major airport business activities:

- Airport operations: Airport administration employment and earnings
- Contractors: Direct employment
- Airport tenant employment including:
  - Concessionaires
  - Car rental agencies
  - Aviation-related employment and/or revenue (e.g., fixed base operators [FBOs], maintenance, repair, and overhaul services [MROs], etc.)
  - Cargo and courier services
- Revenues
  - Parking revenues
  - Fuel revenues
  - Aviation-related revenues not included in tenant employment (e.g., tie-down fees, airport-owned hangar rental, landing fees)
  - Commercial/tenant revenues not included in tenant employment (e.g., fees from commercial development, advertising revenue, etc.)
- Capital expenditures

The data for each airport was checked to ensure any stated aviation revenues or spending with contractors were not double-counted in capital spending or spending from other airport activities. Capital expenditure purchases and contractors known to be from outside of Arizona were removed from employment and spending estimates, as those expenditures do not generate any successive waves of impacts within the state. Survey data were then categorized into detailed North American Industry Classification System (NAICS) codes and then aligned with corresponding IMPLAN industry codes. Data were supplemented and gaps filled using Dun & Bradstreet data.

Before finalizing the direct inputs used in the economic impact analysis, quality control checks were performed on the data. Wages, revenues, and airport administration employees; tenants; and contractors were reviewed to identify potential outliers. For example, wages per employee (i.e., average salary) above or below a certain level, depending on the type of business, could indicate a survey or data processing error.

To further check for outliers, tenant revenues and rents/taxes paid were examined. If rents or taxes exceeded revenues, a red flag was identified to be addressed. Airport revenues from tenants (i.e., payments from tenants to airports) were compared to the number of tenant employees to identify potential survey errors. The 2021 Arizona AEIS team worked to resolve any potential outliers or inconsistencies in the data before running the direct inputs through the models.

For the eight non-responsive airports, the 2021 Arizona AEIS team used parametric and categorical data contained in the *2018 SASP Update* to establish peer groupings. The SASP parameters considered in the analysis included:[16]

- Airport state classification
- Runway length
- Fuel availability
- Number of based aircraft
- Number and type of operations

The parameters for a non-responsive airport were compared to the corresponding parameters for other airports in its peer group that had responded to the surveys. This allowed for a best fit analysis to estimate the input data for the non-responsive airports.

For the six airports with existing economic impact studies with a baseline study year different than the 2021 Arizona AEIS (as listed in **Table 1.3**), a three-step process was used to update the original results to align with the 2019 economic impact estimates of the 2021 Arizona AEIS.[17]

- For operational impacts and capital expenditure data, the original monetary results reported in each study were converted to 2019 dollars (the base year for the 2021 Arizona AEIS). In essence, this conversion adjusted the original results for inflationary effects.
- To varying degrees, the existing studies provided breakouts of on-airport revenue by major categories. Proxy economic indicators were used to estimate annual growth rates for the major categories of on-airport operations revenues. These growth rates were applied to the on-airport revenues by categories to derive 2019 estimates. All six airports (PHX, DVT, GYR, TUS, RYN, and FFZ) provided actual topline capital expenditures for 2019.
- For all 67 airports included in the study, the inputs required to derive estimates for direct visitor spending in 2019 were available. Thus, the same process was used to derive 2019 direct visitor spending for 65 of 67 airports – those without existing studies and the six with existing studies done prior to 2019. The “Visitor Spending Methodology” section that follows briefly discusses the approach for deriving estimated 2019 direct visitor spending.

The economic impact results for the two airports with existing economic impact studies with a 2019 study year were incorporated into the 2021 Arizona AEIS without modification.[18]

16 Runway length, fuel availability, number of based aircraft, and operations data reported in the 2018 SASP Update were compared with more recent data available in the FAA’s Airport Data and Information Portal (ADIP) to identify any differences that would have affected how the nonresponsive airports were classified into peer groups. This comparison did not result in any changes to the peer group categorization conducted as part of the 2021 Arizona AEIS.

17 These airports included Phoenix Sky Harbor International Airport (PHX), Phoenix Deer Valley Airport (DVT), Phoenix Goodyear Airport (GYR), Tucson International Airport (TUS), Ryan Airfield (RYN), and Falcon Field (FFZ).

18 These airports included the Eloy Municipal Airport (E60) and Lake Havasu City Airport (LHC).

VISITOR SPENDING METHODOLOGY

In 2019, Arizona airports welcomed approximately 11 million out-of-state visitors. These visitors then directly spent money on transportation, lodging, dining, shopping, entertainment, and other expenses with local Arizona businesses. This section provides a summary of how the direct visitor spending estimates used in the 2021 Arizona AEIS were derived.

Visitor Arrivals

Quantifying total visitor arrivals by airport involved making separate estimations for general aviation arrivals and commercial passengers. To estimate the number of out-of-state visitors who arrived by general aviation, the study team developed a data-driven, multi-step process detailed in **Appendix C. 2021 AEIS Study Methodology.** Operations data were obtained from the FAA's Air Traffic Activity System (ATADS), Airport Manager Survey, FAA Terminal Area Forecast (TAF), and 5010 Airport Master Record (listed in order of preference). Then, the percent of itinerant arrivals from out-of-state was estimated based on state classification, proximity to a domestic border (within 30 miles), or U.S. Customs and Border Protection-designation as an Airport of Entry or Landing Rights Airport. The number of pilots and passengers per arrival were obtained from airport managers or estimated based on state airport classification. These analyses provided estimates of the number of out-of-state or international travelers arriving in Arizona.

For visitors arriving by scheduled commercial service, revenue-paying passenger (enplanement) data was obtained from the ACAIS published by the FAA. Data from Airline Data, Inc. was then used to determine the share of enplanements that were either out-of-state or international visitors arriving into Arizona.

Per Person Visitor Spending

The Arizona Office of Tourism provided a spending profile for passengers who arrive in Arizona by air transportation using scheduled commercial service. This provided a baseline for all commercial travel where existing studies did not exist. The profile covers the key spending categories of transportation, lodging, dining, shopping, and entertainment. Based on this statewide spending profile, county-specific spending profiles were generated to identify an average per-person spend by airport, taking into consideration variations in pricing for hotels, food, services, and goods in different geographic regions of the state. Some smaller counties did not have county-specific pricing available, and an estimate was generated for those counties based on available data.

The same county-specific profiles were used as the baseline profile for visitors arriving in Arizona using general aviation. For those arriving by piston aircraft, the profile was adjusted to account for the high share of these visitors that do not stay overnight. Prior studies show that nearly three-fourths of visitors who arrive by general aviation stay for one day or less. The spend profile for general aviation visitors was adjusted to account for this variation. For those general aviation passengers arriving via jet aircraft, the GA profile was expanded to account for the longer stay and higher spend by these passengers.

Total Visitor Spending by Airport

For visitors arriving by both general aviation and scheduled commercial service, total visitor spend by airport is the product of the number of visitors and their per-person spending profile. The spending profile data was used to generate estimates of visitor spending by airport by category (transportation, lodging, dining, shopping, and entertainment), which was then aligned with the corresponding IMPLAN industries to create inputs for the economic
impact models.

Summary

The aviation industry plays an essential role in the Arizona economy by meeting the vital transportation and logistics services needs of the state's diverse commercial/industrial base, rapidly growing population, and thriving tourism industry. The ADOT Aeronautics Group initiated the 2021 Arizona AEIS to evaluate the economic and social benefits stimulated by the state's 67 publicly owned, public use airport system. The results of the 2021 Arizona AEIS are intended to provide ADOT, airport owners/sponsors, and aviation system users with information regarding the value and substantial economic contributions of the state aviation system. This information can then be communicated out to the general public, policymakers, and stakeholders.

Data collection is essential to any airport economic impact analysis. To this end, surveys were designed and administered to airport managers and tenants to collect the primary data required for the 2021 Arizona AEIS. These data were collected covering activities that generated direct on-airport impacts and some aspects of off-airport visitor spending. The 2021 Arizona AEIS team developed methods to review and validate the survey data and to estimate data missing due to nonresponsive airports. In addition, the team created a process to estimate 2019 economic impacts for airports with existing studies with a different baseline study year than the ADOT analysis. Finally, using data from the FAA, Airline Data, Inc., and the Arizona Office of Tourism, the 2021 Arizona AEIS team derived estimates of the number of visitors entering each airport and their subsequent spending for transportation, lodging, dining, shopping, and entertainment.

For the 59 airports without existing studies, sixteen economic impact models were built to assess how they ultimately stimulated the Arizona economy. The on-airport revenues, capital improvement expenditure, and visitor spending data for each airport was processed through the appropriate county model to determine its contributions to economic activity, jobs, earnings, and taxes across Arizona. The airport-level results were then aggregated and harmonized to produce county-level and state-level assessments of the economic impacts of Arizona's 67 public-use airports. A more extensive discussion of the economic impact methodology is presented in **Appendix C. 2021 AEIS Study Methodology**. The top-line economic impacts of Arizona airports are provided in **Chapter 2. Economic Impacts of Arizona Airports and the Aviation Industry**. The economic impacts by airport are presented in **Appendix A. Economic Impacts of Arizona Airports by Airport**.

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Chapter 2. Economic Impacts of Arizona Airports and the Aviation Industry

The aviation industry is a critical part of the Arizona economy. Quantifying the size, scope, and reach of the industry demonstrates the importance of continued investment into airports for the ongoing strength, diversity, and vitality of the Arizona economy. The 2021 Arizona Aviation Economic Impact Study (2021 Arizona AEIS) quantifies the economic impacts of the 67 publicly owned, public-use airports in Arizona as well as specific types of off-airport aviation-related industries as of 2019.

Arizona airports connect people and businesses worldwide to enable a thriving tourism industry and robust air cargo network. The state's airports support a vibrant general aviation (GA) community that draws aviation enthusiasts and student pilots from across the globe. GA airports also play a vital role in the state's safety, security, and resiliency by hosting activities such as air medical flying, search and rescue operations, and wildland firefighting. Arizona's sunny weather and mild winters not only make the state popular with out-of-state visitors and aviation enthusiasts; these same conditions make Arizona an ideal geography for civilian and military pilot training and other activities, as well as aerospace research, development, and manufacturing. Together, Arizona airports, major military installations, and aerospace manufacturing and research industries serve as the foundation for one of the state's most important economic engines.

Together, Arizona airports, major military installations, and aerospace manufacturing and research industries serve as the foundation for one of the state's most important economic engines.

To this end, the details provided throughout this chapter of the 2021 Arizona AEIS represent the direct, indirect, and induced economic impacts of primary components that compose the economic impact of Arizona airports and the broader off-airport aviation-related industries within the state. These components are presented in **Figure 2.1**. On-airport business activities and visitor spending specifically reflect the economic impacts of Arizona's 67 system airports, while off-airport aviation-related industries encompass the economic impacts of the state's aerospace manufacturing industry and principal military installations with an aviation-related mission component.

Figure 2.1. Components of the Economic Impacts Reported in the 2021 Arizona AEIS

The economic impacts of Arizona airports are presented at statewide, county, and airport-specific levels (airport-specific impacts are presented in **Appendix A. Economic Impacts of Arizona Airports by Airport**). Economic impacts for off-airport aviation-related industries are calculated separately and are therefore only available at the state level.

As discussed in **Chapter 1. Introduction and Data Collection** and detailed in **Appendix D. Incorporation of Existing Economic Impact Studies**, 8 of the 67 airports had recently completed economic impact studies conducted by independent consultancies. In such cases, the 2021 Arizona AEIS team projected the results of these existing studies forward to 2019, instead of re-estimating their impacts. The study team surveyed and analyzed the remaining 59 airports within the scope of the study. In all cases, economic impacts reflect a 2019 study year.

Components of Economic Impacts

The 2021 Arizona AEIS reviewed and identified three major components of aviation economic impact in Arizona:

- On-airport business activities
- Visitor spending
- Off-airport aviation-related industries (i.e., aerospace manufacturing and research and principal military installations)

Each of these components is described in the sections that follow.

ON-AIRPORT BUSINESS ACTIVITIES

On-airport business activities include employment and sales directly related to airport operations and business tenants. As described in **Chapter 1. Introduction and Data Collection** and detailed in **Appendix C. 2021 Arizona AEIS Study Methodology**, IHS Markit either compiled Airport Manager and Tenant survey results obtained by Kimley-Horn, incorporated existing studies with a 2019 baseline year, or projected the existing study results forward that had a previous baseline year to determine the direct business activities that occurred at Arizona's 67 airports in 2019.[1] Based on the format of Kimley-Horn's survey material and the major on-airport business activities that generate economic impacts in the state, IHS Markit generated a categorical approach that considered the following:

- Airport operations: Direct employment and wages
- Contractors: Direct employment
- Airport tenant employment including but not limited to:
  - Concessions
  - Car rental
  - Aircraft services (e.g., fixed based operators [FBOs], aircraft maintenance, etc.)
  - Cargo and courier providers

1 Airports with existing economic impact studies with a 2019 baseline year and thus directly incorporated into the 2021 Arizona AEIS are as follows: Eloy Municipal Airport (E60) and Lake Havasu City Airport (HII). Airports with existing studies that were brought forward to a 2019 baseline year are as follows: Phoenix Goodyear Airport (GYR), Falcon Field (FFZ), Phoenix Deer Valley Airport (DVT), Phoenix Sky Harbor International Airport (PHX), Ryan Field (RYN), and Tucson International Airport (TUS). Additional details about the inclusion of existing studies are provided in **Chapter 1. Introduction and Data Collection** and **Appendix D. Incorporation of Existing Economic Impact Studies**.

- Revenues including but not limited to:
  - Fuel
  - Automobile parking
  - Aviation-related revenues not included in tenant employment (e.g., hangar storage, tie down, and landing fees)
  - Commercial/tenant revenues not included in tenant employment (e.g., property rental)
- Capital expenditures (Arizona-based companies only)

The size and structure of on-airport business activities vary widely based on the primary function of an airport (commercial service versus GA), size, location (rural versus non-rural), and other factors. Some rural GA airports require only 1 or 2 part-time employees to maintain normal business operations, while large commercial service airports have employee counts in the thousands. Furthermore, smaller GA airports often provide fewer services and require fewer capital expenditures to maintain their facilities.

AVIATION-RELATED VISITOR SPENDING

Arizona maintains a vibrant and growing tourism industry. While the local tourism industry supports day-trippers, overnight road trippers, and locals enjoying all their home state has to offer, the focus of this study is on out-of-state visitors who arrive by air. In 2019, Arizona welcomed over 11 million visitors through its airports. These visitors included international and domestic arrivals via commercial passenger service and out-of-state visitors utilizing the vast network of GA airports within the state, including corporate/business and recreational travelers. Direct visitor spending encompasses the expenditures incurred by these air visitors during their stay. The direct spending is broken out by the following key spending categories:

- Transportation (i.e., local ground transportation)
- Lodging
- Dining
- Shopping
- Entertainment

OFF-AIRPORT AVIATION-RELATED INDUSTRIES

Off-airport aviation-related industries include principal military operations and aerospace manufacturing and research inclusive of aviation support industries (such as airplane parts manufacturing). The impacts of aerospace manufacturing and research were estimated using industry employment data produced by IHS Markit's Business Market Insights™ database. The impacts of principal military installations were sourced from *The Economic Impact of Arizona's Principal Military Operations* prepared by The Maguire Company in 2017.[2]

2 Note that all principal military installations incorporated into the 2021 Arizona AEIS have an aviation-related mission component. The military impacts reported under the "off-airport aviation-related industries" component of the 2021 Arizona AEIS exclude the Arizona Air National Guard 161st and 162nd units based at Phoenix Sky Harbor (PHX) and Tucson International (TUS) airports. The economic impacts of these units are incorporated into the economic impacts of their respective airports. As such, they were removed from the military impacts component to avoid duplication. The economic impact of military retirees was also removed from the analysis, as the associated economic impact is not sufficiently aviation-related to warrant inclusion in the 2021 Arizona AEIS.

Defining Airport Economic Impacts

IHS Markit used IMPLAN's input-output multiplier assumptions to estimate the total economic impact of airports in Arizona (i.e., on-airport business activities and visitor spending). Based upon the IMPLAN modeling procedure, different types of multipliers are assigned to sales and employment estimates to capture three different levels of economic impacts that business activities and visitor spending have on local economies.

- **Direct impacts:** Direct impacts capture jobs held by employees of the airport and its tenants, as well as those directly employed as a result of capital improvement and visitor spending. If direct jobs were not provided during data collection, direct sales were used. Direct impacts capture jobs and sales (also referred to as output) of airport businesses.
- **Indirect impacts:** Indirect impacts capture the local supply chain activity required by airport business activities including ongoing operations and maintenance as well as capital improvement projects. This includes jobs and other business activities required to support the airport and aviation industry. Examples of supply chain activities might include light manufacturing, wholesalers that supply goods to the airport, truck transportation that delivers these supplies, and warehousing that may store inventories of supplies.
- **Induced impacts:** Induced impacts capture the effect of the direct and indirect employees' wages on the local economy. Aircraft mechanics, for example, spend their earnings on housing, food, transportation, and other consumer items within the state.
- **Total impacts:** Total impacts capture the combined economic impact of direct + indirect + induced impacts on the state economy.

Economic impacts only include goods and services provided by Arizona-based companies. Goods and services that are provided by companies known to be located outside of Arizona were excluded, as this represents money leaving the state economy. In cases where the location of a business provider was unknown, IHS Markit relied on assumptions built into the IMPLAN model for the impacted industry sector.

Measures of Airport Economic Impacts

The IMPLAN model reports the outcomes of economic impacts into four major economic indicators, as described in **Chapter 1**:

- Economic activity (or output)
- Jobs
- Earnings (labor income)
- Taxes

This study used IMPLAN-reported results and their definitions to maintain consistency and clarity. The tables in this chapter summarize the total impacts for each aviation-related industry component. The analyses presented in the "Economic Impacts by Major Industry" section of this chapter (beginning on page 15) highlight the details of the industries that make up the indirect and induced impacts.

To provide a better idea of the incremental benefit that aviation activity adds to the Arizona economy, the economic indicator **value added** has been included in the results of this study. Reported by the IMPLAN model, value added is described most simply as the difference between a private industry's sales and its

non-labor cost of production.[3] The sum of industries' value-added measures is reported as state-level gross state product (GSP). While the economic indicator of economic activity (output) also includes the intermediate inputs required for production, which may fluctuate in price due to inflationary and market factors outside of an industry's control, value added more accurately reflects the overall marginal benefits that an industry adds to a regional or statewide economy.

Economic Impacts of Arizona Airports

On-airport business activities and aviation-related visitor spending impacts are the focus of the 2021 Arizona AEIS. As such, the impacts from these two major components are examined first in some detail.

Among on-airport business activities, airport operations are responsible for the majority of direct expenditures (78%), followed by tenant activity (19%) and capital expenditures (3%). These direct expenditures, in turn, stimulate follow-on (indirect and induced) effects. As shown in **Table 2.1**, Arizona's on-airport business activities contributed over 221,000 jobs and statewide visitor spending supported over 164,000 additional jobs in 2019. On-airport business activities and visitor spending accounted for 13% of employment in Arizona and generated nearly $59.4 billion in sales (or economic activity).

Table 2.1. Total Economic Impacts of Arizona Airports

Economic Indicator	On-airport Business Activities	Visitor Spending	Total
Jobs	221,529	164,528	386,057
Earnings	$13,605,806,927	$6,744,757,192	$20,350,564,120
Economic Activity	$41,037,524,306	18,361,345,875	$59,398,870,180

Sources: IHS Markit 2021, IMPLAN 2019

Additionally, Arizona airports contributed $33.0 billion in value added to the state. Arizona's 2019 nominal GSP was $323 billion. Airports in Arizona contributed 10.2% of the GSP in 2019, reflecting their size and importance in the state economy.

Arizona airports contributed $33.0 billion in value added to the state equating to 10.2% of the GSP in 2019, reflecting their size and importance in the state economy.

COMMERCIAL SERVICE AIRPORTS

Shown in **Table 2.2,** Arizona's 11 commercial service airports contributed $28.4 billion of direct economic activity, or direct spending, in 2019. That activity directly supported over 174,000 jobs earning a total of nearly $9.1 billion in worker earnings. Just over 85,000 of those direct jobs were supported by on-airport activities, and nearly 90,000 were supported by spending from out-of-state visitors utilizing the airports.

The $28.4 billion in direct spending was a catalyst for additional activity in Arizona. Activities initiated by on-airport spending and visitor spending required sourcing of goods and services with local and statewide vendors. Those vendors then spent money with their own suppliers, generating more activity. A total of $9.9 billion of indirect activity was initiated by commercial service airports in the state. Furthermore, employees at direct and indirect companies spent a portion of their wages in the state, initiating the induced round of impacts. The induced economic activity of $17.9 billion supported over 125,000 jobs paying a total of $6.5 billion in earnings to those employees.

3 "What is industry value added?" Bureau of Economic Analysis. 10 March 2006. https://www.bea.gov/help/faq/184.

For every 100 workers directly supported by commercial service airports, 110 additional jobs were supported in Arizona.

Commercial service airports contributed a total (direct, indirect, and induced) of $56.1 billion of economic activity in Arizona in 2019. This activity supported over 367,000 jobs, paying total salaries of $19.3 billion. For every 100 workers directly supported by commercial service airports, 110 additional jobs were supported in the state.

Table 2.2. Economic Impacts - Commercial Service Airports

Economic Indicators	On-airport Business Activities	Visitor Spending	Total
Direct Economic Impacts			
Jobs	85,224	89,357	174,581
Earnings	$ 6,155,950, 031	$2,920,624,844	$ 9,076,574,876
Economic Activity	$ 20,515,290,630	$7,874,769,562	$ 28,390,060,192
Indirect Impacts			
Jobs	47,776	19,589	67,365
Earnings	$2,433,800,756	$1,274,920,603	$3,708,721,359
Economic Activity	$6,074,247,750	$3,807,913,925	$9,882,161,675
Induced Impacts			
Jobs	73,600	51,517	125,117
Earnings	$4,089,679,040	$2,412,329,541	$6,502,008,580
Economic Activity	$11,562,355,620	$6,295,300,948	$17,857,656,568
Total Economic Impacts			
Jobs	206,600	160,463	367,063
Earnings	$12,679,429,827	$6,607,874,988	$19,287,304,815
Economic Activity	$38,151,893,999	$17,977,984,436	$56,129,878,435

Sources: IHS Markit 2021, IMPLAN 2019

GENERAL AVIATION AIRPORTS

The economic impacts of Arizona's 56 GA airports are shown in **Table 2.3**. These airports contributed nearly $1.8 billion in direct economic activity in 2019. Ninety percent of that activity, or $1.6 billion, came from on-airport activities such as airport operations, aviation-related tenants, and capital expenditures. The remaining $199.1 million came from out-of-state visitor spending. The $1.8 billion of direct economic activity supported nearly 9,600 direct jobs and wages of $562.5 million.

Direct spending by airports and visitors supported $641.2 million of supply chain activity, or indirect impacts, and $837.2 million of induced activity. That additional spending supported over 3,600 indirect jobs and almost 5,800 induced jobs. GA airports contributed a total of $3.3 billion of economic activity in 2019. They supported nearly 19,000 jobs and $1.1 billion of salaries and wages. The average salary of a job supported by GA airports was $55,978, 5% higher than the state average in 2019.

GA airports contributed a total of $3.3 billion of economic activity in 2019, supporting 19,000 jobs and $1.1 billion in earnings for Arizona workers and their families.

Table 2.3. Economic Impacts - General Aviation Airports

Economic Indicators	On-airport Business Activities	Visitor Spending	Total
Direct Economic Impacts			
Jobs	6,682	2,900	9,582
Earnings	$484,762,875	$77,710,284	$562,473,159
Economic Activity	$1,591,599,018	$199,059,536	$1,790,658,554
Indirect Impacts			
Jobs	3,063	576	3,639
Earnings	$183,377,511	$26,802,656	$210,180,167
Economic Activity	$573,076,724	$68,098,433	$641,175,156
Induced Impacts			
Jobs	5,184	590	5,774
Earnings	$258,236,715	$32,369,265	$290,605,980
Economic Activity	$720,954,564	$116,203,470	$837,158,035
Total Economic Impacts			
Jobs	14,929	4,065	18,994
Earnings	$926,377,101	$136,882,204	$1,063,259,305
Economic Activity	$2,885,630,307	$383,361,439	$3,268,991,745

Sources: IHS Markit 2021, IMPLAN 2019

Airport Economic Impacts by Stream

The following section presents the economic impacts of Arizona's 67 commercial service and GA airports in terms of on-airport activities and visitor spending. Note that these same impacts are presented by airport type in the sections above (i.e., commercial service and GA) and are not reflective of an additional stream or type of economic impact.

ON-AIRPORT BUSINESS ACTIVITIES

The economic impacts of on-airport business activities are presented in **Table 2.4**. On-airport activities include airport operations, aviation-related tenants, capital expenditures, contractors, and other revenues at commercial service and GA airports. Spending by the airports and tenants to support these activities, or direct economic activity, totaled $22.1 billion in 2019. This spending with local suppliers stimulated $6.6 billion of indirect activity and $12.3 billion of induced activity.

Most of this activity occurred at the state's 11 commercial service airports. Ninety-two-point-seven percent of direct on-airport jobs were at commercial service airports. Furthermore, 93% of on-airport-related total output was stimulated by commercial service airports. GA airports' on-airport activities stimulated $2.9 billion dollars of economic activity in 2019, supporting 14,929 total jobs.

On-airport business activities at all airports stimulated a total of $41.0 billion of economic activity and supported 221,529 jobs. On average, workers in these jobs earned $61,418, 14% higher than the 2019 statewide average annual salary.[4] For every 100 direct, on-airport jobs, an additional 141 jobs were supported in the state.

Table 2.4. Economic Impacts by Stream - On-airport Business Activities

Economic Indicators	Direct	Indirect	Induced	Total
Commercial Service Airports				
Jobs	85,224	47,776	73,600	206,600
Earnings	$ 6,155,950,031	$2,433,800,756	$4,089,679,040	$12,679,429,827
Economic Activity	$ 20,515,290,630	$6,074,247,750	$11,562,355,620	$38,151,893,999
General Aviation Airports				
Jobs	6,682	3,063	5,184	14,929
Earnings	$484,762,875	$183,377,511	$258,236,715	$926,377,101
Economic Activity	$1,591,599,018	$573,076,724	$720,954,564	$2,885,630,307
Total Arizona Airports				
Jobs	91,906	50,839	78,784	221,529
Earnings	$ 6,640,712,906	$2,617,178,267	$4,347,915,755	$13,605,806,927
Economic Activity	$ 22,106,889,648	$6,647,324,473	$12,283,310,184	$41,037,524,306

Sources: IHS Markit 2021, IMPLAN 2019

VISITOR SPENDING

Shown in **Table 2.5**, the direct economic activity of visitor spending represents all spending by out-of-state visitors who arrive by air.. Spending by the 11 million plus visitors to the state topped $8.1 billion in 2019 and supported over 92,000 direct jobs. The vast majority of direct visitor spending is from those visitors who arrive via the commercial service airports, as those visitors spent nearly $7.9 billion in Arizona and supported nearly 90,000 jobs.

The $8.1 billion in direct visitor spending generated an indirect impact through their supply chain of $3.9 billion and supported over 20,000 jobs. Direct and indirect visitor spending then generated an additional $6.4 billion in induced economic activity which supported over 52,000 jobs. In total, visitors arriving by air to Arizona in 2019 supported over 164,000 jobs and generated $18.4 billion in economic output.

Visitor spending generated $3.0 billion in direct earnings for those 92,000 jobs. This represents average earnings of $32,500 per direct employee. The earnings profile of those direct jobs supported by visitors varies from that of direct on-airport employees, but these jobs are more sensitive to changes in output. It takes just 113 visitors to generate enough spending to support one additional direct job. The downstream impacts of visitor spending differ from on-airport impacts as well: For every 100 direct jobs supported by visitor spending, an additional 79 jobs are supported within the state.

4 Bureau of Labor Statistics: *Quarterly Census of Employment and Wages*, 2021

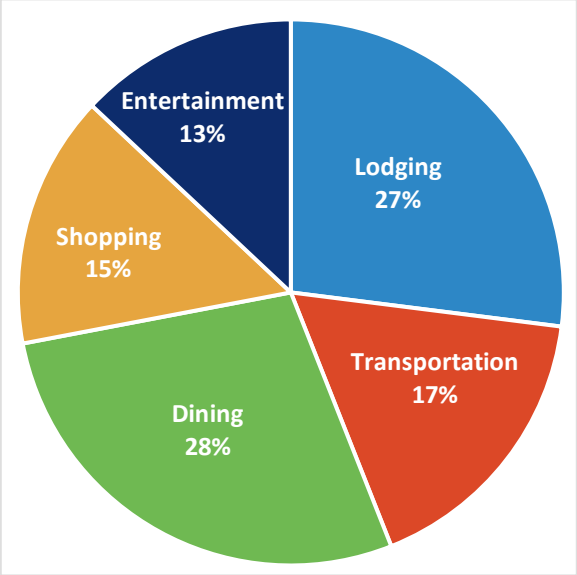
Table 2.5. Economic Impacts by Stream - Visitor Spending

Economic Indicators	Direct	Indirect	Induced	Total
Commercial Service Airports				
Jobs	89,357	19,589	51,517	160,463
Earnings	$2,920,624,844	$1,274,920,603	$2,412,329,541	$6,607,874,988
Economic Activity	$7,874,769,562	$3,807,913,925	$6,295,300,948	$17,977,984,436
General Aviation Airports				
Jobs	2,900	576	590	4,065
Earnings	$77,710,284	$26,802,656	$32,369,265	$136,882,204
Economic Activity	$199,059,536	$68,098,433	$116,203,470	$383,361,439
Total Arizona Airports				
Jobs	92,257	20,165	52,106	164,528
Earnings	$2,998,335,128	$1,301,723,259	$2,444,698,805	$6,744,757,192
Economic Activity	$8,073,829,098	$3,876,012,358	$6,411,504,419	$18,361,345,875

Sources: IHS Markit 2021, IMPLAN 2019

As shown in **Figure 2.2**, more than half of direct visitor spending went to dining and lodging. Transportation was the third-largest category and captured 17 cents of every tourist dollar spent within the state. Shopping and entertainment made up 15% and 13% of direct spending, respectively.

Figure 2.2. Direct Visitor Spending by Category



Source: IHS Markit 2021

Airport Tax Revenues

The total economic activity of $59.4 billion stimulated by Arizona's 67 airports generated state and local tax revenues of $3.5 billion in 2019. Airports' direct, indirect, and induced economic activity-initiated taxes on production and households in the state. Taxes on production include sales taxes, property taxes, and severance taxes, among others. These made up approximately 90% of the taxes airports generated in 2019. Taxes on households include personal taxes paid by employees of the airports and their supply chain partners. Households contributed 10% of taxes driven by the airports' economic activity.

Arizona's 67 airports generated state and local tax revenues of $3.5 billion in 2019.

Airport activities in Maricopa County produced the highest amount of state and local tax revenues with approximately $2.8 billion of taxes originating in that county alone. Airports in Pima County produced the second-highest amount of tax revenues in the state at $571.8 million. Tax revenues generated by county are presented in the following section.

Airport Economic Impacts by County

Table 2.6 highlights the total combined economic impacts of on-airport activities and visitor spending at the county level. These streams of impacts are grouped together in this section to highlight that Arizona airports impact every county within the state. Maricopa County supports 85% of jobs and 83% of economic activity generated by Arizona's airport system. Maricopa County is home to two commercial service airports (Phoenix Sky Harbor International Airport [PHX] and Phoenix-Mesa Gateway Airport [IWA]) as well as some of the state's busiest GA facilities including Phoenix Deer Valley (DVT), Phoenix Goodyear (GYR), Falcon Field (FFZ), and Scottsdale Municipal (SDL) airports. The 329,000 jobs supported by airports within Maricopa County comprise over 15% of the total employment within the county.[5]

The 329,000 jobs supported by airports within Maricopa County comprise over 15% of the total employment within the county.

Table 2.6. Total Airport Economic Impacts by County

County	Jobs	Earnings	Economic Activity	Tax Revenues
Apache	65	$3,385,462	$9,458,891	$619,427
Cochise	326	$16,334,094	$38,631,269	$2,309,824
Coconino	3,168	$145,508,072	$415,029,252	$24,615,050
Gila	86	$3,964,241	$11,326,296	$632,597
Graham	106	$6,908,933	$15,165,163	$481,918
Greenlee	3	$183,687	$593,015	$25,044
La Paz	45	$2,323,120	$7,048,231	$750,023
Maricopa	329,353	$17,254,649,621	$49,585,412,253	$2,821,418,278
Mohave	2,538	$124,841,474	$373,015,683	$18,558,803
Navajo	216	$13,430,345	$32,439,702	$2,216,172
Pima	46,366	$2,573,253,913	$8,368,038,926	$571,788,100
Pinal	1,010	$54,756,139	$132,675,741	$4,350,094

5 IHS Markit U.S. Regional Service, August 2021 forecast.

County	Jobs	Earnings	Economic Activity	Tax Revenues
Santa Cruz	57	$3,196,804	$8,207,145	$547,939
Yavapai	1,568	$87,809,863	$242,163,237	$15,568,024
Yuma	1,150	$60,018,351	$159,665,376	$8,984,833
Total Arizona	**386,057**	**$20,350,564,120**	**$59,398,870,180**	**$3,472,766,126**

Sources: IHS Markit 2021, IMPLAN 2019

Economic Impacts of Off-airport Aviation-related Industries

Off-airport aviation-related impacts are broken out into two primary sectors:

- Principal U.S. military installations and Arizona Army and Air National Guard operations
- Aerospace manufacturing and research (including off-airport aviation-support industries such as airplane parts manufacturing)

The impacts for these two sectors were calculated at the state level only. Combined, these off-airport aviation-related industries supported nearly 190,000 jobs and over $62.0 billion in economic activity as shown in **Table 2.7**.

Table 2.7. Total Economic Impacts of Off-airport, Aviation-related Industries

Industry Activity	Jobs	Earnings	Economic Activity
Military Installations[6]	73,291	$3,839,800,000	$10,546,600,000
Aerospace Manufacturing and Research	116,477	$9,977,882,221	$51,477,434,453
Total	**189,768**	**$13,817,682,221**	**$62,024,034,453**

Sources: IHS Markit 2021, The Maguire Company 2017

MILITARY INSTALLATIONS

Principal military installations in Arizona, all of which have a significant aviation component, contributed an estimated 73,291 jobs in Arizona in 2019 and over $10.5 billion in sales as shown in **Table 2.8**. IHS Markit referenced *Economic Impact of Arizona's Principal Military Operations* study published in 2017 by The Maguire Company for its estimates on military installations. Employment surrounding military facilities are less sensitive to economic pressures, as military funding is determined by the federal government rather than market pressures. With that in consideration, the 2021 Arizona AEIS used the 2017 results for the 2019 data year. Major facilities include:[7]

6 As noted previously, all principal military installations incorporated into the 2021 Arizona AEIS from the 2017 *Economic Impact of Arizona's Principal Military Operations* prepared by The Maguire Company have an aviation-related mission component. The military impacts reported under the "off-airport aviation-related industries" component of the 2021 Arizona AEIS exclude the Arizona Air National Guard 161st and 162nd units based at PHX and TUS. The economic impacts of these units are incorporated into the economic impacts of their respective airports and are thus excluded here to avoid duplication. The economic impact of military retirees reported in The Maguire Company study was also removed from the analysis, as the associated economic impact is not sufficiently aviation-related to warrant inclusion in the 2021 Arizona AEIS. The economic impacts generated by Marine Corps Air Station Yuma are incorporated here and not reflected in the "Arizona Airports" component of the 2021 Arizona AEIS at the statewide or airport-specific level.

7 Ibid.

- Davis-Monthan Air Force Base in Pima County
- Fort Huachuca in Cochise County
- Luke Air Force Base in Maricopa County
- Marine Corps Air Station Yuma in Yuma County
- Yuma Providing Ground in Yuma County
- Silvery Bell Army Heliport in Pinal County
- Papago Park Air National Guard in Maricopa County
- U.S. Naval Observatory in Coconino County

Table 2.8. Total Economic Impacts of Arizona's Military Installations

Economic Indicators	Direct	Indirect	Induced	Total
Jobs	45,059	15,116	13,116	73,291
Earnings	$2,324,400,000	$817,100,000	$698,300,000	$3,839,800,000
Economic Activity	$5,875,700,000	$2,152,700,000	$2,518,200,000	$10,546,600,000

Source: The Maguire Company 2017

AEROSPACE MANUFACTURING AND RESEARCH

Aerospace manufacturing and research maintains a large and growing presence in Arizona. As shown in **Table 2.9**, the industry directly employed 41,883 workers in Arizona in 2019. This ranks Arizona fourth in terms of aerospace jobs among all states in the United States, an improvement from sixth in 2012. Workers in the industry earned approximately $133,000 on average in 2019, more than double the state average across all industries.[8] This reflects the high value of the aerospace jobs supported in the state.

The 41,883 direct jobs in the aerospace manufacturing industry generated $37.2 billion of economic activity in 2019. That direct activity stimulated $6.9 billion of indirect economic activity and $7.4 billion of induced activity. This combined $14.3 billion of activity supported nearly 75,000 indirect and induced jobs and $4.4 billion in earnings. Employees in these indirect and induced jobs earned an average of $59,061 in annual salaries. For every 100 direct jobs in the aerospace manufacturing industry, an additional 178 jobs are supported in Arizona. In total, aerospace manufacturing and research generated nearly $51.5 billion in economic activity in 2019 and supported over 116,000 jobs.

For every 100 direct jobs in the aerospace manufacturing industry, an additional 178 jobs are supported in Arizona. Employees in the aerospace industry earned an average of $133,000 in 2019, more than double the state average across all industries.

Table 2.9. Total Economic Impacts from Aerospace Manufacturing and Research

Economic Indicators	Direct	Indirect	Induced	Total
Jobs	41,883	26,734	47,860	116,477
Earnings	$5,572,259,831	$2,045,398,195	$2,360,224,194	$9,977,882,221
Economic Activity	$37,210,058,670	$6,895,544,911	$7,371,830,872	$51,477,434,453

Sources: IHS Markit 2021, IMPLAN 2019

8 Bureau of Labor Statistics: *Quarterly Census of Employment and Wages,* 2021

Total Economic Impacts of Arizona Airports and Off-airport Aviation-related Industries

The total impacts of Arizona's 67 publicly owned, public-use airports; principal military installations; and aerospace manufacturing and research industry in 2019 are displayed in **Table 2.10**. This shows that Arizona airports and off-airport aviation-related industries generated total economic activity in excess of $121.4 billion which supported over 575,000 Arizona jobs and $34.2 billion in employee earnings.

Two components of these impacts were responsible for much of these impacts: commercial aviation and aerospace manufacturing. Commercial aviation comprised 46% of the economic activity and 64% of the jobs supported. The 367,063 jobs supported by activities related to commercial service airports made up 12.3% of all non-farm jobs in the state in 2019, reflecting the size and importance of commercial service airports in the Arizona economy.9 Aerospace manufacturing and research stimulated a $51.5 billion of total economic activity which supported 116,477 jobs (3.9% of all non-form jobs in the state).

Arizona airports and off-airport aviation-related industries generated total economic activity in excess of $121.4 billion which supported nearly 576,000 Arizona jobs and $34.2 billion in employee earnings.

In total, the 575,825 employees supported by the aviation-related industries represent 19% of all employment in Arizona in 2019.[10] The $121.4 billion of economic activity stimulated by airports and aviation-related industries, or output, comprised 18% of all economic activity in Arizona in 2019.[11]

Table 2.10. Total Economic Impacts of Arizona Airports, Military Installations, and Aerospace Manufacturing and Research

Airport / Aviation Industry Activity	Jobs	Earnings	Economic Activity
Arizona Airports			
Commercial Service	367,063	$19,287,304,815	$56,129,878,435
General Aviation	18,994	$1,063,259,305	$3,268,991,745
Off-airport Aviation-related Industries			
Military Installations	73,291	$3,839,800,000	$10,546,600,000
Aerospace Manufacturing and Research	116,477	$9,977,882,221	$51,477,434,453
Total	**575,825**	**$34,168,246,341**	**$121,422,904,633**

Sources: IHS Markit 2021, IMPLAN 2019, The Maguire Company 2017

9 IHS Markit, U.S. Regional Services, August 2021 forecast

10 Ibid.

11 Ibid.

Comparison with Previous Arizona AEIS

The ADOT Aeronautics Group last commissioned the Arizona AEIS in 2012. Since that time, nearly all airport types and aviation industry activities have grown, as reported in **Table 2.11**. Growth at GA and commercial service airports is due to increases in both on-airport activity (from airport operations, aviation-related tenants, capital projects, etc.) and demand from out-of-state visitors departing by air. GA airports saw the most notable increases, with jobs, earnings, and economic activity growing by greater than 200% between the study years. Much of this growth is due to increased tenant activity as well as higher visitor spending.

The impacts of Arizona airports, military installations, and aerospace manufacturing and research industry grew at a rate near or above statewide trends between 2012 and 2019. Since 2012, the number of jobs supported by all components of the 2021 Arizona AEIS have grown by nearly 19% to reach approximately 575,825 – nearly as much as the 19% growth seen at the state level across all industries.[12] Overall economic activity, or output, has doubled in that timeframe, far outpacing the statewide growth rate of 42% in economic activity.[13]

Table 2.11. Total Economic Impacts of Arizona Airports and Off-airport Aviation-related Industries, 2012 vs. 2019

Airport / Aviation Industry Activity	Jobs			Earnings (millions $)			Economic Activity (millions $)		
	2012	2019	%	2012	2019	%	2012	2019	%
Arizona Airports									
Commercial Service	283,646	367,063	29%	$10,165	$19,287	90%	$32,885	$56,130	71%
General Aviation	5,873	18,994	223%	$321	$1,063	231%	$771	$3,269	324%
Off-airport Aviation-related Industries									
Military Installations	92,103	73,291	-20%	$3,778	$3,840	2%	$7,631	$10,547	38%
Aerospace Manufacturing and Research	103,181	116,477	13%	$7,072	$9,978	41%	$20,389	$51,477	152%
Total	**484,803**	**575,825**	**19%**	**$21,336**	**$34,168**	**60%**	**$61,676**	**$121,423**	**100%**

Sources: IHS Markit 2021, IMPLAN 2019, The Maguire Company 2017

12 IHS Markit, U.S. Regional Services, August 2021 forecast

13 Ibid.

Economic Impacts by Major Industry

The economic impacts of Arizona airports, aerospace manufacturing and research industries, and principal aviation-related military installations are distributed throughout the state economy.[14] As stated earlier in this chapter, these three study components contributed $121.4 billion in total economic activity (output) to Arizona during the 2019 baseline study year. This economic activity can be viewed in terms of their impact on specific major industries depending on their relative importance to and spending patterns associated with each of these study components. This section of the 2021 Arizona AEIS looks specifically at the distribution of total economic impacts within major Arizona industries, providing further insight into precisely how Arizona airports, aerospace industry, and principal military installations contribute to the state economy.

The distribution of total economic impact by major industry sector is presented for each study component in the following subsections, with the cumulative impacts of all components presented at the end. Major industries are presented at the two-digit sector level as organized by the North American Industry Classification System (NAICS). There are 20 two-digit sectors in the NAICS.[15] Results were obtained from the IMPLAN modelling program, which maps the relationships between industries to assess how money moves within the economy. Results are provided in terms of jobs and economic activity (output). All tables are organized in terms of economic activity by percent total.

AIRPORTS

Arizona's 67 publicly owned, public-use airports generate economic impacts through on-airport activities and visitor spending. On-airport activities include airport administration and tenant employment; maintenance and operations activities; and capital improvements necessary to maintain, modernize, and expand airport facilities. Visitor spending impacts are generated when non-local visitors travel to Arizona and spend money on lodging, entertainment, retail, and other hospitality-related industries.

Arizona airports supported 386,057 workers and generated $59.4 billion in total economic activity during 2019, the study year of the 2021 Arizona AEIS. **Table 2.12** reveals that nearly one-third of these workers (31.82%) and over one-quarter of total economic activity (26.18%) were concentrated in Sector 72, Accommodation and Food Services. Most of these workers were supported by the over 11 million visitors who travel to Arizona by air each year. Sectors 48-49, Transportation and Warehousing represents 13.19% of economic activity generated by Arizona airports and 22.89% of jobs. The relative difference between these two metrics is due to the low output generated by workers in Sectors 48-49.

14 As described previously, the 2021 Arizona AEIS brings together the economic impacts of Arizona's 67 publicly owned, public-use airports; aerospace manufacturing and research industry; and principal military installations with a significant aviation-related component. These three elements of the 2021 Arizona AEIS are referred to as the "study components."

15 Three NAICS sectors are represented by a range of two-digit codes including Sectors 48-49, Transportation and Warehousing; Sectors 31-33, Manufacturing; and Sectors 44-45, Retail Trade.

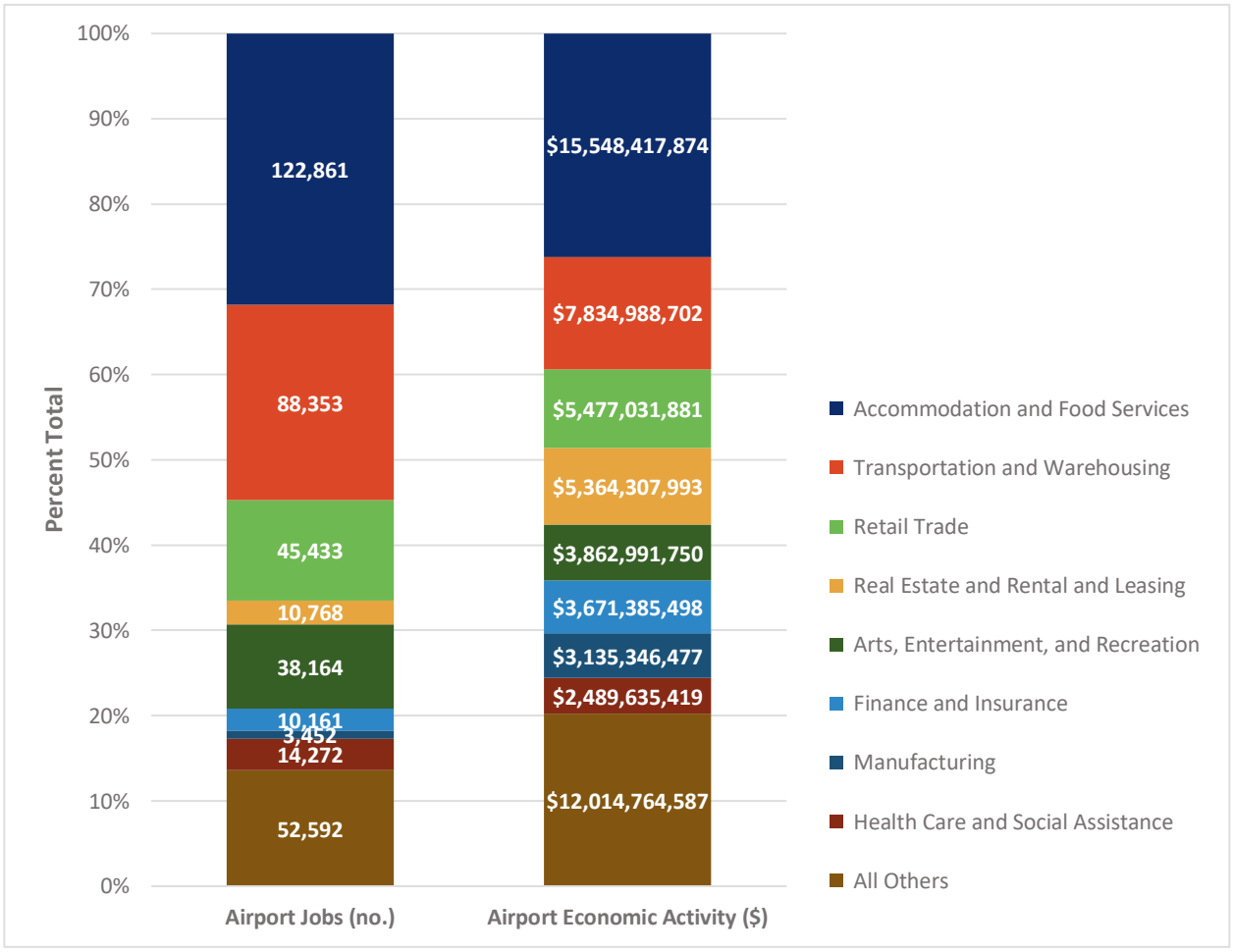
Table 2.12. Major Industries Supported by Arizona Airports

NAICS Sector	NAICS Sector Description	Jobs		Economic Activity	
		No.	Percent Total	No.	Percent Total
72	Accommodation and Food Services	122,861	31.82%	$15,548,417,874	26.18%
48-49	Transportation and Warehousing	88,353	22.89%	$7,834,988,702	13.19%
44-45	Retail Trade	45,433	11.77%	$5,477,031,881	9.22%
53	Real Estate and Rental and Leasing	10,768	2.79%	$5,364,307,993	9.03%
71	Arts, Entertainment, and Recreation	38,164	9.89%	$3,862,991,750	6.50%
52	Finance and Insurance	10,161	2.63%	$3,671,385,498	6.18%
31-33	Manufacturing	3,452	0.89%	$3,135,346,477	5.28%
62	Health Care and Social Assistance	14,272	3.70%	$2,489,635,419	4.19%
51	Information	2,687	0.70%	$1,958,054,368	3.30%
56	Administrative and Support and Waste Management and Remediation Services	14,182	3.67%	$1,793,291,843	3.02%
54	Professional, Scientific, and Technical Services	9,116	2.36%	$1,779,276,812	3.00%
42	Wholesale Trade	3,310	0.86%	$1,596,137,622	2.69%
81	Other Services (except Public Administration)	9,475	2.45%	$1,147,141,077	1.93%
22	Utilities	714	0.18%	$1,146,138,068	1.93%
55	Management of Companies and Enterprises	3,202	0.83%	$748,674,822	1.26%
92	Public Administration	2,181	0.56%	$739,580,689	1.25%
23	Construction	2,557	0.66%	$528,474,731	0.89%
61	Educational Services	4,568	1.18%	$425,893,028	0.72%
11	Agriculture, Forestry, Fishing and Hunting	480	0.12%	$83,027,360	0.14%
21	Mining, Quarrying, and Oil and Gas Extraction	120	0.03%	$69,074,167	0.12%
Arizona Airports Statewide Total		**386,057**	**100.00%**	**$59,398,870,180**	**100.00%**

Sources: IHS Markit 2021, IMPLAN 2019

Figure 2.3 shows that the top eight industry sectors supported by Arizona airports compose nearly 80% of total economic activity, with the remaining 12 sectors composing the remaining 20%. It is interesting to note that the top industries in terms of jobs generally aligned with top industries in terms of economic activity. Sectors 31-33, Manufacturing, represents the largest exception, as Manufacturing represents 5.28% of economic activity but only 0.89% of jobs. This is because of the high output per worker associated with manufacturing.

Figure 2.3. Top Industries Supported by Arizona Airports



Sources: IHS Markit 2021, IMPLAN 2019

AEROSPACE MANUFACTURING AND RESEARCH

Table 2.13 presents the economic impact of the Arizona aerospace manufacturing and research industry by sector. Over 5,000 aerospace firms are located in the state including some of the largest and most cutting-edge firms in the world. In addition, thousands of smaller firms and suppliers that provide manufacturing inputs and specialized expertise to government and private-sector end clients are also located in Arizona. In total, the aerospace manufacturing and research industry contributed $51.5 billion in total economic activity and supported 116,477 workers during the 2019 study year. Over three-quarters of the economic activity (77.84%) was associated with other firms in Sector 31-33, Manufacturing. Specialized workers such as engineers, consultants, and lawyers in Sector 54, Professional, Scientific, and Technical Services composed 5.15% of total economic activity and 6.16% of employees.

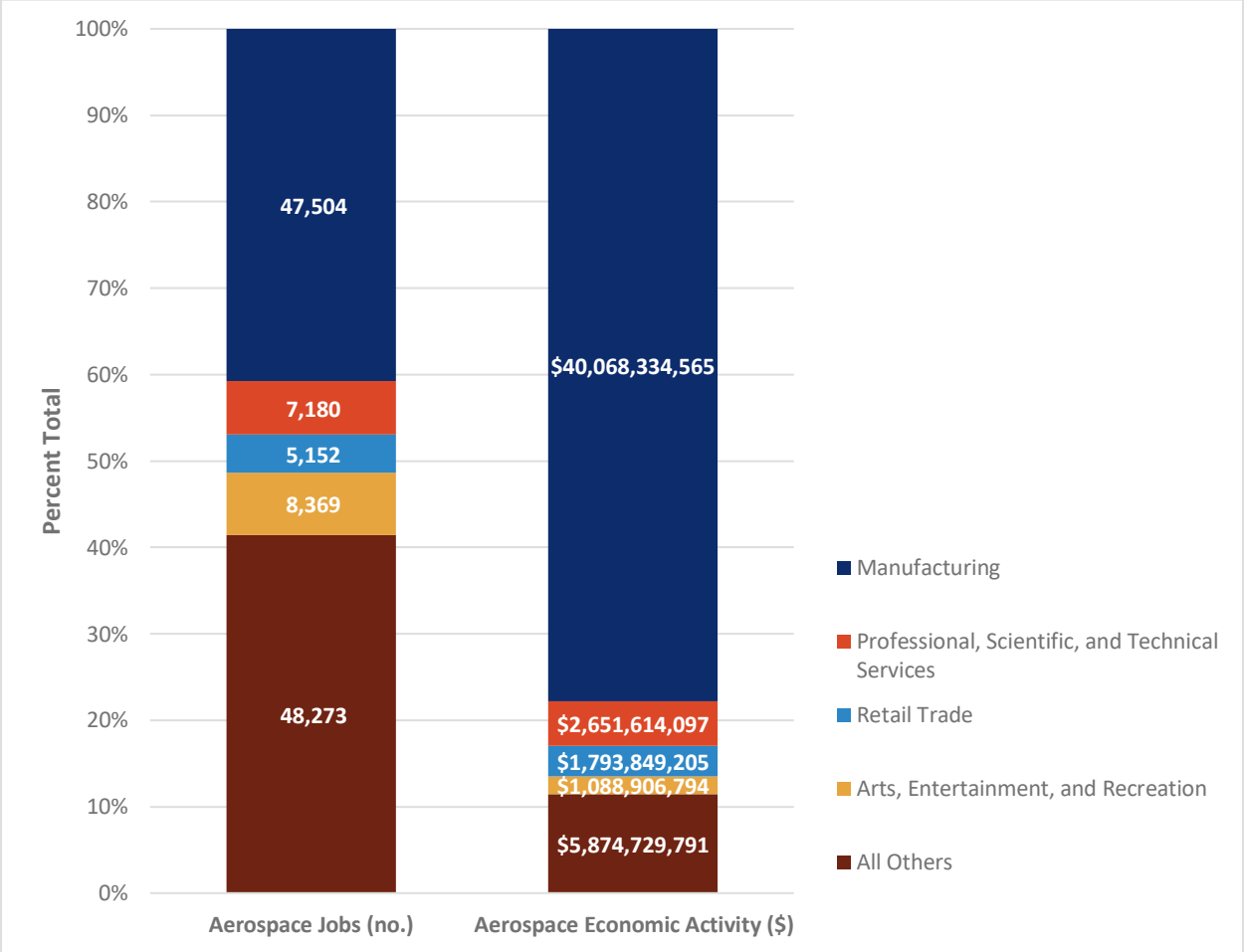
Table 2.13. Major Industries Supported by the Aerospace Manufacturing and Research Industry

NAICS Sector	NAICS Sector Description	Jobs		Economic Activity	
		No.	Percent Total	No.	Percent Total
31-33	Manufacturing	47,504	40.78%	$40,068,334,565	77.84%
54	Professional, Scientific, and Technical Services	7,180	6.16%	$2,651,614,097	5.15%
44-45	Retail Trade	5,152	4.42%	$1,793,849,205	3.48%
71	Arts, Entertainment, and Recreation	8,369	7.19%	$1,088,906,794	2.12%
51	Information	8,413	7.22%	$989,071,154	1.92%
62	Health Care and Social Assistance	8,646	7.42%	$845,304,444	1.64%
56	Administrative and Support and Waste Management and Remediation Services	5,729	4.92%	$801,903,477	1.56%
53	Real Estate and Rental and Leasing	2,249	1.93%	$774,565,386	1.50%
48-49	Transportation and Warehousing	5,507	4.73%	$612,608,322	1.19%
81	Other Services (except Public Administration)	8,330	7.15%	$600,694,803	1.17%
92	Public Administration	2,746	2.36%	$244,989,243	0.48%
23	Construction	160	0.14%	$207,676,642	0.40%
52	Finance and Insurance	490	0.42%	$192,161,446	0.37%
527	Other Services	1,071	0.92%	$177,470,159	0.34%
55	Management of Companies and Enterprises	601	0.52%	$114,087,962	0.22%
72	Accommodation and Food Services	1,923	1.65%	$108,881,403	0.21%
22	Utilities	968	0.83%	$90,321,636	0.18%
61	Educational Services	1,159	0.99%	$73,399,212	0.14%
21	Mining, Quarrying, and Oil and Gas Extraction	181	0.16%	$29,342,734	0.06%
11	Agriculture, Forestry, Fishing and Hunting	71	0.06%	$8,652,374	0.02%
42	Wholesale Trade	29	0.02%	$3,599,393	0.01%
Aerospace Manufacturing and Research Total		**116,477**	**100.00%**	**$51,477,434,453**	**100.00%**

Sources: IHS Markit 2021, IMPLAN 2019

Figure 2.4 shows that the top four sectors composed 88.59% of the total economic output generated by the Arizona aerospace manufacturing and research industry. The remaining 16 sectors represented 11.41%, none of which constituted more than 2% of the total. Total job numbers followed a different pattern, with those same top four sectors representing 58.55% of total jobs. This provides insight into how the economic activity (or output) generated by workers in various industries can be very different. Employees in the Sector 31-33, Manufacturing, generated 77.84% of output but represented only 40.78% of the total workforce. For each additional worker in a typical manufacturing job, output increases to a greater extent than in other industries. Total jobs versus economic activity in Sector 54, Professional, Scientific, and Technical Services, were fairly aligned (6.16% versus 5.15%, respectively). This indicates that the labor that these employees contributed less additional "value" to a product or service along the supply chain as compared to workers in Manufacturing. Lower wage jobs in industries such as Sector 71, Arts, Entertainment, and Recreation; Sector 62, Health Care and Social Assistance; and others contributed less additional value still, with jobs significantly exceeding output in terms of percent total.

Figure 2.4. Top Industries Supported by the Aerospace Manufacturing and Research Industry



Sources: IHS Markit 2021, IMPLAN 2019

PRINCIPAL MILITARY INSTALLATIONS

Arizona's principal military installations and Arizona Air National Guard units generated a total economic impact of $10.5 billion and employed 73,291 workers in the state.[16] As shown in **Table 2.14**, 70.09% of workers and 67.90% of total economic activity fell within Sector 92, Public Administration. This broad sector encompasses nearly all activities managed, administered, and overseen by local, state, and federal governments, including the U.S. military. Other top sectors supported by Arizona's military installations included Sector 53, Real Estate and Rental and Leasing (6.40% total economic activity) and Sector 62, Health Care and Social Assistance (5.04% total economic activity).

Table 2.14. Major Industries Supported by Arizona's Principal Military Installations

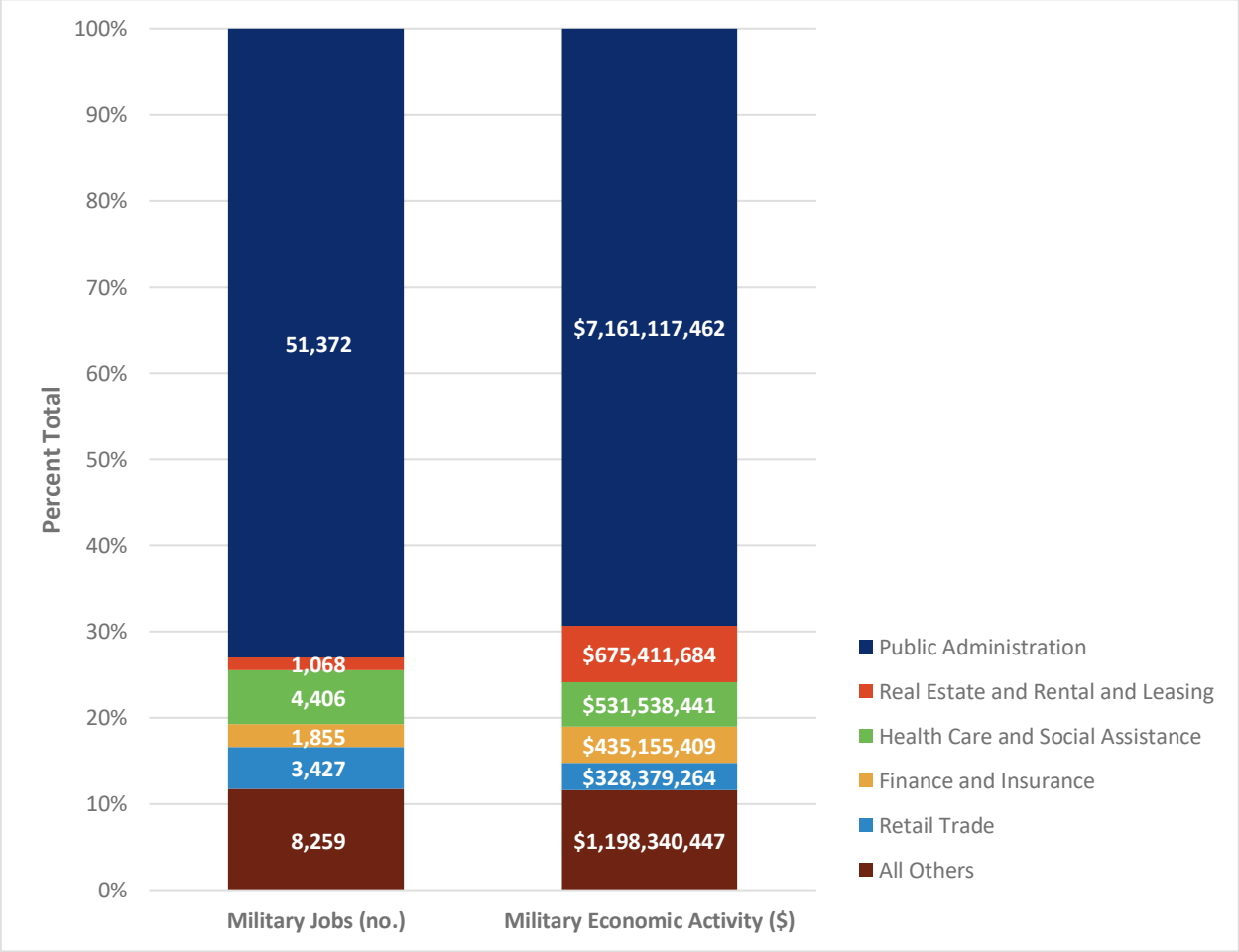
NAICS Sector	NAICS Sector Description	Jobs		Economic Activity	
		No.	Percent Total	No.	Percent Total
92	Public Administration	51,372	70.09%	$7,161,117,462	67.90%
53	Real Estate and Rental and Leasing	1,068	1.46%	$675,411,684	6.40%
62	Health Care and Social Assistance	4,406	6.01%	$531,538,441	5.04%
52	Finance and Insurance	1,855	2.53%	$435,155,409	4.13%
44-45	Retail Trade	3,427	4.68%	$328,379,264	3.11%
72	Accommodation and Food Services	2,905	3.96%	$216,657,293	2.05%
42	Wholesale Trade	517	0.71%	$172,339,161	1.63%
81	Other Services (except Public Administration)	2,118	2.89%	$168,693,865	1.60%
51	Information	351	0.48%	$162,160,314	1.54%
54	Professional, Scientific, and Technical Services	1,075	1.47%	$144,849,063	1.37%
48-49	Transportation and Warehousing	944	1.29%	$122,485,950	1.16%
56	Administrative and Support and Waste Management and Remediation Services	1,309	1.79%	$115,899,112	1.10%
22	Utilities	67	0.09%	$68,880,456	0.65%
31-33	Manufacturing	189	0.26%	$67,963,758	0.64%
71	Arts, Entertainment, and Recreation	660	0.90%	$54,440,586	0.52%
61	Educational Services	569	0.78%	$39,720,309	0.38%
23	Construction	170	0.23%	$36,818,052	0.35%
55	Management of Companies and Enterprises	179	0.24%	$28,657,220	0.27%
11	Agriculture, Forestry, Fishing and Hunting	99	0.14%	$11,718,684	0.11%
21	Mining, Quarrying, and Oil and Gas Extraction	11	0.02%	$3,713,917	0.04%
Principal Military Installations Total		**73,291**	**100.00%**	**$10,546,600,000**	**100.00%**

Sources: The Maguire Company 2017, IHS Markit 2021, IMPLAN 2019

16 The 2021 Arizona AEIS incorporated the economic impacts of Arizona's principal military installations from the 2017 *Economic Impact of Arizona's Principal Military Operations* prepared by The Maguire Company. All installations have a significant aviation-related mission component. The military impacts reported under this section of the 2021 Arizona AEIS exclude the Arizona Air National Guard 161st and 162nd units based at Phoenix International Airport (PHX) and Tucson International Airport (TUS). The economic impacts of these units are incorporated into the economic impacts of their respective airports and reported in the "Arizona Airports" section above. They are thus excluded here to avoid duplication. The economic impact of military retirees reported in The Maguire Company study was also removed from the analysis, as the associated economic impact is not sufficiently aviation-related to warrant inclusion in this study.

Figure 2.5 depicts the top six industries supported by Arizona's principal military installations in terms of jobs and economic activity. These industries comprised 88.73% of total jobs and 88.63% of total economic activity. The remaining 12 industries constituted 11.27% and 11.36% of total jobs and economic activity generated by Arizona's principal military installations (respectively), none of which represent more than 2.0% of total economic activity.

Figure 2.5. Top Industries Supported by Principal Military Installations



Sources: The Maguire Company 2017, IHS Markit 2021, IMPLAN 2019

CUMULATIVE TOTAL: ARIZONA AIRPORTS, AEROSPACE MANUFACTURING AND RESEARCH, AND PRINCIPAL MILITARY INSTALLATIONS

In total, airports, aerospace manufacturing and research, and principal military installations in Arizona contributed $121.4 billion in economic activity to the state economy and supported 575,825 employees in 2019. As shown in **Table 2.15**, over one-third of this cumulative economic activity fell within Sector 31-33, Manufacturing, although this same industry only supported 8.88% of workers. Sector 72, Accommodation and Food Services supported the highest single percent total jobs at 22.17% and the second-highest percent total economic activity at 13.07%. Sector 48-49, Transportation and Warehousing; Sector 92, Public Administration; and Sector 44-45, Retail Trade were the next-highest ranking sectors in terms of economic

activity, composing 7.06%, 6.71%, and 6.26% (respectively) of total Arizona airports and off-airport aviation-related industries economic activity. These same industries also represented the highest percent total employees except those within Sector 71, Arts, Entertainment, and Recreation. This sector supported 8.20% of workers but contributed 4.12% of total economic activity.

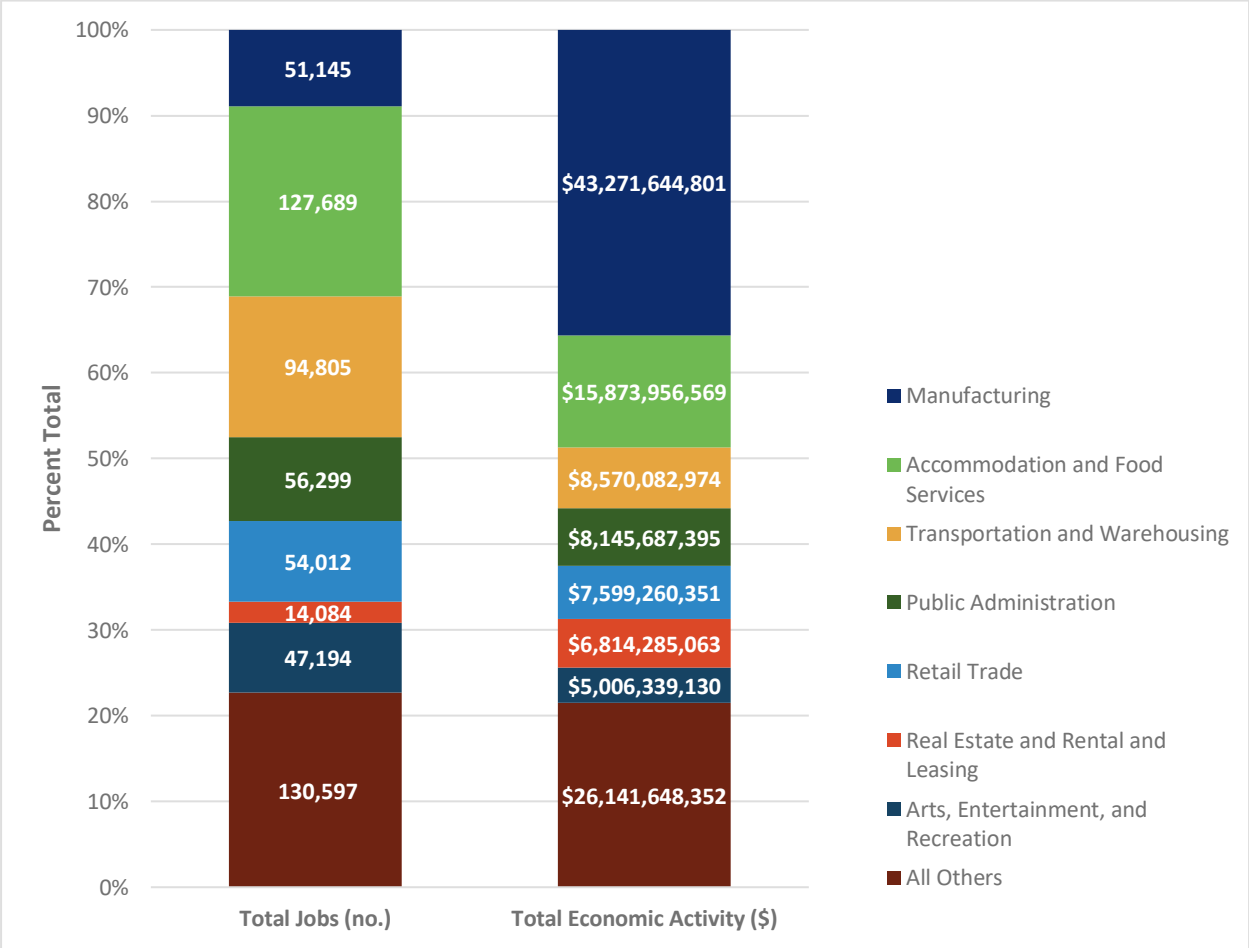
Table 2.15. Major Industries Supported by Arizona Airports, Aerospace Manufacturing and Research Industry, and Principal Military Installations

NAICS Sector	NAICS Sector Description	Jobs		Economic Activity	
		No.	Percent Total	No.	Percent Total
31-33	Manufacturing	51,145	8.88%	$43,271,644,801	35.64%
72	Accommodation and Food Services	127,689	22.17%	$15,873,956,569	13.07%
48-49	Transportation and Warehousing	94,805	16.46%	$8,570,082,974	7.06%
92	Public Administration	56,299	9.78%	$8,145,687,395	6.71%
44-45	Retail Trade	54,012	9.38%	$7,599,260,351	6.26%
53	Real Estate and Rental and Leasing	14,084	2.45%	$6,814,285,063	5.61%
71	Arts, Entertainment, and Recreation	47,194	8.20%	$5,006,339,130	4.12%
54	Professional, Scientific, and Technical Services	17,372	3.02%	$4,575,739,972	3.77%
52	Finance and Insurance	12,507	2.17%	$4,298,702,354	3.54%
62	Health Care and Social Assistance	27,324	4.75%	$3,866,478,304	3.18%
51	Information	11,450	1.99%	$3,109,285,836	2.56%
56	Administrative and Support and Waste Management and Remediation Services	21,221	3.69%	$2,711,094,432	2.23%
81	Other Services (except Public Administration)	19,922	3.46%	$1,916,529,744	1.58%
42	Wholesale Trade	3,855	0.67%	$1,772,076,176	1.46%
22	Utilities	1,749	0.30%	$1,305,340,161	1.08%
55	Management of Companies and Enterprises	3,982	0.69%	$891,420,004	0.73%
23	Construction	2,887	0.50%	$772,969,426	0.64%
61	Educational Services	6,296	1.09%	$539,012,549	0.44%
527	Other Services	1,071	0.19%	$177,470,159	0.15%
11	Agriculture, Forestry, Fishing and Hunting	650	0.11%	$103,398,418	0.09%
21	Mining, Quarrying, and Oil and Gas Extraction	312	0.05%	$102,130,818	0.08%
Cumulative Total		**575,825**	**100.00%**	**$121,422,904,633**	**100.00%**

Sources: The Maguire Company 2017, IHS Markit 2021, IMPLAN 2019

Figure 2.6 presents the top seven industry sectors within which the economic impacts of airports, aerospace manufacturing and research industries, and principal military installations fell in 2019. These sectors composed 77.32% of total jobs and 78.47% of total economic activity. All other sectors combined represented 22.68% of total jobs and 21.53% of total economic activity, and no one sector composed more than 4.0% total economic activity. As noted in previous subsections, **Figure 2.6** again highlights the different relationships between jobs and economic activity associated with various major industries.

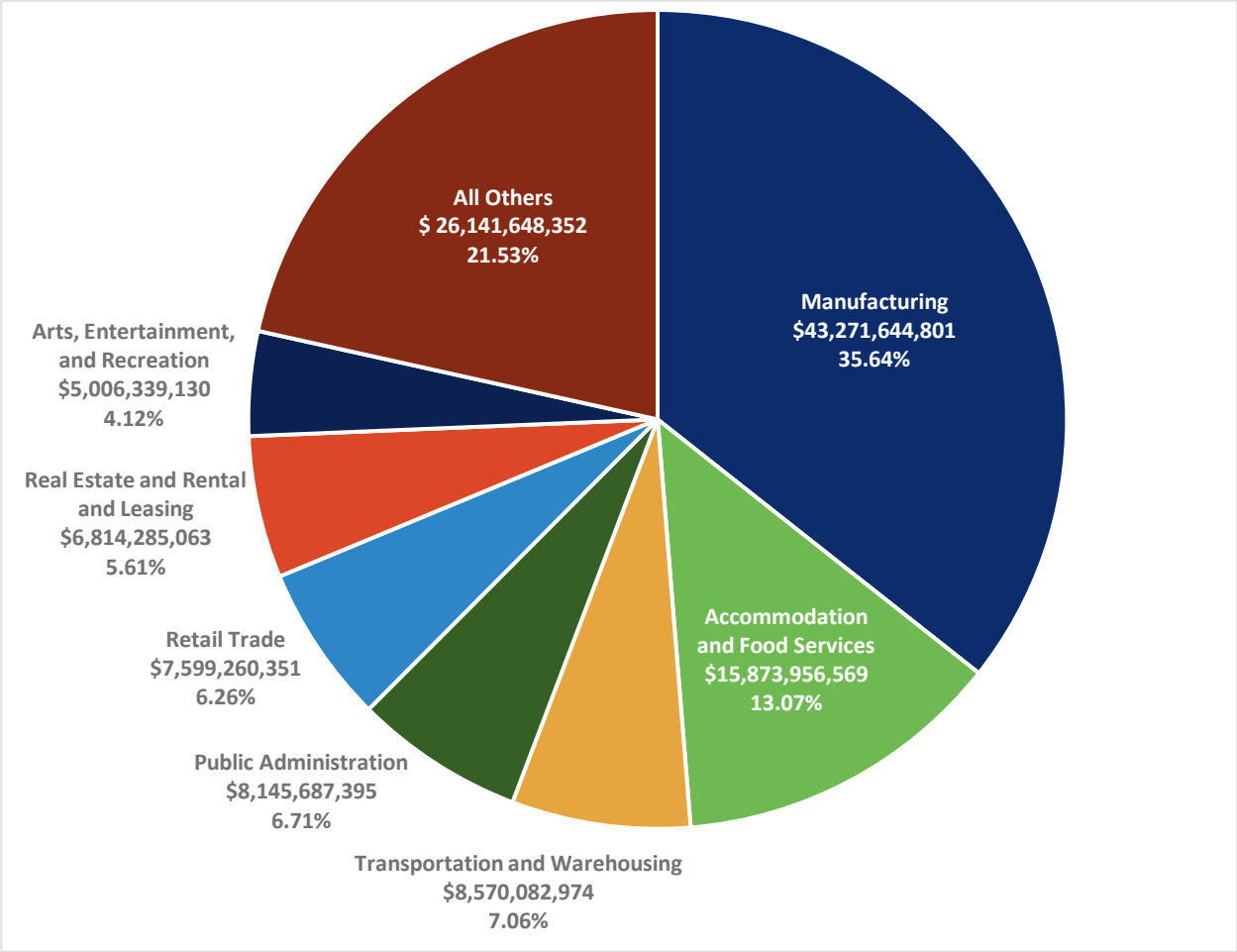
Figure 2.6. Top Major Industries Supported by Arizona Airports, the Aerospace Manufacturing and Research Industry, and Principal Military Installations



Sources: The Maguire Company 2017, IHS Markit 2021, IMPLAN 2019

Figure 2.7 depicts the top major industries supported by Arizona airports, aerospace manufacturing and research industries, and principal military installations in 2019 by percent total economic activity (output). The figure clearly illustrates the extent to which Sector 31-33, Manufacturing is bolstered by the industry components of the 2021 Arizona AEIS—totaling over $43.3 billion or 35.64% of total economic activity. Manufacturing has a particularly important role in Arizona's aerospace industry – one of the state's most important economic engines. Airports are also a cornerstone of Arizona's hospitality industry, with 13.07% equaling over $15.9 billion in economic activity annually contributed by Sector 72, Accommodation and Food Services.

Figure 2.7. Top Major Industries Supported by Arizona Airports, the Aerospace Manufacturing and Research Industry, and Principal Military Installations by Percent Total Economic Activity



Sources: The Maguire Company 2017, IHS Markit 2021, IMPLAN 2019

Summary

As the study clearly shows, the aviation industry is a critical component of the Arizona economy and a true growth engine for the state. The direct impacts of the aviation industry are wide-ranging – from the airports and their on-airport tenants, to the varied industries that serve the millions of tourists who fly to Arizona, to the aviation-related military installations and the significant aerospace manufacturing and research base located within the state. This study also highlights the importance of the supply chain needed to support the aviation industry. The supply chain impacts everything from professional services like lawyers and accountants to fuel suppliers for the airports and component suppliers for those involved in aerospace manufacturing. The wages for those involved in these direct and indirect activities then touch all aspects of the local economy, with the result that nearly 1 in 5 Arizona jobs in 2019 was supported by the aviation industry. Economic impacts accrued with many Arizona industry sectors, with particularly substantial economic activity generated within the state's manufacturing and hospitality-related industries.

The 2021 Arizona AEIS reveals that nearly 1 in 5 Arizona jobs in 2019 was supported by the aviation industry.

Each component of the aviation industry impacts Arizona's economy substantively. Airports contributed nearly $60 billion in economic activity and supported over 386,000 jobs in the state. Aerospace manufacturing and military installations impacted $62 billion of economic activity and supported over 189,700 jobs. These impacts reflect substantial growth over the results of the *2012 AEIS*.

The following chapters project these impacts out to future years using industry-specific indicators that factor in trends like the 2020 recession, air travel trends, and expectations for overall growth and development of the Arizona economy.

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Chapter 3. Key Aviation Activities and Impacts to the State Aviation Fund

The 67 commercial service and general aviation (GA) airports that compose the Arizona aviation system are a foundation of Arizona's economic vitality while supporting the safety, security, and resiliency of the state's 7.28 million residents and 46.7 million annual visitors.[1] Airports offer global connectivity for Arizona's 150,000 business establishments, which together employ 2.6 million workers with a total annual payroll of $169.7 billion.[2] Many of Arizona's aerospace manufacturing and research firms have locations at or adjacent to airports. Industry giants like Honeywell Aerospace; Raytheon; The Boeing Company; and Textron—owner of the Beechcraft, Cessna, and Hawker aircraft and Bell helicopter brands—are several examples of major companies with long-established relationships with airports in the state. In addition to Arizona's unique climate and business-friendly environment, many of these companies are drawn by the presence of six U.S. military installations and four Arizona National Guard operations. The endless sunshine of southern and central Arizona has also cultivated a robust flight training industry that draws prospective pilots from around the world.

Airports provide a common thread between, and a cornerstone of, some of the most unique and valuable economic activities occurring in the state. This chapter of the 2021 Arizona Aviation Economic Impact Study (2021 Arizona AEIS) takes an in-depth look into the impacts of six specific aviation activities that contribute to the state's economic vitality and quality of life as well as the strength, security, and resiliency of the United States. These activities include:

- Commercial service airports
- General aviation airports
- Tourism
- Aviation-related education
- Military installations
- Aerospace manufacturing and research

These key aviation activities play a powerful role in Arizona's culture of innovation, military prowess, and economic health and diversity. The first section of this chapter presents each key aviation activity in turn, including its current economic impact to Arizona as well as its projected future impacts based on state-specific and nationwide trends. Projections are important because they provide some insight into future workforce and educational needs, as well as other investments that may be required to support growth such as ground transportation and utility infrastructure. The economic impacts of all key aviation activities are projected to grow or remain constant over the 20-year forecast horizon. Economic impacts are also compared to those reported in the previous Arizona AEIS (prepared by the Elliott D. Pollack & Company in 2012 using a 2011 baseline year).

Additionally, forecasting growth in airport and aviation-related industries provides insight into anticipated future revenues into local and state tax accounts, including, but not limited to, the State Aviation Fund. The State Aviation Fund is the primary state mechanism for funding airport development via the Arizona Pavement Preservation Program (APPP), Airport Development Grants, and airport loans. Understanding future revenues

1 Dean Runyan Associates (2020). *Arizona Travel Impacts, 2000-2019(p)*. Prepared for the Arizona Office of Tourism. Available online at https://tourism.az.gov/wp-content/uploads/2020/07/Arizona-Travel-Impacts-2000-2019-1.pdf (accessed May 2021).

2 U.S. Census Bureau (2019). 2019 County Business Patterns (Table: CB1900CBP). Available online at https://data.census.gov/cedsci/table?q=CBP2019.CB1900CBP&g=0400000US04&tid=CBP2019.CB1900CBP&hidePreview=true

into the State Aviation Fund enhances the Arizona Department of Transportation (ADOT) Aeronautics Group's ability to conduct long-term planning by providing insight into the level of support that may be provided to eligible airports in the state. Projections are designed to help the ADOT Aeronautics Group make sound resource allocation and planning decisions. With this information, the agency will have a clearer understanding of funding availability in the long-term, which supports the agency's ability to prioritize the most pressing airport investment needs.

In consideration of these objectives, this chapter of the 2021 Arizona AEIS first provides an overview of the state's macroeconomic forecast. The macroeconomic forecast includes details about social, economic, and other factors anticipated to drive the Arizona economy and, in turn, aviation-related demands through the 20-year study horizon. These macroeconomic forecast drivers are then applied as appropriate to forecast the future economic impacts of Arizona's key aviation activities and revenues into the State Aviation Fund as presented in the subsequent two sections. Additional factors anticipated to drive growth within specific key aviation activities and accounts into the State Aviation Fund are addressed in their respective subsections.

It is important to note that at the time of this writing, the COVID-19 pandemic is ongoing and has caused significant disruptions to some elements of the aviation industry. As of fall 2021, IHS Markit projects that the domestic aviation industry will recover to 2019 levels by late 2022 or early 2023, with international aviation activities not fully recovering until 2024. While this will still have an effect on near-term economic activity, this recovery period is a year shorter than originally anticipated during the initial stages of the crisis. As the 2021 Arizona AEIS uses 2019 data, it does not reflect the impacts of the pandemic on the aviation industry. As such, the short-term activity forecasts presented in this chapter project higher annual growth rates than what may actually be experienced. However, the impacts of the pandemic are not expected to last beyond the projected recovery period, which is fully captured in the first projected period of the forecast, and long-term growth rates are projected to reflect actual growth in the industry.

Arizona Macroeconomic Forecast

The medium-term outlook for this Sun Belt state remains robust as the demographic center of the United States continues to push south and west. Arizona's strong growth in population and households is expected to be a driving force of economic expansion over the next two decades. The state's population is expected to rise 1.1% per year over the forecast horizon. This is over twice the rate of the United States, which is expected to grow at a rate of 0.5% per year. Significant increases in the resident population are anticipated to be bolstered by further domestic and international in-migration. These new residents will create a strong demand for services and new housing. Additionally, new Arizona residents are anticipated to drive demand for the Professional & Business Services sector, with employment expanding by 2.6% annually over the next decade (from 2019 to 2030, with 3.1% growth over the first six years and 2.1% growth over the last five years). This employment sector comprises jobs that provide specialized services for others such as lawyers, accountants, engineers, human resource professionals, and researchers. The most significant trends anticipated to affect the Arizona economy through 2040 are as follows:

Strengths

- Home prices in Arizona are much lower than in California and many other mountain region states. House affordability will contribute to Arizona's draw, particularly in comparison with other fast-growing states in the Southwest.
- Because of strong population growth and proximity to Mexico, companies looking to build new strategic facilities and regional headquarters will be strongly drawn to Arizona. As of August 2021, Caterpillar, Northern Trust, and Santander are currently establishing new operations centers in the state.
- Population growth will keep Arizona's services sector in an expansionary phase. In particular, retirees will support robust growth in the Health Care services sector.

Weaknesses

- Arizona's Manufacturing sector is heavily dependent on military and aerospace work, which are vulnerable to cuts in federal spending. Additionally, silicon chip manufacturing has been volatile in recent years as the popularity of mobile devices surpasses traditional desktop and laptop computers.
- The Arizona economy is highly dependent upon population growth, with housing and services driving much of its labor market gains. This Sun Belt economy will need to diversify further to mitigate the impacts of potential future crises.
- Annual monsoon rainfalls have diminished, average temperatures have increased, and groundwater levels have fallen in recent years. The multistate Colorado River Compact has also been strained as reservoir levels have fallen to historic lows. Potential future water supply limitations could result in lower population and economic growth.

In consideration of these broad statewide trends, the 2021 Arizona AEIS developed forecasts of key economic indicators anticipated to most significantly impact Arizona aviation between 2019 (baseline year) and 2040. **Table 3.1** provides IHS Markit's most recent forecast with highlights of the forecast immediately following. While most key economic indicators are anticipated to grow through 2040, growth rates will vary over time. Additionally, various measures of economic activity (e.g., employment [also referred to as jobs in other locations throughout the study], earnings and gross state product [GSP]) do not generally grow at the same rate.[3] This is due to changes in productivity over time, inflation, and other factors.

3 GSP is the state counterpart of the Nation's gross domestic product (GDP), the most comprehensive measure of U.S. economic activity. GSP for a state is derived as the sum of the GSP originating in all industries in the state. GSP, which correlates to value added in this report, measures the monetary value of final goods and services—that is, those that are bought by the final user—produced in a country or a given geography (Arizona in this study).

Table 3.1. Key Economic Indicators for Arizona Forecast, 2019 - 2040

Economic Indicator	Actual	Forecast				CAGR			
	2019	2025	2030	2035	2040	2019-2025	2025-2030	2030-2035	2035-2040
GSP (millions $)	370,119	512,590	664,435	858,824	1,098,890	5.6%	5.3%	5.3%	5.1%
Leisure & Hospitality	17,675	24,457	31,909	39,584	47,887	5.6%	5.5%	4.4%	3.9%
Professional & Business Services	42,205	66,950	92,936	127,151	175,511	8.0%	6.8%	6.5%	6.7%
Transportation & Warehousing[4]	11,985	15,050	18,780	22,808	27,128	3.9%	4.5%	4.0%	3.5%
Real GSP (millions 2012$)	323,598	386,810	444,590	512,422	587,685	3.0%	2.8%	2.9%	2.8%
Employment (thousands), Total Non-farm	2,943	3,226	3,405	3,580	3,769	1.5%	1.1%	1.0%	1.0%
Leisure & Hospitality	332	386	413	426	431	2.5%	1.4%	0.6%	0.2%
Arts, Entertainment, and Recreation	46	58	67	72	76	4.0%	3.1%	1.4%	1.0%
Professional & Business Services	448	538	596	633	691	3.1%	2.1%	1.2%	1.8%
Management of Companies & Enterprises	34	35	32	29	27	0.6%	-2.2%	-1.8%	-1.5%
Transportation, Trade, & Utilities[4]	544	559	556	578	597	0.4%	-0.1%	0.8%	0.7%
Transportation & Warehousing4	107	148	152	149	143	5.5%	0.4%	-0.3%	-0.9%
Average Annual Wage (thousands $)									
Manufacturing, Durables	89	120	146	182	224	5.0%	4.1%	4.4%	4.3%
Leisure & Hospitality	29	40	51	64	79	5.4%	4.8%	4.6%	4.6%
Transportation, Warehousing, & Utilities[4]	60	69	85	104	129	2.3%	4.3%	4.3%	4.4%
Personal Consumption Expenditures (PCE), Total (millions $)	276,910	369,866	488,493	637,829	822,176	4.9%	5.7%	5.5%	5.2%
PCE, Services-Transportation	9,815	12,852	17,221	22,205	28,821	4.6%	6.0%	5.2%	5.4%
Consumer Price Index (CPI)	2.65	3.01	3.36	3.76	4.23	2.2%	2.2%	2.3%	2.4%

Source: IHS Markit's U.S. Regional Service, August 2021 forecast

4 "Transportation and Warehousing" refers to industries with NAICS codes 48-49, while "Transportation, Trade, and Utilities" refers to NAICS codes 22, and 42-49. "Transportation, Warehousing, & Utilities" refers to NAICS codes 22, and 48-49.

Over the first six years of the forecast period (2019-2025), GSP, employment in the Transportation & Warehousing sector, and PCE are forecasted to grow more moderately as compared to later periods. Arizona's GSP is forecasted at 5.6% compound annual growth rate (CAGR), employment in the Transportation & Warehousing sector is forecasted at 5.5% CAGR, and total PCE is forecast at 4.6% CAGR. Each of these forecast indicators are key drivers of various aviation-related activities (as discussed in more detail in pertinent subsections below).

During the 2025 to 2030 period, growth is expected to increase, reflecting the recovery of the post-pandemic period. While statewide GSP growth will be strong over this period (5.3% CAGR), GSP in the Professional & Business Services sector is expected to grow at an even more rapid pace with a 6.8% CAGR. Employment recovery is consistently slower than GSP growth, as many industry sectors generally improve productivity over time. Slower employment growth is expected in the Arts, Entertainment, & Recreation and Professional & Business Services sectors, with CAGRs of 3.1% and 2.1%, respectively.

Between 2030 and 2035, GSP is expected to remain healthy with a statewide CAGR of 5.3%. GSP in the Professional & Business Services sector remains strong with a 6.5% CAGR. Employment in the Leisure & Hospitality sector, a key driver for tourism and visitor spending, is expected to slow over the forecast period with a CAGR of 0.6% from 2030 to 2035. Employment in the Management of Companies and Enterprises sector and Transportation, Trade, & Utilities sector are forecast to be in decline or stagnation, with CAGRs of -1.8% and 0.8%, respectively, from 2030 through 2035.

In the long-term forecast from 2035 through 2040, real GSP growth for the state is expected to remain stable, with growth continuing at 2.8% CAGR.5 Employment growth indicators are projected to slow or decline as productivity continues to improve. Automation and productivity gains are expected to influence the Leisure & Hospitality sector as well, as employment growth in the overall Leisure & Hospitality industry is forecasted to slow to a CAGR of 0.2% from 2035 through 2040.

CPI growth is forecasted to consistently increase throughout the forecast period, with a CAGR of 2.2% in 2019 through 2025 and ending with a CAGR of 2.4% from 2035 through 2040. PCEs on Transportation Services are forecasted to grow at a much faster rate than statewide CPI, with 4.9% CAGR from 2019 to 2025, then rising to 5.2% CAGR by the end of the forecast period from 2035-2040. PCEs on Transportation Services are anticipated to experience particularly robust growth from 2025-2030 with a CAGR of 5.7%.

These key economic indicators were applied to the forecasts of the economic impacts of key aviation activities and revenues into the State Aviation Fund presented in the following sections. Additional notes regarding specific forecast methodologies by activity and revenue accounts are provided within relevant subsections. Detailed forecast tables for each key aviation activity are presented in **Appendix E. Detailed Forecast Tables.**

Key Aviation Activities

The following sections provide an overview of the six key aviation activities identified by the ADOT Aeronautics Group. The 2019 economic impacts for each key activity are compared to the impacts identified in the *Economic Impact of Aviation in Arizona 2012* (Elliott D. Pollack & Company, also referred to as the 2012 AEIS). Additionally, the economic impacts of each activity are forecast through a 20-year period (2020-2040) using trends identified in IHS Markit's Regional Group's Arizona macroeconomic forecast.

5 Real GSP is used here as opposed to nominal GSP which is previously referenced in the text. When discussing general economic health and expectations, real GSP is used as it better represents the growth by not factoring in inflation. However, when comparing things like tourism spending or the State Aviation Fund, both of which are in nominal values because they are subject to inflation, nominal better represents the expected growth. Unless specified, for consistency and simplicity, all statewide and sector GSP data are in nominal terms.

It is important to note that some of the evaluations provided in this section capture the economic impacts of activities occurring off-airport property. As discussed in **Chapter 2. Economic Impacts of Arizona Airports,** the aerospace manufacturing and research industry and Arizona's principal military installations may be adjacent to or in the vicinity of airports and may rely on public facilities for personnel travel; air cargo shipping; and to conduct testing, development, training, and other support services. Additionally, all principal military installations incorporated into the 2021 Arizona AEIS have a significant aviation-related component of their overall mission. In this way, the analyses presented here provide a holistic and comprehensive evaluation of aviation and aerospace within the Arizona economy.

Furthermore, economic impacts associated with certain activities are sometimes overlapping. For example, the economic impacts of non-resident travelers arriving in the state through a commercial service airport are captured within the commercial service and tourism activity categories. For these reasons, the economic impacts of the six activities that are the focus of this section cannot be added together to avoid duplication.

FORECASTS

Arizona's aviation industry is ever evolving and highly connected with many other business sectors and economic trends. As such, the economic impacts presented in the 2021 Arizona AEIS will likely change in the future; it is important to plan for these changes to accommodate growth. The following section presents the forecasted economic impact growth for each key Arizona aviation activity through a 20-year period (2020-2040). Additionally, the section discusses the existing trends and projected future factors that will most significantly influence the six key activities. A comparison with the previously conducted *2012 AEIS* is also presented after the Forecasts section of this chapter.

The 2021 Arizona AEIS forecast for the six aviation activities is primarily based on the Arizona macroeconomic forecast from 2020 to 2040 presented above. Abridged forecast tables are presented in each subsection, with full data presented in **Appendix E. Detailed Forecast Tables.**

Commercial Service Airports

Commercial aviation includes scheduled passenger and cargo services. Eleven commercial service airports in Arizona offer scheduled passenger service and act as a gateway for visitors arriving and departing from Arizona.[6] Economic impacts generated at commercial services airports account for most of the economic activity contributed by Arizona airports. Phoenix Sky Harbor International (PHX) and Tucson International (TUS) airports are the largest airports in terms of passenger traffic (as measured in terms of enplanements), accounting for 93% of the state's total enplanements in 2019. PHX serves as a hub for American Airlines and Southwest Airlines, while Phoenix-Mesa Gateway (IWA) serves as a focus city for Allegiant Airlines. The 11 commercial service airports in Arizona are presented in **Table 3.2.**

6 The *2012 AEIS* identified 12 airports classified as commercial service facilities using data from 2011. This includes the 11 airports identified in **Table 3.2**, plus Kingman (IGM). IGM lost scheduled airline service in 2012 after data collection for the study was completed; therefore, it is not considered a commercial service airport in this study.

Table 3.2. Arizona Commercial Service Airports

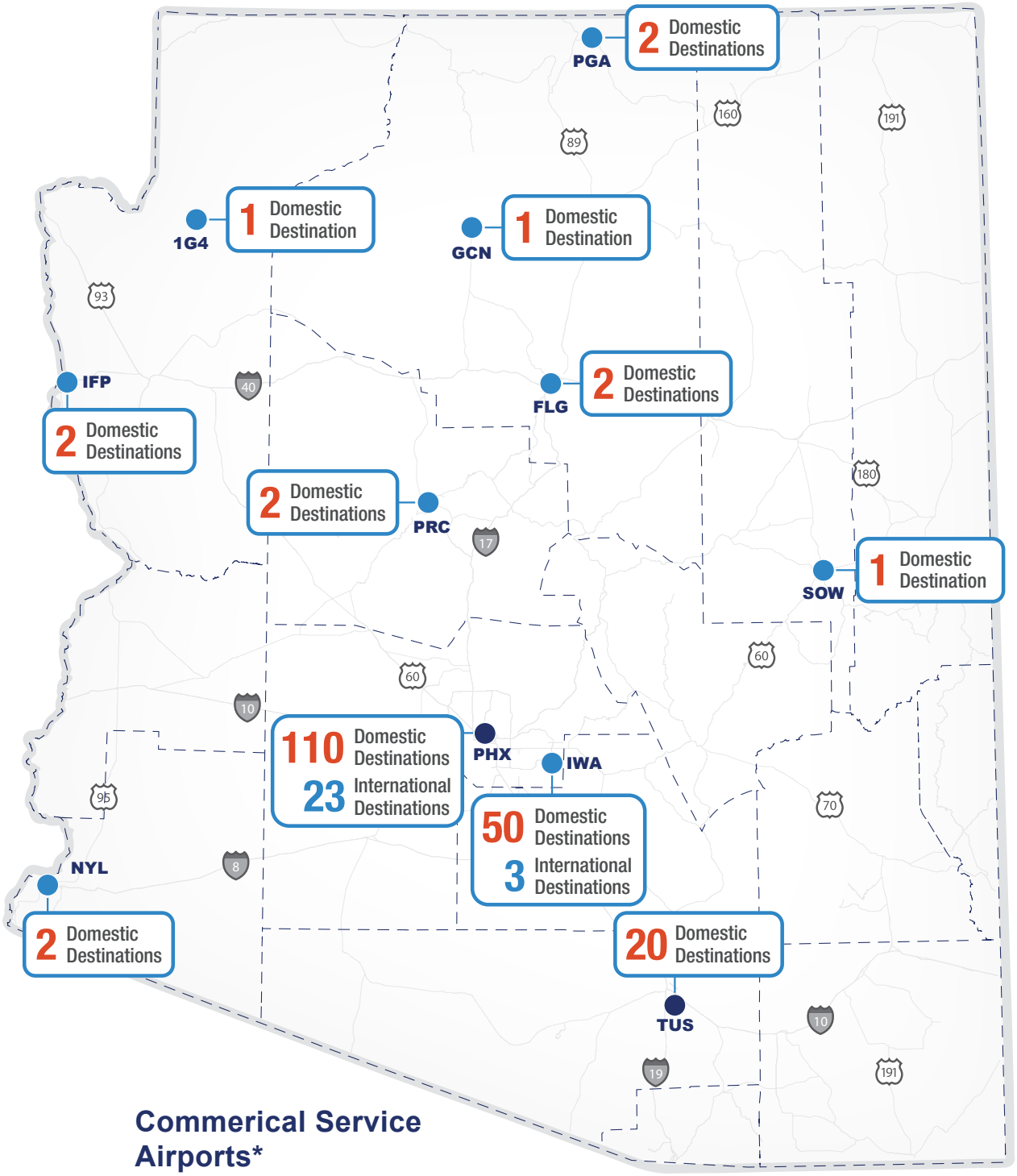
Associated City	Airport Name	FAA ID	2019 Passenger Enplanements
Bullhead City	Laughlin/Bullhead International	IFP	134,498
Flagstaff	Flagstaff Pulliam	FLG	119,864
Grand Canyon	Grand Canyon National Park	GCN	250,990
Page	Page Municipal	PGA	41,579
Peach Springs	Grand Canyon West	1G4	132,884
Phoenix	Phoenix-Mesa Gateway	IWA	881,855
Phoenix	Phoenix Sky Harbor International	PHX	22,433,552
Prescott	Prescott Regional - Ernest A Love Field	PRC	27,771
Show Low	Show Low Regional	SOW	4,574
Tucson	Tucson International	TUS	1,849,081
Yuma	Yuma International	NYL	100,480

*Note: Sum of individual airport enplanements does not equal statewide enplanements reported in **Figure 3.2** due to air taxi enplanements being recorded at GA airports. Source: Federal Aviation Administration (FAA) Air Carrier Activity Information System (ACAIS) 2021*

Figure 3.1 presents the location of each commercial service airport in Arizona and the number of nonstop airline destinations served. These airports are collectively served by 22 unique airlines that provide connectivity with 134 domestic and 24 international destinations in five countries.

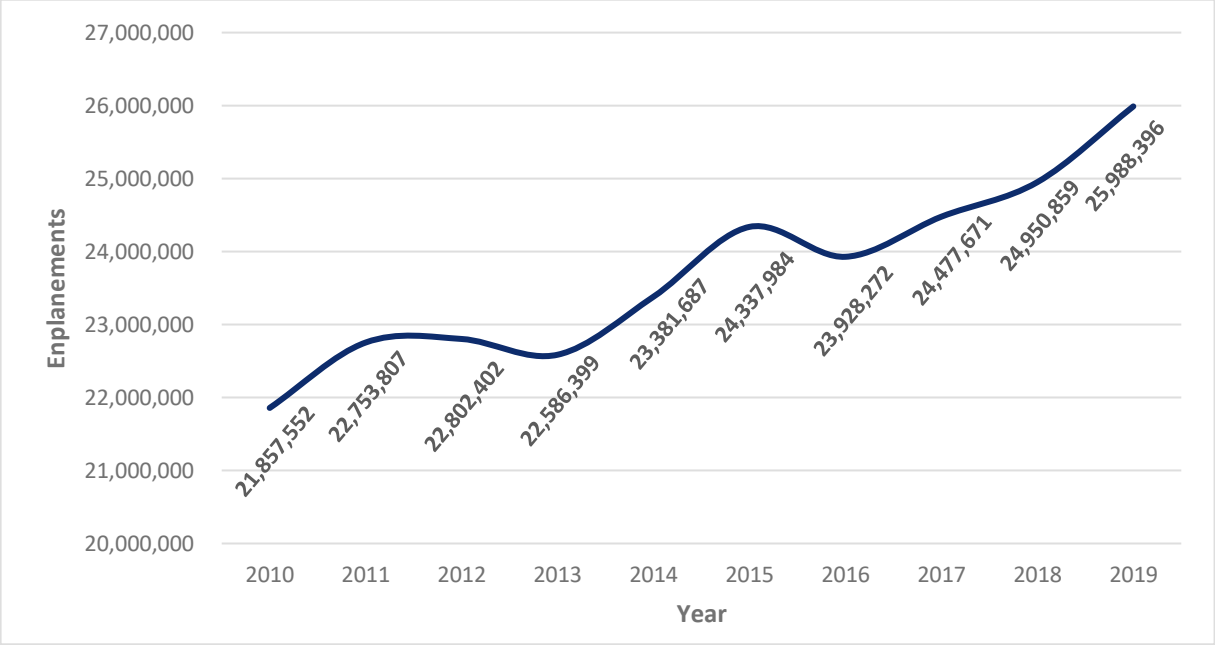
Arizona's commercial service airports have experienced relatively consistent growth in passenger traffic over the past decade due to a strong national economy and improved conditions within the aviation industry following the Great Recession, withstanding the impact of the COVID-19 pandemic in 2020. Arizona's economic growth has remained particularly robust, driven, in part, by one of the highest rates of population growth in the United States. Passenger traffic data for this study was obtained from the FAA's ACAIS, which reports a variety of passenger, aircraft, and air cargo traffic data for all commercial service and GA airports in the country. ACAIS data showed passenger enplanements in Arizona have increased 18.9% in the past decade, growing from around 21.9 million in 2010 to approximately 26.0 million passenger enplanements in 2019. Ten of the eleven commercial service airports in the state reported net traffic growth from 2010 to 2019, including Phoenix-Mesa Gateway Airport (IWA) and Prescott Regional Airport – Ernest A. Love Field (PRC), both of which saw passenger traffic increase by more than double. **Figure 3.2** presents total statewide passenger enplanements in Arizona between 2010 and 2019.

Figure 3.1. Arizona Commercial Service Airports and Number of Nonstop Destinations Served



Sources: Kimley-Horn 2021, Airport-specific websites (accessed June 2021)

Figure 3.2. Total Passenger Enplanements at Arizona Airports, 2010 - 2019



Note: Includes air charter and air taxi passenger enplanements recorded at GA airports for consistency with forecasted enplanements presented below. However, GA airports account for less than 0.1% of annual statewide passenger enplanements.
Sources: FAA ACAIS 2021, Kimley-Horn 2021

The 2021 Arizona AEIS utilized ACAIS data as a baseline to develop an enplanement forecast for the 20-year planning period of 2020 through 2040. The *FAA Aerospace Forecast 2020-2040* was used to identify national growth rates for passenger enplanements levels. These national-level projections were tailored to reflect regional socioeconomic conditions and projected trends to develop the Arizona statewide enplanements forecast. The short-term enplanements forecast (2019-2025) was influenced by the expected timeline of a post-pandemic recovery in air travel and aircraft fuel prices, while the long-term (2025-2040) projection of enplanements is driven by projected employment growth in three aviation-intensive sectors: Professional & Business Services, Leisure & Hospitality, and Transportation, Warehousing, & Utilities. The resulting forecast, shown in **Table 3.3**, projects statewide passenger enplanements will grow from 26.0 million in 2019 to 38.5 million in 2040, representing a 1.9% CAGR. Due to the ongoing COVID-19 pandemic, passenger traffic is projected to be lower in the short-term as the industry recovers, resulting in a lower CAGR from 2019-2025 of only 1.4%. However, pent-up travel demand is projected to cause passenger traffic to grow more rapidly between 2025 and 2030 (2.5% CAGR) before it returns to a more moderate growth rate from 2030-2040 (1.8% CAGR).

Table 3.3 Arizona Enplanement Forecasts, 2019 (actual) - 2040

Year	Enplanements (thousands)
2019 (actual)	25,989
2025	28,316
2030	32,037
2035	35,198
2040	38,482
CAGR (2019-2040)	1.9%

Notes: 2019 baseline data obtained from ACAIS includes air taxi/air charter activity occurring at GA airports. These enplanements contribute less than one person of enplanement activity occurring statewide. Sources: FAA ACAIS 2021, IHS Markit 2021

The enplanements forecast served as the driver for the commercial aviation employment forecast. Therefore, employment in the commercial aviation sector is projected to have a 1.9% CAGR, increasing from approximately 85,000 in 2019 to over 126,000 in 2040. The average wage per worker in the commercial aviation sector is projected to increase at the state average wage rate (3.7%) for employees in the Transportation, Warehousing, & Utilities sector. This is projected to increase total direct earnings in commercial aviation from $6.2 billion in 2019 to $13.3 billion in 2040. Economic activity in commercial aviation is forecast to grow at the same rate as the projected Arizona GSP in the Transportation & Warehousing sector (4.0% CAGR). As shown in **Table 3.4**, economic activity generated by commercial aviation is expected to increase from $20.5 billion in 2019 to $46.4 billion in 2040.

Table 3.4. Economic Impact Forecasts – Commercial Service Airports, 2019 (actual) - 2040

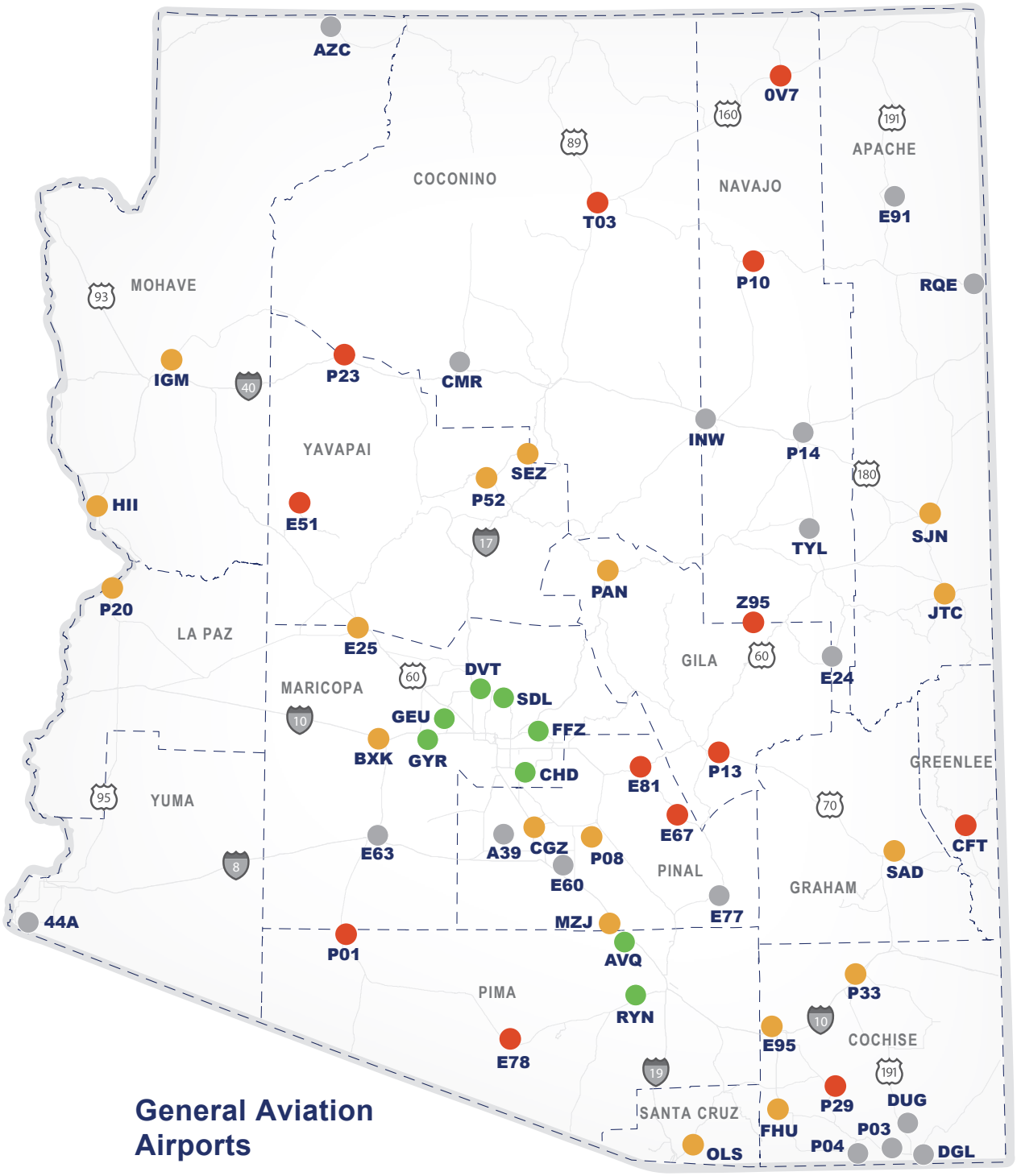
Year	Jobs (number)	Earnings ($)	Economic Activity ($)
2019 (actual)	85,224	$6,155,950,031	$20,515,290,630
2025	92,856	$7,074,808,330	$25,761,748,806
2030	105,058	$8,718,985,428	$32,147,171,349
2035	115,425	$10,758,922,355	$39,041,870,512
2040	126,194	$13,315,677,644	$46,437,176,733
CAGR (2019-2040)	1.9%	3.7%	4.0%

*Note: See **Table 3.1** for the detailed commercial aviation forecast table. The economic impacts of commercial service airports presented here include those generated by on-airport activities and visitor spending. The economic impact of tourism presented below (**Table 3.6**) includes the visitor spending portion only. As such, the impacts presented in these sections cannot be added together to avoid duplication. Source: IHS Markit 2021*

General Aviation Airports

While most commonly associated with the recreational flying of private aircraft, GA includes all civil aviation activities other than scheduled commercial service. A variety of aviation uses are considered GA including flight training, corporate and business flying, aerial firefighting and medical evacuations, agricultural spraying, non-military governmental patrols, aerial surveying and photography, private charters, search and rescue operations, skydiving, and aerial advertising. Arizona's 56 GA airports regularly support many of these activities, generating economic growth and providing vital services to their communities. **Figure 3.3** presents the location and *2018 Arizona State Aviation System Plan (SASP)* Update classification of each of the 56 GA airports in the state.

Figure 3.3. Arizona GA Airports

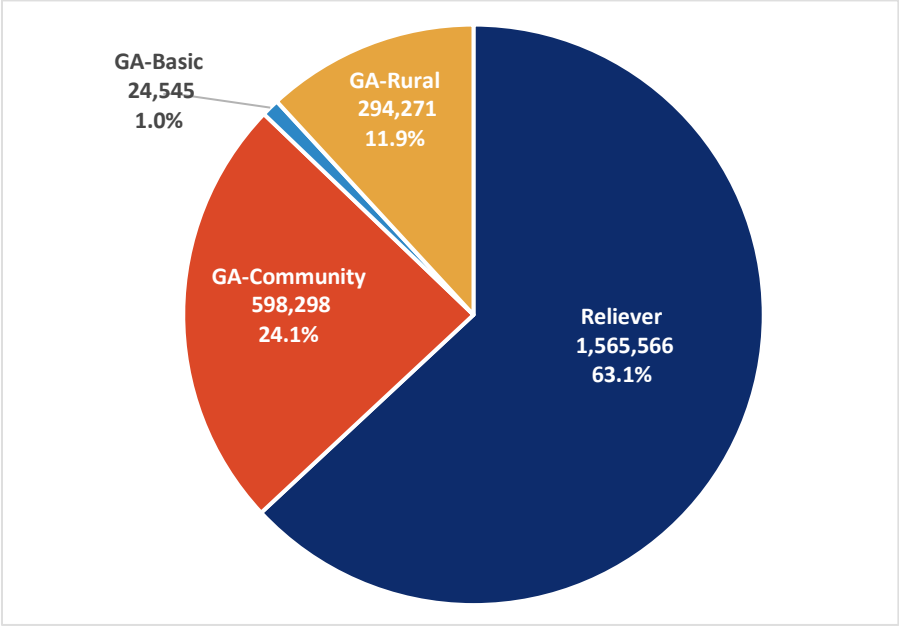


Sources: Kimley-Horn 2021, ADOT Aeronautics Group 2018

Statewide, GA airports supported nearly 2.5 million GA aircraft operations in 2019.[7] **Figure 3.4** presents the breakdown of GA operations by *2018 SASP Update* airport classifications. More than 60% of these operations occurred at the eight Reliever airports located near the Phoenix and Tucson metropolitan areas. These Reliever airports are among the busiest GA facilities in the country. Phoenix-Deer Valley (DVT) and Scottsdale (SDL) airports were the 9th and 14th busiest GA airports in the country in 2019, while five other airports in Arizona ranked within the top 100.[8] Reliever airports typically support business aircraft operations, based flight training, and recreational flying. Business and corporate aircraft typically utilize Reliever airports. In many cases, these airports provide access to a high number of attractions, suppliers, and customers in large cities without interfering with traffic at the nearby commercial service airports. Additionally, Reliever airports generally provide the aircraft facilities and services often required by more demanding and sophisticated business jets.

Arizona's 17 GA-Community airports are mostly located in smaller micropolitan areas around the state and account for 24% of total statewide GA operations. Transient recreational and flight training aircraft are frequent users of these airports, along with occasional business/corporate flights and air taxi service. These facilities provide more direct access to communities without scheduled commercial service while still offering ample amenities. Most GA-Community airports have business tenants and sell both Jet A fuel and AvGas (100 low lead [LL]), further contributing to their economic impact and supporting the efficacy of the airport system. While the 13 GA-Basic and 17 GA-Rural airports account for only 13% of total GA operations, these facilities provide essential activities and improved mobility for many small communities in the state. Transient flight training, recreational, and air ambulance aircraft commonly utilize these airports. Some GA-Basic and GA-Rural airports offer fuel and other aircraft services and amenities; however, many act as basic landing strips for small aircraft. The airports are critical as they usually allow for faster travel to and from rural communities than roads, which can prove lifesaving during emergency events.

Figure 3.4. Arizona GA Operations by Airport Classification, 2019



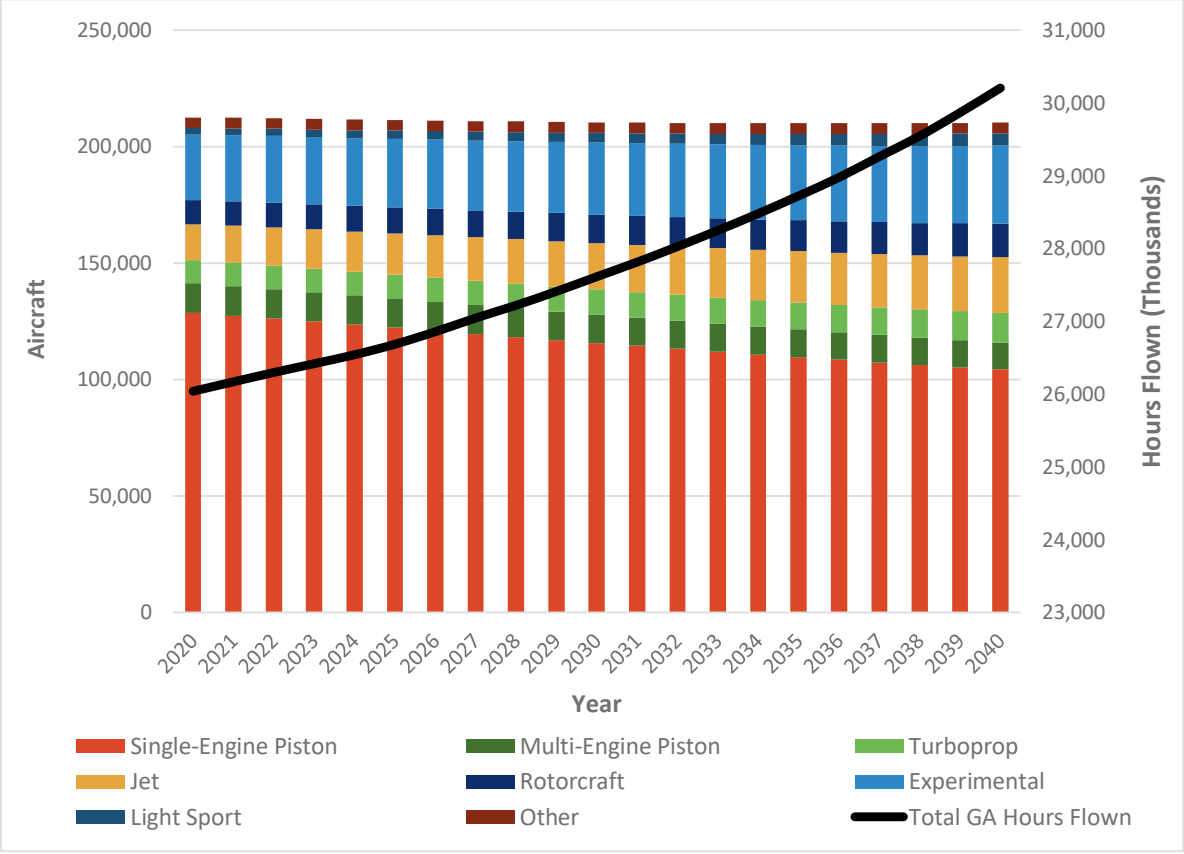
Sources: FAA Form 5010 Airport Master Record, FAA ATADS, FAA TAF, Airport Manager Survey (accessed August 2020)

7 Because most GA airports are non-towered, obtaining accurate operation counts can be extremely challenging. The 2021 Arizona AEIS obtained operations counts from the following sources, in order of preference: FAA Air Traffic Activity System (ATADs), Airport Manager Survey, Terminal Area Forecast (TAF), and 5010 Airport Master Record.

8 FAA ATADS available online at https://aspm.faa.gov/

The future growth in economic activity generated by Arizona's GA airports will be largely dependent on trends in the national aviation industry. The FAA coordinates with several industry organizations such as the General Aviation Manufacturers Association (GAMA) to identify existing patterns in the industry and to predict future trends. These trends are published in the annual *FAA Aerospace Forecast*. According to the *FAA Aerospace Forecast 2020-2040* and as shown in **Figure 3.5**, the total GA aircraft fleet size is projected to remain relatively stable during the 20-year forecasting window. The largest segment of the fleet, single-engine piston aircraft, is expected to shrink approximately 1.0% annually through 2040. The turbine, rotorcraft, and light sport aircraft (LSA) segments are expected to grow, offsetting the decline in the single-engine fleet; but their small relative size compared to the single engine fleet will result in a marginal net change in national fleet size. As more sophisticated and longer-range aircraft, particularly business jets, continue to enter the GA market, total GA hours flown are forecast to increase by nearly 16.0% during the planning timeframe (0.9% CAGR), exceeding 30.2 million annually by 2040. This growth will largely reflect the growth of economic activity at GA airports in Arizona and around the country, as higher utilization rates will likely correlate with an increase in aviation fuel sales, aircraft maintenance, and other economic activities at airports.

Figure 3.5. GA Fleet Size and Total Hours Flown, 2020 - 2040



Source: FAA Aerospace Forecast 2020-2040

The 2021 Arizona AEIS GA employment forecast was developed in consideration of the *FAA Aerospace Forecast 2020-2040* of total GA hours flown (0.9% CAGR). However, the growth rate for Arizona GA flight hours flown was adjusted upwards to reflect the population growth differential between Arizona and the United States. As a result, Arizona GA flight hours and GA employment are projected to have a 1.6% CAGR through the planning window. The earnings and output growth generated by GA airports are projected to occur at the same rates as Transportation & Warehousing industry growth for average wage and GSP for average output growth (3.7% CAGR and 4.0% CAGR, respectively). As shown in **Table 3.5**, GA airports are expected to contribute approximately 9,300 jobs, $1.0 billion in total direct earnings, and just over $3.6 billion in economic activity by 2040.

Table 3.5. Economic Impact Forecasts – GA Airports, 2019 (actual) - 2040

Year	Jobs (number)	Earnings ($)	Economic Activity ($)
2019 (actual)	6,682	$484,762,875	$1,591,599,018
2025	7,400	$557,120,251	$1,998,625,067
2030	7,975	$686,594,339	$2,494,013,235
2035	8,594	$847,233,344	$3,028,911,649
2040	9,257	$1,048,570,268	$3,602,647,714
CAGR (2019-2040)	1.6%	3.7%	4.0%

*Notes: See **Table E.4** for the detailed GA airport forecast table. The economic impacts of GA airports presented here include those generated by on-airport activities and visitor spending. The economic impact of tourism presented below (**Table 3.6**) include the visitor spending portion only. As such, the impacts presented in these sections cannot be added together to avoid duplication.*
Source: IHS Markit 2021

Tourism

Arizona is home to dozens of unique natural, historic, cultural, and social destinations, making tourism a popular activity and a significant economic catalyst in the state. Visitors from around the world come to see the state's diverse scenery, learn about the multicultural heritage, experience the lively social scene, partake in numerous sporting events and activities, and enjoy the year-round pleasant weather. Aviation facilitates interstate and international tourism, as the majority of out-of-state and international visitors use Arizona's 11 commercial service and 56 GA airports to travel to and from the state.

Arizona has a rich history that spans across many cultures over thousands of years. The state is home to dozens of ancient Tribal sites belonging to the Navajo, Apache, Hopi, Hualapai, and other Tribal peoples. While the state is still home to several large mining operations, Arizona's mountainous regions contain dozens of ghost towns dating back to the 19th century silver boom that is often correlated with the iconography of the wild west. Towns such as Tombstone and Jerome now serve as tourist destinations for historic reenactments, museums, and collectibles. Historic Route 66 traverses northern Arizona, drawing thousands of visitors to communities along the "Mother Road."

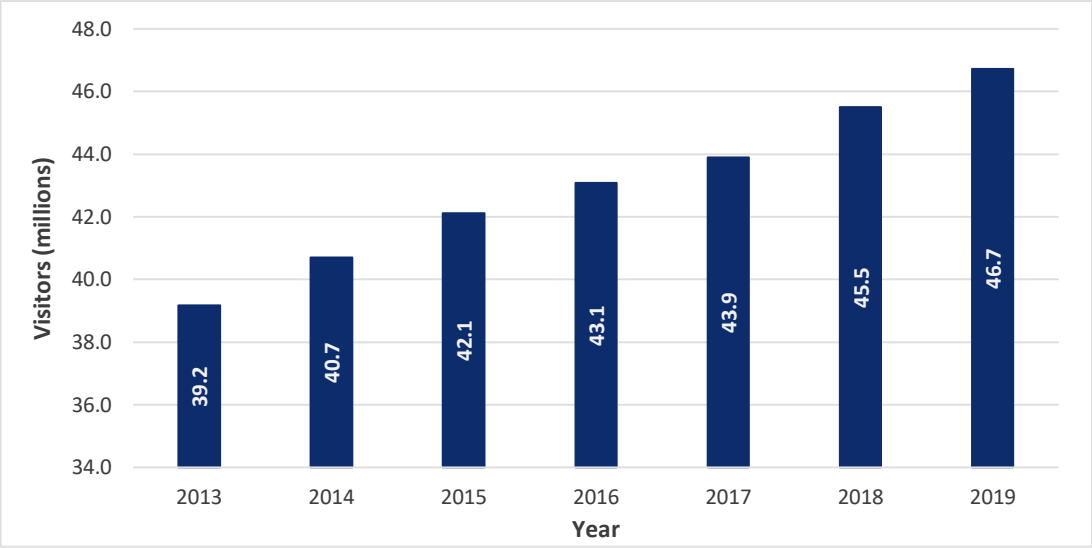
Twenty-one national parks, monuments, historic parks, and recreation areas are located in Arizona, collectively receiving more than 14 million visitors annually. The most prominent attraction in Arizona is the Grand Canyon, which is accessed via Grand Canyon National Park (GCNP) or Grand Canyon West Resort, located in the Hualapai Indian Reservation. GCNP is the sixth-busiest national park in the country, recording nearly 6 million visitors in 2019. The Glen Canyon National Recreation Area, situated along the Arizona-Utah border near Page, attracted more than 3.8 million visitors in 2019, the second-most of any national park in the

state. Arizona also has 28 state parks and state historic parks that recorded 3.1 million visitors.[9]

Arizona hosts a variety of events that bring in visitors from around the globe. Glendale has hosted multiple Super Bowls in the past 15 years and will be the site of Super Bowl LVII in 2023. Scottsdale plays host to the annual Waste Management Phoenix Open at the TPC Scottsdale Golf Course and the Barrett-Jackson car auction each winter, drawing in professional athletes, celebrities, and thousands of spectators each year. The Phoenix metropolitan area is also the home of 10 Major League Baseball (MLB) spring training facilities. These facilities are used by 15 MLB teams each February and March to conduct spring training, drawing thousands of baseball fans from other markets to enjoy the pleasant springtime weather. The Phoenix Raceway located in Avondale is the site of two annual NASCAR race weekends, as well as numerous other auto sports racing events.

As shown in **Figure 3.6**, tourism has grown steadily in the state, as the number of annual overnight domestic visitors rose approximately 19.1% between 2013 and 2019. The Arizona Office of Tourism estimated a total of 46.7 million overnight visitors stayed in Arizona in 2019. This included 29.4 million visitors traveling from out-of-state and 6.1 million international overnight visitors traveling to Arizona in 2019 (the remaining 11.2 million visitors were in-state travelers). Approximately 84.0% of the 40.6 million domestic visitors traveled for leisure. Nearly 20% of all international visitors arrived via overseas, as Mexico and Canada make up the bulk of Arizona's international visitors.[10]

Figure 3.6. Overnight Visitors to Arizona, 2013 - 2019



Source: Arizona Office of Tourism 2019

Economic impacts presented in this analysis related to tourism reflect the jobs, earnings, and economic activity generated by off-airport visitor spending in the state. Factors influencing future changes in visitor spending-related jobs, earnings, and economic activity include forecasted growth of the Leisure & Hospitality sector within Arizona, overall statewide economic growth, and forecasted growth of statewide passenger enplanements (as presented in **Table 3.3**). As 2019 serves as the base year of the study and therefore does not account for losses in visitor spending impacts caused by the COVID-19 pandemic, near-term growth is expected to be impacted as the tourism industry rebounds from the pandemic. However, tourism has already shown indications of strong growth, and it is anticipated the state will follow a long-term trend of robust growth in tourism-related activities after a short period of slower growth.

9 National and state park visitation statistics are available at https://tourism.az.gov/data-trends/

10 Additional details about the Arizona Visitor Profile are available at https://tourism.az.gov/visitation-profiles/

Table 3.6 presents the resulting forecast of tourism activities in Arizona through 2040. Total direct employment in visitor spending generated by aviation activities was nearly 92,300 in 2019 and is forecast to grow to over 121,500 by 2040, with a CAGR of 1.3%. Aviation-sourced visitor spending generated just below $3.0 billion in earnings and almost $8.1 billion in economic activity in 2019. Visitor spending-supported earnings are expected to increase at a 4.3% CAGR to nearly $7.3 billion by 2040. Economic activity (output) is forecast to grow from nearly $8.1 to over $17.8 billion by 2040, with a CAGR of 3.8%. It is important to note that the impacts presented here are duplicative of impacts reported under the commercial service and GA airport sections above; as such, these impacts cannot be added.

Table 3.6. Economic Impact Forecasts – Tourism, 2019 (actual) - 2040

Year	Jobs (number)	Earnings ($)	Economic Activity ($)
2019 (actual)	92,257	$2,998,335,128	$8,073,829,098
2025	96,775	$3,726,777,006	$9,740,969,508
2030	103,797	$4,676,328,595	$11,859,357,861
2035	113,900	$5,834,508,752	$14,540,752,348
2040	121,559	$7,256,503,285	$17,832,688,159
CAGR (2019-2040)	1.3%	4.3%	3.8%

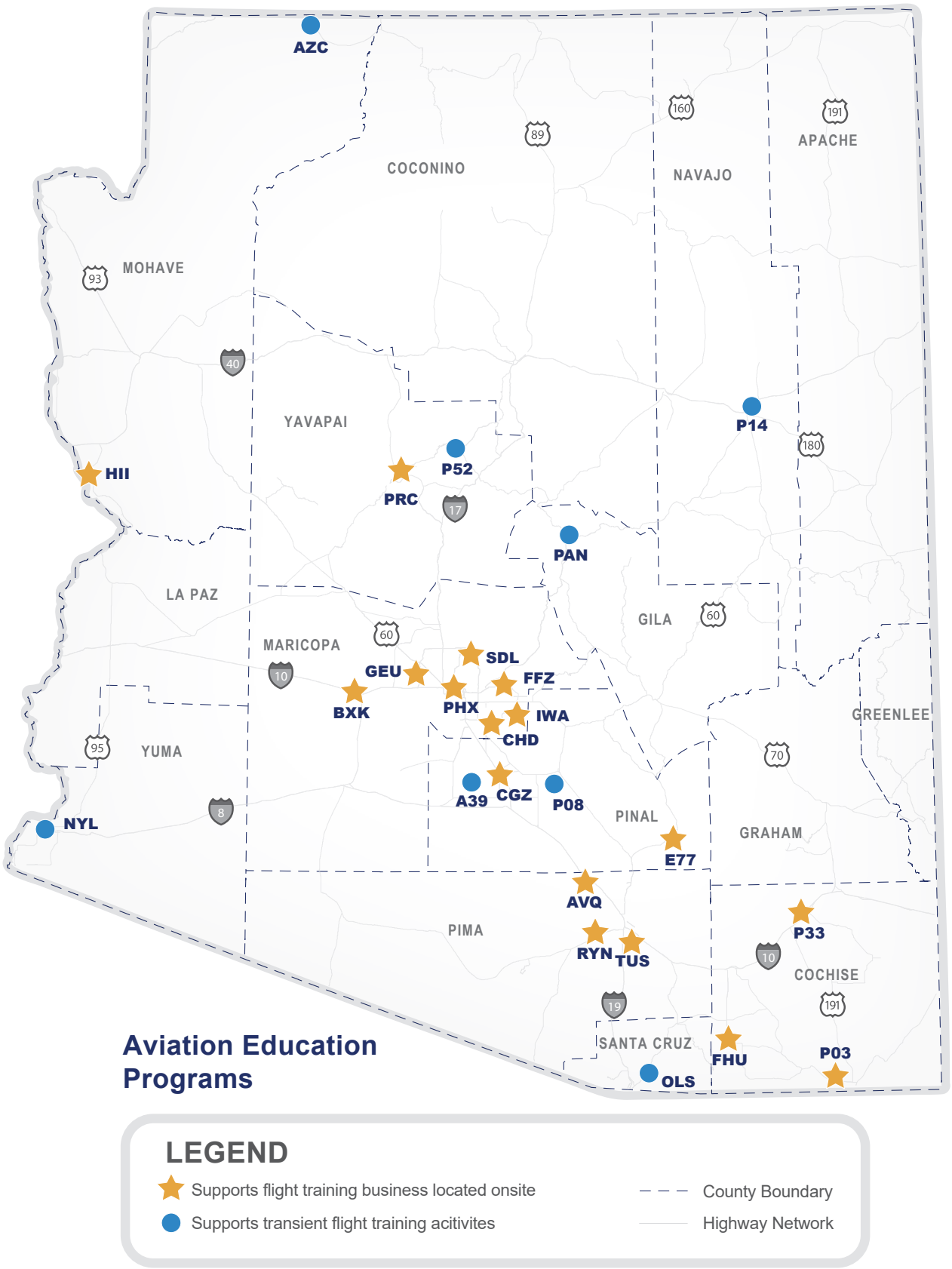
*Note: See **Table E.5** for the detailed tourism forecast table. The economic impacts of commercial service airports and GA airports presented in the sections above (**Table 3.4** and **Table 3.5**, respectively) also include the economic impact of tourism activity. As such, impacts presented in these sections cannot be added together to avoid duplication. Source: IHS Markit 2021*

Aviation-related Education

Education is a critical component of the aviation industry, as there is a consistent and growing need for new pilots, mechanics, air traffic controllers, and dispatchers to join the workforce. Arizona is home to dozens of aviation training programs that range from small private flight schools to large universities that employ thousands of employees. Large aviation education institutions in the state include Embry-Riddle Aeronautical University (ERAU), with two locations in Prescott including its Flight Training Center on the airfield at Prescott Regional - Ernest A Love Field (PRC); CAE Phoenix Aviation Academy, located at Falcon Field (FFZ); Arizona State University (ASU) Polytechnic School, located at Phoenix-Mesa Gateway (IWA); and Cochise College, located at Cochise College Airport (P03). These institutions provide career-oriented training for future professional pilots and aviation support personnel. ERAU and ASU Polytechnic School offer four-year undergraduate and graduate programs in several aviation and aerospace-related fields.

Nearly every airport in Arizona supports some level of flight training, whether it be primary flight training for new pilots performing touch-and-go's or specialized training for backcountry and tailwheel aircraft. During the outreach portion of the 2021 Arizona AEIS, 17 airports reported having aviation-related education or flight training businesses based onsite. The influence of flight training activities extends far beyond their home airports, as student pilots nearly always utilize other airports to develop their knowledge and skillset. In addition to the airports that have based aviation education businesses, eight reported having flight training activities occurring daily or weekly. **Figure 3.7** shows the location of these airports in the state as reported by airport managers during the 2021 Arizona AEIS data collection.

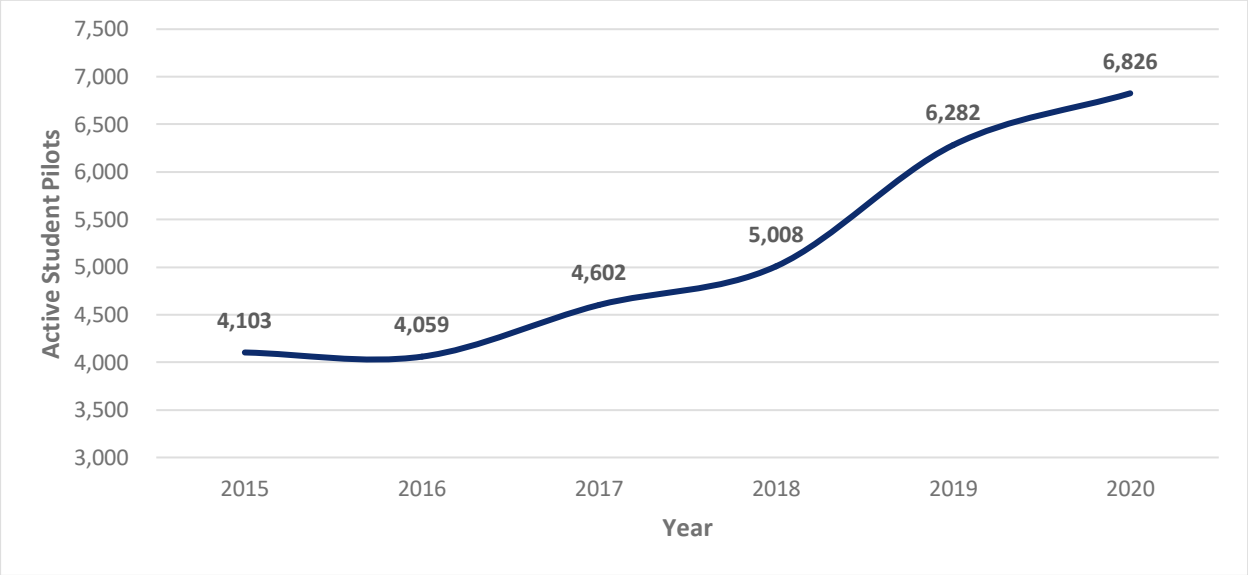
Figure 3.7. Airports Supporting Aviation Education in Arizona



Source: Airport Manager Survey 2020

In recent years, flight training activities have grown substantially in Arizona due in large part to the nationwide commercial pilot shortage. As shown in **Figure 3.8**, the number of active student pilots has increased by 66.4% between 2015 and 2020. While a portion of this growth is reflective of an increase in population in the state, a large portion of these new active certificates represent student pilots traveling to Arizona from other states or foreign countries. Both ERAU Prescott and CAE Phoenix Aviation Academy reported significant growth in their pilot training programs during this time period.[11]

Figure 3.8. Active Student Pilot Certificates in Arizona, 2015 - 2020



Source: U.S. Civil Airmen Statistics 2021

Aviation education, specifically flight training, is projected separately through IHS Markit's Business Market Insight (BMI) database which follows IHS Markit's overall macroeconomic forecast trends. Total direct employment in the aviation-related education and flight training sector is expected to grow from just below 1,800 in 2019 to nearly 3,500 by 2040, due in part to an expansion of ERAU's activities in Prescott. This forecast includes an assumption of a shift of 300 jobs from the ERAU campus in Daytona Beach, Florida to its campuses in Prescott, Arizona in the near-term horizon. **Table 3.7** presents the 20-year forecast of direct aviation education economic impacts in Arizona. Total earnings in Arizona are expected to follow the annual rate of change in IHS Markit's U.S. Regional Service's forecast for wages in educational services in Arizona, rising from $146.6 million in 2019 to $366.4 million in 2040 (4.5% CAGR). Annual economic activity is expected to follow the growth path of economic activity in flight training from IHS Markit's BMI database, growing from $316.3 million in 2019 to nearly $1.4 billion in 2040 (7.3% CAGR).

11 Aviation education activities at ERAU Prescott and CAE Phoenix Aviation Academy are discussed in further detail in **Appendix B. Arizona World-class Aviation Businesses**.

Table 3.7. Economic Impact Forecasts – Aviation Education, 2019 (actual) - 2040

Year	Jobs (number)	Earnings ($)	Economic Activity ($)
2019 (actual)	1,791	$146,562,253	$316,283,656
2025	2,746	$231,213,092	$527,920,860
2030	3,006	$286,638,801	$735,335,493
2035	3,262	$326,127,882	$1,014,084,677
2040	3,466	$366,432,722	$1,386,959,569
CAGR (2019-2040)	3.2%	4.5%	7.3%

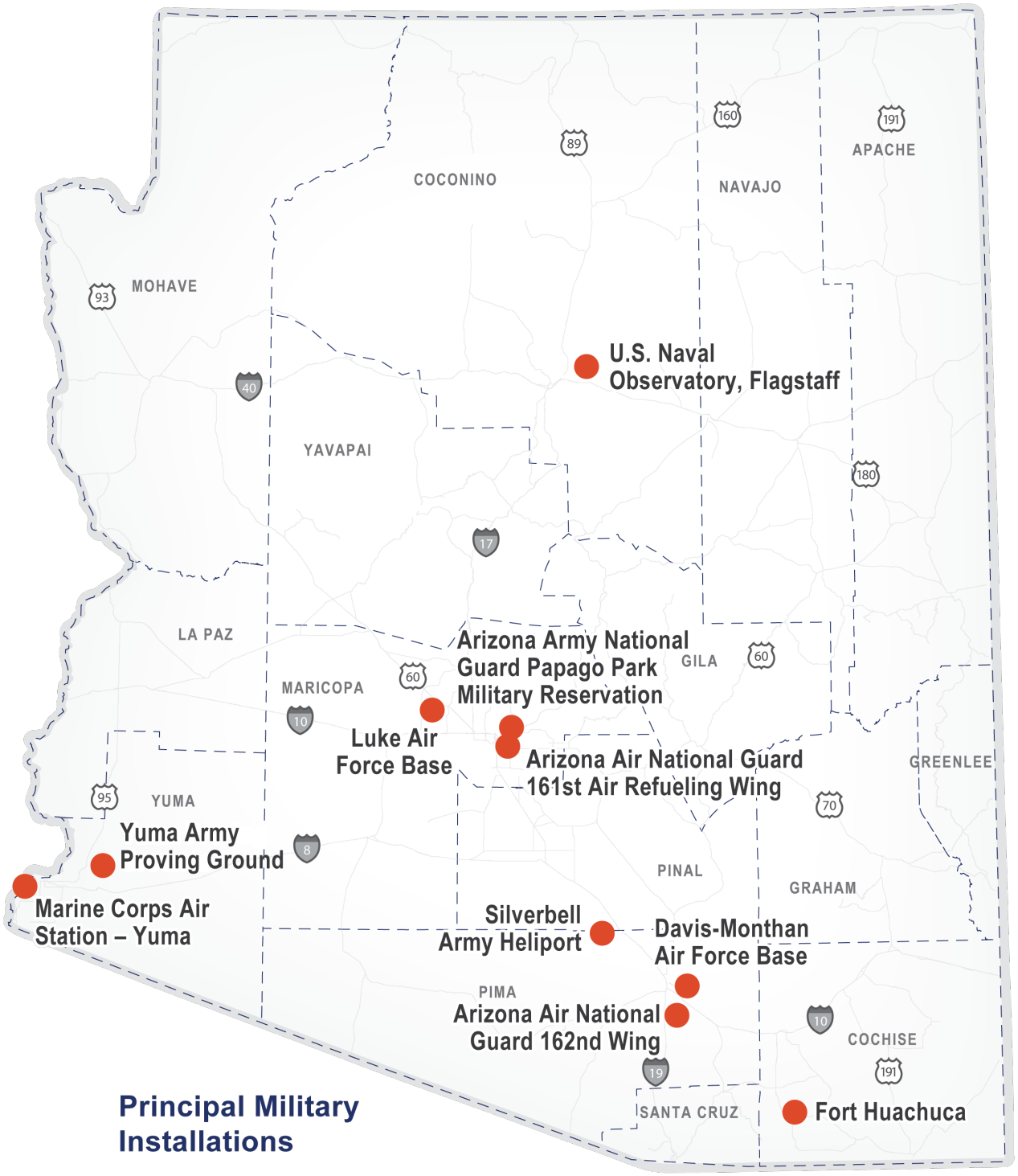
*Note: See **Table E.6** for the detailed aviation education forecast table. Source: IHS Markit 2021*

Military Installations

Military installations are a considerable driver in Arizona's economy. The state is home to several major U.S. military installations and Arizona Air and Army National Guard units that conduct training and operations vital to the country's domestic and overseas defense operations. These facilities employ approximately 21,000 active military personnel in Arizona and thousands of civilians in dozens of communities around the state. The Arizona Military Affairs Commission sought to quantify the total economic impacts of these installations through the *Economic Impact of Arizona's Principal Military Operations 2017* study (or the *2017 Military Study),* published by *The Maguire Company.* [12] The *2017 Military Study* identified 10 principal military facilities shown in **Figure 3.9**, serving specialized purposes for the U.S. Department of Defense or having a direct and distinct impact on the communities in which they reside. These installations include two U.S. Air Force Bases (AFB), one Marine Corps Air Station (MCAS), one Army fort and airfield, one Army proving ground, one Naval Observatory, and four Arizona National Guard installations.

12 Note that all principal military installations incorporated into the 2021 Arizona AEIS from the 2017 *Economic Impact of Arizona's Principal Military Operations* study prepared by The Maguire Company have an aviation-related mission component. The military impacts reported under the military installations component of the Arizona AEIS exclude the 161st and 162nd Arizona Air National Guard units based at PHX and TUS. The economic impacts of these units are incorporated into the economic impacts of their respective airports and are thus excluded here to avoid duplication. The economic impact of military retirees reported in The Maguire Company study was also removed from the analysis, as the associated economic impacts are not sufficiently aviation-related to warrant inclusion in the 2021 Arizona AEIS.

Figure 3.9. Principal Military Installations in Arizona



Note: The economic impacts of military installations exclude the 161st and 162nd units based at PHX and TUS (respectively) to avoid duplication with the impacts presented in the commercial service airport section above. Source: The Maguire Company 2017

Given that military spending and operations are largely determined by the U.S. Congress and are generally disconnected from other economic trends, employment levels were projected to remain constant throughout the forecast period. Additionally, data from the U.S. Bureau of Labor Statistics (BLS) shows that military employment in Arizona has remained constant over the past several decades. Total direct earnings and economic activity were increased at a nominal rate (3.0% CAGR) throughout the forecast horizon. By 2040, total direct earnings are expected to grow to more than $4.3 billion, while output is expected to increase to over $10.9 billion. **Table 3.8** presents the forecasted economic impacts of Arizona's principal military installation between 2019 and 2040.

Table 3.8. Economic Impact Forecasts – Military Installations, 2019 (actual) - 2040

Year	Jobs (number)	Earnings ($)	Economic Activity ($)
2019 (actual)	45,059	$2,324,400,000	$5,875,700,000
2025	45,059	$2,775,455,158	$7,015,893,079
2030	45,059	$3,217,513,209	$8,133,342,954
2035	45,059	$3,729,979,647	$9,428,773,624
2040	45,059	$4,324,068,702	$10,930,532,815
CAGR (2019-2040)	0.0%	3.0%	3.0%

Sources: The Maguire Company 2017, IHS Markit 2021

Aerospace Manufacturing and Research

Arizona is one of the country's premier locations for aerospace manufacturing and technological research, contributing to the advancement of the civil and military aviation and aerospace industries. In total, there are over 1,200 aerospace manufacturing and research companies in Arizona. The largest of these include Raytheon Technologies (12,000 employees), Honeywell Aerospace (10,000 employees), The Boeing Company, Northrop Grumman, and MD Helicopters. Notable facilities in Arizona include MD Helicopter's headquarters at FFZ, Raytheon's Missile and Defense Division headquarters at TUS, The Boeing Company's Apache Helicopter Manufacturing facility adjacent to FFZ in Mesa, and Textron Aviation's Able Aerospace Services manufacturing plant at IWA. These companies rely on a network of more than 500 suppliers and vendors to produce a variety of goods and services.

The 2021 Arizona AEIS identified six categories of manufacturing activity which comprise the aerospace manufacturing industry as a whole. Those six categories of aerospace manufacturing are as follows:

- Aircraft Manufacturing
- Aircraft Engine and Engine Parts Manufacturing
- Other Aircraft Parts and Auxiliary Equipment Manufacturing
- Guided Missile and Space Vehicle Manufacturing
- Guided Missile and Space Vehicle Propulsion Unit and Propulsion Unit Parts Manufacturing
- Other Guided Missile and Space Vehicle Parts and Auxiliary Equipment Manufacturing

Employment growth in all six categories of the aerospace sector is generally projected to be driven by worldwide demand for aerospace products, U.S. aerospace exports, and Arizona's projected economic position within the United States. Each category is forecast separately through the IHS Markit BMI service.

IHS Markit used employment data from its proprietary BMI database to capture the contribution of aerospace manufacturing on Arizona in 2019. BMI is a robust database that provides market-leading forecast views of business employment and output at the state, metropolitan statistical area (MSA), and county levels.

Using advanced modeling techniques and a rich dataset from the U.S. Census Bureau, IHS Markit's teams of economists and business specialists leverage IHS Markit's internationally recognized U.S. macroeconomic, industry, and regional forecasts to generate business activity indicators by county and detailed four-digit NAICS code. Private companies, financial institutions, and government agencies use this one-of-a-kind database to get a deep look at U.S. markets. Aerospace manufacturing employment totals for 2019 at the state and county levels were run through the IMPLAN models to derive the direct, indirect, and induced results.

Using the aggregated forecasts from the aforementioned manufacturing sectors as the base for developing the final forecasts, the economic impacts of aerospace manufacturing and research were developed. The results are presented in **Table 3.9.** Direct employment is projected to decrease from approximately 41,900 in 2019 to roughly 37,000 over the next two decades, due in part to increased automation within the industry. However, the total direct earnings and economic activity generated in this high-productivity sector will grow from $5.6 billion and $37.2 billion in 2019 to $11.4 billion and $76.4 billion in 2040, respectively. This equates to a similar CAGR of 3.5% for both metrics.

Table 3.9. Economic Impact Forecasts – Aerospace Manufacturing and Research, 2019 (actual) - 2040

Year	Jobs (number)	Earnings ($)	Economic Activity ($)
2019 (actual)	41,883	$5,572,259,831	$37,210,058,670
2025	37,351	$6,147,032,519	$40,569,521,469
2030	36,935	$7,409,776,113	$49,845,856,119
2035	37,605	$9,332,162,128	$62,316,799,772
2040	37,436	$11,426,973,816	$76,406,755,437
CAGR (2019-2040)	-0.5%	3.5%	3.5%

*Note: See **Table E.7** for the detailed aerospace manufacturing and research forecast table. Source: IHS Markit 2021*

COMPARISON TO PREVIOUS AEIS

While it is important to project future economic impacts of the six key activities, it is also valuable to compare the findings of the 2021 Arizona AEIS with past AEIS results to illustrate how the economic impacts have grown in recent years. In the following sub sections, the economic impacts of each key aviation activity are compared to the findings of the study *Economic Impact of Aviation in Arizona 2012* (Elliott D. Pollack & Company 2012). Note that detailed methodological information is unavailable for the 2012 AEIS. As such, a detailed comparison between the two study years is not feasible. It is possible that study assumptions, modeling processes, and other differences account for at least a portion of the significant growth witnessed over time. Additionally, the number and classifications of airports have changed over time.

Commercial Service Airports

The economic impacts of commercial service airports in Arizona as calculated in 2012 and 2019 are compared in **Table 3.10**. In 2019, commercial aviation supported 85,000 jobs (47.9% increase over 2012) and $6.2 billion of total direct earnings (61.5% increase over 2012), generating nearly $20.5 billion in economic output for Arizona (70.1% increase over 2012).

Table 3.10. Economic Impacts of Commercial Service Airports in Arizona, 2012 vs. 2019

Year	Jobs (number)	Earnings ($)	Economic Activity ($)
2012	57,641	$3,811,300,000	$12,060,100,000
2019	85,224	$6,155,950,000	$20,515,291,00
Actual Change	+27,583	+$2,344,650,000	+$8,455,191,000
Percent Change	+47.9%	+61.5%	+70.1%

Sources: Elliott D. Pollack & Company 2012, IHS Markit 2021

General Aviation Airports

In 2019, GA airports supported nearly 6,700 jobs and $484.8 million of direct earnings, generating nearly $1.6 billion in economic activity for Arizona. **Table 3.11** presents a comparison of the economic impacts of GA airports in Arizona between 2012 and 2019. Direct economic activity generated by GA airports increased more than 350.9% from the 2012 study. Total direct jobs and earnings supported by GA airports increased by 40.3% and 192.0% over the previous study year, respectively.

Table 3.11. Economic Impacts of General Aviation in Arizona, 2012 vs. 2019

Year	Jobs (number)	Earnings ($)	Economic Activity ($)
2012	4,763	$166,000,000	$353,000,000
2019	6,682	$484,763,000	$1,591,599,000
Actual Change	+1,919	+$318,763,000	+$1,238,599,000
Percent Change	+40.3%	+192.0%	+350.9%

Sources: Elliott D. Pollack & Company 2012, IHS Markit 2021

Tourism

The economic impacts of Arizona tourism are compared between 2012 and 2019 in **Table 3.12.** As shown, the direct economic activity generated by tourism increased by 68.5% from the previous study year. Direct jobs and earnings generated from tourism increased by 79.7% and 102.2% from the 2012 study, respectively.

Table 3.12. Economic Impacts of Tourism in Arizona, 2012 vs. 2019

Year	Jobs (number)	Earnings ($)	Economic Activity ($)
2012	51,341	$1,482,700,000	$4,793,000,000
2019	92,257	$2,998,335,000	$8,073,829,000
Actual Change	+40,916	+$1,515,635,000	+$3,280,829,000
Percent Change	+79.7%	+102.2%	+68.5%

Sources: Elliott D. Pollack & Company 2012, IHS Markit 2021

Aviation-related Education

Table 3.13 compares the economic impacts of aviation education and flight training activities in the state between 2012 and 2019. As shown, aviation education and flight training supported nearly 1,800 jobs and $146.6 million of direct earnings, generating $316.3 million in economic activity in 2019. The direct economic activity generated by aviation education and flight training increased by 264.8% from the previous study year. Total direct jobs and earnings supported increased by 23.3% and 172.4% over the previous study year, respectively.

Table 3.13. Economic Impacts of Aviation-related Education in Arizona, 2012 vs. 2019

Year	Jobs (number)	Earnings ($)	Economic Activity ($)
2012	1,453	$53,800,000	$86,700,000
2019	1,791	$146,562,000	$316,284,000
Actual Change	+338	+$92,762,000	+$229,584,000
Percent Change	+23.3%	+172.4%	+264.8%

Sources: Elliott D. Pollack & Company 2012, IHS Markit 2021

Military Installations

The Arizona Military Affairs Commission sought to quantify the total economic impacts of Arizona's principal military installations through the *2017 Military Study* published by *The Maguire Company.* This study determined the direct economic impacts of military installations. Induced and indirect impacts were determined in a similar fashion as the *2021 Arizona AEIS* study using the IMPLAN model.[13]

Table 3.14 compares the economic impacts of the 10 principal military installations in the state as reported in the 2012 AEIS and the 2021 Arizona AEIS. The 2012 AEIS presented results of the *Economic Impact of Arizona's Principal Military Operations 2008 study (The Maguire Company and ESI),* which calculated impacts using fiscal year (FY) 2005 data. *The 2021 Arizona AEIS* presents the results of the *2017 Military Study,* which utilized financial and tax information from FY 2014. Therefore, the impacts presented in the table represent the impacts generated in fiscal years 2005 and 2014, respectively. As shown, the direct economic activity generated by principal military operations increased by 93.0% from the 2012 results.14 The number of jobs and earnings supported by the military in Arizona increased by 3.1% and 31.9% between the studies, respectively.

Table 3.14. Economic Impacts of Principal Military Installations, 2008 vs. 2017

Year (baseline year)*	Jobs (number)	Earnings ($)	Economic Activity ($)
2008 (FY 2005)	43,716	$1,762,700,000	$3,044,500,000
2017 (FY 2014)	45,059	$2,324,400,000	$5,875,700,000
Actual Change	+1,343	+$561,700,000	+$2,831,200,000
Percent Change	+3.1%	+31.9%	+93.0%

**Notes: The economic impacts reported in the 2012 and 2019 Arizona AEISs incorporated the results of the 2008 and 2017 Military Studies, which respectively reflected FY 2005 and FY 2014 baseline study years. (The Maguire Company and ESI). Sources: Elliott D. Pollack & Company 2012, The Maguire Company 2017, IHS Markit 2021*

Aerospace Manufacturing and Research

Table 3.15 presents a comparison of the economic impacts generated by aerospace manufacturing and research in 2012 and 2019. Aerospace manufacturing and research generated $37.2 billion in direct economic activity in 2019, representing a 227.4% increase from the findings of the 2012 study. Aerospace manufacturing and research supported nearly 42,000 direct jobs and $5.6 billion of direct earnings in 2019, a 58.4% and 52.9% increase from the prior study year in the respective metrics.

Table 3.15. Economic Impacts of Aerospace Manufacturing and Research, 2012 vs. 2019

Year	Jobs (number)	Earnings ($)	Economic Activity ($)
2012	26,433	$3,643,600,000	$11,364,000,000
2019	41,883	$5,572,260,000	$37,210,059,000
Actual Change	+15,450	+$1,928,660,000	+$25,846,059,000
Percent Change	+58.4%	+52.9%	+227.4%

Sources: Elliott D. Pollack & Company 2012, IHS Markit 2021

13 See **Appendix C. 2021 Arizona AEIS Methodology** for a detailed description of study methodology including the IMPLAN model.

14 Due to the limited information provided from the military studies, additional context cannot be provided to explain the significant percent growth in economic activity (output) for the comparison of 2008 and 2017 military-related activities.

Impacts to the State Aviation Fund

In addition to forecasting the future economic impacts of key aviation activities, the 2021 Arizona AEIS also forecasted the future balance of the State Aviation Fund. This section first provides an overview of the State Aviation Fund and historic activity in terms of revenue accounts and expenditures. This baseline information is then grown according to forecasted future activity which is based on many of the same socioeconomic and aviation-specific drivers discussed in the key aviation activities section above. This analysis allows the ADOT Aeronautics Group to better understand its ability to fund investment into airports to preserve and enhance the system.

OVERVIEW OF THE STATE AVIATION FUND

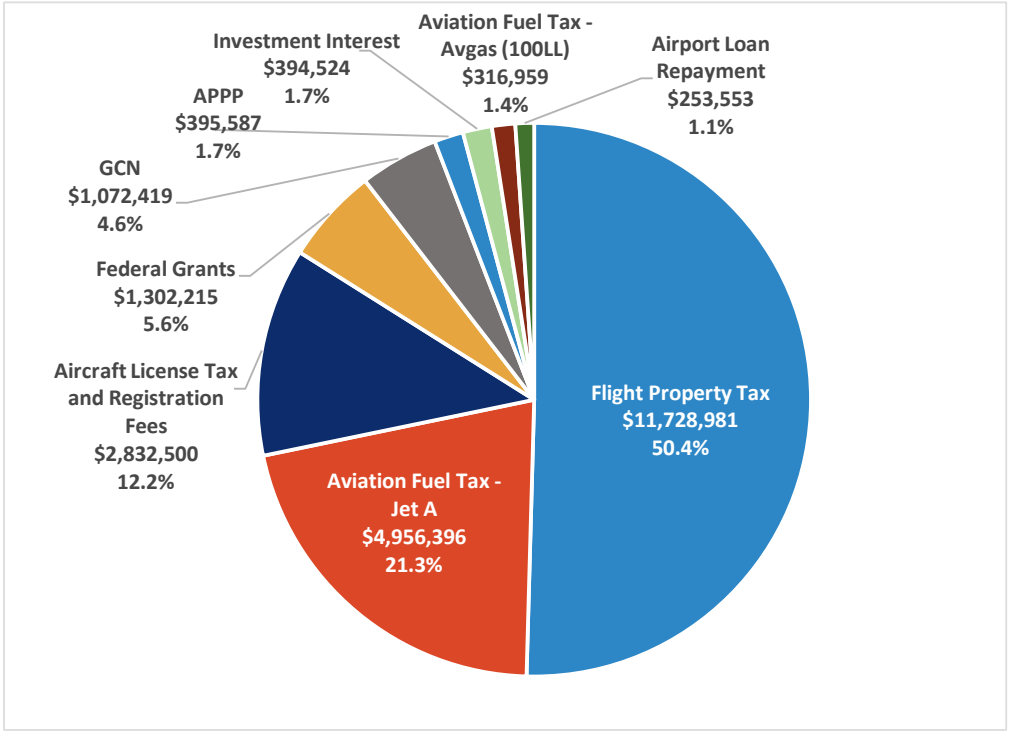
The Arizona State Aviation Fund is the primary state mechanism to support airport development in Arizona. The State Aviation Fund is established in the Arizona Revised Statutes (A.R.S.) 28-8202, and revenues are derived from various sources:

- **Flight property tax:** Tax on the full cash value of flight property operated by airline companies in Arizona (A.R.S. 42-14255).
- **Aircraft license tax and registration fees:** Tax levied on all aircraft customarily maintained and registered in the State of Arizona except regularly scheduled aircraft operated by an airline company for hire or other types of aircraft specifically excluded. The tax is levied at a rate of 0.5% of the average fair market value of the aircraft based on the make, model, and year. The minimum tax is $20 per year (A.R.S. 28-8335).
- **Airport loan repayments:** Airport loan payments associated with the Airport Loan Program.
- **Investment interest:** Monies earned through the investment of the State Aviation Fund (A.R.S. 35-313).
- **Grand Canyon National Park Airport (GCN) revenues:** GCN is owned by ADOT and revenues are deposited in the State Aviation Fund (A.R.S. 8204). Revenues from GCN may include but are not limited to:
  - Landing and takeoff fees for commercial aircraft
  - Aircraft tiedown fees
  - Terminal and land space rental fees
  - Fuel flowage fees
  - Commercial-use ramp fees
  - Security and commercial ground transportation fees
- **Aviation fuel tax:** Tax is levied on both Jet A fuel used by jet aircraft and Avgas (100LL) used in piston engines. The jet fuel excise and jet fuel use taxes are levied at a rate of $0.0350 per gallon on the first 10 million gallons of fuel (A.R.S. 42-5352). All jet fuel purchased in excess of 10 million gallons is exempt from further taxation. Avgas is subject to a state excise tax of $0.05 per gallon (A.R.S. 28-8344).

- **Airport Pavement Preservation Program (APPP):** ADOT Aeronautics administers an Airport Pavement Management System (APMS) to evaluate airport pavement conditions statewide. These data are used to prioritize state investment into pavement maintenance projects to support the preservation of Arizona's airport infrastructure. Revenues associated with the APPP into the State Aviation Fund represent the local airport sponsor match to pavement maintenance projects conducted under the program.
- **Federal grants:** ADOT Aeronautics receives federal funds to support statewide programs including but not limited to the Arizona State Aviation System Plan (SASP), which was most recently updated in 2018.
- Sale of seized or abandoned aircraft pursuant to A.R.S. 28-8331.

Figure 3.10 presents the contribution of revenues into the State Aviation Fund for FY 2019, which had a total balance of $23.2 million. The flight property tax contributed half of the State Aviation Fund's revenues in FY 2019 (50.4%) for a total of $11.7 million. This tax is paid on aircraft and associated equipment that is owned, leased, loaned, or otherwise made available by or to commercial airline companies that engage in air commerce in Arizona. Various taxes levied on aviation fuel (i.e., Jet A and Avgas [100LL] combined) supported nearly one quarter of the State Aviation Fund (22.7%) at $5.3 million. The aircraft license tax and registration fees generated 12.2% of the State Aviation Fund at $2.8 million.

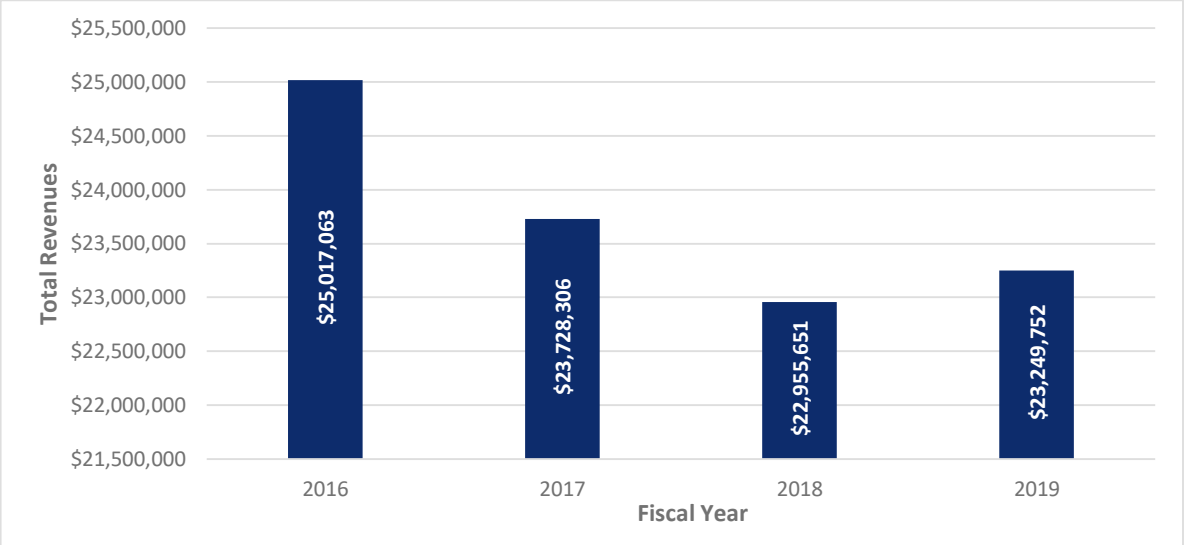
Figure 3.10. Receipts into the State Aviation Fund by Source, FY 2019



Note: This graphic does not depict a negative amount of $37,712 attributable to payment/credit card processing fees (accounts 4645 and 4647); however, the negative amount is reflected in the total figure cited in the text above ($23.2 million). The pie chart also excludes prior year reimbursements from GCN (account 4823), miscellaneous receipts (account 4699), and current year reimbursements (account 4823). In total, these excluded accounts totaled less than 1% of the State Aviation Fund. Exclusions also off-set the negative balance generated by the payment/credit card processing fees noted previously. Source: ADOT FMS 2020

These revenues can vary year-to-year due to external conditions affecting aviation in Arizona, such as the number of business and leisure travelers who visit the state via air, as well as internal policy changes that affect contributions into the State Aviation Fund. **Figure 3.11** depicts the receipts into the State Aviation Fund by source between FY 2016 and FY 2019, during which time it remained fairly consistent with total revenues averaging $23.7 million.

Figure 3.11. Total State Aviation Fund Revenues, FY 2016 - FY 2019



Source: ADOT FMS 2020

Table 3.16 depicts all revenues sources into the State Aviation Fund between FY 2016 and FY 2019.

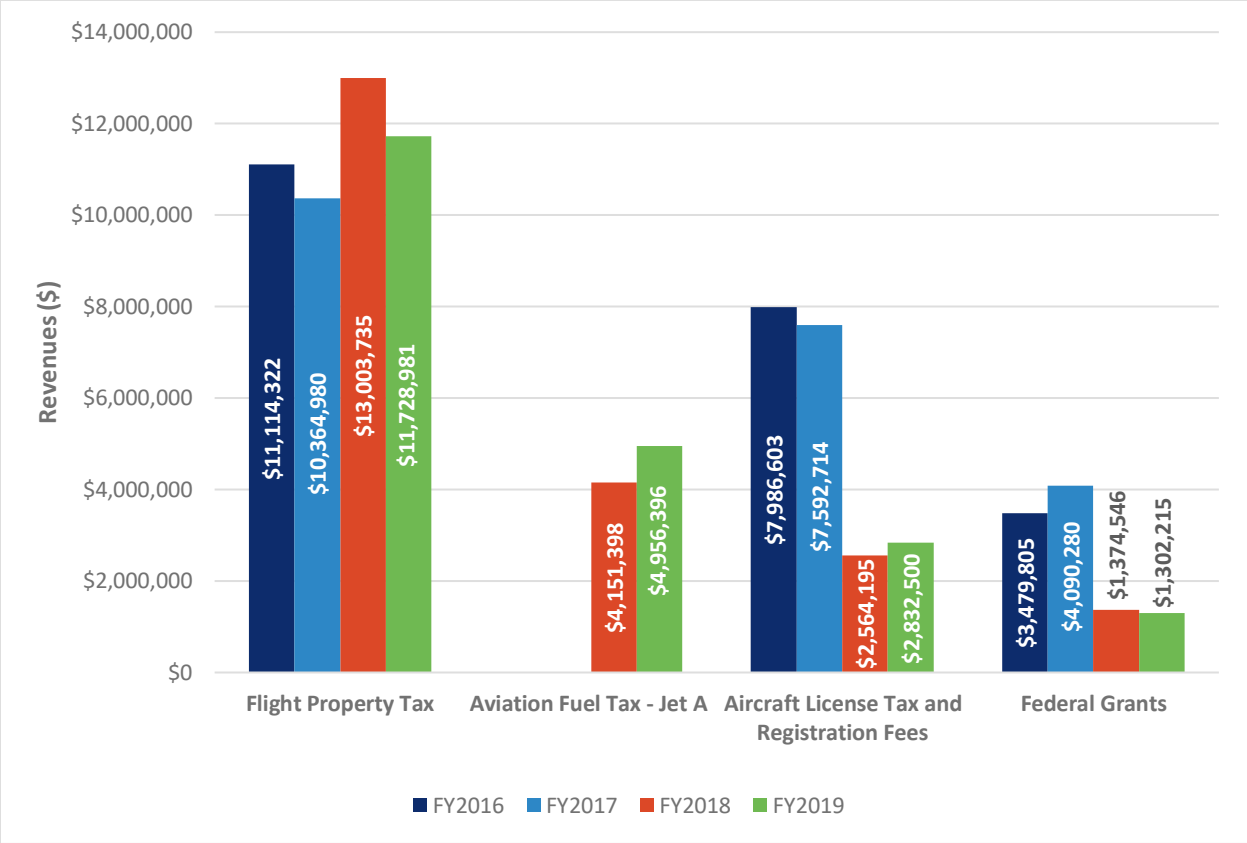
Table 3.16. Revenues into the State Aviation Fund, FY 2016 - FY 2019

Category	FY 2016	FY 2017	FY 2018	FY 2019
Flight Property Tax	$11,114,322	$10,364,980	$13,003,735	$11,728,981
Aviation Fuel Tax - Jet A	-	-	$4,151,398	$4,956,396
Aircraft License Tax and Registration Fees	$7,986,603	$7,592,714	$2,564,195	$2,832,500
Federal Grants	$3,479,805	$4,090,280	$1,374,546	$1,302,215
GCN	$1,239,521	$1,202,070	$1,277,215	$1,072,419
APPP	$351,883	-$386,881	-$28,408	$395,587
Investment Interest	$94,253	$39,593	$100,751	$394,524
Aviation Fuel Tax - Avgas (100LL)	$325,479	$306,780	$341,400	$316,959
Airport Loan Repayment	$333,405	$334,883	$190,165	$253,553
Reimbursements - GCN	$53,789	$14,248	$353	$34,261
Reimbursements	$146	$134	-$134	$68
Misc - GCN	-	-$2,313	-$1,984	-$1,796
Misc	$37,856	$171,819	-$17,579	-$35,916
Total	**$25,017,063**	**$23,728,306**	**$22,955,651**	**$23,249,752**

Source: ADOT FMS 2020

Figure 3.12 depicts the four largest sources of revenue into the State Aviation Fund (based on FY 2019). While the total Fund remained relatively flat, individual accounts showed some year-over-year volatility during the study years. As some accounts peaked, declines in others off-set any relative gains. Aircraft License Tax and Registration Fees collected an average of $7.8 million in FY 2016 and FY 2017, before falling sharply in the following two fiscal years to average $2.7 million. Conversely, Aviation Fuel Tax – Jet A revenues were added into the State Aviation Fund in FY 2018, which resulted in an immediate increase of $4.6 million (FY 2018/FY 2019 average). These shifts came about due to two concurrent changes found in Senate Bill (S.B.) 1531, effective May 12, 2017. S.B. 1531 reallocated the distribution of Aircraft License Tax revenues so that 50.0% is deposited into the State General Fund, 35.0% goes into the State Aviation Fund, and the remaining 15.0% is allocated to counties and incorporated cities and towns. While this change decreased the allocation of the Aircraft License Tax into the State Aviation Fund (which had previously been set at 100.0%), S.B. 1531 also amended the A.R.S. to distribute 100.0% of the Jet Fuel Excise and Use Taxes into the State Aviation Fund. As a result, these amendments significantly changed the composition of the State Aviation Fund but were approximately revenue-neutral for the State Aviation Fund as a whole.

Figure 3.12. Four Highest Receipts into the State Aviation Fund, FY 2016 - FY 2019



Note: The Aviation Fuel Tax – Jet A was added to the funding in FY2018; as such, no revenues are reported for the previous two study years. Source: ADOT FMS 2020

DISTRIBUTION OF FUNDING

Annual expenditures from the State Aviation Fund are used to support the maintenance and enhancement of eligible airports across the state, as well as to fund special studies conducted by the ADOT Aeronautics Group. The State Transportation Board (STB) is responsible for establishing the programs and associated guidelines for the equitable, efficient, and effective distribution of funds. STB policies are then implemented by the ADOT Aeronautics Group.

The ADOT Aeronautics Group administers funding allocations through the Five-year Development Program (Program). The Program is generally comprised of three funding mechanisms to support airport-specific development and one mechanism to support statewide studies. The current ADOT Airport Development Guidelines (October 2011) also reference the Airport Loan Program to support revenue-producing projects at airports. However, this program is currently suspended. The funding mechanisms administered by the Program are summarized in **Table 3.17.**

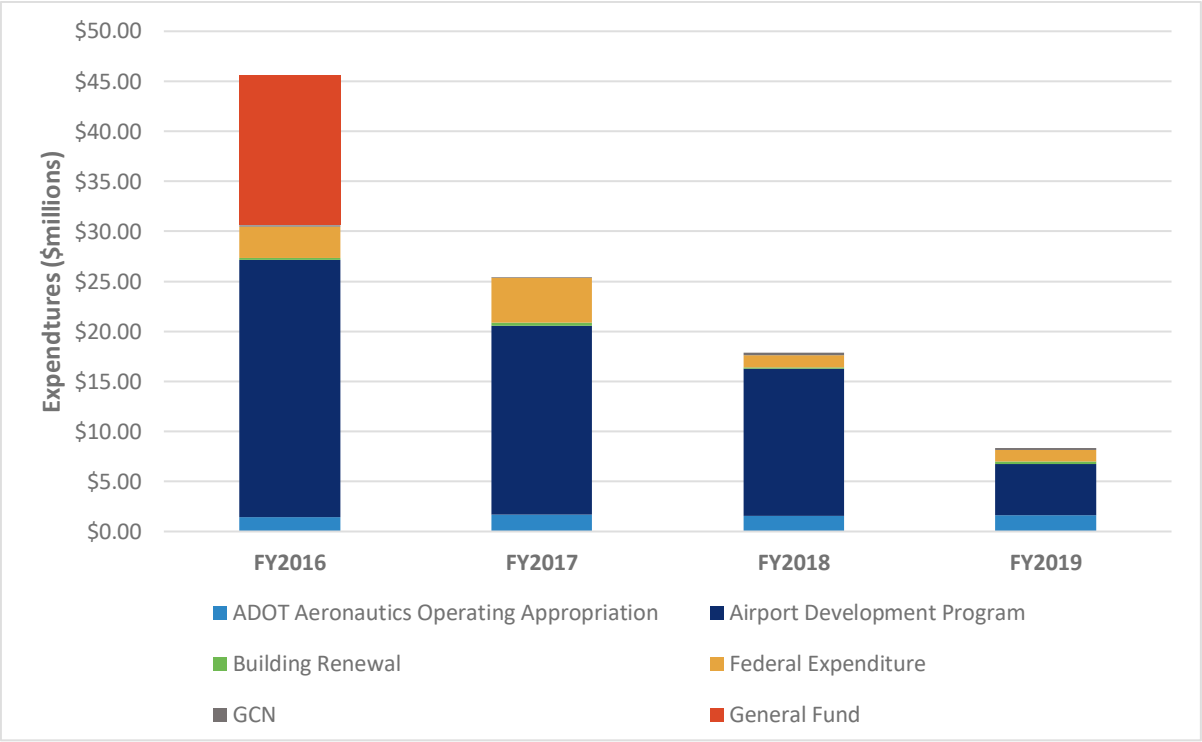
Table 3.17. Summary of the Five-year Airport Development Program

Funding Mechanism	Summary	Eligibility	Prioritization
Federal/ State/ Local (FSL) Airport Development Grants	Provides a one-half share of an airport sponsor's match of an FAA Airport Improvement Program (AIP) grant.	Recipient of an FAA AIP grant	ADOT Aeronautics matches all request FSL Development grants
State/Local (SL) Airport Development Grants	Provides a 90% to 95% match for eligible projects. Projects are prioritized based on project category, type of project, and measure of aviation activity.	Compliant with criteria provided in the Airport Development Guidelines Publicly owned, public-use airports (including those airports owned by a Tribal entity)	Projects selected based on priority rating model outlined in the ADOT Airport Development Guidelines Priority rating model considers project component (i.e., type) and airport state classification
APPP	Provides maintenance improvements to extend the useful life of airfield pavement.	Project identified by ADOT based on a prioritized need Airport required to conduct a certified annual maintenance program post-construction	Funding prioritized based on actual pavement conditions and needs, with pavement inspections occurring triennially
State System Planning and Services	Supports state and regional planning efforts to ensure safe and orderly airport development in Arizona.	Projects requested by ADOT Aeronautics Group and approved by the STB based on current and projected conditions in the state	Not applicable (N/A) – Studies and other projects conducted as required
Airport Loan*	Provide interest-bearing loans for airport development projects designed to generate direct revenue to the airport.	Airport identified in the ADOT SASP dated November 2009 Owned by the public agency making the loan application Open to the public	N/A, Program currently suspended

**Note: The airport loan program is suspended at the time of this writing in mid-2021. Source: ADOT Airport Development Guidelines (October 2011)*

Funds are distributed through the Five-year Airport Capital Improvement Program (ACIP) developed by the Aeronautics Group and annually approved by the STB. The specific amounts awarded through each program varies from year-to-year based on current and projected State Aviation Fund balances and current and projected liabilities. **Figure 3.13** summarizes expenditures by type from FY 2016 through FY 2019. Over time, expenditures have eroded with an 81.7% decline witnessed between the beginning and ending of the study period. In FY 2016, $15.0 million of the State Aviation Fund was transferred to the State General Fund in accordance with S.B. 1469 (Chapter 8 – 2015, 52nd Legislature, First Regular Session). Due to this transfer and other expenditures, the State Aviation Fund ended FY 2016 with a balance of $6.0 million. The balance further declined to $4.4 million in FY 2017, then increased to $9.4 million in FY 2018. The balance of the State Aviation Fund continued to grow to reach a balance of $24.4 million in FY 2019. This reflects a year-over-year growth rate of 158.1% between FY 2018 and FY 2019.

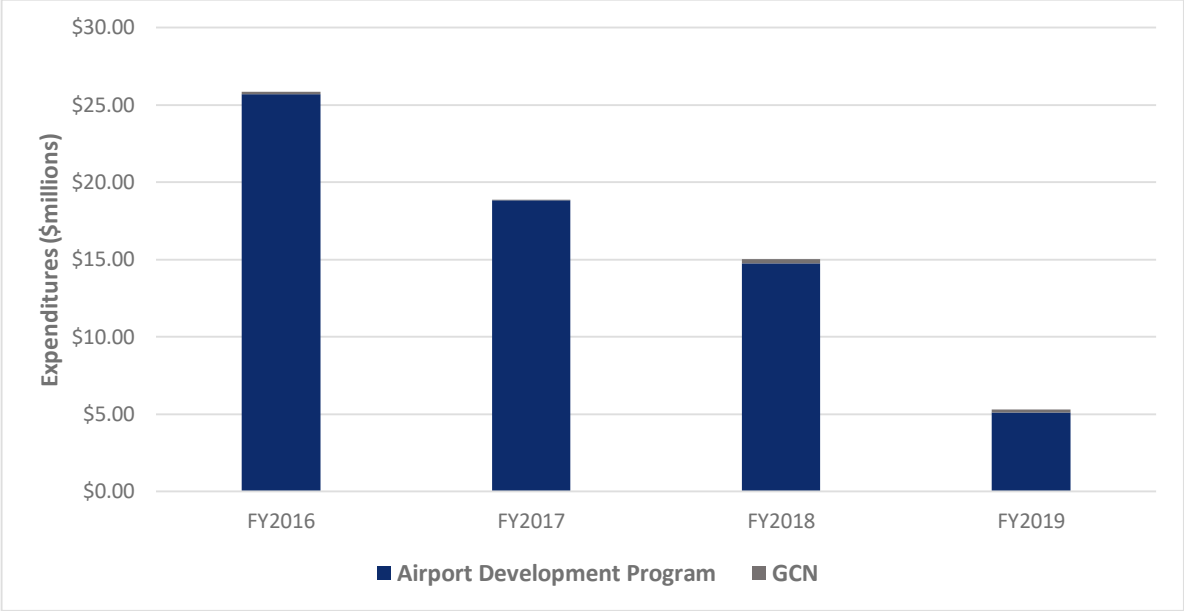
Figure 3.13. State Aviation Fund Expenditures, FY 2016 - FY 2019



Source: ADOT FMS 2020

ADOT's Five-year ACIP is annually adjusted based on what the State Aviation Fund can financially support. **Figure 3.14** looks more granularly at expenditures to support the Airport Development Program and GCN, which are the primary mechanisms for state support to airports. These expenditures reflect the trend depicted in the figure above, with state support to airports declining over time. A similar trend was witnessed by most other expenditure categories during this study period. During FY 2019, ADOT Aeronautics temporarily suspended State/Local Development Grants to prioritize providing the required state match to projects supported by the federal AIP and pavement maintenance projects via the APPP. State/Local Development Grants were reinstated in FY 2020, with support for airport projects anticipated to substantially grow in the coming years.[18]

Figure 3.14. Airport Development Program and GCN Annual Expenditures, FY 2016 - FY 2019



Source: ADOT FMS 2020

IMPACT OF HISTORICAL STATE AVIATION FUND SWEEPS

Primarily intended to fund on-going maintenance and capital improvement programs for Arizona's aviation assets, the State Aviation Fund is funded by various fees levied on aviation-related user groups, including commercial airlines and their passengers, and aircraft owners and operators. Since at least FY 1998, the Arizona State Legislature has diverted or reallocated over $100.0 million from the State Aviation Fund to cover non-aviation-related expenditures. Notably:

- Between FYs 1998 and 2002: Over $41.5 million in Flight Property Taxes were diverted from the State Aviation Fund to pay for Y2K compliance
- FY2003: Approximately $6.0 million was reallocated to settle a lawsuit ($1.5 million) and to cover a state budget shortfall ($4.5 million)
- FY 2008: $18.1 million was diverted to cover a state budget shortfall
- FY 2009: Nearly $22.5 million was swept into the General Fund to cover a state budget shortfall resulting from the 2007 – 2009 economic downturn
- FY 2010: Almost $8.0 million was swept to cover a state budget shortfall ($3.4 million) and reallocated from the State Aviation Fund to offset a sweep of the Equipment Fund ($4.4 million)
- FY 2011: Close to $3.9 million was diverted to cover a state budget shortfall
- FY 2016: $15.0 million was diverted to cover the General Fund

Diverting or reallocating State Aviation Fund monies away from aeronautical-related purposes effectively shifts dollars generated by direct aviation users to non-aeronautical purposes. The reduction in available aviation development funding has had significant impacts on the ADOT Aeronautics' Group's ability to support maintenance and capital improvement needs.

The most recent sweep in FY 2016, depicted in **Figure 3.13**, led to the ADOT Aeronautics' Group's cancelation of grants that had already been issued to airports and to the temporary suspension of State/Local Grants and the Airport Pavement Preservation Program (APPP) (note both programs have been reinstated at the time of this writing in October 2021). Grant caps to airports have also been reduced.

As the 2021 Arizona AEIS has demonstrated, aviation in Arizona generates immense economic benefits for the state. In addition, funding airport projects generates successive waves of indirect and induced impacts that cycle throughout the Arizona economy. In total, on-airport activities alone, including construction projects, generated $41.0 billion in total economic activity (output) in 2019. This, in turn, supported an additional $18.4 billion of economic activity generated by visitor spending, as aircraft cannot efficiently or sometimes even safely fly unless airports are maintained and expanded as demand grows.

Further, when maintenance needs are deferred – such as what occurred during the temporary suspension of the APPP and State/Local Grant Program – maintenance projects can become far more costly and time-intensive to complete. The economic impacts generated by airports far exceed state investment into the system. This demonstrates that investment in airports via the State Aviation Fund is fundamental to ensure Arizona airports remain safe; advanced; and responsive to residents, visitors, and other users. Continued investment into airports is an investment in Arizona's future.

STATE AVIATION FUND FORECAST

In addition to reviewing historic activity associated with the State Aviation Fund, the 2021 Arizona AEIS provides forecasted revenues into the State Aviation Fund to support ADOT Aeronautics' long-term resource allocation and planning decisions. Over the next 20 years, demands on Arizona's commercial service and GA airports are anticipated to grow. According to the analyses of the 2021 Arizona AEIS, enplanements in Arizona are projected to increase from 26.0 million in 2019 to 38.5 million by 2040 – an increase of 48% over the next two decades. Additionally, GA airports will likely experience growth in key activities such as flight training and corporate/business aviation, as well as emergency services including medical flights as the state continues to gain residents, visitors, and businesses. Arizona airports will require increased state investment to support the preservation of existing infrastructure and capacity enhancements to support additional aircraft and the pilots and passengers they serve. To provide insight into ADOT Aeronautics' ability to meet increasing investment needs over the next 20 years, the 2021 Arizona AEIS provides forecasts of each of the accounts into the State Aviation Fund. The methodology is described below, followed by a presentation of the forecast results.

Methodology

Growth trends for each revenue stream that feeds into the State Aviation Fund were reviewed and evaluated. To forecast Arizona's State Aviation Fund revenue, the starting point from which to forecast each account (i.e., baseline year) was established. While the forecasts of the six key aviation activities presented earlier in this chapter used a consistent 2019 baseline year, each revenue account into the State Aviation Fund was considered individually to ensure the "baseline" represented an appropriate and reasonable historical value from which to launch the forecast.

In most cases, 2019 revenues appeared to represent the historical average and could therefore be reasonably used as a starting point for projected growth. For these funding sources, the applied projected growth will match the specified appropriate forecast driver for all periods. However, some revenue streams varied significantly from year-to-year. In these instances, using a 2019 baseline to apply average annual growth rates of the specified appropriate forecast driver for the first six-year period (2019 to 2025) would not result in representative near-term revenue expectations. In such cases, the following methodology was applied:

- Calculated average revenues of the previous four years (2016 to 2019) and used as the "2019 baseline replacement"
- Applied near-term growth expectation to the 2019 baseline replacement to obtain the 2025 forecasted value
- Recalculated the average annual growth rate from the actual 2019 baseline to the 2025 expectation to obtain the actual growth rate over the first period of the forecast (2019 to 2025)

As a result of the above-specified methodology, the variation between the actual 2019 baseline to 2025 growth rates across funding sources, as well as the variation between this first 6-year period and the longer-term growth rates, is influenced by the baseline figure used to initiate the funding levels, and, in these cases, will not reflect the exact same near-term annual growth rate as the forecast driver for that particular funding source.

Forecast Drivers

As described in more detail above, Arizona's state investment into airports is largely provided by fuel taxes and user fees. For example, the Flight Property Tax is paid by airlines involved in commercial activities; Jet A fuel taxes are paid by owners and operators of turbine-powered jets; Avgas fuel taxes are paid by the owners and operators of piston-powered GA aircraft commonly used for flight training and recreational purposes. Federal money awarded via the FAA AIP originates from the Airport and Airway Trust Fund, which is similarly supported by user fees, fuel taxes, and other revenue sources. To project future growth, it becomes necessary to consider not only who is paying aviation-related taxes and fees into the State Aviation Fund but also the purpose of those flying. While the Flight Property Tax is directly paid by airlines, costs are passed to consumers who are flying for leisure or business or transporting goods via air cargo. Looking at future projections of user trends (e.g., tourism and business activity) provides insight into how taxes and fees into the State Aviation Fund will change over time.

Founded on this overall approach, eight growth patterns driving revenues into the State Aviation Fund were identified. Additionally, eight accounts were excluded from the forecast as described in the subsection below. Each of the growth patterns affecting revenue accounts into the State Aviation Fund are presented in **Table 3.18** (listed alphabetically) with projected CAGRs through 2040. Annual growth rates are anticipated to vary throughout the forecast horizon, in part due to COVID-related recovery scenarios in the near-term. Notably, the study assumes that enplanements and out-of-state visitor (i.e., tourism) rates will return to pre-COVID levels by 2022.

Table 3.18. Revenue Driver CAGRs for State Aviation Fund Forecasts

Drivers for State Aviation Fund Forecasts	Forecast End Year			
	2025	2030	2035	2040
Balance of State Aviation Fund	1.8%	2.4%	2.1%	1.9%
Enplanements[1]	1.4%	2.5%	1.9%	1.8%
Enplanements[1] and Inflation	4.2%	4.1%	3.8%	3.0%
Flat Growth	0.0%	0.0%	0.0%	0.0%
GA Activity	1.7%	1.5%	1.5%	1.5%
Inflation	2.2%	2.2%	2.3%	2.4%
Leisure & Hospitality[2]	1.3%	1.3%	1.3%	1.3%
Tourism Growth[1]	1.0%	2.1%	2.1%	2.1%

Notes: (1) Assumed return to 2019 levels in 2022. Applied original 2019-2025 CAGR to remaining 3 years. Used resulting figure to recalculate first period CAGR. (2) Function of long-term Leisure and Hospitality employment growth. Source: IHS Markit 2021

Each account in the State Aviation Fund was then matched with the appropriate growth pattern to project future activity through 2040. The growth patterns by category are described in the following sections, with the associated accounts summarized in **Table 3.19.**

Table 3.19. Projected State Aviation Fund Growth Patterns by Category and Revenue Account

Categorization / Revenue Account	Growth Pattern
Flight Property Tax	
4182 Flight Property Tax	Enplanements
Aviation Fuel Tax - Jet A	
4111 Transaction Privilege Tax	Enplanements, Inflation
Aircraft License Tax and Registration Fees	
4174 In Lieu Taxes - SRP	Excluded
4176 In Lieu Taxes - Other	GA Activity
4183 Aircraft Taxes	GA Activity
4419 Other Licenses	Excluded
Federal Grants	
4211 Federal Grants - Operating	Flat Growth
4213 Aviation Federal Grants - Capital	Flat Growth
GCN	
4321 Parking	Tourism Growth
4323 Concessions	Tourism Growth
4326 Commercial Space	Leisure & Hospitality
4339 Other Fees & Charges for Services	Tourism Growth
4632 Rental Income	Tourism Growth
APPP	
4236 City Grants - Other	Flat Growth
4236 State & Local Government - Other	Excluded
Investment Interest	
4631 Treasurers Interest	Balance of State Aviation Fund
Aviation Fuel Tax - Avgas (100LL)	
4165 Motor Vehicle Fuel Tax	GA Activity
Airport Loan Repayment	
4635 Loan and Other Interest Income	Flat Growth
4699 Aviation Loan Principal Repayment	Flat Growth
4699 Help Loan Principal Repayment	Excluded
Miscellaneous	
4314 Filing Fees	Excluded
4372 Printouts & Decals	Excluded
4381 Sale of Capital Assets	Inflation
4519 Other Fines, Forfeitures & Penalties	Excluded

Categorization / Revenue Account	Growth Pattern
4699 Miscellaneous Receipts	Flat Growth
Miscellaneous - GCN	
4645 Payment Card Transaction Fees Paid	Tourism Growth
4647 Credit Card Processing Fees Paid	Excluded
Reimbursements	
4823 Current Year Reimbursements (Refunds)	Flat Growth
Reimbursements - GCN	
4821 Prior Year Reimbursements (Refunds)	Flat Growth

Source: IHS Markit 2021

Balance of the State Aviation Fund

In the case of the Treasurer's Interest revenue stream, the growth rate is determined by the balance of the State Aviation Fund. As such, the forecasted sum of the State Aviation Fund minus Treasurer's Interest over the forecast period was computed. The resulting calculated growth rate was then applied to forecast Treasurer's Interest.

- 4631 Treasurer's Interest

Enplanements

The 2021 Arizona AEIS constructed a commercial aviation enplanement forecast based on an analysis of historical enplanements in the context of economic activities, including jobs and economic activity (output), in Arizona.[15] As described in the commercial service airports subsection above, enplanements were forecasted as a function of employment in three relevant industry sectors: Professional & Business Services, Transportation & Warehousing, and Leisure & Hospitality. These sectors play the dominant role in determining air travel demand. This forecasting approach differs from the *FAA Aerospace Forecast,* which is a function of national PCE and oil prices. The following account is driven by IHS Markit's commercial aviation enplanements forecast:

- 4182 Flight Property Tax

Enplanements and Inflation

A combination of commercial enplanements and inflationary factors were applied to forecast the Transaction Privilege Tax. The same commercial enplanements forecast described above was modified by inflation (CPI) to generate a distinct growth factor for the following revenue stream:

- 4111 Transaction Privilege Tax[16]

Flat Growth

Eight of the revenue streams in the Arizona State Aviation Fund did not demonstrate relationships with other observable trends. These revenue streams are typically subject to political decisions and have been

15 2019 baseline enplanement data obtained from the FAA's ACAIS. As noted previously, statewide enplanement data obtained from the FAA encompassed scheduled and unscheduled passenger service at Primary and Nonprimary commercial service airports, as well as air taxi/charters at GA airports.

16 This gross receipts tax is levied by the State of Arizona on certain persons for the privilege of conducting business in the state, and is imposed on the seller rather than the buyer.

historically volatile. Due to the unpredictable nature of these revenues streams, a 0.0% (flat) growth trend was applied to hold revenues constant over the forecast horizon. While these revenue streams are expected to be available in the future, there is no reliable way to forecast any changes to the revenue levels over time:

- 4211 Federal Grants – Operating
- 4213 Aviation Federal Grants – Capital[17]
- 4236 City Grants – Other[18]
- 4635 Loan and Other Interest Income[19]
- 4699 Aviation Loan Principal Repayment
- 4699 Miscellaneous Receipts
- 4821 Prior Year Reimbursements (Refunds)
- 4823 Current Year Reimbursements (Refunds)

GA Activity

The FAA also forecasts GA activity for the United States. This study adjusted the *FAA Aerospace Forecast 2020-2040* of GA flight hours upwards based on the population growth differential between the United States and Arizona to estimate an Arizona-specific GA growth rate. This forecast methodology was used to drive the following account forecasts:

- 4165 Motor Vehicle Fuel Tax
- 4183 Aircraft Taxes
- 4176 In Lieu Taxes - Other

Inflation

One revenue stream follows Arizona-specific inflationary trends. Inflation estimates (specifically, the CPI for Arizona) as discussed in the macroeconomic trends section (see page 2) were applied to the forecast growth in the following revenue stream:

- 4381 Sale of Capital Assets

Tourism Growth

Revenue streams associated with Grand Canyon National Park Airport (GCN), which is owned and managed by the State of Arizona, are closely tied to tourism activity within the state. To forecast revenue streams related to tourism growth at GCN, Grand Canyon National Park visitor growth forecasts were combined with inflation measures (CPI). The resulting growth rate was then applied to a 2019 baseline replacement (four-year average from 2016 to 2019 of historic revenues) described above. This forecast methodology was used to drive revenues into the following accounts:

- 4321 Parking
- 4323 Concessions
- 4339 Other Fees & Charges for Services

17 This account is a function of GCN projects and State FAA funded projects. Federal reimbursement is based on capital expenditure projections.

18 This account is a function of APPP project expenditures.

19 Item driven by set repayment schedule for items 4635 Loan and Other Interest Income and 4699 Aviation Loan Principal Repayment up to 2034. While each account individually changes over time, their sum remains constant over the forecast horizon as the balance of payments shift from interests to principal.

- 4632 Rental Income
- 4645 Payment Card Transaction Fees Paid

Leisure & Hospitality Sector Growth

One of the designated GCN accounts, 4326 Commercial Space, does not follow the same forecast path as the other GCN accounts. Revenues into this account are primarily a function of the Leisure & Hospitality sector as opposed to overall tourism within the State. As such, forecast rates as reported in the macroeconomic trends section (see page 2) were applied to project the growth in the following account:

- 4326 Commercial Space

Excluded Revenue Streams

Eight accounts demonstrated little to no forecastable activity through the 2016 through 2019 historical period and were therefore excluded from the forecast. Those accounts are as follows:

- 4174 In Lieu Taxes - SRP
- 4236 State & Local Government - Other
- 4314 Filing Fees
- 4372 Printouts & Decals
- 4419 Other Licenses
- 4519 Other Fines, Forfeitures, & Penalties
- 4647 Credit Card Processing Fees Paid
- 4699 Help Loan Principal Repayment

PROJECTED FUTURE REVENUE

Based on the drivers presented above, revenues into the State Aviation Fund are anticipated to grow by just over 50% by 2040, from $23.2 million in 2019 to $35.1 million by the end of the forecast horizon. This represents an annual growth rate of 2.0%. **Table 3.20** summarizes the forecasted balance of the State Aviation Fund through 2040, with full details by account provided in **Table 3.21**. **Table 3.21** illustrates the total State Aviation Fund balance by revenues streams for each forecast period.

Table 3.20. State Aviation Fund Forecast Summary, 2019 (actual) - 2040

Year	Revenue ($)
2019 (actual)	$23,249,752
2025	$25,583,152
2030	$28,826,362
2035	$31,981,127
2040	$35,145,142
CAGR (2019-2040)	2.0%

Sources: ADOT FMS 2020, IHS Markit 2021

Table 3.21. State Aviation Fund Forecast, 2019 (actual) - 2040 (projected)

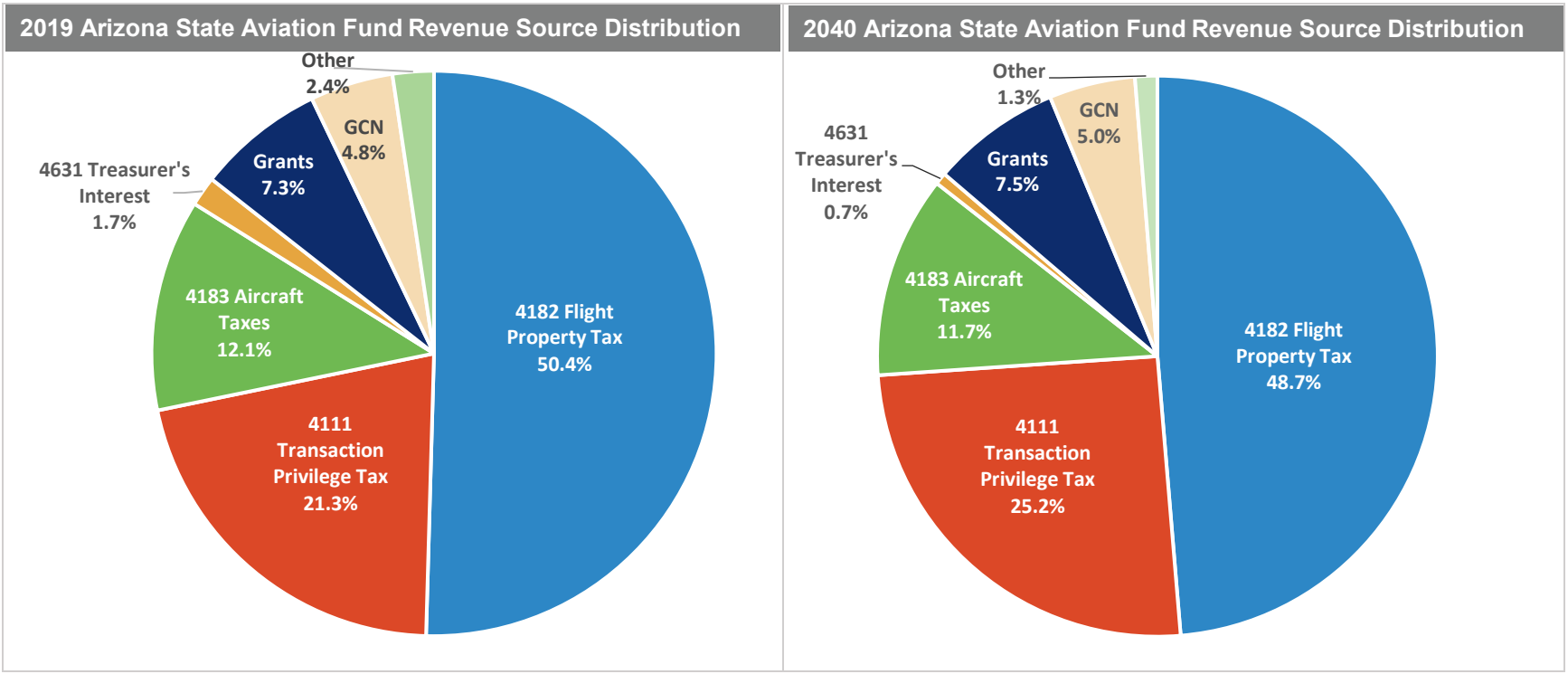
Account	Actual	Forecast				CAGR			
	2019	2025	2030	2035	2040	2025*	2030	2035	2040
4183 Aircraft Taxes	2,816,905	3,275,390	3,530,130	3,803,824	4,097,335	2.5%	1.5%	1.5%	1.5%
4419 Other Licenses	-	-	-	-	-	-	-	-	-
4236 City Grants - Other	395,587	70,742	70,742	70,742	70,742	-24.9%	0.0%	0.0%	0.0%
4236 State & Local Government - Other	-	-	-	-	-	-	-	-	-
4111 Transaction Privilege Tax	4,956,396	5,193,519	6,349,872	7,651,591	8,870,955	0.8%	4.1%	3.8%	3.0%
4165 Motor Vehicle Fuel Tax	316,959	357,314	385,104	414,961	446,980	2.0%	1.5%	1.5%	1.5%
4211 Federal Grants - Operating	494,825	517,854	517,854	517,854	517,854	0.8%	0.0%	0.0%	0.0%
4213 Aviation Federal Grants - Capital	807,390	2,043,858	2,043,858	2,043,858	2,043,858	16.7%	0.0%	0.0%	0.0%
4182 Flight Property Tax	11,728,981	12,587,546	14,241,653	15,647,008	17,106,856	1.2%	2.5%	1.9%	1.8%
4314 Filing Fees	-	-	-	-	-	-	-	-	-
4321 Parking	26,717	27,440	30,444	33,778	37,477	0.4%	2.1%	2.1%	2.1%
4323 Concessions	575,783	678,304	752,581	834,991	926,426	2.8%	2.1%	2.1%	2.1%
4326 Commercial Space	140,519	161,147	171,898	183,366	195,598	2.3%	1.3%	1.3%	1.3%
4339 Other Fees & Charges for Services	233,872	284,121	315,234	349,753	388,052	3.3%	2.1%	2.1%	2.1%
4632 Rental Income	95,529	126,274	140,102	155,444	172,465	4.8%	2.1%	2.1%	2.1%
4631 Treasurer's Interest	394,524	174,850	197,015	218,577	240,202	-12.7%	2.4%	2.1%	1.9%
4635 Loan and Other Interest Income	121,894	13,561	7,603	308	-	-30.6%	-10.9%	-47.4%	-
4699 Aviation Loan Principal Repayment	131,659	24,605	30,562	18,775	-	-24.4%	4.4%	-9.3%	-
4699 Help Loan Principal Repayment	-	-	-	-	-	-	-	-	-
4176 In Lieu Taxes-Other	15,596	6,505	7,011	7,554	8,137	-13.6%	1.5%	1.5%	1.5%
4372 Printouts & Decals	-	-	-	-	-	-	-	-	-
4381 Sale of Capital Assets	-	12,968	14,483	16,227	18,229	-	2.2%	2.3%	2.4%
4519 Other Fines, Forfeitures & Penalties	-	-	-	-	-	-	-	-	-

Account	Actual	Forecast				CAGR			
	2019	2025	2030	2035	2040	2025*	2030	2035	2040
4645 Payment Card Transaction Fees Paid	(36,250)	(63,367)	(70,306)	(78,005)	(86,547)	9.8%	2.1%	2.1%	2.1%
4647 Credit Card Processing Fees Paid	(1,796)	-	-	-	-	-	-	-	-
4699 Miscellaneous Receipts	334	64,806	64,806	64,806	64,806	140.6%	0.0%	0.0%	0.0%
4821 Prior Year Reimbursements (Refunds)	34,261	25,663	25,663	25,663	25,663	-4.7%	0.0%	0.0%	0.0%
4823 Current Year Reimbursements (Refunds)	68	54	54	54	54	-4.0%	0.0%	0.0%	0.0%
Total Receipts	**23,249,752**	**25,583,152**	**28,826,362**	**31,981,127**	**35,145,142**	**1.6%**	**2.4%**	**2.1%**	**1.9%**

**Note: 2025 CAGRs may display larger changes due to using the average of previous four years (2016-2019) as baseline. Sources: IHS Markit 2021, ADOT FMS 2020*

Figure 3.15 compares 2019 (left) and 2040 (right) revenue streams into the State Aviation Fund. The relative shares of the top revenue streams into the State Aviation Fund are expected to remain consistent over time, with the Flight Property Tax continuing to support the majority of the total amount available.

Figure 3.15. State Aviation Fund Forecast Comparison by Account, 2019 (actual) vs. 2040 (projected)



Sources: IHS Markit 2021, ADOT FMS 2020

Summary

This chapter of the 2021 Arizona AEIS highlights the important role that aviation and aerospace-related industries will continue to play in the Arizona economy over the next 20 years. With a rapidly growing population, low housing prices, strategic location near international markets, and business-friendly environment, Arizona airports are well-poised to see an uptick in demand for commercial service, air cargo, and GA activities in the coming years. Trends within the industry itself – such as a growing need for new pilots fueling the need for aviation education and rising demand for corporate/business activity – may bring new activity to Arizona's GA airports. Economic and population growth is largely concentrated in the "Sun Corridor" – an expansive geographic area that generally refers to the Interstate 10 corridor between Tucson and Phoenix, then extending upwards into southern Yavapai County. However, airports across the state will benefit from new residents, visitors, and business, with towns and cities across central and northern Arizona witnessing expansion. While the path back to normalcy from COVID-19 remains uncertain, the industry appears to be on the road to recovery. The widespread availability of vaccines, loosening travel restrictions, and other factors have catalyzed a return to the skies for many leisure and business travelers. The hope is that this upward trend continues unabated.

Additional activity will result in corresponding aviation-related economic impacts, which directly benefits airports and the communities and regions in which they are located. To ensure that airports can keep pace, it will be important to continue investing in the preservation of existing and development of new infrastructure and services. Because revenues into the State Aviation Fund are largely driven by taxes and fees imposed on aviation users, activity growth should continue to grow the State Aviation Fund over time. However, the State Aviation Fund lacks diversification, with the majority of available investment dollars being contributed by airlines and the passengers they serve. Should commercial activity drop for a prolonged period – due to another COVID-19-related resurgence, natural or human-caused disaster, or other factor – investment dollars could drop. The ADOT Aeronautics Group and broader aviation industry in Arizona may consider developing a State Aviation Fund contingency plan or other resiliency strategy to ensure airport investment needs can continue to be met. Regardless of what the future may bring, the 2021 Arizona AEIS demonstrates that Arizona aviation is a foundation of the state's economy, and its value to our communities and state will only continue to soar for decades to come.

Chapter 4. Aviation Business Benefits

Air travel is essential to an increasingly globalized world. The aviation industry provides the means for goods and people to move rapidly between markets, with domestic and international borders serving to delineate political territories more than economic divides. Because air travel is foundational to global trade, access to airports and the services they provide is a catalyst for economic growth in developed and emerging markets worldwide. In the previous chapters of the *2021 Arizona Aviation Economic Impact Study (2021 Arizona AEIS),* this report looked at how Arizona's 67 publicly owned, public-use airports generate $59.4 billion annually in economic output within the state. These economic impacts are generated through a combination of on-airport business activities, construction-related spending, and out-of-state visitors who bring new money into the state's economy. Such activities center on the airports themselves, with quantifiable impacts being directly attributed to specific facilities. *The 2021 Arizona AEIS* now shifts outwards to take a closer look at how specific industries within the state rely on airports to conduct business activities. This evaluation provides a more holistic view of the roles and functions of airports within the Arizona economy and offers insight into an additional layer of economic benefits not fully captured in previous analyses.

The aviation business benefits analysis of the *2021 Arizona AEIS f*ocuses specifically on businesses' use of airports for employee and client travel and air cargo. Additionally, the importance of access to a commercial service and/or general aviation (GA) airport in a company's decision to locate to a specific location is explored. The types of industries that generally rely on air transportation often provide high-paying jobs that support Arizona's families. Furthermore, the taxes that air-reliant businesses pay fund schools, healthcare, transportation infrastructure, parks, and other public services that contribute to Arizona's high standard of living. As such, airports benefit the communities where they are located by attracting businesses that generate their own waves of economic impacts in terms of jobs, earnings, and economic output.

Methodology

This analysis of the *2021 Arizona AEIS* was conducted by first identifying the industry types with the highest propensity to rely on aviation. A survey was then distributed to over 3,000 businesses within these air-reliant industries requesting information on their use of commercial service and GA airports. Additionally, airport managers provided information during the data collection process of the 2021 Arizona AEIS (see **Chapter 1. Introduction and Data Collection** for more details on the Airport Manager Survey) about specific businesses known to use their facilities. The businesses identified by airport managers received the same survey instrument as air-reliant businesses. The following sub-sections provide additional information about these general steps.

SELECTION OF AIR-RELIANT BUSINESSES

Certain types of industries are more likely to rely on airports for the transportation of goods and people than other types of industries. For example, crop production relies on aviation for agricultural spraying, as well as the distribution of perishable food products. The Arizona Department of Agriculture reports that crops grown in the state are exported to 70 countries including China, Panama, and France. Additionally, Arizona suppliers distribute seeds to growers in Colombia, Denmark, Egypt, and Italy. In total, the annual value of Arizona agricultural exports is approximately $4.2 billion.[1] While not all exports travel by aircraft, the most perishable and valuable of these crops do—making aviation a vital component of the logistics chain of the agricultural industry.

1 https://agriculture.az.gov/sites/default/files/AZDA_GuideToAZAg-R5.pdf

Many manufacturing-related industries depend on air cargo for replacing broken equipment parts, receiving just-in-time production inputs, and shipping goods for further assembly processes and end consumers. Consultants providing specialized services in fields such as law, accounting, engineering, architecture, and scientific research fly to meet clients, visit project sites, and attend conferences and trainings to stay abreast of the latest developments in their areas of expertise.

Identifying the industry types in the state most likely to depend on aviation was the first step in the aviation business reliance analysis of the *2021 Arizona AEIS.* Industry types were broken down into sectors by the North American Industry Classification System (NAICS) developed under the auspices of the Office of Management and Budget (OMB). The NAICS was jointly developed by U.S., Canadian, and Mexican agencies to provide a standardized system for comparing business statistics among North American countries, and the system is now used to classify business establishments for the purpose of federal analyses of the U.S. economy. The NAICS groups peer industries according to similarities in the processes used to produce goods or services.[2] The system uses a six-digit hierarchical structure in which sectors are broken down into progressive granularity depending on the number of digits in the code. Example NAICS breakdowns for Scheduled Passenger Air Transportation and Scheduled Freight Air Transportation are provided in **Table 4.1**. There are 20 two-digit sectors included in the NAICS.

Table 4.1. Example NAICS Code Breakdown

Level	NAICS Code	Title
Sector	48-49	Transportation and Warehousing[1]
Subsector	481	Air Transportation
Industry Group	4811	Scheduled Air Transportation[2]
NAICS Industry	48111	Scheduled Air Transportation[2]
National Industry	481111	Scheduled Passenger Air Transportation
	481112	Scheduled Freight Air Transportation

Notes: (1) The Transportation and Warehousing sector is one of three sectors that are represented by a range of two-digit codes. The others include Manufacturing (31-33) and Retail Trade (44-45). (2) No differentiation is provided between industry group and NAICS industry in this case. Source: NAICS 2017

The 2021 Arizona AEIS leveraged sector-to-sector spending data from input-output tables produced by the Bureau of Economic Analysis (BEA) to identify industries that rely most heavily on air transportation services. Input-output tables provide estimates of annual spending between all sectors in the economy. The study team isolated sector 481 (Air Transportation) and analyzed annual spending from all other sectors in two ways. First, industries that spend the most on air transportation were identified. Then, industries with a "high intensity of use" were identified; in other words, the sectors for which air transportation comprises a high percentage of total annual spending. The two measures are related but provide different results. For example, one sector might have a low total amount of spending on air transportation compared to other sectors, but its percentage of total spending devoted to air transportation could be higher than other industries, meaning they rely on air transportation significantly. Given this, both criteria are important in determining the importance of air transportation to an individual industry.

The results of these two analyses were combined to provide a comprehensive list of the industries in Arizona at the three-digit NAICS level that most significantly depend on air travel. Listed in **Table 4.2**, these 41 subsectors represent the industries with the greatest likelihood to rely on aviation in the state.

2 https://www.census.gov/naics/#q1

Table 4.2. Air-reliant Businesses within the Arizona Economy by NAICS Subsector

NAICS Subsector	Description
111	Crop Production
112	Animal Production and Aquaculture
213	Support Activities for Mining
221	Utilities
311	Food Manufacturing
315	Apparel Manufacturing
316	Leather and Allied Product Manufacturing
323	Printing and Related Support Activities
325	Chemical Manufacturing
326	Plastics and Rubber Products Manufacturing
327	Nonmetallic Mineral Product Manufacturing
331	Primary Metal Manufacturing
332	Fabricated Metal Product Manufacturing
333	Machinery Manufacturing
334	Computer and Electronic Product Manufacturing
335	Electrical Equipment, Appliance, and Component Manufacturing
336	Transportation Equipment Manufacturing
423	Merchant Wholesalers, Durable Goods
424	Merchant Wholesalers, Nondurable Goods
484	Truck Transportation
487	Scenic and Sightseeing Transportation
491	Postal Service
492	Couriers and Messengers
511	Publishing Industries (except Internet)
517	Telecommunications
518	Data Processing, Hosting, and Related Services
519	Other Information Services
522	Credit Intermediation and Related Activities
523	Securities, Commodity Contracts, and Other Financial Investments and Related Activities
524	Insurance Carriers and Related Activities
531	Real Estate
532	Rental and Leasing Services
541	Professional, Scientific, and Technical Services
551	Management of Companies and Enterprises
561	Administrative and Support Services
562	Waste Management and Remediation Services
611	Educational Services

NAICS Subsector	Description
621	Ambulatory Health Care Services
622	Hospitals
713	Amusement, Gambling, and Recreation Industries
722	Food Services and Drinking Places

Sources: IHS Markit 2021, 2017 NAICS, U.S. BEA 2019

These subsectors were used as the primary criteria when searching for Arizona companies that rely on the air transportation industry. The Dun & Bradstreet database was used to identify specific businesses for inclusion in the aviation business reliance analysis. The methodology applied additional search criteria to further refine the final list of companies. Those criteria were as follows:

- Employed at least 25 staff members
- Provided a contact email for at least one employee[3]

Before the list of Arizona businesses was finalized, an extra step was taken to ensure that there was representation from each county within the state. As presented in **Table 4.3,** this process resulted in the selection of 3,277 Arizona businesses for inclusion in this analysis. A least one business per county received a survey, with Maricopa and Pima counties (respectively) serving as home to the largest number and percentage of total businesses.

Table 4.3. Businesses by County Included in the Business Aviation Survey

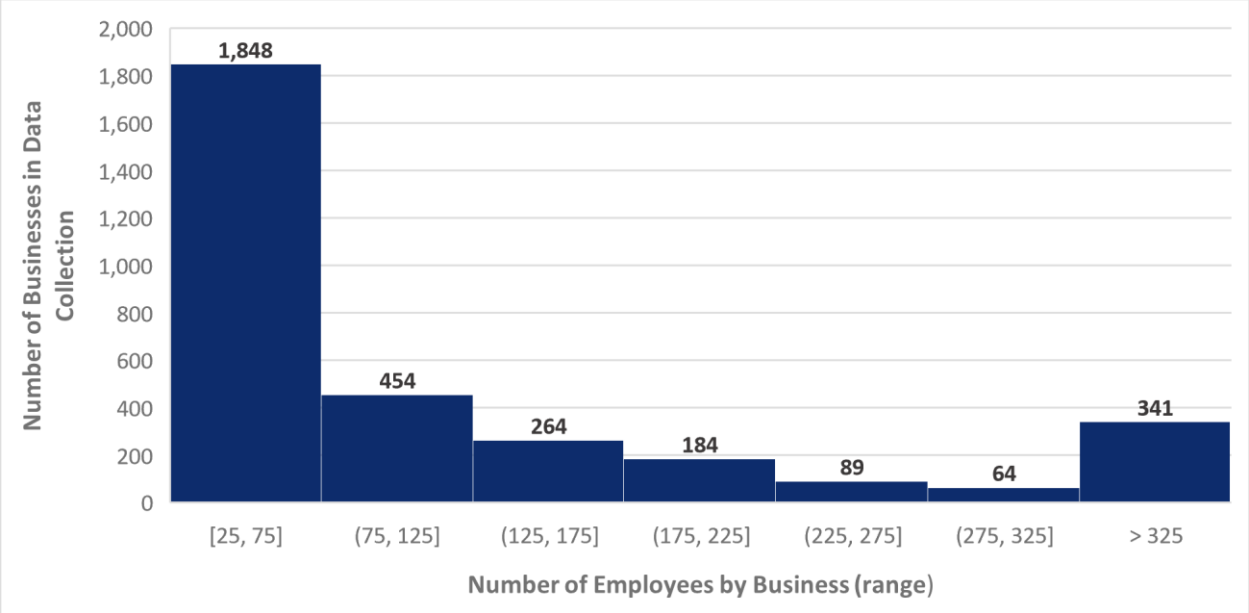
Arizona County	Number of Businesses	Percent Total
Apache	13	0.4%
Cochise	29	0.9%
Coconino	46	1.4%
Gila	7	0.2%
Graham	9	0.3%
Greenlee	1	>0.0%
La Paz	3	0.1%
Maricopa	2,564	78.2%
Mohave	28	0.9%
Navajo	7	0.2%
Pima	435	13.3%
Pinal	43	1.3%
Santa Cruz	15	0.5%
Yavapai	31	0.9%
Yuma	39	1.2%
Not provided	7	0.2%
Total	**3,277**	**100.0%**

Sources: IHS Markit 2021, 2017 NAICS, Dun & Bradstreet 2021

3 Contacts at businesses with more than one contact provided were filtered for job descriptions such as “accounting,” “operations,” and “controller.” It was surmised that individuals in these positions could best speak to their company’s use of and spending on air transportation.

Businesses ranged in size from having 25 employees to over 7,500. As shown in **Figure 4.1**, 1,848 businesses had between 25 and 75 employees (56.4%). Three hundred and forty-one businesses staffed more than 325 employees (10.4%).

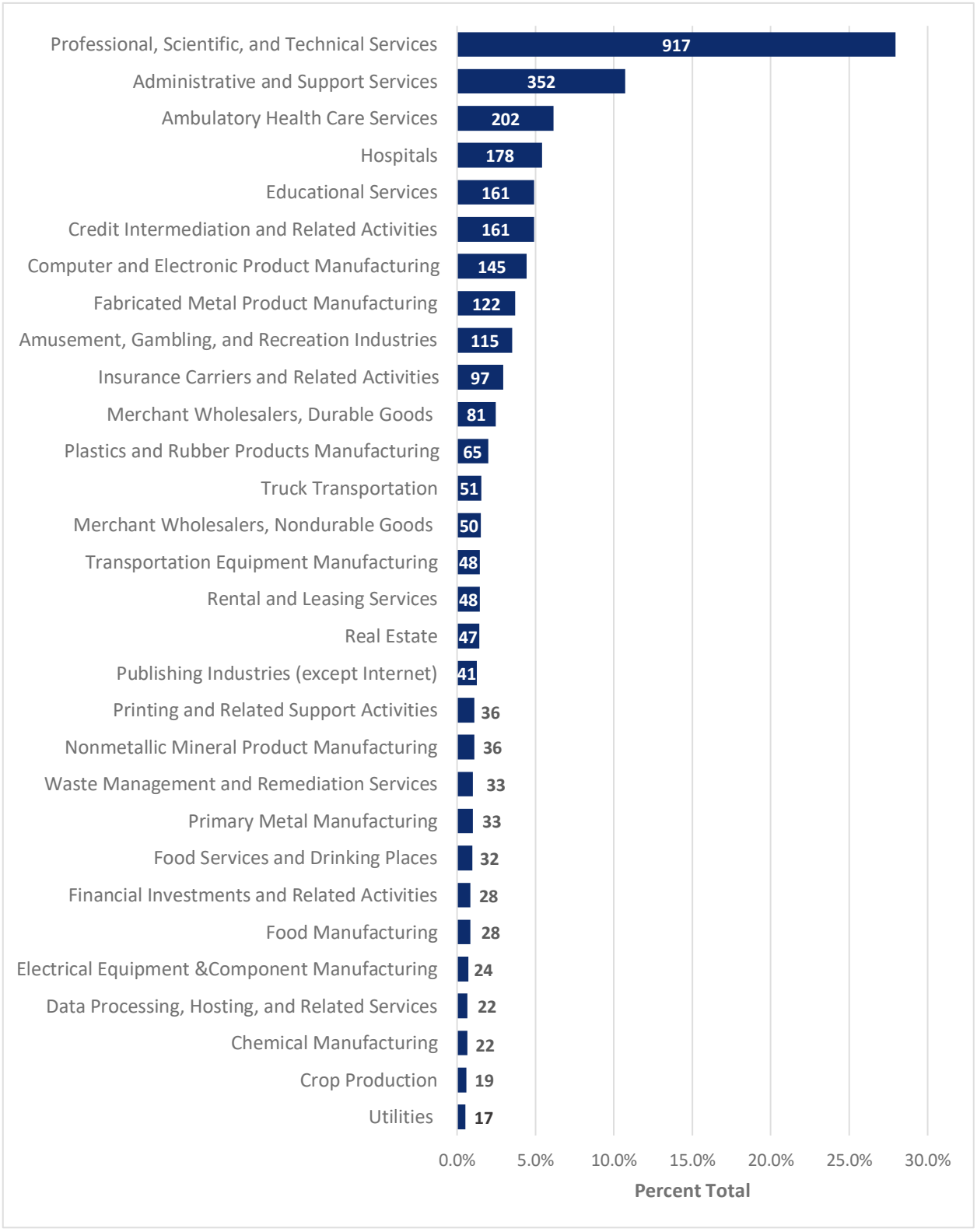
Figure 4.1. Number of Employees by Businesses Included in Data Collection



Sources: IHS Markit 2021, Kimley-Horn 2021

Figure 4.2 shows that approximately 28.0% of businesses that received a survey were categorized within the Professional, Scientific, and Technical Services subsector (917 businesses). This was nearly three times as many as the next highest subsector, Administration and Support Services, which received 10.7% of the surveys distributed (352 businesses). Ambulatory Health Care Services, Hospitals, Credit Intermediation and Related Activities, and Educational Services received 6.2% and 5.4% of the surveys distributed (respectively). Approximately 60.1% of the surveys were distributed to businesses in the top six subsectors, with the remaining 39.9% sent to businesses in the other 35 subsectors. While these percentages reflect the proportion of Arizona companies that fall into each air-reliant subsector, it is not necessarily indicative of their relative reliance on air transportation.

Figure 4.2. Businesses by Subsector Included in Data Collection by Percent Total and Number[1,2]



Notes: (1) The 10 industry subsectors that received less than 10 surveys are excluded from the chart for brevity. (2) The number in the bar char indicates total number of businesses that received the survey. Sources: IHS Markit 2021, Kimley-Horn 2021

In addition to the 3,277 businesses identified using the methodology above, the 2021 Arizona AEIS also distributed surveys to 71 companies that airport managers reported as "reliant" on their facilities in the Airport Manager Survey. Additional information about the Airport Manager Survey is provided in **Chapter 1. Introduction and Data Collection**. In total, 3,348 Arizona businesses were identified for inclusion in the aviation business reliance analysis of the 2021 Arizona AEIS.

BUSINESS AVIATION SURVEY

The Business Aviation Survey was designed to collect information about Arizona companies' experiences with and use of commercial service and GA airports in Arizona during calendar year 2019. The information requested on the Business Aviation Survey is summarized below.

- **Company details:** Name, contact information, number of employees, industry subsector
- **Aviation reliance:** Purpose(s) of aviation usage, percent of employees who used any form of aviation to conduct business activities
- **Use of commercial service:** Top origin and destination airports, budget for airline travel, number of trips taken by employees/customers
- **Use of GA:** Aircraft usage structure (i.e., does the business own, charter, lease, or have fractional ownership of a GA aircraft?), top origin and destination airports, number of trips taken by employees/customers
- **Use of air cargo:** Most common type of good shipped via air cargo, volume of goods shipped
- **Business reliance factors:**
  - Percent reduction of workforce and revenue if the company did not have access to airports/aviation in Arizona
  - Factors that influenced where the company chose to locate including proximity to a commercial service airport, GA airport, and/or other mode of transportation; availability of raw materials and a trained workforce; and socioeconomic factors such as cost of living, labor costs, tax incentives, and/or regulatory environment

The Business Aviation Survey was distributed by the ADOT Communications team and was available for completion for approximately one month in Spring 2021. Businesses received an initial survey request and a reminder request two weeks later. Survey recipients were given the option of completing a fillable PDF form and returning via email or accessing an online survey via the SurveyMonkey platform. The online survey used "skip logic," meaning the survey automatically tailored questions based on recipients' responses. For example, if a recipient reported that their company did not rely on GA to conduct its business operations, the survey automatically "skipped" to the following main section (i.e., air cargo).

Business Reliance Results

Of the 3,348 Arizona businesses that received the Business Aviation Survey, a total of 41 responses were received for a response rate of 1.2%. This low response rate is reflective of a broader trend affecting research efforts. Survey rates have continuously declined over the past several decades.4 Researchers struggle with either not being able to contact potential respondents or facing refusal when they do make a connection. A recent study by the Pew Research Center found that telephone response rates declined from 36% in 1997 to 6% in 2018.[5] While the Business Aviation Survey was conducted by email, many of the same reasons cited by pollsters using other survey instruments seem to hold true. People receive a constant influx of survey requests via phone, email, or in-app pop-up windows after making a purchase or receiving a service—whether visiting the doctor or changing their car oil. Growing cybersecurity concerns, fraudulent phishing emails, and the perception that a survey is an intrusion on one's time and privacy exacerbate the overall "survey fatigue" experienced by the public.

The Pew Research Center study went on to note that low response rates do not necessarily invalidate the results of a survey. In fact, "studies examining the impacts of low response on data quality have generally found that response rates are an unreliable metric of accuracy."[6] While responses to the Business Aviation Survey were limited, they do generally reflect industry analysts' understanding of how businesses depend on airports. The analyses conducted by the 2021 Arizona AEIS team confirmed that airports are valuable assets to the Arizona business community and provide a critical link to domestic and international markets. The workforce and revenues of aviation-reliant businesses would likely decrease should airports no longer be available to them, and proximity to a commercial service airport is a key factor in businesses' decisions on where to locate their facilities.

In reviewing the results below, it is important to note that not all companies completed all questions of the Business Aviation Survey. Results indicate the total number of respondent businesses (i.e., if a response was left blank, they were excluded from the presentation of results). The results of the Arizona Business Aviation Survey are summarized in the following subsections.

COMPANY DETAILS

Table 4.4 summarizes the percent of total respondents by NAICS subsector. Mirroring the relative number of surveys distributed, the highest percentage of respondents fell within the Professional, Scientific, and Technical Services subsector at 14.6%. Nearly half of respondents indicated that they did not fall within the NAICS subsectors provided on the survey form (reported as "other"). Multiple companies that selected the "other" option specified they were in the software development, insurance, real estate, tourism, and aerospace industries—all of which would have fallen into the NAICS subsectors provided on the survey form. As such, this selection may indicate that respondents quickly completed the survey without carefully considering the drop-down menu options provided.

Businesses that responded ranged in size from having between 2 and 152 full- and part-time employees and employed an average of 43 total staff.

4 Leeper, Thomas (2019). "Where did all of the responses go? Perhaps we ate them." *Public Opinion Quarterly*, Volume 83, Issue S1, P. 280–288. Available online at https://doi.org/10.1093/poq/nfz010 (accessed April 2021).

5 Kennedy, Courtney and Hannah Hartig (2019). "Response rates in telephone surveys have resumed their decline." Pew Research Center. Available online at https://www.pewresearch.org/fact-tank/2019/02/27/response-rates-in-telephone-surveys-have-resumed-their-decline/ (accessed April 2021).

6 Ibid.

Table 4.4. Business Aviation Survey Respondents by NAICS Subsector

NAICS Subsector	Description	Percent Total Respondents
541	Professional, Scientific, and Technical Services	14.6%
332	Fabricated Metal Product Manufacturing	9.8%
488	Support Activities for Transportation	7.3%
611	Educational Services	4.9%
487	Scenic and Sightseeing Transportation	4.9%
561	Administrative and Support Services	2.4%
621	Ambulatory Health Care Services	2.4%
518	Data Processing, Hosting, and Related Services	2.4%
511	Publishing Industries (except Internet)	2.4%
484	Truck Transportation	2.4%
-	Other	46.3%
Total		**100.0%**

Source: Business Aviation Survey 2021

AVIATION RELIANCE

Corporate jets at Marana Regional Airport (AVQ)

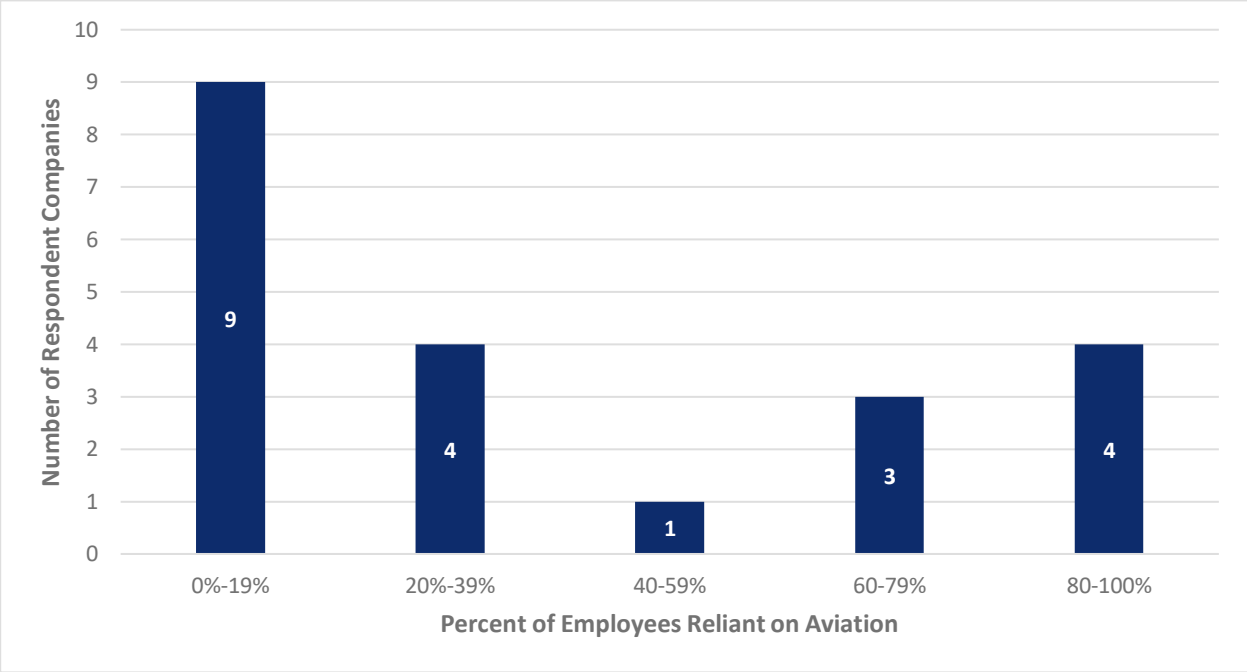
Businesses use aviation for a variety of reasons, from transporting employees to branch and client locations, manufacturing plants, and production facilities to connecting goods with global marketplaces. A company's decision to travel by scheduled commercial passenger service and/or GA is influenced by various factors such as available transportation modes; access to airports at point of origin or destination; valuation of time, productivity, and efficiency during transit; importance of scheduling flexibility; and reliability of service. Corporate/business aviation, one type of GA activity, is also associated with enhanced traveler safety and security. Evidencing this point, some Arizona airports reported an uptick in corporate/business aviation during the COVID-19 pandemic as companies enacted new protocols to reduce employees' potential exposure to the virus.

Business trips are conducted by staff at many levels within organizations, including time-critical trips by sales, technical, and middle- and top-management employees. In a survey conducted by the National Business Aviation Association (NBAA), approximately 50% of business air travel is conducted by mid-level management, with the remaining flight activities split between technical, sales, and service professionals and top executives.

Employee Air Travel

Figure 4.3 shows the percent of employees that rely on aviation at the 21 respondent businesses. More than half of all respondent businesses (12) indicated that at least 20% of employees used aviation for business purposes at least once in 2019. Four businesses indicated that 80 to 100% of employees used scheduled commercial service or GA to conduct business activities during the study year.

Figure 4.3. Percent of Employees Reliant on Aviation

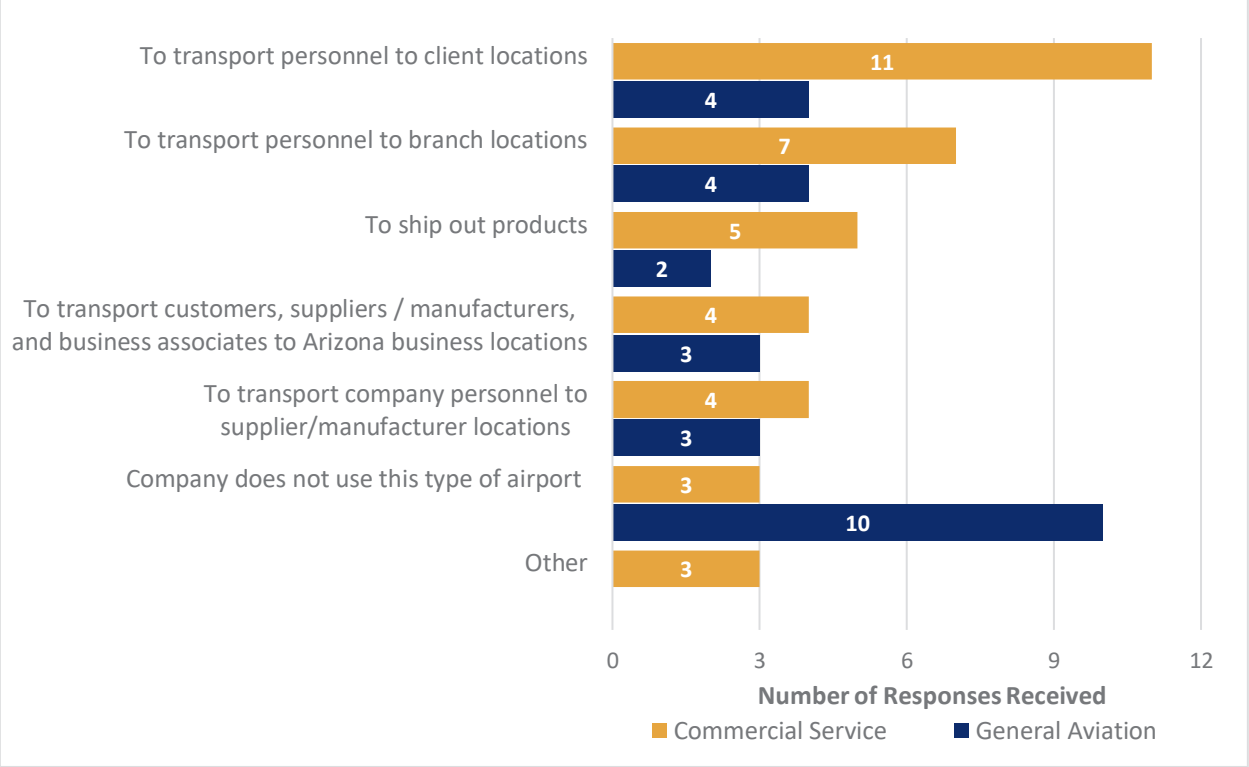


Source: Business Aviation Survey 2021

Purpose of Air Travel

Responding businesses reported taking between zero and 3,000 annual business trips via scheduled commercial service and GA (reported separately), with an average of 420 trips per year via commercial service and 226 trips via GA. As shown in **Figure 4.4**, most companies relied on aviation to transport company personnel to client locations. The second-most popular use of commercial service and tied for the most common use of GA was to transport personnel to branch locations.

Figure 4.4. Business Purpose of Air Travel



Source: Business Aviation Survey 2021

USE OF COMMERCIAL SERVICE

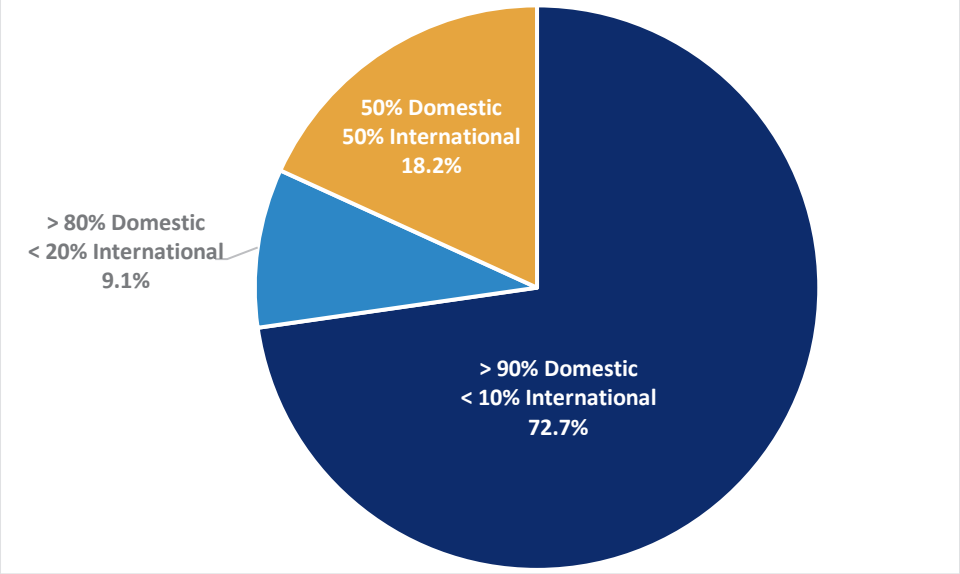
Arizona is home to 11 commercial service airports. Phoenix Sky Harbor International Airport (PHX) is the largest airport within the Arizona system and one of the busiest in the United States. In 2019, PHX ranked 13th nationally in terms of number of enplanements with over 22 million travelers boarding an aircraft via its jetways. The airport was home to 20 airlines in 2019 offering non-stop service from Phoenix to over 110 domestic and 20 international destinations.

Tucson International Airport (TUS) was the second-busiest airport in the state with 1.8 million enplanements in 2019. TUS provides non-stop access to 18 destinations on eight air carriers. Commercial service airports such as Show Low Regional (SOW), Prescott Regional – Ernest A. Love Field (PRC), and Page Municipal (PGA) offered more limited services but are critical to providing access to customers, manufacturers, and suppliers in areas outside Arizona's urban core. In all cases, commercial service airports provide a gateway for travelers to access markets in the United States and abroad either directly or by connecting through other facilities.

Destinations Accessed via Commercial Service

Survey respondents indicated that their businesses relied most heavily on Arizona airports to access domestic destinations. Of the 11 respondents, 72.7% travelled to domestic destinations over 90% of the time. Eighteen-point-two percent of respondents travelled equally to domestic and international locations (50/50 split), and 9.1% travelled to domestic destinations between 80% and 89% of the time (80/20 split). The percent of trips taken to domestic versus international locations reported by respondent businesses is depicted in **Figure 4.5**.

Figure 4.5. Domestic versus International Business Travel

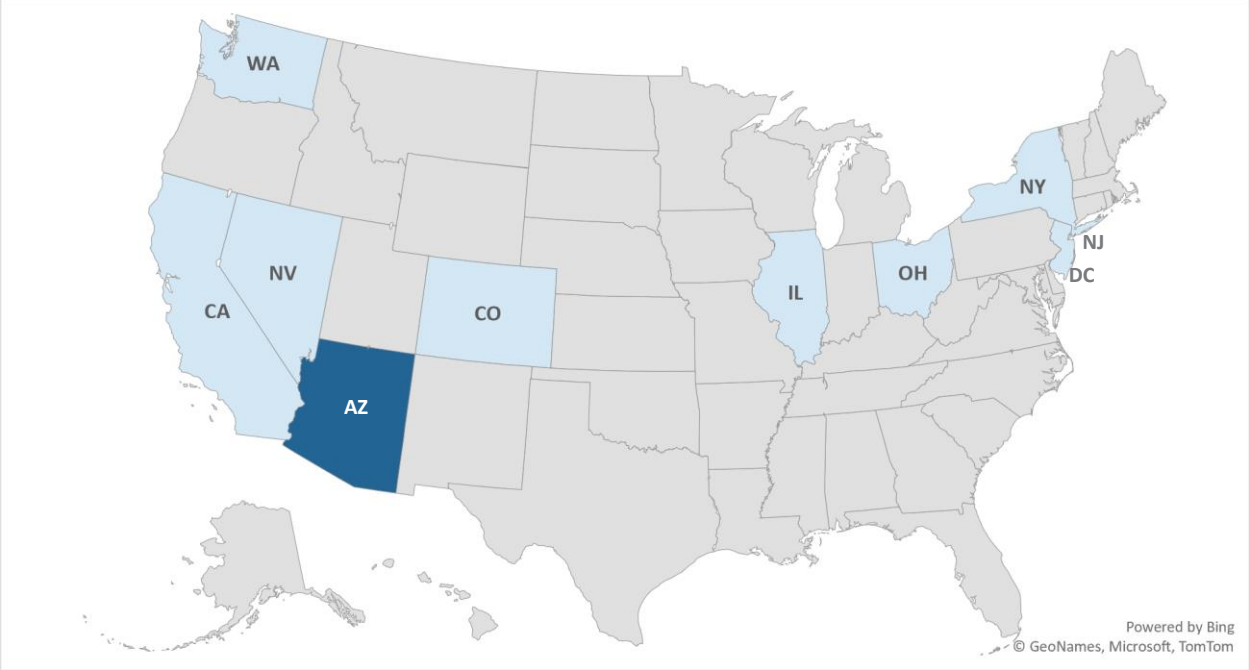


Source: Business Aviation Survey 2021

Further supporting the finding that most business travel occurred domestically in 2019, respondent businesses indicated the eight states and the District of Columbia (DC) depicted in **Figure 4.6** (shaded in light blue) as the most common destinations accessed via commercial service airports.

Phoenix Sky Harbor International Airport (PHX) is the busiest airport in Arizona in terms of enplanements and aircraft operations.

Figure 4.6. Most Common Destinations Accessed by Commercial Service Airports

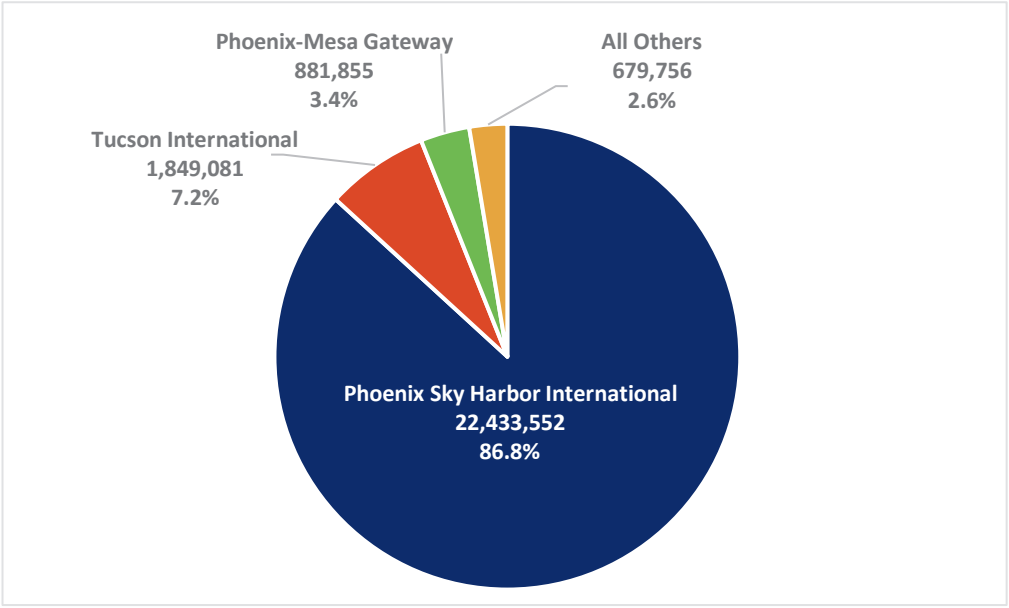


Source: Business Aviation Survey 2021

Departure Airports

Phoenix Sky Harbor International (PHX) and Tucson International Airport (TUS) were the most common commercial service departure airports utilized by respondent businesses. These two airports, along with Phoenix Mesa Gateway (IWA), supported 97.3% of all enplanements in Arizona in 2019, as shown in **Figure 4.7**. The state's other eight commercial service airports supported 2.6% of all enplanements in Arizona during the study year.

Figure 4.7. Enplanements by Number and Percent Airport Share, 2019



Source: FAA Air Carrier Activity Information System (ACAIS) 2019

USE OF GENERAL AVIATION

SRP depends on the St. John's Airport to reach its power production facilities in eastern Arizona. The airport also supports air medical transport for local community members requiring emergency or specialized treatment.

GA is defined as any civilian aviation use outside of scheduled commercial service. As such, business use of GA encompasses a wide variety of activities that rely on many different types of aircraft and airports. While corporate/business aviation is often associated with the transport of company executives to internal meetings and client visits via corporate aircraft, GA is used for a diverse range of business activities by many types of organizations. According to the NBAA, only 3% of the approximately 15,000 business aircraft registered in the United States are flown by Fortune 500 companies. Ninety-seven percent of aircraft are operated by a range of small, medium, and large businesses; universities; and charitable organizations. While diverse in industry, size, and geographic location, businesses rely on GA for the speed, flexibility, productivity, security, and efficiency that it provides.

Additionally, most of the airports in the United States are GA—allowing significantly greater access to potential markets outside of major urban centers. There are 56 publicly owned, public-use airports in Arizona which compose 88% of the airports in the state aviation system. These facilities offer access to even the most remote corners of the state. Not only do businesses use GA airports to connect with branch locations and clients, but also to reach remote manufacturing and production facilities.

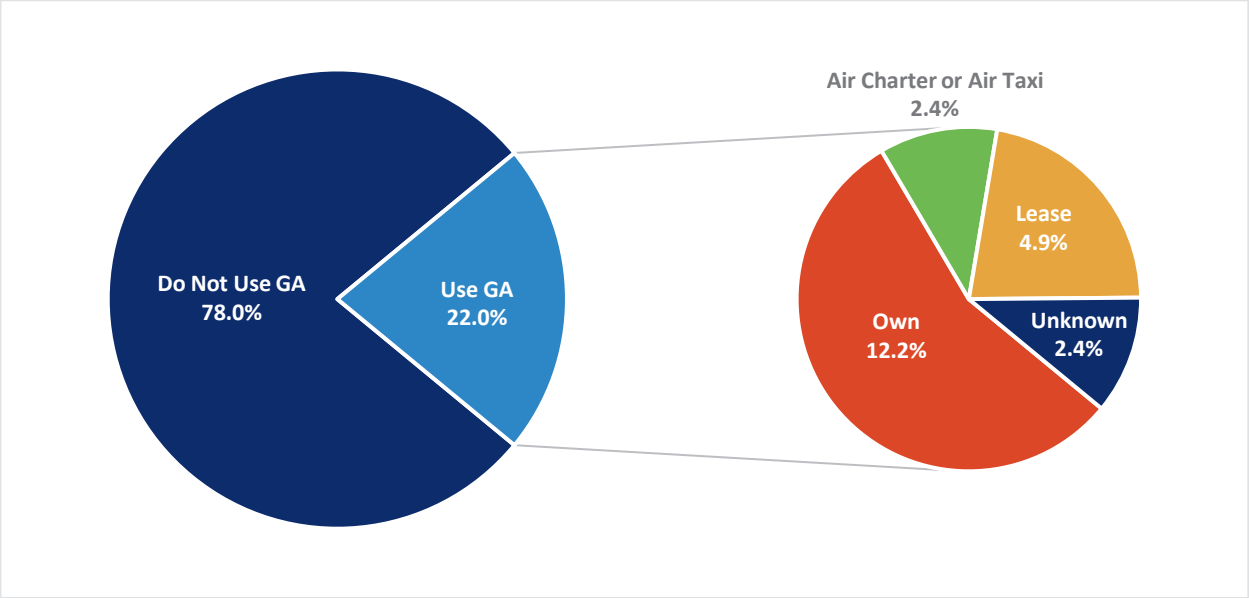
For example, Phoenix-based mining company Freeport-McMoRan depends on the Bagdad Airport (E81) to reach its mining operations in Bagdad, Arizona. This facility employs over 1,000 direct workers and generates more than $321.4 million in total economic impact for the state, including $130.6 million for Yavapai County. The Salt River Project (SRP) uses the St. John's Airport (SJN) to access its power station located north of the airport in far eastern Arizona—saving company executives, engineers, and other workers several hours of driving time from their headquarters in Phoenix.

General aviation provides our company with the means to conduct business more efficiently and effectively. - Kazal Fire Protection, Inc.

Dependence on General Aviation

Twenty-two percent of survey respondents indicated that they depended on GA airports to conduct business activities in 2019, as reported in **Figure 4.8**. Of the companies that use GA, most own a GA aircraft (12.2%).

Figure 4.8. Business Use of GA



Source: Business Aviation Survey 2021

USE OF AIR CARGO

Arizona airports serve as a key link along global logistics chains that connect raw materials, interim manufacturing inputs, final products, and end users. Significant volumes of goods are transported each year on integrated express carriers such as FedEx, UPS, and DHL; all-cargo carriers such as ABX and Ameriflight; and commercial passenger carriers such as American Airlines, British Airways, Southwest Airlines, and Delta Air Lines with either dedicated all-cargo freighters or as "belly cargo" on passenger aircraft. Air cargo handlers and freight forwarders such as Swissport International, SHIPHAUS, and Worldwide Flight Services also play an important role in logistics chains and employ workers at airports across Arizona.

Historically, "air-eligible" goods have been most closely associated with high-value, low-weight, and time- and temperature-sensitive goods such as electronics, software, just-in-time manufacturing inputs, and perishable items such as fresh food and flowers. Arizona is home to many such companies, with several notable producers of semiconductors, aerospace parts and vehicles, medical devices, and electronics headquartered in the state. The agricultural economy also thrives with high-value crops such as dates and pecans being shipped to global markets. The Boeing Company's *World Air Cargo Forecast, 2020-2039* estimates that while less than 1% of world trade tonnage is carried by air cargo, that cargo represents about 35% of the total value of all goods shipped.

While these types of high-value goods are anticipated to continue to be transported by air, air mail and freight are now used to transport all manner of durable and non-durable goods. Air cargo providers have traditionally faced severe competition from alternative and cheaper modes of transport, such as trucks, container ships, and rail. With consumers now expecting the near-immediate delivery of goods, retailers must turn to the skies for faster and more reliable transportation service. These trends have only increased during COVID-19.

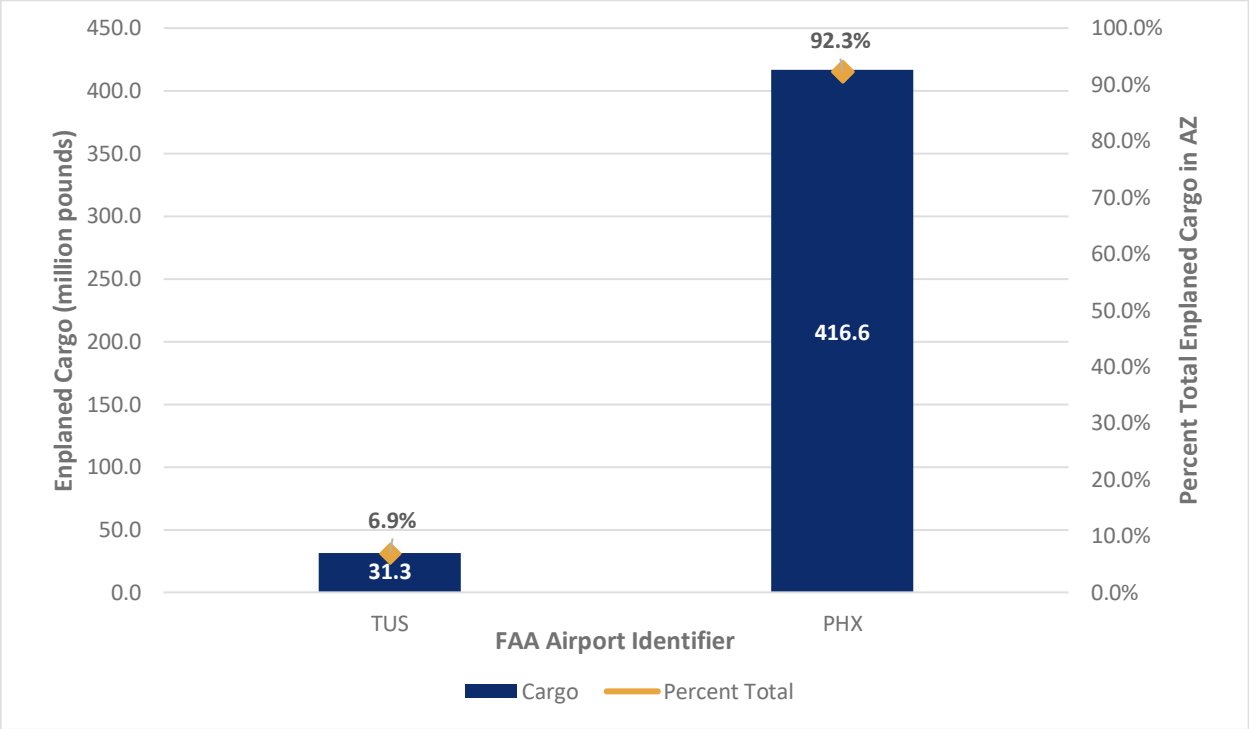
Today's consumers are proving to be increasingly comfortable with online purchases. A recent study by Salesforce found that nearly 60% of shoppers believe they will do more online purchasing after the pandemic than before. Further, while air passenger traffic was down by nearly 95% during the first half of 2020, all-cargo airlines continued to operate at or near 100% capacity. Coupled with other trends such as modal competition, globalization, and market liberalization, global air cargo traffic is anticipated to grow at 4% annually over the next 20 years.

Phoenix Mesa Gateway International Airport (IWA) is home to SkyBridge Arizona, the only joint air cargo hub in the country to house both U.S. and Mexican customs agents. Photo source: Office of the Governor

This growth will likely affect airports across the state, driven by worldwide trends and bolstered by Arizona's growing population, robust economic base, and the presence of numerous industries reliant on air cargo. Further, leading e-commerce provider Amazon already operates several major distribution centers near Phoenix, with plans to continue to expand its local presence in the coming years. Amazon may increase Amazon Air operations at some Arizona airports. Notably, Phoenix Sky Harbor International Airport (PHX) recently citied the growth of Amazon Air as a potential driver in its own forecasts of air cargo activity. Phoenix-Mesa Gateway Airport's (IWA) SkyBridge Arizona facility may also increase air cargo activity in Arizona. The only facility of its kind in the United States, SkyBridge Arizona houses both U.S. and Mexico customs officials, allowing goods to travel directly to Mexican markets without having to pass through the international customs processing center in Mexico City. This joint cargo hub promises to expedite shipping and enhance economic connectivity with Arizona's largest international trading partner.

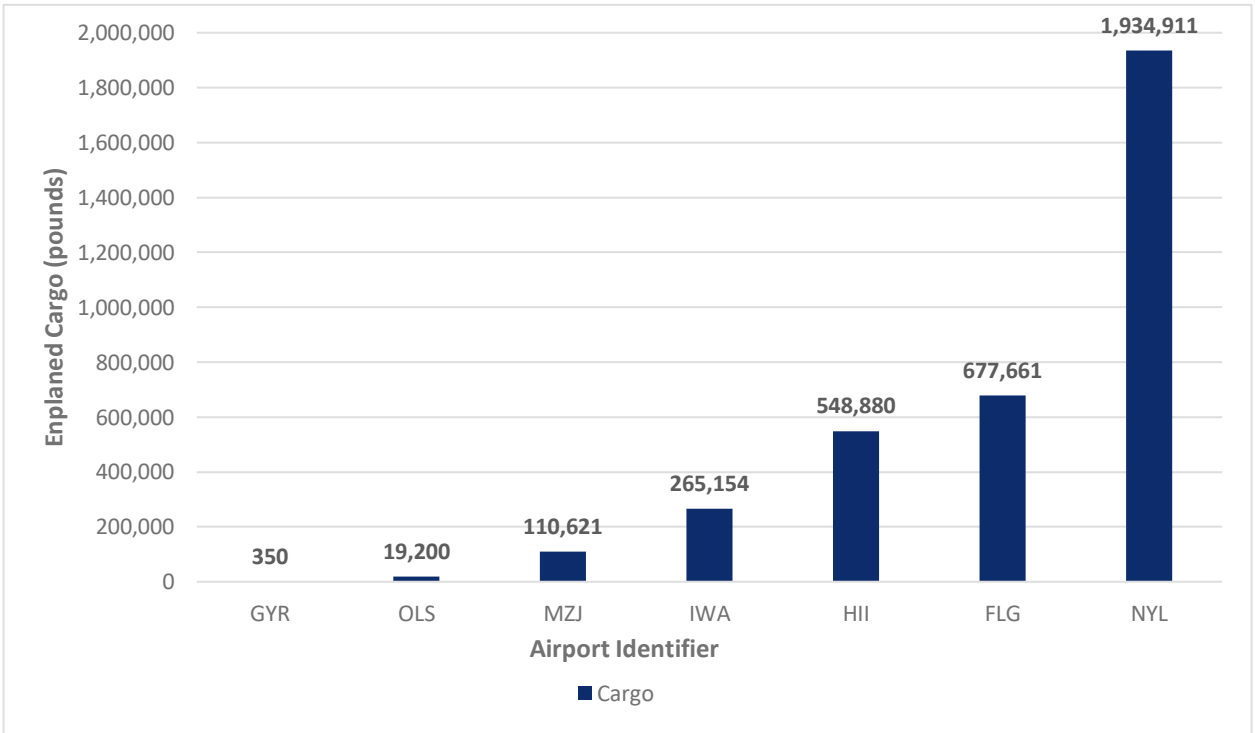
In 2019, approximately 451.4 million pounds of air cargo were enplaned at Arizona airports. Phoenix Sky Harbor International (PHX) and Tucson International (TUS) airports witnessed the most significant activity in terms of volume and percent total, as depicted in **Figure 4.9**. Phoenix Sky Harbor International Airport (PHX) supported 92.3% of statewide enplaned cargo (416.6 million pounds) destined for 167 airports in all 50 states and around the world. The next top seven Arizona airports in terms of cargo enplaned less than 1% of the statewide total in 2019. These airports are depicted in **Figure 4.10**.

Figure 4.9. Enplaned Air Cargo by Volume and Percent Total - PHX and TUS, 2019



Note: Air cargo represents the sum of all freight and mail shipped. Source: BTS Schedule T-100 2019 (accessed April 2021)

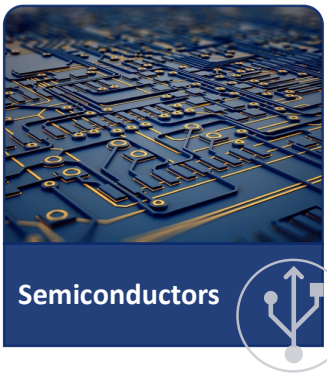
Figure 4.10. Enplaned Air Cargo by Volume - Top Airports Excluding PHX and TUS, 2019



Airport identifiers: GYR = Phoenix-Goodyear Airport, OLS = Nogales International Airport, MZJ = Pinal Airpark, IWA = Phoenix-Mesa Gateway International Airport, HII = Lake Havasu City Airport, FLG = Flagstaff Pulliam Airport, NYL = Yuma International Airport. Note: Air cargo is the sum of all freight and mail shipped. Source: BTS Schedule T-100 2019 (accessed April 2021)

Dependence on Air Cargo

Reflecting the types of goods most often associated with air cargo, five respondents of the Business Aviation Survey indicated that they rely on Arizona airports to ship goods including semiconductors, medical devices, and software.



IMPORTANCE OF AVIATION TO BUSINESSES

On average, respondents indicated that they would have to reduce their workforce by 52.8% and revenues would decrease by 61.4% if they did not have access to an airport. Forty-point-zero percent of respondents indicated that access to a commercial service airport is "important" or "very important" when making decisions about where to locate their business. In fact, access to a commercial service airport is among the top four factors respondents indicated when evaluating where to site their business location(s). The average importance of all factors evaluated in the Business Aviation Survey are presented in **Figure 4.11**.

It is an advantage to have a large, centrally located airport such as Phoenix Sky Harbor International Airport available. The Scottsdale Airport is also convenient. - Nationwide Insurance

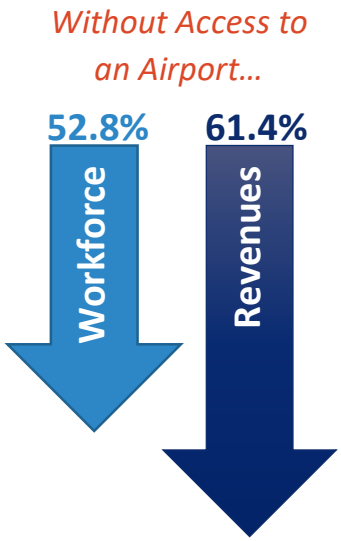
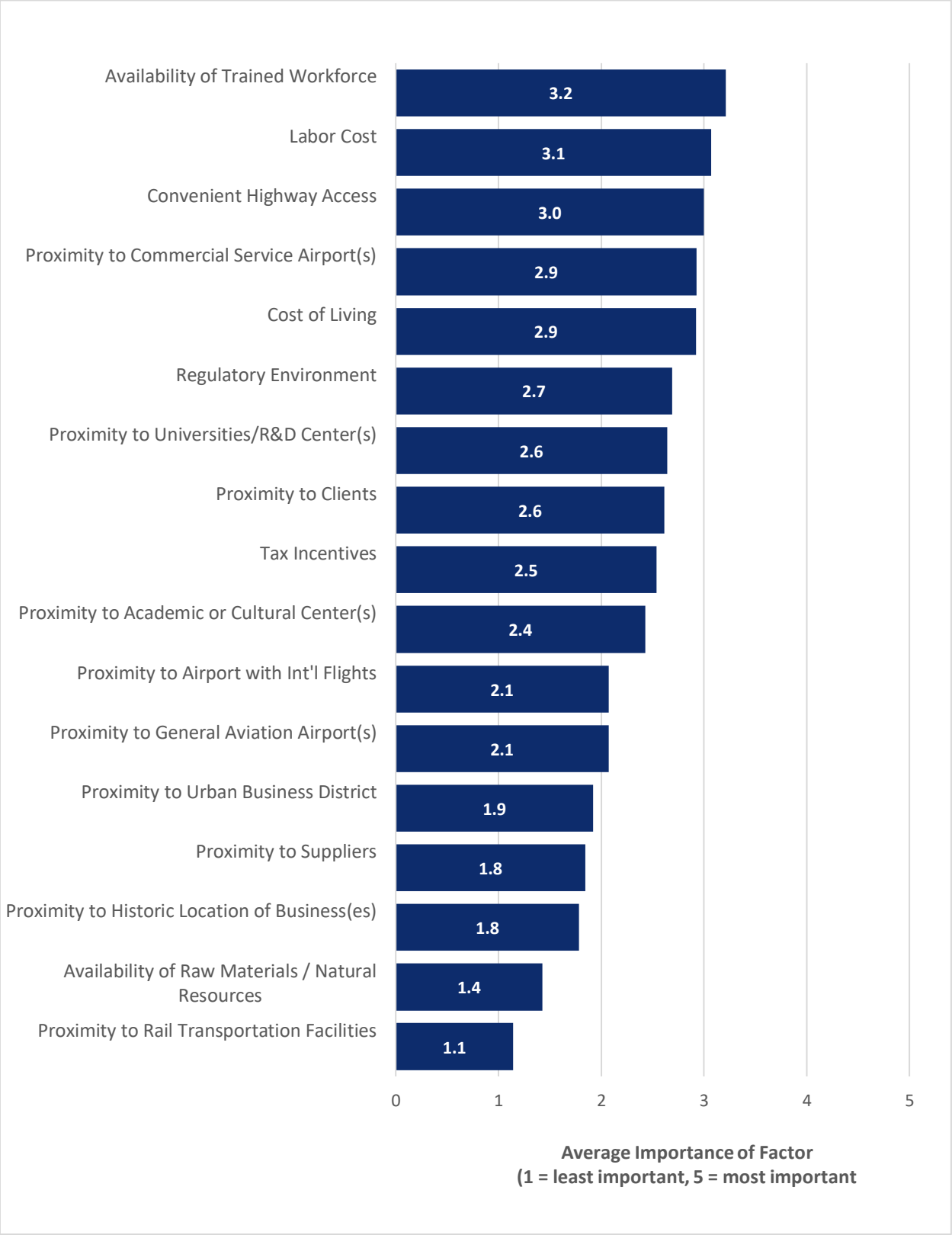


Figure 4.11. Valuation of Factors Where Arizona Businesses Chose to Locate



Source: Business Aviation Survey 2021

Summary

The Business Aviation Survey of the 2021 Arizona AEIS provides a valuable perspective on the importance of the state's airport system as an element of the economic fabric of the state. Airports allow commerce to thrive, and several recent studies have cited close connection between airports and regional economic development.[7] Arizona's major employment sectors including aerospace, electronics, semiconductor manufacturing, and tourism are all affiliated with a high propensity to rely on aviation to conduct business, further underlying why support for airports is a key component of advancing the state's overall economic development.

7 Florida, Richard (2012). "Airports play a considerable role in economic development, and the most important cargo they move is people." Available at https://www.bloomberg.com/news/articles/2012-05-23/airports-and-the-wealth-of-cities (accessed April 2021).

Appendix A. Economic Impacts of Arizona Airports By Airport

Appendix A of the 2021 Arizona Aviation Economic Impact Study (2021 Arizona AEIS) provides the numerical economic impacts of each Arizona airport included in this study. The economic impacts are presented in the following tables:

- **Table A.1.** Economic Impacts by Type – Direct Economic Impacts
- **Table A.2.** Economic Impacts by Type – Indirect Economic Impacts
- **Table A.3.** Economic Impacts by Type – Induced Economic Impacts
- **Table A.4.** Economic Impacts by Type – Total Economic Impacts of Arizona Airports
- **Table A.5.** Taxes Stimulated by Arizona Airports

For additional information about results presented in this appendix as well as definitions of terminology used, please see **Appendix C. 2021 AEIS Methodology**. Consolidated statewide results are presented in **Chapter 2. Economic Impacts of Arizona Airports and the Aviation Industry.**

It is important to note the economic impacts of eight airports were obtained from separate studies completed by airport sponsors. Full details about these independent studies are presented in **Appendix D. Incorporation of Existing Economic Impact Studies**.

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Table A.1. Economic Impacts by Type – Direct Economic Impacts

Associated City	Airport Name	FAA ID	Direct Impacts		
			Jobs (Number)	Earnings ($)	Economic Activity (Output) ($)
Commercial Service					
Bullhead City	Laughlin/Bullhead International	IFP	592	$24,211,440	$58,545,166
Flagstaff	Flagstaff Pulliam	FLG	588	$25,456,144	$68,753,618
Grand Canyon	Grand Canyon National Park	GCN	986	$39,158,451	$105,198,090
Page	Page Municipal	PGA	305	$14,306,433	$39,230,625
Peach Springs	Grand Canyon West	1G4	517	$17,762,449	$47,849,184
Phoenix	Phoenix Sky Harbor	PHX	137,530	$6,844,896,886	$21,040,596,524
Phoenix	Phoenix-Mesa Gateway	IWA	6,002	$301,048,208	$1,070,598,377
Prescott	Prescott Regional - Ernest A. Love Field	PRC	664	$42,208,285	$105,951,197
Show Low	Show Low Regional	SOW	63	$4,455,277	$10,338,937
Tucson	Tucson International	TUS	26,643	$1,726,576,183	$5,754,872,312
Yuma	Yuma International	NYL	690	$36,495,120	$88,126,160
General Aviation					
Ajo	Eric Marcus Municipal	P01	1	$17,582	$44,922
Bagdad	Bagdad	E51	3	$205,200	$558,075
Benson	Benson Municipal	E95	15	$586,880	$1,796,028
Bisbee	Bisbee Municipal	P04	2	$95,912	$333,355
Buckeye	Buckeye Municipal	BXK	91	$7,320,462	$54,670,724
Casa Grande	Casa Grande Municipal	CGZ	119	$4,675,475	$12,229,244
Chandler	Chandler Municipal	CHD	308	$11,920,495	$28,864,377
Chinle	Chinle Municipal	E91	4	$159,326	$496,048
Cibecue	Cibecue	Z95	1	$78,263	$292,832
Clifton	Greenlee County	CFT	2	$103,039	$354,470
Colorado City	Colorado City Municipal	AZC	5	$320,561	$1,116,259
Coolidge	Coolidge Municipal	P08	94	$4,040,596	$7,619,459
Cottonwood	Cottonwood Municipal	P52	63	$2,886,086	$6,816,772

Associated City	Airport Name	FAA ID	Direct Impacts		
			Jobs (Number)	Earnings ($)	Economic Activity (Output) ($)
Douglas	Bisbee-Douglas International	DUG	64	$4,024,666	$5,824,075
Douglas	Cochise College	P03	62	$2,279,129	$3,968,934
Douglas	Douglas Municipal	DGL	22	$1,356,829	$2,597,589
Eloy	Eloy Municipal	E60	193	$11,305,712	$19,281,923
Gila Bend	Gila Bend Municipal	E63	4	$150,071	$472,191
Glendale	Glendale Municipal	GEU	227	$12,037,338	$27,127,386
Globe	San Carlos Apache	P13	1	$56,921	$199,526
Goodyear	Phoenix Goodyear	GYR	494	$32,853,905	$82,025,044
Holbrook	Holbrook Municipal	P14	<1	$32,796	$150,690
Kayenta	Kayenta	0V7	15	$946,134	$1,593,509
Kearny	Kearny	E67	2	$173,287	$382,585
Kingman	Kingman	IGM	265	$22,001,965	$81,789,934
Lake Havasu City	Lake Havasu City	HII	120	$6,673,375	$19,533,365
Marana	Marana Regional	AVQ	219	$9,864,212	$21,368,665
Marana	Pinal Airpark	MZJ	165	$12,700,021	$27,693,109
Maricopa	Ak Chin Regional	A39	16	$582,821	$1,735,314
Mesa	Falcon Field	FFZ	1,709	$111,416,883	$480,539,180
Nogales	Nogales International	OLS	30	$1,770,607	$3,991,510
Parker	Avi Suquilla	P20	26	$1,344,860	$4,080,323
Payson	Payson	PAN	51	$2,191,909	$5,922,126
Phoenix	Phoenix Deer Valley	DVT	1,451	$94,468,966	$255,245,376
Polacca	Polacca	P10	1	$52,765	$196,724
Safford	Safford Regional	SAD	59	$4,525,796	$7,761,250
San Luis	Rolle Airfield	44A	<1	$1,590	$2,500
San Manuel	San Manuel	E77	5	$240,258	$702,827
Scottsdale	Scottsdale	SDL	3,241	$175,955,646	$559,144,022
Sedona	Sedona	SEZ	140	$5,947,613	$18,222,209

Associated City	Airport Name	FAA ID	Direct Impacts		
			Jobs (Number)	Earnings ($)	Economic Activity (Output) ($)
Seligman	Seligman	P23	3	$178,378	$621,354
Sells	Sells	E78	1	$46,735	$172,267
Sierra Vista	Sierra Vista Municipal-Libby Army Airfield	FHU	35	$1,668,515	$4,739,742
Springerville	Springerville Municipal	JTC	19	$1,205,831	$2,681,562
St. Johns	St. Johns Industrial Air Park	SJN	13	$544,706	$1,703,959
Superior	Superior	E81	<1	$1,991	$5,397
Taylor	Taylor	TYL	2	$122,018	$438,622
Tombstone	Tombstone Municipal	P29	<1	$6,818	$17,329
Tuba City	Tuba City	T03	1	$47,054	$173,003
Tucson	Ryan Field	RYN	122	$5,379,906	$21,578,112
Whiteriver	Whiteriver	E24	18	$1,896,175	$2,739,751
Wickenburg	Wickenburg Municipal	E25	35	$1,744,449	$4,256,560
Willcox	Cochise County	P33	9	$378,440	$968,757
Williams	H.A. Clark Memorial Field	CMR	11	$822,732	$1,739,198
Window Rock	Window Rock	RQE	1	$91,749	$323,081
Winslow	Winslow-Lindbergh Regional	INW	21	$971,713	$1,755,411
Total			**184,163**	**$9,639,048,034**	**$30,180,718,746**

Sources: Federal Aviation Administration (FAA) Air Traffic Activity Database (ATADS) 2020, FAA Terminal Area Forecast (TAF) 2020, FAA Traffic Flow Management System Counts (TFMSC) 2020, Airline Data, Inc. 2020, Airport Manager Survey 2020, Airport Tenant Survey 2020, Dean Runyan, Inc. 2019, Arizona Department of Tourism 2020, Dun & Bradstreet 2019, IHS Markit 2021, IMPLAN 2019, Kimley-Horn 2021

Table A.2. Economic Impacts by Type – Indirect Economic Impacts

Associated City	Airport Name	FAA ID	Indirect Impacts		
			Jobs (Number)	Earnings ($)	Economic Activity (Output) ($)
Commercial Service					
Bullhead City	Laughlin/Bullhead International	IFP	135	$7,490,844	$22,114,258
Flagstaff	Flagstaff Pulliam	FLG	162	$8,997,996	$26,238,188
Grand Canyon	Grand Canyon National Park	GCN	312	$17,154,399	$50,917,193
Page	Page Municipal	PGA	85	$4,740,717	$13,691,692
Peach Springs	Grand Canyon West	1G4	123	$6,702,909	$20,139,974
Phoenix	Phoenix Sky Harbor	PHX	58,600	$3,174,805,561	$8,188,913,210
Phoenix	Phoenix-Mesa Gateway	IWA	1,661	$99,080,715	$301,889,454
Prescott	Prescott Regional - Ernest A. Love Field	PRC	207	$12,358,293	$35,277,040
Show Low	Show Low Regional	SOW	19	$1,073,028	$3,091,140
Tucson	Tucson International	TUS	5,895	$367,000,409	$1,192,926,562
Yuma	Yuma International	NYL	167	$9,316,489	$26,962,964
General Aviation					
Ajo	Eric Marcus Municipal	P01	<1	$6,066	$18,887
Bagdad	Bagdad	E51	1	$65,273	$183,532
Benson	Benson Municipal	E95	4	$209,384	$609,918
Bisbee	Bisbee Municipal	P04	1	$34,947	$95,969
Buckeye	Buckeye Municipal	BXK	39	$2,813,065	$12,907,005
Casa Grande	Casa Grande Municipal	CGZ	34	$1,928,944	$5,563,508
Chandler	Chandler Municipal	CHD	71	$3,878,631	$11,564,108
Chinle	Chinle Municipal	E91	1	$56,895	$165,207
Cibecue	Cibecue	Z95	<1	$28,897	$76,372
Clifton	Greenlee County	CFT	1	$37,174	$102,130
Colorado City	Colorado City Municipal	AZC	2	$112,252	$311,867
Coolidge	Coolidge Municipal	P08	20	$1,045,130	$3,336,053
Cottonwood	Cottonwood Municipal	P52	19	$1,020,909	$3,045,737

Associated City	Airport Name	FAA ID	Indirect Impacts		
			Jobs (Number)	Earnings ($)	Economic Activity (Output) ($)
Douglas	Bisbee-Douglas International	DUG	7	$444,881	$1,190,864
Douglas	Cochise College	P03	11	$549,953	$1,832,098
Douglas	Douglas Municipal	DGL	6	$305,854	$978,928
Eloy	Eloy Municipal	E60	23	$1,381,672	$2,376,802
Gila Bend	Gila Bend Municipal	E63	1	$53,446	$152,920
Glendale	Glendale Municipal	GEU	73	$4,196,468	$11,870,241
Globe	San Carlos Apache	P13	<1	$20,905	$57,137
Goodyear	Phoenix Goodyear	GYR	223	$11,738,173	$26,828,815
Holbrook	Holbrook Municipal	P14	<1	$13,004	$35,199
Kayenta	Kayenta	0V7	4	$208,698	$657,172
Kearny	Kearny	E67	1	$74,189	$196,138
Kingman	Kingman	IGM	137	$8,750,771	$25,598,150
Lake Havasu City	Lake Havasu City	HII	41	$2,624,006	$7,857,079
Marana	Marana Regional	AVQ	59	$3,326,213	$9,565,491
Marana	Pinal Airpark	MZJ	98	$5,920,854	$15,651,679
Maricopa	Ak Chin Regional	A39	4	$207,179	$611,187
Mesa	Falcon Field	FFZ	628	$44,195,930	$192,493,051
Nogales	Nogales International	OLS	11	$668,967	$1,840,438
Parker	Avi Suquilla	P20	8	$428,384	$1,242,549
Payson	Payson	PAN	13	$755,898	$2,202,814
Phoenix	Phoenix Deer Valley	DVT	703	$36,755,775	$85,872,363
Polacca	Polacca	P10	<1	$19,469	$51,557
Safford	Safford Regional	SAD	13	$747,999	$2,273,038
San Luis	Rolle Airfield	44A	<1	$377	$1,127
San Manuel	San Manuel	E77	1	$77,559	$226,239
Scottsdale	Scottsdale	SDL	1,244	$68,419,961	$189,197,357
Sedona	Sedona	SEZ	38	$2,094,087	$6,100,445

Associated City	Airport Name	FAA ID	Indirect Impacts		
			Jobs (Number)	Earnings ($)	Economic Activity (Output) ($)
Seligman	Seligman	P23	1	$65,484	$178,365
Sells	Sells	E78	<1	$17,203	$45,820
Sierra Vista	Sierra Vista Municipal-Libby Army Airfield	FHU	8	$428,967	$1,277,149
Springerville	Springerville Municipal	JTC	5	$297,094	$918,828
St. Johns	St. Johns Industrial Air Park	SJN	4	$195,036	$564,339
Superior	Superior	E81	<1	$698	$2,138
Taylor	Taylor	TYL	1	$44,738	$121,062
Tombstone	Tombstone Municipal	P29	<1	$2,368	$7,415
Tuba City	Tuba City	T03	<1	$17,335	$46,175
Tucson	Ryan Field	RYN	51	$2,335,168	$8,702,974
Whiteriver	Whiteriver	E24	1	$52,837	$151,535
Wickenburg	Wickenburg Municipal	E25	12	$708,817	$1,965,308
Willcox	Cochise County	P33	3	$143,475	$415,946
Williams	H.A. Clark Memorial Field	CMR	6	$363,485	$970,614
Window Rock	Window Rock	RQE	1	$33,486	$91,497
Winslow	Winslow-Lindbergh Regional	INW	4	$255,736	$774,819
Total			**71,004**	**$3,918,901,526**	**$10,523,336,831**

Sources: IHS Markit 2021, IMPLAN 2019

Table A.3. Economic Impacts by Type – Induced Economic Impacts

Associated City	Airport Name	FAA ID	Induced Impacts		
			Jobs (Number)	Earnings ($)	Economic Activity (Output) ($)
Commercial Service					
Bullhead City	Laughlin/Bullhead International	IFP	203	$9,832,612	$30,850,027
Flagstaff	Flagstaff Pulliam	FLG	221	$10,686,284	$33,528,251
Grand Canyon	Grand Canyon National Park	GCN	360	$17,461,932	$54,791,211
Page	Page Municipal	PGA	122	$5,906,819	$18,533,564
Peach Springs	Grand Canyon West	1G4	157	$7,586,325	$23,804,096
Phoenix	Phoenix Sky Harbor	PHX	107,569	$5,841,119,879	$15,862,636,535
Phoenix	Phoenix-Mesa Gateway	IWA	2,561	$124,062,775	$389,293,243
Prescott	Prescott Regional - Ernest A. Love Field	PRC	349	$16,915,090	$53,081,150
Show Low	Show Low Regional	SOW	35	$1,714,363	$5,379,135
Tucson	Tucson International	TUS	13,247	$452,518,336	$1,341,188,648
Yuma	Yuma International	NYL	293	$14,204,164	$44,570,709
General Aviation					
Ajo	Eric Marcus Municipal	P01	<1	$7,333	$23,009
Bagdad	Bagdad	E51	2	$83,896	$263,218
Benson	Benson Municipal	E95	5	$246,909	$774,741
Bisbee	Bisbee Municipal	P04	1	$40,575	$127,317
Buckeye	Buckeye Municipal	BXK	65	$3,140,700	$9,856,443
Casa Grande	Casa Grande Municipal	CGZ	42	$2,048,915	$6,427,950
Chandler	Chandler Municipal	CHD	101	$4,900,371	$15,374,800
Chinle	Chinle Municipal	E91	1	$67,043	$210,368
Cibecue	Cibecue	Z95	1	$33,225	$104,256
Clifton	Greenlee County	CFT	1	$43,474	$136,415
Colorado City	Colorado City Municipal	AZC	3	$134,223	$421,144
Coolidge	Coolidge Municipal	P08	33	$1,577,265	$4,948,804
Cottonwood	Cottonwood Municipal	P52	25	$1,211,723	$3,801,860

Associated City	Airport Name	FAA ID	Induced Impacts		
			Jobs (Number)	Earnings ($)	Economic Activity (Output) ($)
Douglas	Bisbee-Douglas International	DUG	29	$1,385,465	$4,347,771
Douglas	Cochise College	P03	18	$877,283	$2,752,675
Douglas	Douglas Municipal	DGL	11	$515,623	$1,617,849
Eloy	Eloy Municipal	E60	30	$574,926	$4,244,343
Gila Bend	Gila Bend Municipal	E63	1	$63,104	$198,010
Glendale	Glendale Municipal	GEU	104	$5,037,429	$15,802,422
Globe	San Carlos Apache	P13	<1	$24,131	$75,719
Goodyear	Phoenix Goodyear	GYR	291	$14,414,814	$47,797,506
Holbrook	Holbrook Municipal	P14	<1	$14,200	$44,559
Kayenta	Kayenta	0V7	7	$358,251	$1,123,941
Kearny	Kearny	E67	1	$72,123	$226,193
Kingman	Kingman	IGM	197	$9,540,497	$29,931,116
Lake Havasu City	Lake Havasu City	HII	41	$1,097,245	$3,154,063
Marana	Marana Regional	AVQ	84	$4,092,386	$12,838,532
Marana	Pinal Airpark	MZJ	119	$5,782,182	$18,134,375
Maricopa	Ak Chin Regional	A39	5	$244,962	$768,638
Mesa	Falcon Field	FFZ	1,870	$93,798,998	$195,325,432
Nogales	Nogales International	OLS	16	$757,230	$2,375,197
Parker	Avi Suquilla	P20	11	$549,877	$1,725,359
Payson	Payson	PAN	19	$914,477	$2,868,974
Phoenix	Phoenix Deer Valley	DVT	943	$51,105,392	$167,158,761
Polacca	Polacca	P10	<1	$22,396	$70,277
Safford	Safford Regional	SAD	34	$1,635,138	$5,130,876
San Luis	Rolle Airfield	44A	<1	$611	$1,916
San Manuel	San Manuel	E77	2	$98,546	$309,219
Scottsdale	Scottsdale	SDL	1,486	$75,784,902	$252,387,136
Sedona	Sedona	SEZ	51	$2,493,935	$7,825,022

Associated City	Airport Name	FAA ID	Induced Impacts		
			Jobs (Number)	Earnings ($)	Economic Activity (Output) ($)
Seligman	Seligman	P23	2	$75,613	$237,261
Sells	Sells	E78	<1	$19,824	$62,205
Sierra Vista	Sierra Vista Municipal-Libby Army Airfield	FHU	12	$586,426	$1,839,851
Springerville	Springerville Municipal	JTC	10	$466,098	$1,462,437
St. Johns	St. Johns Industrial Air Park	SJN	5	$229,370	$719,722
Superior	Superior	E81	<1	$834	$2,616
Taylor	Taylor	TYL	1	$51,704	$162,239
Tombstone	Tombstone Municipal	P29	<1	$2,849	$8,938
Tuba City	Tuba City	T03	<1	$19,964	$62,645
Tucson	Ryan Field	RYN	42	$2,046,359	$4,630,520
Whiteriver	Whiteriver	E24	12	$603,762	$1,895,105
Wickenburg	Wickenburg Municipal	E25	16	$761,407	$2,388,376
Willcox	Cochise County	P33	3	$161,946	$508,031
Williams	H.A. Clark Memorial Field	CMR	8	$368,326	$1,155,185
Window Rock	Window Rock	RQE	1	$38,830	$121,843
Winslow	Winslow-Lindbergh Regional	INW	8	$380,894	$1,194,855
Total			**130,890**	**$6,792,614,560**	**$18,694,814,603**

Sources: IHS Markit 2021, IMPLAN 2019

Table A.4. Economic Impacts by Type – Total Economic Impacts of Arizona Airports

Associated City	Airport Name	FAA ID	Total Impacts		
			Jobs (Number)	Earnings ($)	Economic Activity (Output) ($)
Commercial Service					
Bullhead City	Laughlin/Bullhead International	IFP	930	$41,534,896	$111,509,452
Flagstaff	Flagstaff Pulliam	FLG	971	$45,140,425	$128,520,058
Grand Canyon	Grand Canyon National Park	GCN	1,658	$73,774,781	$210,906,494
Page	Page Municipal	PGA	512	$24,953,969	$71,455,881
Peach Springs	Grand Canyon West	1G4	797	$32,051,682	$91,793,254
Phoenix	Phoenix Sky Harbor	PHX	303,699	$15,860,822,326	$45,092,146,268
Phoenix	Phoenix-Mesa Gateway	IWA	10,224	$524,191,698	$1,761,781,074
Prescott	Prescott Regional - Ernest A. Love Field	PRC	1,220	$71,481,668	$194,309,387
Show Low	Show Low Regional	SOW	118	$7,242,668	$18,809,213
Tucson	Tucson International	TUS	45,785	$2,546,094,928	$8,288,987,521
Yuma	Yuma International	NYL	1,150	$60,015,772	$159,659,833
General Aviation					
Ajo	Eric Marcus Municipal	P01	1	$30,981	$86,818
Bagdad	Bagdad	E51	6	$354,370	$1,004,825
Benson	Benson Municipal	E95	24	$1,043,173	$3,180,687
Bisbee	Bisbee Municipal	P04	3	$171,434	$556,641
Buckeye	Buckeye Municipal	BXK	196	$13,274,228	$77,434,172
Casa Grande	Casa Grande Municipal	CGZ	196	$8,653,334	$24,220,702
Chandler	Chandler Municipal	CHD	479	$20,699,497	$55,803,285
Chinle	Chinle Municipal	E91	6	$283,263	$871,623
Cibecue	Cibecue	Z95	2	$140,384	$473,460
Clifton	Greenlee County	CFT	3	$183,687	$593,015
Colorado City	Colorado City Municipal	AZC	10	$567,036	$1,849,270
Coolidge	Coolidge Municipal	P08	146	$6,662,991	$15,904,315
Cottonwood	Cottonwood Municipal	P52	107	$5,118,717	$13,664,369

Associated City	Airport Name	FAA ID	Total Impacts		
			Jobs (Number)	Earnings ($)	Economic Activity (Output) ($)
Douglas	**Bisbee-Douglas International**	**DUG**	100	$5,855,012	$11,362,710
Douglas	**Cochise College**	**P03**	91	$3,706,365	$8,553,708
Douglas	Douglas Municipal	DGL	38	$2,178,306	$5,194,366
Eloy	Eloy Municipal	E60	247	$13,262,310	$25,903,068
Gila Bend	Gila Bend Municipal	E63	6	$266,622	$823,121
Glendale	Glendale Municipal	GEU	404	$21,271,234	$54,800,049
Globe	San Carlos Apache	P13	2	$101,958	$332,382
Goodyear	Phoenix Goodyear	GYR	1,008	$59,006,891	$156,651,364
Holbrook	Holbrook Municipal	P14	1	$60,000	$230,449
Kayenta	Kayenta	0V7	26	$1,513,084	$3,374,622
Kearny	Kearny	E67	5	$319,598	$804,917
Kingman	Kingman	IGM	599	$40,293,233	$137,319,200
Lake Havasu City	Lake Havasu City	HII	202	$10,394,626	$30,544,507
Marana	Marana Regional	AVQ	363	$17,282,810	$43,772,689
Marana	Pinal Airpark	MZJ	382	$24,403,057	$61,479,163
Maricopa	Ak Chin Regional	A39	25	$1,034,962	$3,115,139
Mesa	Falcon Field	FFZ	4,207	$249,411,811	$868,357,662
Nogales	Nogales International	OLS	57	$3,196,804	$8,207,145
Parker	Avi Suquilla	P20	45	$2,323,120	$7,048,231
Payson	Payson	PAN	84	$3,862,283	$10,993,914
Phoenix	Phoenix Deer Valley	DVT	3,097	$182,330,133	$508,276,499
Polacca	Polacca	P10	1	$94,631	$318,558
Safford	Safford Regional	SAD	106	$6,908,933	$15,165,163
San Luis	Rolle Airfield	44A	<1	$2,579	$5,543
San Manuel	San Manuel	E77	8	$416,364	$1,238,285
Scottsdale	Scottsdale	SDL	5,970	$320,160,508	$1,000,728,514
Sedona	Sedona	SEZ	230	$10,535,634	$32,147,676

Associated City	Airport Name	FAA ID	Total Impacts		
			Jobs (Number)	Earnings ($)	Economic Activity (Output) ($)
Seligman	Seligman	P23	5	$319,475	$1,036,979
Sells	Sells	E78	1	$83,762	$280,293
Sierra Vista	Sierra Vista Municipal-Libby Army Airfield	FHU	55	$2,683,909	$7,856,741
Springerville	Springerville Municipal	JTC	34	$1,969,023	$5,062,826
St. Johns	St. Johns Industrial Air Park	SJN	22	$969,112	$2,988,021
Superior	Superior	E81	<1	$3,523	$10,152
Taylor	Taylor	TYL	3	$218,460	$721,923
Tombstone	Tombstone Municipal	P29	<1	$12,035	$33,682
Tuba City	Tuba City	T03	1	$84,354	$281,823
Tucson	Ryan Field	RYN	216	$9,761,432	$34,911,605
Whiteriver	Whiteriver	E24	31	$2,552,775	$4,786,391
Wickenburg	Wickenburg Municipal	E25	62	$3,214,673	$8,610,244
Willcox	Cochise County	P33	15	$683,861	$1,892,734
Williams	H.A. Clark Memorial Field	CMR	25	$1,554,543	$3,864,996
Window Rock	Window Rock	RQE	3	$164,064	$536,421
Winslow	Winslow-Lindbergh Regional	INW	34	$1,608,343	$3,725,085
Total			**386,057**	**$20,350,564,120**	**$59,398,870,180**

Sources: IHS Markit 2021, IMPLAN 2019

Table A.5. Taxes Stimulated by Arizona Airports

Associated City	Airport Name	FAA ID	Total Tax Impacts ($)
Commercial Service			
Bullhead City	Laughlin/Bullhead International	IFP	$5,547,976
Flagstaff	Flagstaff Pulliam	FLG	$7,622,421
Grand Canyon	Grand Canyon National Park	GCN	$12,508,694
Page	Page Municipal	PGA	$4,237,991
Peach Springs	Grand Canyon West	1G4	$4,567,028
Phoenix	Phoenix Sky Harbor	PHX	$2,565,750,689
Phoenix	Phoenix-Mesa Gateway	IWA	$100,245,639
Prescott	Prescott Regional - Ernest A. Love Field	PRC	$12,411,390
Show Low	Show Low Regional	SOW	$1,284,983
Tucson	Tucson International	TUS	$566,386,518
Yuma	Yuma International	NYL	$8,984,521
General Aviation			
Ajo	Eric Marcus Municipal	P01	$5,932
Bagdad	Bagdad	E51	$64,183
Benson	Benson Municipal	E95	$190,178
Bisbee	Bisbee Municipal	P04	$33,282
Buckeye	Buckeye Municipal	BXK	$4,406,017
Casa Grande	Casa Grande Municipal	CGZ	$794,134
Chandler	Chandler Municipal	CHD	$3,175,216
Chinle	Chinle Municipal	E91	$57,079
Cibecue	Cibecue	Z95	$32,345
Clifton	Greenlee County	CFT	$25,044
Colorado City	Colorado City Municipal	AZC	$92,008
Coolidge	Coolidge Municipal	P08	$521,461
Cottonwood	Cottonwood Municipal	P52	$872,803
Douglas	Bisbee-Douglas International	DUG	$679,394
Douglas	Cochise College	P03	$511,440
Douglas	Douglas Municipal	DGL	$310,579
Eloy	Eloy Municipal	E60	$849,295
Gila Bend	Gila Bend Municipal	E63	$46,836
Glendale	Glendale Municipal	GEU	$3,118,132
Globe	San Carlos Apache	P13	$18,564
Goodyear	Phoenix Goodyear	GYR	$8,913,489
Holbrook	Holbrook Municipal	P14	$15,743
Kayenta	Kayenta	0V7	$230,543
Kearny	Kearny	E67	$26,391

Associated City	Airport Name	FAA ID	Total Tax Impacts ($)
Kingman	Kingman	IGM	$6,832,099
Lake Havasu City	Lake Havasu City	HII	$1,519,693
Marana	Marana Regional	AVQ	$2,990,988
Marana	Pinal Airpark	MZJ	$2,015,743
Maricopa	Ak Chin Regional	A39	$102,137
Mesa	Falcon Field	FFZ	$49,409,697
Nogales	Nogales	OLS	$547,939
Parker	Avi Suquilla	P20	$750,023
Payson	Payson	PAN	$614,033
Phoenix	Phoenix Deer Valley	DVT	$28,921,018
Polacca	Polacca	P10	$21,763
Safford	Safford Regional	SAD	$481,918
San Luis	Rolle Airfield	44A	$312
San Manuel	San Manuel	E77	$40,600
Scottsdale	Scottsdale	SDL	$56,941,620
Sedona	Sedona	SEZ	$2,053,413
Seligman	Seligman	P23	$66,236
Sells	Sells	E78	$19,152
Sierra Vista	Sierra Vista Municipal-Libby Army Airfield	FHU	$469,767
Springerville	Springerville Municipal	JTC	$331,545
St. Johns	St. Johns Industrial Air Park	SJN	$195,674
Superior	Superior	E81	$333
Taylor	Taylor	TYL	$49,319
Tombstone	Tombstone Municipal	P29	$2,014
Tuba City	Tuba City	T03	$16,715
Tucson	Ryan Field	RYN	$2,385,510
Whiteriver	Whiteriver	E24	$326,990
Wickenburg	Wickenburg Municipal	E25	$489,924
Willcox	Cochise County	P33	$113,170
Williams	H.A. Clark Memorial Field	CMR	$229,230
Window Rock	Window Rock	RQE	$35,128
Winslow	Winslow-Lindbergh Regional	INW	$254,485
Total			**$3,472,766,126**

Source: IHS Markit 2021, IMPLAN 2019

Appendix B. World-class Aviation Businesses

For nearly 100 years, Arizona's sunny skies and expansive landscape have attracted pilots, corporations, and military personnel to fly and do business in the Grand Canyon State. The state's natural, cultural, and economic environment make Arizona an exceptional place to conduct several types of unique aviation activities. Today, Arizona's 67 public-use airports support a variety of activities that not only generate economic growth, but also promote the safety, accessibility, and security of the communities they serve; attract visitors from around the world; and prepare future professionals for careers in aviation and aerospace industries.

The Arizona Department of Transportation (ADOT) Aeronautics Group identified specific sectors of Arizona's aviation industry in which businesses are both unique in nature and significantly influence the overall aviation industry. These "world-class" aviation business sectors include skydiving operations, glider operations and soaring, aerial tour operations, and aviation-related higher education and flight training. The impacts of these world-class businesses and organizations extend far beyond Arizona's borders. In the following analysis, the qualitative and quantitative impacts of these business sectors are highlighted, along with case studies of some of the businesses and airports that support the activities that make Arizona aviation so unique. The analysis includes the following sections:

- Economic impacts of Arizona's world-class aviation businesses
- World-class aviation activities
  - Skydiving
  - Glider operations/soaring
  - Aerial tours
  - Aviation-related education and flight training
- Summary

Economic Impacts of Arizona's World-class Aviation Businesses

To calculate the economic impacts associated with Arizona's world-class aviation businesses, the project team identified businesses using the North American Industry Classification System (NAICS). The NAICS codes used in the analysis included flight training (NAICS industry code 611512) and scenic or sightseeing transportation (industry code 487990), which encompasses skydiving, gliding/soaring, and aerial tour operations. Statewide employment data for these industries were obtained from the U.S. Bureau of Labor Statistics (BLS). Employment data from Embry-Riddle Aeronautical University's (ERAU) Prescott campus were collected independently from data published by the university. Because ERAU is involved with aviation-related education more broadly, it is categorized as an institution of higher education within NAICS unlike other flight training operations in the state. As a result, the relevant ERAU data were added to the flight training data collected through the NAICS code for flight training. Once employment data were compiled, it was modeled in IMPLAN.

Arizona's world-class aviation businesses contributed $426.0 million in value added to the gross state product (GSP), illustrating the significance of these activities in the state economy.

As shown in **Table B.1**, Arizona's world-class aviation industries as identified by the 2021 Arizona AEIS and ERAU's Arizona operations generated $356.0 million of direct economic activity or output in 2019. These businesses directly supported 2,016 jobs, generating nearly $165.0 million in employee earnings. These businesses purchased goods and services from other vendors in the state, generating $205.2 million of indirect economic activity. Additionally, employees spent their earned wages at stores, restaurants, and businesses in the state, generating $236.3 million in induced economic activity. In all, the world-class aviation businesses included in this analysis contributed nearly $797.5 million in total economic output to the state economy in 2019, supporting a total of 4,746 jobs and more than $317.7 million in earnings.

Table B.1. 2019 Economic Impacts of World-class Businesses

Economic Impact Type	Employment	Earnings	Economic Output
Direct Impacts	2,016	$164,974,600	$356,017,781
Indirect Impacts	1,234	$77,480,263	$205,198,758
Induced Impacts	1,497	$75,290,103	$236,251,601
Total Impacts	4,746	$317,744,960	$797,468,140

Note: World-class businesses include on-airport businesses involved in skydiving, gliding, flight training, and aerial tours, plus the off-airport activities of Embry-Riddle Aeronautical University in Prescott. Sources: IHS Markit 2021, IMPLAN 2019

In the following sections, the 2021 Arizona AEIS provides an overview of each business sector included in this analysis and highlights an Arizona airport uniquely involved in the success of business activities within the state.

World-class Aviation Activities

The following case studies highlight some of Arizona's most unique aviation-related activities and demonstrate the state's position in the global aviation industry as a host to many activities that draw customers and visitors from other states and countries around the world.

WORLD-CLASS AVIATION ACTIVITY: SKYDIVING

Since its creation, aviation has been a vital catalyst for tourism and trade, allowing travelers and goods to access remote and/or foreign areas of the world. In certain cases, aviation itself is an attraction for visitors. Skydiving is one of these attractions. Thrill-seekers are drawn to dedicated skydiving operators at five Arizona airports that offer opportunities to skydive above stunning scenery at the Grand Canyon, Sonoran Desert, and Phoenix metropolitan area. Most visitors using these airports to skydive also dine at local restaurants, stay at nearby hotels, and shop at local stores, greatly increasing the economic activity generated by the airports.

Eloy Municipal (E60) – Skydive Arizona

Operating out of Eloy Municipal Airport (E60) in south-central Arizona, Skydive Arizona is a premier destination for professional skydivers and new thrill-seekers alike. Since moving to Eloy in 1991, Skydive Arizona has grown into one of the largest skydiving facilities in the world, as it conducts over 135,000 jumps per year. Skydive Arizona is able to operate an average of 340 days annually thanks to the region's clear skies and pleasant weather. Located less than four miles from Interstate 10 and the City of Eloy, Skydive Arizona is easily accessible from the Phoenix and Tucson metropolitan areas.

Skydive Arizona relies on more than 30 staff members to provide instruction, videography, and rigging for thousands of skydivers per year. The company has 19 highly qualified instructors including multiple former and current national and world champion skydivers. Skydive Arizona operates five De Havilland DHC-6 Twin Otter, seven Short SC.7 Skyvans, one Douglas DC-3, one Beechcraft 18, and one Pilatus Porter. Skydive Arizona's 15-aircraft fleet can carry 240 jumpers simultaneously and typically conduct around 330 jumps per day.

Customers of Skydive Arizona can complete first-time tandem jumps with an experienced staff member or train to obtain a skydiving license which allows the individual to conduct solo jumps. Skydive Arizona adheres to Federal Aviation Administration (FAA) and United States Parachuting Association (USPA) standards when conducting all rigging, jumping, and instruction. The company offers the Accelerated Skydiving Program (ASP), in which students attend the on-site Class-A ground school, utilize an indoor skydiving facility, and complete other USPA requirements to earn their Class-A skydive license in as little as a week if they so choose.

Skydive Arizona's vertical wind tunnel

In addition to tandem skydiving and instructional services, Skydive Arizona also offers special aerial services through their film office. Their aerial stunt services staff are top-tier aerial specialists with a combined number of 48 competitive gold medals earned over 87 years of experience and 48,000 jumps. Cinematographers utilize top-of-the-line filming equipment and industry expertise to capture stunts for productions. The film office has aided in the production of numerous projects including blockbuster films, award ceremony stunts, Super Bowl commercials, and other nationally televised programs. Skydive Arizona hosts a number of events each year including the USPA Collegiate National Championships, parachute team training courses, night jumps, and various community events which garner participants and spectators from around the world.

Skydive Arizona's ground facilities are located adjacent to E60, and the company maintains a through-the-fence agreement with the airport to access the airfield facilities. As Skydive Arizona has grown, the company has expanded into different sectors and has attracted several other businesses to E60. Skydive Arizona offers customers and visitors lodging, a fitness center, pool, showers, laundry facilities, and debriefing rooms. Skydive Arizona also operates SkyVenture Arizona, a vertical wind tunnel for indoor skydiving; Square 2, a skydiving pro-shop; and Desert Sky Rigging which offers FAA-certified parachute rigging, inspection, maintenance, and repair. Other businesses that operate at E60 include the Bent Prop Saloon and Cookery and Axis Flight School, both located on the grounds of Skydive Arizona, as well as the Skyrider Suites hotel which provides lodging for visitors. The operations of Skydive Arizona and the other businesses at E60 generate substantial economic activity throughout the local and state economy, making it a truly world-class business.

WORLD-CLASS AVIATION ACTIVITY: GLIDER OPERATIONS/ SOARING

Harnessing the power of the wind instead of Avgas or Jet A fuel, gliding and soaring are some of the most unique activities in the GA industry. Due in large part to the state's diverse terrain and consistently sunny weather, Arizona is an oasis for glider and sailplane pilots from around the globe. Mountain ranges and hot desert valleys provide ideal thermal conditions for soaring over picturesque scenery. Arizona is home to five soaring clubs, three of which are located at publicly owned, public-use airports, and two of which are located at privately-owned airports. Estrella Sailport (E68), a privately owned airport that almost exclusively supports soaring operations, is highlighted in the case study below. Eleven additional publicly-owned GA airports indicated occasional use by gliders and sailplanes. The economic activity generated by users of these soaring clubs and their users contribute to the total economic output of aviation in Arizona.

Arizona Soaring, Inc. – Estrella Sailport (E68)

Nestled south of the Estrella Mountains and a 15-minute drive west of Maricopa is Estrella Sailport, home of Arizona Soaring. Arizona Soaring is one of the premier glider and sailplane operators in the nation. The business attracts aspiring students, veteran gliding/soaring pilots, and visitors from around the globe. The facility benefits from Arizona's year-round flying weather and uncongested airspace just outside of the busy Phoenix metropolitan area. Arizona Soaring is primarily focused on providing glider pilot training for beginners and experienced pilots, but also offers glider rides to non-pilots. New students learn the basics of soaring during the training program, which typically takes three to four weeks. Since sailplanes are nonmotorized, a person as young as fourteen can fly solo and work to obtain a glider pilot certificate. Many glider pilots continue their education to transition from sailplanes to powered aircraft to fly recreationally or fill commercial pilot positions. Approximately 60 check rides – test flights required for pilot certification – are completed annually at E68, over half of which are conducted by pilots who reside outside of Arizona and many of whom travel from foreign countries.

Gliders at E68

Pilots who have already earned their glider or powered-aircraft certifications can pursue several specialty courses including aerobatic glider, tow pilot, commercial glider, and glider flight instructor training. Aerobatic glider students learn gravity-defying stunts such as inverted flights, rolls, spins, and loops that are frequently used in glider competitions. Arizona Soaring hosted the inaugural Estrella Classic in 2020, a glider competition that allowed glider pilots to compete in performing complex aerobatic maneuvers. The second annual Estrella Classic was held in March 2021 and brought 24 competitors and dozens of supporters from around the country to participate in the three-day event. The event was the first glider-only aerobatics competition sanctioned by the International Aerobatics Club (IAC).

The origins of Arizona Soaring are steeped in aerobatic gliding expertise through the merits of former owner Les Horvath and current owner Jason Stephens. Les Horvath is a five-time U.S. national champion aerobatic glider pilot who has trained and mentored hundreds of glider pilots throughout his career. The program is currently run by owner Jason Stephens. A similarly accomplished multi-time U.S. national champion aerobatics glider pilot, Jason has nearly 20 years of glider instruction experience.

Since its early beginnings, Arizona Soaring has grown alongside the development of the nearby city of Maricopa and is a vital asset to the community. Originally established in 1969, the family-owned business celebrated its 53rd anniversary in April 2021. Arizona Soaring continues to expand its global reach each year and is dedicated to generating interest in aviation among people of all ages. The business is widely supported by the local community, as it attracts local and international clients who generate economic activity throughout the area.

WORLD-CLASS AVIATION ACTIVITY: AERIAL TOURS

For centuries, the diverse landscape of the American Southwest has attracted visitors from around the world wishing to experience the region's many natural wonders. The advent of aviation provided a new opportunity for tourism, as aircraft offered a new viewpoint for tourists. Air tour operations began in Arizona when Grand Canyon Scenic Airlines (or GCSA) was established in 1927. GCSA was responsible for the construction of what would become Phoenix-Sky Harbor International Airport (PHX) and has continued to offer fixed-wing charter flights across northern Arizona for more than 90 years. Today, 18 companies in the state conduct aerial tours of destinations including the Grand Canyon, Horseshoe Bend, Sedona, Canyon De Chelly, the Vermilion Cliffs, Lake Powell, and Lake Mead. Ten airports in Arizona reported supporting aerial tours, but the majority of these activities occurred at just three facilities: Page Municipal (PGA), Grand Canyon National Park (GCN), and Grand Canyon West (1G4) airports. These three airports collectively recorded more than 425,000 passenger enplanements in 2019, with nearly all of them attributed to aerial tours.

Grand Canyon National Park (GCN) – Aerial Helicopter Tour Operators

Located less than seven miles from the south rim of the Grand Canyon, Grand Canyon National Park Airport (GCN) is ideally situated to provide aerial tour operators quick and easy access to one of the natural wonders of the world. GCN's 8,999-foot-long by 150-foot-wide runway allows the airport to accommodate aircraft as large as Air Force One; however, most aerial tour flights operate from the 30 dedicated helipads located around the airport. In a typical year, helicopters and aircraft owned by four companies generally fly 10 hours a day nearly 365 days a year.

GCSA DHC-6 Twin-Otter aircraft at GCN

Helicopter tours of the Grand Canyon that are popular today did not begin in Arizona until 1965, when Elling Halvorson was asked to conduct scenic flights while transporting pipeline construction workers into and out of the Grand Canyon. Halvorson founded Grand Canyon Helicopters the same year and began operating flights from the company's terminal in Tusayan, one mile north of GCN. Grand Canyon Helicopters grew quickly, initially purchasing GCSA in 1967 and eventually Papillon in 1986. The company continued to expand and is now the oldest and largest aerial tour operator in the world. Today, the company operates the Papillon, Grand Canyon Helicopters, and Grand Canyon Scenic Airlines brands—all of which fly out of GCN. By the time the company celebrated its 50th anniversary in 2015, Papillon Grand Canyon Helicopters owned a fleet of 75 helicopters flying from five airports in northern Arizona and southern Nevada. While the company is headquartered at McCarran International Airport in Las Vegas, GCN is the company's busiest terminal in terms of passenger enplanements.

Papillon opened its current terminal building at GCN in 1996, and the brand is now the largest operator at the airport. Papillon runs a terminal, hangar, and 20 dedicated helipads located on the north end of the airport. Grand Canyon Helicopters is housed in a separate terminal located directly west of the airport's main terminal. Finally, Grand Canyon Scenic Airlines operates their air charter service and fixed base operator (FBO) service from a terminal adjacent to the main airport terminal on the primary apron. Papillon and Grand Canyon Helicopters utilize Airbus H130 ECO-Star, AS350 A-Star, and Bell 206 Jet Ranger helicopters. GCSA operates single-engine Cessna 208B Grand Caravan and De Havilland DHC-6 Twin Otter twin-turboprop aircraft from PGA, GCN, and 1G4.[1]

Other large aerial tour operators at these airports include Maverick Aviation Group and Westwind Air Service. Maverick Aviation Group owns Maverick Helicopters and Maverick Airlines. Founded in 1995, Maverick Helicopters offers scenic flights from GCN and 1G4 using a fleet of 47 ECO-Star helicopters.[2] Maverick Airlines, meanwhile, uses Beechcraft 1900D aircraft to transport passengers from the company's main hub in Las Vegas to GCN and 1G4, where passengers can transfer to helicopters or ground tours. Westwind Air Service provides charter service to and from Phoenix/Scottsdale via Phoenix Deer Valley Airport (DVT), Sedona via Sedona Municipal Airport (SEZ), and Flagstaff via Flagstaff Pulliam Airport (FLG), in addition to service at PGA and GCN.

WORLD-CLASS AVIATION ACTIVITY: AVIATION-RELATED EDUCATION AND FLIGHT TRAINING

Education is vital to the ongoing prosperity of the aviation industry, as new pilots, mechanics, air traffic controllers, and dispatchers, as well as other aviation professionals, must be trained before joining the industry's ever-growing workforce. Arizona is home to many aviation training programs that range from small private flight schools to large universities that educate thousands of students each year. Detailed in the case studies below, Embry-Riddle Aeronautical University (ERAU or Embry-Riddle) at Prescott Regional – Ernest A. Love Field (PRC) and CAE Phoenix Aviation Academy (or CAE Phoenix) at Falcon Field (FFZ) are the two largest aviation education programs in the state. Both companies specialize in professional pilot training and aviation-related higher education. In addition, more than 50 businesses conduct flight training activities at 40 other airports around the state. Many of these organizations provide education for prospective employees of airlines, aerospace companies, and government agencies, as well as those wishing to join the vast community of recreational pilots in Arizona and beyond.

Due to the importance of aviation education to the industry and statewide economy, the ADOT Aeronautics Group determined that it would be beneficial to specifically highlight the substantial economic impact of aviation-related education in the 2021 Arizona AEIS. **Table B.2** presents the total economic impacts generated by aviation education institutions including ERAU, CAE Phoenix Aviation Academy, and other dedicated flight training establishments statewide.[3] In total, aviation-related higher education programs generated nearly $708.5 million in economic activity in 2019. It is important to note that these impacts are included in the total impacts associated with all world-class aviation businesses in the state (presented in **Table B.1**).

1 Papillon. (n.d.) "Our Aircraft Fleet." Available online at https://www.papillon.com/about-papillon/our-aircraft-fleet (accessed December 2020)

2 Maverick Helicopters Press Release (2016). "Maverick Helicopters Celebrates 20 years of Success." Available online at https://verticalmag.com/press-releases/maverick-helicopters-celebrates-20-years-success/ (accessed December 2020).

3 The economic impacts of world-class aviation education programs presented in this section of the analysis include both the activities of ERAU at the school's main campus in the city of Prescott and the Flight Operations Center on the grounds of PRC. However, the total impacts of Arizona's 67 publicly owned, public-use airports reported in Chapter 2 of the 2021 Arizona AEIS Technical Report only include the economic impacts of ERAU's on-airport operations at PRC.

Table B.2. 2019 Economic Impacts of Aviation-related Education and Flight Training

Total Jobs	Total Earnings	Total Economic Output
4,217	$282,282,355	$708,465,004

Sources: IHS Markit 2021, IMPLAN 2019

Prescott Regional Airport - Ernest A. Love Field (PRC) – Embry-Riddle Aeronautical University

Located eight miles north of the city of Prescott, Prescott Regional Airport - Ernest A. Love Field (PRC) is a commercial service airport serving north-central Arizona. PRC is the second-busiest airport in Arizona in terms of GA traffic due in large part to the high level of flight training activities occurring at the field. PRC is home to several flight schools; however, one program stands out as one of the premier aviation education programs in the country: Embry-Riddle. Embry-Riddle is an accredited university that offers undergraduate and graduate education programs focused on aviation and aerospace education. ERAU has two main campuses: the original campus in Daytona Beach, Florida, and the Prescott campus in Prescott, Arizona. The Prescott campus opened in 1978 and is located less than three miles southwest of PRC. ERAU also offers online courses for students at 125 remote campuses around the world. In total, Embry-Riddle serves approximately 25,000 students globally.

Embry-Riddle's Prescott campus is home to nearly 3,000 students who participate in courses offered by four colleges. ERAU Prescott's four colleges offer courses related to aeronautics, arts and sciences, engineering, security, and intelligence, all of which focus on aviation and aerospace applications. Located on the airfield at PRC, the College of Aviation's Flight Department operates the Flight Training Center. All pilot-related degree programs are conducted at this site. The College of Aviation has almost 1,000 students enrolled in undergraduate courses in aeronautical science, air traffic management, aircraft dispatching, applied meteorology, and unmanned aerial systems (UAS).

The Aeronautical Science degree program at Embry Riddle enables students to combine fixed wing or helicopter flight training with aviation-focused academic study to prepare for jobs as pilots. More than 730 students were enrolled in the Fixed Wing and Rotary Wing Aeronautical Science programs for the 2020-21 academic year. Students in the Fixed Wing Aeronautical Science degree program are automatically enrolled in flight training conducted by the ERAU Flight Department at PRC. Students enrolled in the Rotary Wing Aeronautical Science program complete their helicopter training through Universal Helicopters. Universal Helicopters contracts with the school and is co-located with the ERAU Flight Department at the Flight Training Center at PRC.

Embry Riddle's Flight Department has approximately 170 staff members working at PRC, the majority of whom are certified flight instructors (CFIs). Most of these CFIs are recent graduates of ERAU hired immediately after graduation. This practice of hiring graduates as CFIs not only ensures that Embry-Riddle's high standards of training are maintained, but also allows for recent graduates to build flight hours needed to work for mainline commercial airlines. The Flight Department employs an additional 110 students who assist in flight program support and aircraft maintenance while earning their degrees and certifications.

ERAU Prescott operates a fleet of 47 aircraft for flight training at PRC. The school's fleet includes 37 Cessna 172S Skyhawk aircraft used for primary, instrument, and commercial flight training and five Diamond DA42 Twinstar aircraft used for multi-engine flight training. Additionally, ERAU Prescott utilizes one Cessna 182 and one American Super Decathlon for specialized flight training. ERAU Prescott's Golden Eagles collegiate competitive flight team also flies three Cessna 150s from PRC. The team has won the National Intercollegiate

Flying Association National Championship 12 times in the program's 30-year history. The Flight Department is undergoing a fleet replenishment program that will completely replace its primary flight training fleet by 2023, ensuring that students train in the most advanced and up-to-date equipment.

In addition to the school's extensive aircraft fleet at PRC, the Flight Department has several other hands-on training aids that allow students to practice their craft in a controlled and supervised environment. A dedicated flight training center houses 10 highly advanced flight simulators. These flight training devices are equipped with cockpits from the Cessna 172 and Diamond DA42 and wrap-around visuals that simulate advanced weather and wind conditions, providing students with highly realistic training conditions. Additionally, the Flight Department offers students the ability to practice instrument flight procedures using virtual reality training suites and PC-based aviation training devices. The Flight Department also operates an FAA-certified Part 145 repair station to keep its fleet in top condition. This provides additional opportunities for student employment.

ERAU Cessna 172 Skyhawks at PRC

Beyond the classroom, Embry-Riddle works extensively to prepare students for a successful career in the aviation industry. ERAU Prescott maintains recurring internship programs with organizations throughout the aviation industry, including several businesses and organizations located onsite at PRC. Students can participate in internships and training programs with organizations including the National Weather Service, FedEx, and K2 Aviation. Additionally, the FAA designated the PRC air traffic control tower as an official training tower. The school partners with the FAA to allow students to participate in real-world air traffic control training. The school maintains pathway agreements with 14 airlines that allow aeronautical science students to apply for airline pilot positions as early as their sophomore year. Additionally, ERAU students are considered "reduced-Air Transport Pilot (ATP) minimums eligible" that allows students to earn their ATP certificate in only 1,000 flight hours, 500 hours less than the FAA standard. As a result, Aeronautical Science Degree students have a 100 percent job placement rate in the year following graduation, and the College of Aviation has a 90 percent one-year job placement rate among students in all degree programs.

ERAU Prescott also supports the local community and fosters economic growth throughout the Prescott Valley. The school employs several hundred people between the main campus and PRC. Thousands of prospective students, business associates, and industry professionals visit the school each year, all of whom bring additional business to local restaurants, hotels, and attractions. Additionally, PRC's location in Arizona enables Embry-Riddle to conduct flight training in nearly 5,000 square miles of uncongested airspace, which spreads out flight training aircraft and reduces traffic congestion in the airspace over Prescott. ERAU Prescott and PRC have leveraged the advantages of the community and surrounding area to attract new businesses to the airport without impacting other airport users or causing airspace congestion.

Embry-Riddle is a premier aviation education organization that supports the growth of the global aviation industry. The school's highly focused curriculum ensures that students receive the highest quality of training and graduates are well qualified and prepared for successful careers in aviation. Furthermore, ERAU Prescott and the Flight Department Operations Center at PRC support the economic health of the local community, the airport, and the entire region.

Falcon Field (FFZ) – CAE Phoenix Aviation Academy

Located at Falcon Field Airport (FFZ) in Mesa, Arizona, CAE Phoenix is one of the world's premier aviation training programs. CAE Phoenix took over operations from another flight school at Falcon Field in 2012 and has since grown to be one of the largest flight training companies in Arizona with more than 250 employees working at FFZ. CAE Phoenix is part of the CAE network of flight training facilities, providing pilot, aircraft maintenance, and cabin crew training for thousands of current and future industry professionals around the globe. CAE Phoenix is considered a Flight Training Organization (FTO), offering ground and flight instruction for cadets with little to no flying experience through primary training programs. CAE Phoenix is the company's only FTO (also known as an Aviation Academy) in North America and is one of only nine such facilities around the world. Overall, CAE has five additional simulator centers in the U.S. dedicated to providing recurrent training to current airline pilots and crewmembers rather than initial training to new pilots.

CAE maintains partnerships with 40 major international airlines, four aircraft manufacturers, and hundreds of business aviation operators on five continents. Most cadets enrolled at CAE Phoenix are concurrently enrolled in an airline pathway training program for a major domestic or international air carrier. CAE Phoenix is the primary training location for the American Airlines Cadet Academy, JetBlue Gateway Select Program, Aeromexico Cadet Program, and the Southwest Airlines Destination 225° Cadet Pathway. Other international partners of CAE Phoenix include Air China, Xiamen Airlines, Atlas Air, Japan Airlines, Air Asia, EasyJet, and Qatar Airways.

Cadet programs offer airlines the ability to train new pilots using company-specific practices from the beginning of their flying career, reducing the need for further airline-specific instruction upon hiring. In exchange, cadets receive highly focused instruction and a streamlined pathway to employment. CAE Phoenix works in tandem with airlines to tailor coursework, so each company's specific safety and training standards are met. Curriculums are also customized for specific countries or regions to meet the standards of various regulatory agencies including the FAA, the European Union Aviation Safety Agency (EASA), and the Civil Aviation Administration of China (CAAC). Students can also join CAE Phoenix without affiliation to an airline, allowing for more employment flexibility upon graduation.

As of Spring 2021, approximately 1,200 cadets were enrolled in primary flight training at CAE's nine Aviation Academies around the globe. With more than 600 cadets currently training at FFZ, more than half of all students enrolled in CAE's global airline pilot training programs complete their flight training in Arizona. Thanks to its many agreements with airlines and aerospace companies worldwide, the cadet population at CAE Phoenix is highly diverse. Additionally, domestic and international airlines have introduced programs to increase diversity in the aviation workforce. CAE Phoenix coordinates with airlines to promote these initiatives and is working to develop a scholarship program for prospective female pilots.

During their training at CAE Phoenix, students are housed in the Mesa area and can choose to receive weekly stipends for living expenses. Most domestic and international students receive both ground and flight instruction while at CAE Phoenix. However, some international cadets complete much of their ground instruction at CAE facilities in Europe or Asia prior to arriving at CAE Phoenix. Upon arriving at FFZ, cadets complete all necessary flight training to obtain a commercial pilot's license, typically within a 12- to 18-month timeframe. Upon graduation, most domestic cadets are hired by CAE Phoenix as CFIs who then train new cadets. CAE Phoenix maintains a ratio of approximately four cadets to every one instructor, enabling students to receive personalized and hands-on instruction while maintaining a regular and convenient flight training schedule. This often benefits student pilots, as fewer hours are needed to teach necessary skills and concepts, which streamlines the training process and results in lower training costs compared to traditional flight schools.

CAE Phoenix utilizes a diverse fleet of advanced fixed-wing piston aircraft to conduct flight training activities. The company operates a fleet of 60 Piper Archer TX, eight Diamond DA-40, and two Diamond DA-20 aircraft to conduct initial single-engine flight training. A fleet of multi-engine piston aircraft are used for advanced training, including eight Piper Seminoles. Two Cessna Citation CJ1+ jet aircraft based at Phoenix-Mesa Gateway Airport (IWA) are utilized for complex turbine flight training to provide final preparation for pilots ready to join airline ranks. CAE Phoenix also has state-of-the-art ground training and aircraft maintenance facilities at FFZ, ensuring that both pilots and aircraft are always safe and ready to fly.

CAE Phoenix's flight training operations are not limited to FFZ and IWA. Cadets and instructors often fly to other GA airports around the state and the region. Students fly to airports including Coolidge Municipal (P08), Casa Grande Municipal (CGZ), and Eloy Municipal (E60) airports to perform touch-and-go operations and practice flying under instrument flight rules (IFR). Cadets are also required to fly long-distance cross-country flights to northern Arizona and New Mexico.[4] During these cross-country flights, pilots often stop at GA airports to refuel and rest. This contributes to local economies and the economic self-sufficiency of these GA airports, as fuel sales generate revenue for airport operators.

The infrastructure and services provided by the Arizona airport system are vital in CAE Phoenix's designation as a world-renowned business and its role in serving airlines and future pilots from around the globe. The company cited the consistent good weather, the availability of various terrains and airspaces, and the attractive living conditions of the Phoenix metropolitan area as key reasons for choosing Arizona as their primary U.S. training base. FFZ's two runways offer flexibility to pilots operating during peak hours or in the event of an incident, improving safety and efficiency for all airport users. In turn, CAE Phoenix generates substantial economic impact for FFZ, the City of Mesa, and the entire Phoenix metropolitan area, as well as throughout Arizona.

Summary

The four aviation-related world-class businesses covered in this analysis – skydiving, gliders and soaring, aerial tourism, and aviation-related education and flight training – collectively generated nearly $797.5 million in total economic output and supported over 4,700 jobs in Arizona in 2019. However, the numbers alone do not tell the whole story. The influence of these organizations extends far beyond the state's borders, as customers travel from around the world to do business with them and go on to enter careers as pilots, mechanics, air traffic controllers, and other aviation professions with commercial airlines and public agencies. These world-class aviation businesses have a significant role in the ongoing success of the industry through the education and preparation of future members of the worldwide aviation-related workforce.

4 A cross-country flight is defined as a flight between two separate airports at least 50 miles apart. Completion of cross-country flights are required to obtain a pilot's certificate and frequently utilize airports that do not independently support flight training.

Appendix C. 2021 Arizona AEIS Study Methodology

The 2021 Arizona AEIS provides a comprehensive assessment of the contributions Arizona's 67-airport system made to key economic indicators—jobs, earnings, and economic activity—during the study year of 2019. For each airport, the economic impacts stimulated by the following three broad classes of economic activity were evaluated: (1) on-airport activity by employees and business tenants; (2) capital investments or construction expenditures; and (3) spending by out-of-state visitors entering Arizona through the airport system. The data required to conduct the analysis was collected though a rigorous primary research process, which included surveys of airport managers and airport tenants, that was then supplemented with IHS Markit's proprietary economic data, as well as third-party data from the Arizona Office of Tourism, Airline Data Inc., and the Federal Aviation Administration (FAA). The data was then used as to create airport-specific inputs for a set of 16 customized economic impact models—one for each county plus a state-level model—that IHS Markit developed based on the nationally recognized IMPLAN input-output (I/O) economic modeling framework. Results were first summarized by airport, and then harmonized to the statewide level.

The study also includes economic analyses of specific aviation activities that are important to Arizona's economy. These world-class aviation businesses offer unique opportunities for skydiving, aviation educational programs/flight training, glider soaring, and others. The 2021 Arizona AEIS also analyzed the business benefits that accrue to Arizona from the many non-aviation-related industries that rely on aviation to transport employees, clients, and goods by air. Finally, revenue generated in the form of taxes paid from aviation activities and operations are quantified to determine the contributions that airports generate for the state and demonstrate how investments into the airport system yield immense benefits.

Inputs Used in Airport Economic Impact Analysis

Surveys served as a primary data source for the 2021 Arizona AEIS. Two surveys were implemented to gather airport-specific data for activities generating direct on-airport impacts and some aspects of off-airport visitor spending. The data in these surveys served as the inputs used in the economic impact analysis. These two surveys included:

- Airport Manager Survey and Capital Improvement Supplement
- Tenant Survey

The process of compiling data from the surveys and translating them into impacts are detailed below.

DATA ON AIRPORT OPERATIONS AND INVESTMENTS FROM THE AIRPORT MANAGER AND TENANT SURVEYS

Based on the information collected via the Airport Managers and Tenant surveys and the major airport business activities that generate economic impacts in the state, a categorical approach was generated that included consideration of the following:

- Airport operations: Direct employment
- Contractors: Direct employment
- Airport capital expenditures

- Revenues
  - Parking Revenues
  - Fuel Revenues
  - General aviation (GA)-related revenues not included in tenant employment
- Airport tenant employment: Examples of this include:
  - Concessions
  - Car rental
  - Cargo and courier

Airport Operations

To link direct employees to airport operations, IHS Markit used the Airport Manager Survey data provided by Kimley-Horn. Airports provided full-time and part-time employees that IHS Markit converted into full-time equivalents. These data were used as inputs into the economic impact analysis. To obtain the most accurate full-time equivalents data, each of the responding 59 airports were asked how many hours part-time employees typically work in a week. IHS Markit applied the ratio of hours worked per 40-hour work week to the number of part time employees to generate full-time equivalents. Where airports did not provide the number of hours worked, each part-time employee was assumed to be one half of a full-time employee. IHS Markit also consolidated total wages paid by airport to compute average salaries per worker. Average salaries were calculated as a metric for identifying outliers.

Contractors

Contractors were categorized into appropriate sectors and checked for accuracy/relevance to the study. Eighteen airports reported the use of contractors, with Chandler Municipal Airport (CHD) reporting the largest number of contractors on location. Each contractor was reviewed by function and categorized by IMPLAN code. Contractors that were reported to have a city/state outside of Arizona were dropped from this analysis, as we assumed the economic impact of their services to be leakages outside of Arizona and not relevant to the study.

Airport Capital Expenditures

IHS Markit used capital improvement spending data from years 2016, 2017, 2018, and 2019 reported in the Airport Manager Survey. To categorize the capital spending into the correct industries, IHS Markit first reviewed the 4-year trend of capital spending and investigated the capital spending patterns for airports with expenditures above $1 million on 4-year average or with known (reported) 2019 capital expenditures above $1 million. Among these airports, 12 airports provided supplemental capital spending details. Each detailed capital improvement supplemental spending report was categorized into IMPLAN category by spending type and adjusted based upon the proportion of capital project completed in 2019. Results from each capital improvement project were aggregated by IMPLAN category by airport and summarized. Where airports did not provide detailed expenditures, IHS Markit estimated the industry distribution of capex based on observed data. The four-year average of capital spending was inputted into the IMPLAN models.

Revenues

While many of the airport's revenues are captured in other components of the analysis (tenant employment and airport operations employment), some miscellaneous airport revenue streams were isolated to capture the full impact airports make in Arizona. These revenue items were categorized into relevant IMPLAN codes and run through the models.

Airport Tenant Employment

IHS Markit received the Tenant Survey data from Kimley-Horn and translated it into inputs for the economic impact analysis. Prior to inputting these data into the economic impact model, IHS Markit undertook processing and quality assurance measures.

The primary focus of data processing was the number of employees at each airport tenant, as these data were ultimately used as inputs in the economic impact analysis. Tenants responded with full-time and part-time employees at their businesses. To generate full-time equivalents estimates, IHS Markit assumed each part-time employee was one half of a full-time employee. Wherever the tenant did not complete the employment information, IHS Markit used Dun & Bradstreet, a company that provides data and reports on individual businesses, to fill in the number of employees for that tenant. Each of these tenant employees was then input into the economic impact model once their industry was defined.

Before generating economic impacts from the tenants' employee data, IHS Markit first needed to classify the business into a standard industry code consistent with the structure of IMPLAN's modeling framework (IMPLAN codes). IHS Markit first used the company description provided by the tenant to classify the company into a North American Industry Classification System (NAICS) code. Dun & Bradstreet data were used to crosscheck these classifications as Dun & Bradstreet collects that level of information on each company they profile. Once each company was categorized into a NAICS code, IHS Markit used concordance tables to translate the data to a corresponding
IMPLAN code.

Once all on-airport activity (from the Airport Manager Survey and Tenant Survey) for each airport was classified and cross-checked, IHS Markit began the economic impact analysis using these data as direct inputs to the models.

ESTIMATES FOR NON-RESPONSIVE AIRPORTS

For the eight non-responsive airports, the 2021 Arizona AEIS team used parametric and categorical data contained in the 2018 SASP Update to establish peer groupings. The SASP parameters considered in the analysis included:

- Airport state classification
- Runway length
- Fuel availability
- Number of based aircraft
- Number and type of operations

The parameters for a non-responsive airport were compared to the corresponding parameters for other airports in its peer group that had responded to the surveys. This allowed for a best fit analysis to estimate the input data for the non-responsive airports.

Runway length, fuel availability, number of based aircraft, and operations data reported in the *2018 State Aviation System Plan (SASP) Update* were compared with more recent data available in the FAA's Airport Data and Information Portal (ADIP) to identify any differences that would have affected how the nonresponsive airports were classified into peer groups. This comparison did not result in any changes to the peer group categorization conducted as part of the 2021 Arizona AEIS.

Spending by Out-of-state Visitors Entering Arizona Through an Arizona System Airport

In 2019, Arizona's airports welcomed approximately 11 million out-of-state visitors. These visitors then directly spent money with local Arizona business on transportation, lodging, dining, shopping, entertainment, and other expenses. This section provides a summary of how the direct visitor spending estimates used in the 2021 Arizona AEIS were derived.

QUANTIFYING OUT-OF-STATE VISITORS

The process for quantifying out-of-state (including international) visitors who arrived in Arizona during 2019 by air was done separately for those arrived by scheduled commercial service and those who arrived via GA aircraft. The sections below detail each of those processes.

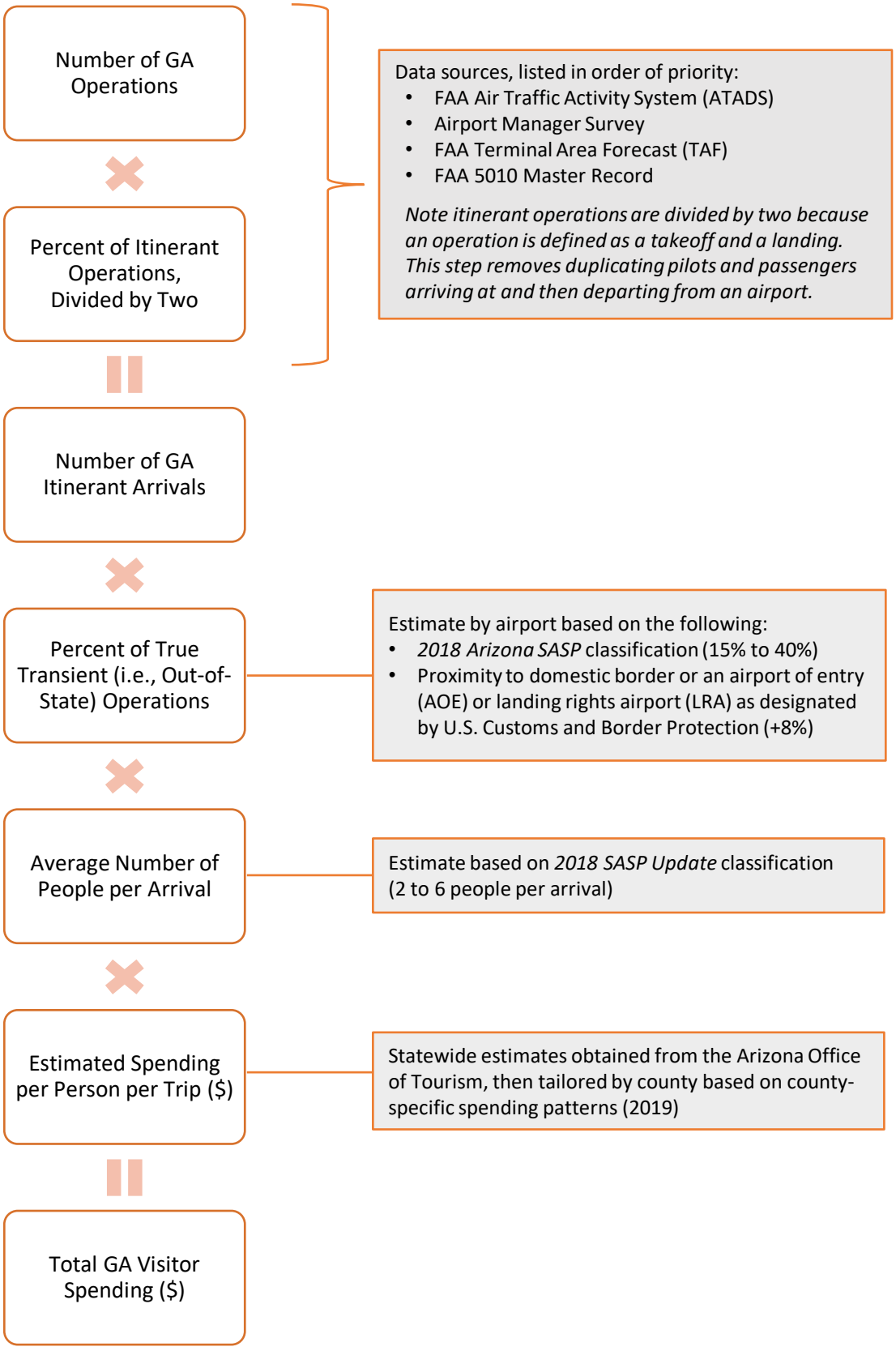
Commercial Airport Arrivals

For visitors arriving by scheduled commercial service, revenue-paying passenger (enplanement) data was obtained from the Air Carrier Activity Information System (ACAIS) published by the FAA. Data from Airline Data, Inc. was then used to determine the share of enplanements that are out-of-state or international visitors arriving in Arizona. These figures provided the total number of commercial passenger visitors into Arizona by each airport for 2019.

GA Airport Arrivals

In additional to traveling by scheduled commercial service, out-of-state and international visitors (also referred to as 'non-local') arrive via GA, which is defined as all civilian aviation except scheduled air service. To calculate the direct visitor spending of non-local visitors traveling via GA airports, the 2021 Arizona AEIS study team developed a multi-step process for first estimating the number of visitors by airport, then applying GA visitor spending profiles tailored to each Arizona county. This methodology is consistent with industry best practices and supports a data-driven approach to estimating the GA visitor spending stream of economic impact. The 2021 Arizona AEIS methodology to estimating GA visitor spending is provided in **Figure C.1,** with additional details below. This methodology was applied to all airports except Relievers. Because of the types of aviation activities supported by these airports and the sophistication of aircraft served, the methodology for Relievers was adjusted to better reflect the economic impact of Arizona's Reliever airports.

Figure C.1. 2021 Arizona AEIS GA Visitor Spending Methodology



Sources: IHS Markit 2021, Kimley-Horn 2020

The following steps detail the methodology outlined in **Figure C.1**:

- **Number of GA Operations:** As the first step in the process, the total number of GA operations was obtained from the following sources, listed in order of priority:
  - FAA ATADS (calendar year [CY] 2019): Towered airports only
  - Airport Managers Survey
  - FAA TAF
  - 5010 Airport Master Record
  - The study team recognizes the inherent difficulty in obtaining operations data from non-towered airports, and all sources except the FAA's ATADS represent estimates of actual activity. The order of priority provided here is deemed most reliable in terms of data accuracy.
- **Percent of GA Itinerant Operations:** GA operations are categorized in terms of local operations performed by aircraft that do not leave the local traffic pattern and itinerant operations, which compose all remaining operations. Data on itinerant operations were obtained from the same sources as noted above in the same order of preference.
- N**umber of GA Itinerant Arrivals:** This figure results from dividing itinerant operations by two, as each operation comprises a takeoff and a landing. This records only arriving aircraft as to avoid double-counting visitors into Arizona.
- **Percent of True Transient (i.e., Out-of-State) Operations:** All itinerant aircraft operations are not necessarily from out-of-state. As such, it is necessary to parse out intra-state operations from those originating from/departing for out-of-state or international airports.
- As a standard industry practice, aviation economic impact studies typically estimate that non-local aircraft perform 30% to 50% of total operations depending on the size or classification of the facility or other criteria. For the 2021 Arizona AEIS, a tailored methodology was developed to determine the percent of true transient operations factoring in three primary drivers of out of state activity:
  - ***2018 SASP Update* Classification:** Arizona's state airport classifications were established in the *2018 SASP Update*, which used numerous factors to group airports based on the type and frequency of aviation activity generally supported. The methodology of the 2021 Arizona AEIS awarded airports a "baseline" percentage of true transient operations ranging from 15% to 40% in accordance with their assigned state classification.
  - **Proximity to domestic border or an AOE or LRA as designated by U.S. Customs and Border Protection:** Airports within 30 miles of a domestic border likely draw more aircraft from adjacent states and can also support a greater variety of out-of-state aircraft, since shorter travel times into Arizona allow smaller aircraft to reach a particular facility. U.S. CBP designates AOEs and LRAs for the lawful entry of international visitors. Airports within 30 miles of the domestic border or designated AOEs or LRAs received eight additional percentage points added to their baseline.

When aggregated, this methodology resulted in the number of aircraft arriving from out-of-state or international destinations. The next step then estimated the number of people per operation.

- **Average Number of People per Departure:** Once out of state departures were established, the 2021 Arizona AEIS estimated the number of pilots, passengers, and other staff on each arriving aircraft. Because Arizona state classifications are designed to group airports based on available facilities and services to support aircraft of varying degrees of sophistication, the average number of people per arrival was estimated by airport classification. The number of people per arrival ranged

from two for small GA airports to six for commercial service airports. Note this only estimated pilots and passengers traveling by GA; separate visitor spending impacts were generated for visitors utilizing commercial air passenger service.

- **Average Spending per Person per Trip ($):** The 2021 Arizona AEIS estimated the average money spent by non-local visitors arriving in Arizona based on 2019 visitor expenditure data provided by the Arizona Office of Tourism. These data were then tailored to county-level pricing data. This resulted in a visitor spending profile tailored to local economies in Arizona. Additional information about the development of visitor spending profiles is provided in the section below.
- T**otal GA Visitor Spending ($):** As the final step in this process, the study team multiplied the number of arriving out-of-state or international visitors by county-specific visitor spending profiles. The outcome of this process represents the direct GA visitor spending for each airport in the scope of the 2021 Arizona AEIS (except Reliever airports, as discussed below).

Reliever Airports

Arizona's eight Reliever airports generally offer the facilities and services to support more sophisticated aircraft as well as the pilots and passengers they serve. In many cases, these airports serve as gateways into the state for high-profile visitors who are assumed to have higher spending profiles than visitors utilizing smaller GA airports. As such, GA visitor spending was estimated using a slightly different process than outlined above. This process is outlined as follows:

- Obtained total operations from the following sources:
  - FAA's ATADS: All towered airports (seven Reliever airports)
  - Airport Manager Survey: Marana Regional (AVQ) provided total operations, as this airport is the only Reliever in Arizona that did not have an air traffic control tower during the 2019 study year.
- Obtained total number of jet and turbine operations from the FAA's Traffic Flow Management Count System (TFMSC) and divided by two to only count arrivals. The study team then assumed all jet operations are itinerant, 90% of which are true transients (out-of-state or international).
- Estimated total number of visitors per jet arrival based on data provided in the Airport Manager Survey. This ranged from 6.5 to 8 people per arrival.
- Developed jet traveler spending profiles based on data from the Arizona Office of Tourism tailored to reflect county-specific spending patterns (additional details provided in the following section). The study assumed that jet travelers spent approximately four times as much as visitors traveling to Arizona through a smaller GA airport.
- Multiplied the number of visitors arriving via jet aircraft by the jet traveler visitor spending profile. This resulted in the direct jet traveler visitor spending impact associated with each Reliever airport.

The study team then subtracted jet travelers from all other GA visitors arriving at each Reliever facility (i.e., non-jet travelers). The primary GA visitor spending methodology was then applied to all remaining, non-jet travelers as estimated using the study methodology described in the section above. These two visitor spending impacts were then added together to produce the direct visitor spending impact for each Arizona Reliever airport.

ESTIMATING THE SPENDING PROFILES OF OUT-OF-STATE VISITORS BY AIR

Baseline State Spending Profile

IHS Markit engaged with the Arizona Office of Tourism, who provided a statewide spending profile for passengers who arrive in Arizona by air transportation using scheduled commercial service in 2019. This spending profile covers the key spending categories of transportation, lodging, dining, shopping, and entertainment on a per-person basis covering their entire trip to the state. This statewide profile served as the basis for developing airport and county-specific spending profiles. The statewide spending profile for each airport was tailored to each airport based on county-level pricing data. That said, each airport was first linked to the county in which it is seated. For each county, adjustments were made to the average per-person spend by category, taking into consideration variations from the statewide average in pricing for hotels, food, transportation, services, and retail goods. Some smaller counties did not have county-specific pricing data available, and an estimate was generated for those counties based on available data of similar counties.

GA Airport Spending Profiles

For GA airports that did not have an existing airport study, the statewide visitor spending profile provided by the Arizona Office of Tourism was the starting point for generating a GA visitor spending profile. The first step was generating a profile representative of those visitors arriving via piston aircraft. Prior studies show that nearly three-fourths of visitors who arrive at GA airports stay for one day or less. As such, a quarter of these visitors were assumed to follow a length of stay and spending pattern similar to that of all statewide visitors by air and the baseline spending profile was applied to them. The remaining visitors via piston aircraft were assumed to be day-trippers and therefore had $0 for lodging. For the remaining spending categories, a per-day figure was calculated from each airport's county specific totals by dividing the baseline profile by 3.6, which is what the Arizona Office of Tourism reported as the 2019 average length of stay. A weighted spending profile for GA passengers was then created based on these two spending patterns.

The airport-specific GA spending profiles then served as the basis for an additional spending profile which was created for passengers who arrive at GA Reliever airports via jet aircraft. These visitors are assumed to stay longer and spend more per visit and therefore a multiplier was applied to each airport's GA spending profile to align with the spending profiles of these visitors. As a result, an estimated $237.4 million was spent by the 1.04 million GA visitors, for an average per-person spend of $228.

Commercial Airport Spending Profiles

Most commercial passengers arrive in Arizona via airports that have existing economic impact studies that the 2021 Arizona AEIS team included and moved forward to 2019 (these studies include over 90% of visitors and over 95% of total spending). Each of these studies contained their own visitor spending profiles that were utilized for in this study and brought forward to 2019. The statewide profile provided by the Arizona Office of Tourism served as the basis for the remaining commercial visitors, which was then adjusted for each airport based on geography. **Table C.1 i**dentifies the spending categories of the commercial visitors, the total amount of spending for 2019, and each category's percent of the total commercial visitor spending. Incorporating in the existing studies with the remaining commercial visitors demonstrated that $7.8 billion was spent by out-of-state visitors in 2019 from just over 10 million visitors, for an average commercial visitor spend of $783 per-trip for 2019 with category spending distributed across the following categories.

Table C.1. Visitor Spending by Spending Category: Commercial Travelers

Expenditure Category	Total Spending (million $)	Percent of All Spending (%)
Lodging	$2,113	27%
Transportation	$1,330	17%
Dining	$2,201	28%
Retail	$1,142	15%
Entertainment	$1,051	13%
Total	**$7,836**	**100%**

Sources: Airline Data, Inc. 2020, Arizona Office of Tourism 2020, IHS Markit 2021

TOTAL VISITOR SPENDING BY AIRPORT

For visitors arriving by both GA and scheduled commercial service, total visitor spend by airport is the product of the number of visitors and their per-person spending profile, broken out by category (transportation, lodging, dining, shopping, and entertainment). Category level spending was then aligned with the corresponding IMPLAN industries to create inputs for each airport's economic impact models.

A summary of the number of visitors by airport type and total visitor spending for each airport is detailed in **Table C.2**.

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Table C.2. Visitor Spending Details by Airport

Associated City	Airport Name	FAA ID	General Aviation Visitor Spending Details			Commercial Service Visitor Spending Details			Total Visitor Spending ($)
			No. of True Transient Visitors	GA Spending Per Visitor ($)	Total GA Visitor Spending ($)	No. of True Commercial Visitors	Commercial Spending Per Visitor ($)	Commercial Visitor Spending ($)	
Commercial Service									
Phoenix	Phoenix Sky Harbor International	PHX	29,377	$164	$4,807,045	8,085,399	$819	$6,625,116,372	$6,629,923,418
Tucson	Tucson International	TUS	53,873	$153	$8,220,385	976,092	$817	$797,502,362	$805,722,746
Bullhead City	Laughlin/Bullhead International	IFP	3,407	$154	$524,259	67,249	$404	$27,144,521	$27,668,779
Flagstaff	Flagstaff Pulliam	FLG	12,198	$172	$2,100,747	66,270	$467	$30,964,923	$33,065,669
Grand Canyon	Grand Canyon National Park	GCN	1,411	$172	$243,038	125,495	$467	$58,638,041	$58,881,078
Page	Page Municipal	PGA	4,380	$172	$754,326	34,373	$467	$16,061,090	$16,815,416
Peach Springs	Grand Canyon West	1G4	140	$154	$21,491	66,442	$404	$26,818,782	$26,840,273
Phoenix	Phoenix-Mesa Gateway	IWA	64,161	$164	$10,498,638	526,211	$438	$230,723,527	$241,222,165
Prescott	Prescott Regional – Ernest A. Love Field	PRC	26,889	$158	$4,241,816	9,174	$414	$3,801,596	$8,043,411
Show Low	Show Low Regional	SOW	1,072	$147	$157,182	2,200	$382	$839,881	$997,063
Yuma	Yuma International	NYL	44,370	$154	$6,817,891	47,259	$397	$18,771,653	$25,589,543
General Aviation									
Chandler	Chandler Municipal	CHD	58,600	$197	$11,558,848	N/A	N/A	N/A	$11,558,848
Glendale	Glendale Municipal	GEU	22,998	$218	$5,008,468	N/A	N/A	N/A	$5,008,468
Goodyear	Phoenix Goodyear	GYR	38,037	$215	$8,189,870	N/A	N/A	N/A	$8,189,870
Marana	Marana Regional	AVQ	32,138	$207	$6,656,580	N/A	N/A	N/A	$6,656,580
Mesa	Falcon Field	FFZ	97,104	$172	$16,743,275	N/A	N/A	N/A	$16,743,275
Phoenix	Phoenix Deer Valley	DVT	118,903	$219	$26,077,596	N/A	N/A	N/A	$26,077,596
Scottsdale	Scottsdale	SDL	210,520	$432	$90,842,251	N/A	N/A	N/A	$90,842,251
Tucson	Ryan Field	RYN	28,283	$162	$4,577,839	N/A	N/A	N/A	$4,577,839
Benson	Benson Municipal	E95	5,625	$151	$847,620	N/A	N/A	N/A	$847,620
Buckeye	Buckeye Municipal	BXK	13,860	$164	$2,267,919	N/A	N/A	N/A	$2,267,919
Casa Grande	Casa Grande Municipal	CGZ	40,734	$147	$5,970,847	N/A	N/A	N/A	$5,970,847
Coolidge	Coolidge Municipal	P08	9,900	$147	$1,451,156	N/A	N/A	N/A	$1,451,156
Cottonwood	Cottonwood Municipal	P52	20,313	$158	$3,204,354	N/A	N/A	N/A	$3,204,354
Kingman	Kingman	IGM	9,825	$154	$1,511,663	N/A	N/A	N/A	$1,511,663
Lake Havasu City	Lake Havasu City	HII	11,707	$177	$2,071,365	N/A	N/A	N/A	$2,071,365
Marana	Pinal Airpark	MZJ	165	$147	$24,186	N/A	N/A	N/A	$24,186
Nogales	Nogales	OLS	4,781	$147	$700,842	N/A	N/A	N/A	$700,842
Parker	Avi Suquilla	P20	6,633	$147	$972,275	N/A	N/A	N/A	$972,275
Payson	Payson	PAN	10,000	$147	$1,465,814	N/A	N/A	N/A	$1,465,814
Safford	Safford Regional	SAD	3,375	$147	$494,712	N/A	N/A	N/A	$494,712
Sedona	Sedona	SEZ	9,319	$158	$1,470,059	N/A	N/A	N/A	$1,470,059
Sierra Vista	Sierra Vista Municipal-Libby Army Airfield	FHU	6,964	$151	$1,049,411	N/A	N/A	N/A	$1,049,411
Springerville	Springerville Municipal	JTC	1,486	$147	$217,891	N/A	N/A	N/A	$217,891

Associated City	Airport Name	FAA ID	General Aviation Visitor Spending Details			Commercial Service Visitor Spending Details			Total Visitor Spending ($)
			No. of True Transient Visitors	GA Spending Per Visitor ($)	Total GA Visitor Spending ($)	No. of True Commercial Visitors	Commercial Spending Per Visitor ($)	Commercial Visitor Spending ($)	
St. Johns	St. Johns Industrial Air Park	SJN	4,875	$147	$714,584	N/A	N/A	N/A	$714,584
Wickenburg	Wickenburg Municipal	E25	7,688	$164	$1,257,909	N/A	N/A	N/A	$1,257,909
Willcox	Cochise County	P33	1,725	$151	$259,937	N/A	N/A	N/A	$259,937
Ajo	Eric Marcus Municipal	P01	294	$153	$44,922	N/A	N/A	N/A	$44,922
Bagdad	Bagdad	E51	531	$158	$83,767	N/A	N/A	N/A	$83,767
Cibecue	Cibecue	Z95	2	$147	$220	N/A	N/A	N/A	$220
Clifton	Greenlee County	CFT	413	$147	$60,465	N/A	N/A	N/A	$60,465
Globe	San Carlos Apache	P13	225	$147	$32,981	N/A	N/A	N/A	$32,981
Kayenta	Kayenta	0V7	225	$147	$32,981	N/A	N/A	N/A	$32,981
Kearny	Kearny	E67	150	$147	$21,987	N/A	N/A	N/A	$21,987
Polacca	Polacca	P10	11	$147	$1,649	N/A	N/A	N/A	$1,649
Seligman	Seligman	P23	600	$158	$94,652	N/A	N/A	N/A	$94,652
Sells	Sells	E78	38	$153	$5,722	N/A	N/A	N/A	$5,722
Superior	Superior	E81	30	$147	$4,397	N/A	N/A	N/A	$4,397
Tombstone	Tombstone Municipal	P29	115	$151	$17,329	N/A	N/A	N/A	$17,329
Tuba City	Tuba City	T03	38	$172	$6,458	N/A	N/A	N/A	$6,458
Bisbee	Bisbee Municipal	P04	360	$151	$54,248	N/A	N/A	N/A	$54,248
Chinle	Chinle Municipal	E91	1,480	$147	$216,940	N/A	N/A	N/A	$216,940
Colorado City	Colorado City Municipal	AZC	960	$154	$147,704	N/A	N/A	N/A	$147,704
Douglas	Douglas Municipal	DGL	1,500	$151	$226,032	N/A	N/A	N/A	$226,032
Douglas	Cochise College	P03	0	$151	$0	N/A	N/A	N/A	$0
Douglas	Bisbee-Douglas International	DUG	812	$151	$122,359	N/A	N/A	N/A	$122,359
Eloy	Eloy Municipal	E60	900	$147	$131,923	N/A	N/A	N/A	$131,923
Gila Bend	Gila Bend Municipal	E63	1,180	$164	$193,084	N/A	N/A	N/A	$193,084
Holbrook	Holbrook Municipal	P14	71	$147	$10,445	N/A	N/A	N/A	$10,445
Maricopa	Ak Chin Regional	A39	6,515	$147	$955,015	N/A	N/A	N/A	$955,015
San Luis	Rolle Airfield	44A	0	$154	$0	N/A	N/A	N/A	$0
San Manuel	San Manuel	E77	560	$147	$82,086	N/A	N/A	N/A	$82,086
Taylor	Taylor	TYL	286	$147	$41,922	N/A	N/A	N/A	$41,922
Whiteriver	Whiteriver	E24	1,200	$147	$175,898	N/A	N/A	N/A	$175,898
Williams	H.A. Clark Memorial Field	CMR	280	$172	$48,222	N/A	N/A	N/A	$48,222
Window Rock	Window Rock	RQE	300	$147	$43,974	N/A	N/A	N/A	$43,974
Winslow	Winslow-Lindbergh Regional	INW	3,878	$147	$568,443	N/A	N/A	N/A	$568,443
Total			**1,039,790**	**$228**	**$237,419,915**	**10,006,165**	**$783**	**$7,836,382,746**	**$8,073,802,661**

Sources: Airport Manager Survey 2020, FAA ATADS 2020, FAA TFMSC 2020, FAA TAF 2020, Airport 5010 Master Record 2020, Airline Data, Inc. 2021, Arizona Office of Tourism 2020, IHS Markit 2021, Kimley-Horn 2020

County and State Economic Impacts

The 2021 Arizona AEIS produced estimates of economic impact for all airports at the state and county levels. The final analysis captured the impacts that airports make to the Arizona economy and the counties in which they are located. To capture both levels of impacts, IHS Markit first measured the county and state impacts separately, then harmonized the two sets of impacts by constraining the county-level figures.

Constraining was necessary to capture the inter-county trade flows that are built into the state-level multipliers but not into the county-specific multipliers. A statewide analysis assumes a certain level of inter-county trade, capturing all activity across the state. County-specific estimates are narrower in scope, and do not capture impacts that originate in other counties. For example, a firm in Maricopa County may source goods and services from a firm in Pima County – this should be reflected in the Pima County impacts, as money is flowing to Pima County. A statewide analysis would capture such activity, but a county-level analysis would not. Harmonizing the two sets of results combined the inter-county trade flows and county-specific details needed for a more accurate set of county impacts. It also ensured the sum of county impacts equaled the total state impacts.

ECONOMIC IMPACT MODELING APPROACH

To quantify the economic impacts presented in this report, IHS Markit developed 15 customized county models and a state-level model for the entirety of Arizona. Key inputs for creating the models were sourced from IMPLAN, Inc., a nationally recognized provider of economic impact modeling data, supplemented by proprietary data from IHS Markit's US Regional Economic Service.

The models use an industry-standard input-output modelling structure that maps economic sales transactions (output) to the required non-labor inputs required to produce a product or service. In theory, this approach links industry sales activity (output) to the first tier of supply chain activity (inputs). The supply chain activity also represents sales activity (output) for the first-tier suppliers, which is then fed back into the model to capture the next tier of supply chain activity. This process repeats through all subsequent tiers of the supply chain.

In 1973, economist Wassily Leontief won the Nobel Prize in economics for his groundbreaking research on input-output analysis. Leontief realized the input-output activity within an economy could be represented by a series of matrices. Though a full exploration of input-output analysis is beyond the scope of this appendix, there are two matrices of note that are core to economic impact analysis. The first, known as an I/O table, captures the dual role of industries as both producers of goods/services and receivers of money within an economy. To capture the production aspect, each industry's sales and first tier supply chain activity f is captured within a column in the matrix. In essence, each column captures how much a given industry has to spend with its supplier industries in order to fulfill a sales obligation. Each industry is also represented by a row in the matrix , the sum of which is the money (income) that industry receives.

Perhaps the most notable and enduring aspect of Leontief's research is a method to transform an input-output table to a matrix that links production activity to demand. The Leontief Inverse Matrix, as it is widely known, lies at the heart of input-output models, allowing for all iterations of supply chain activity that result from a given sales transaction to be captured. When used in conjunction with value added and employee compensation data contained in the I/O table, the contributions to GDP (value added) and labor income can be determined. When and input-output modeling framework is extended to include institutional and structural details, such as household spending patterns, it becomes a Social Accounting Matrix (SAM) model.

The IMPLAN-based models used for the 2021 Arizona AEIS are built using SAM techniques. The models created by IHS Markit are listed in **Table C.3.** Each model captures how economic activity flows through 546 industries at both the county and state level.

Table C.3. Alignment of Economic Impact Models to Arizona Airports

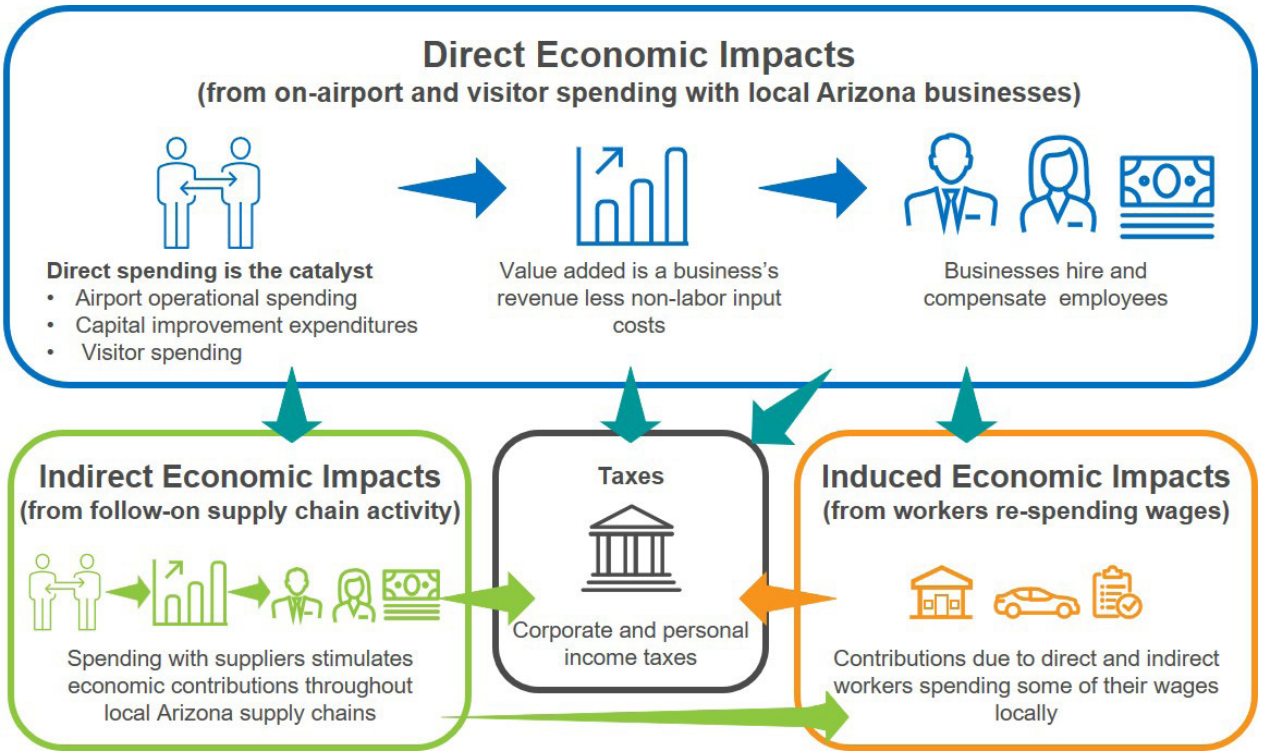
Model Name	Airports Analyzed with the Model
Arizona State	The aggregate inputs from all airports
Apache County	Chinle Municipal, Springerville Municipal, St. Johns Industrial Air Park, Window Rock
Cochise County	Benson Municipal, Bisbee Municipal, Bisbee-Douglas International, Cochise College, Cochise County, Douglas Municipal, Sierra Vista Municipal-Libby Army Airfield, Tombstone Municipal
Coconino County	Flagstaff Pulliam, Grand Canyon National Park, Page Municipal, Tuba City
Gila County	San Carlos Apache, Payson
Graham County	Safford Regional
Greenlee County	Greenlee County
La Paz County	Avi Suquilla
Maricopa County	Buckeye Municipal, Chandler Municipal, Gila Bend Municipal, Glendale Municipal, Phoenix-Mesa Gateway, Scottsdale, Wickenburg Municipal
Mohave County	Laughlin/Bullhead International, Colorado City Municipal, Kingman, Grand Canyon West
Navajo County	Cibecue, Holbrook Municipal, Kayenta, Polacca, Show Low Regional, Taylor, Whiteriver, Winslow-Lindbergh Regional
Pima County	Eric Marcus Municipal, Marana Regional, Sells
Pinal County	Casa Grande Municipal, Coolidge Municipal, Kearny, Pinal Airpark, Ak Chin Regional, San Manuel, Superior
Santa Cruz County	Nogales International
Yavapai County	Bagdad, Cottonwood Municipal, Prescott Regional - Ernest A. Love Field, Sedona, Seligman

Source: IHS Markit 2021

The total economic impacts were calculated as direct, indirect, and induced effects. Direct impacts are analogous to the first-tier supply activity discussed above. Businesses that receive operational and capital improvement spending from any of the Arizona airports must source required inputs from their supply and service networks. This, in turn, triggers activity throughout the remaining tiers of the extended supply chain, known as indirect impacts. For example, assume an airport hires a local construction firm to conduct a capital improvement project (a direct impact). The construction firm then sources cement from a supplier (an indirect impact). That, in turn, helps the cement company hire and pay its employees, and so on (see the green box in **Figure C.2**). This process iterates through the remaining tiers of the Arizona extended supply chain.

The direct and indirect companies pay wages to their employees. The employees, in turn, spend large portions of their incomes in the Arizona economy on consumer purchases, housing, etc. This triggers the third economic impact cycle known as induced impacts (see the orange box in Figure C.1). Total economic impacts are derived by summing the direct, indirect, and induced impacts. Along the way, the direct, indirect, and induced activity generates both corporate and personal taxes at the county, state, and federal levels.

Figure C.2. The Three Economic Impact Cycles



Source: IHS Markit 2021

Direct effects are production changes associated with the immediate or final-demand changes. Indirect effects are production changes in backward-linked industries caused by the changing input needs of directly affected industries (for example, additional purchases to produce additional output). Induced effects are the changes in regional household spending patterns caused by changes in household income generated from the direct and indirect effects. Both the indirect and induced effects are calculated using multipliers that estimate the additional activity initiated by the aviation industry in Arizona.

The notion of a multiplier rests upon the difference between the initial effect of a change in final demand and the total effects of that change. Two types of multipliers are used to compute the level of impacts:

Indirect Multipliers

A Type I multiplier, or indirect multiplier, is the direct effect produced by a change in final demand plus the indirect effect, divided by the direct effect. Increased demands are assumed to lead to increased employment and employee compensation. The Leontief Inverse Matrix (Type I multipliers matrix) is derived by inverting the direct coefficients matrix. The result is a matrix of total requirement coefficients, the amount each industry must produce for the purchasing industry to deliver one dollar's worth of output to final demand.

Induced Multipliers

Type SAM multipliers incorporate "induced" effects resulting from the household expenditures from new labor income. The default relationship is personal consumption expenditures and total household expenditure. Each dollar of workplace-based income is spent based on the SAM relationship generated by IMPLAN.

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Appendix D. Incorporation of Existing Economic Impact Studies

Eight of the 67 airports included in the 2021 Arizona Aviation Economic Impact Study (2021 Arizona AEIS) had recently completed aviation economic impact studies either independently or as part of larger master planning studies (see **Table D.1**). The results of these airports' studies were incorporated into the 2021 Arizona AEIS to provide continuity with previously published economic impacts and to leverage prior data collection efforts. Of the eight airports, several are included in single reports due to airport ownership and are identified as follows:

- The City of Phoenix (COP) Aviation Department sponsored a study entitled, *Economic Impact of the Phoenix Airport System* conducted by the Seidman Research Institute at Arizona State University's W.P. Carey School of Business (Phoenix Study). With a data year of 2016, the study assessed the economic impacts generated by the three airports within the system: Phoenix Sky Harbor International (PHX), Phoenix Deer Valley Airport (DVT), and Phoenix Goodyear Airport (GYR).
- The Tucson Airport Authority (TAA) commissioned Elliott D. Pollack & Company to assess the economic impacts of Tucson International Airport (TUS) and Ryan Airfield (RYN) with a data year of 2017. The results were published in a report entitled, *Economic and Fiscal Impact Analysis Tucson Airport Authority* in 2017 (Tucson Study).
- Researchers at ASU's Seidman Research Institute assessed Falcon Field's (FFZ) economic contribution during the year 2018 as part of a broader master planning study (Falcon Field Study).
- The City of Eloy sponsored a study entitled, *Economic Benefit Analysis for Eloy Municipal Airport*, (E60, Eloy Study) conducted by ASU's Seidman Research Institute in conjunction with Coffman Associates and covered the data year 2019.
- Researchers at ASU's Seidman Research Institute assessed Lake Havasu City Airport's (HII, *Lake Havasu City Study*) economic contribution during the data year 2019 as part of a broader master planning study.

Table D.1 lists each of the airports with existing economic impact studies that are being included in the 2021 Arizona AEIS and the associated data year:

Table D.1. Airports with Existing Economic Impact Studies Incorporated into the 2021 Arizona AEIS

Associated City	Airport Name	FAA ID	Data Year
Phoenix	Phoenix Sky Harbor International	PHX	2016
Phoenix	Phoenix Deer Valley	DVT	2016
Goodyear	Phoenix Goodyear	GYR	2016
Tucson	Tucson International	TUS	2017
Tucson	Ryan Field	RYN	2017
Eloy	Eloy Municipal	E60	2019
Mesa	Falcon Field	FFZ	2018
Lake Havasu City	Lake Havasu City	HII	2019

Sources: Seidman Research Institute 2016, Elliott D. Pollack & Company 2017, Seidman Research Institute 2018, Seidman Research Institute 2019

As the base data year for the 2021 Arizona AEIS is 2019, the economic impact results in the previously published *Phoenix Study, Tucson Study*, and *Falcon Field Study* needed to be projected forward to 2019. The 2021 Arizona AEIS team coordinated with the COP Aviation Department, TAA, and Falcon Field Aviation Department to obtain data to update their airports' economic impacts to the 2019 study year. The updated impact estimates were shared with each of the airports' administration teams for review and approval of the 2019 impact estimates. The data year for the *Eloy Study* and *Lake Havasu City Study* was 2019 so no forward movement to a different study year was necessary. However, the results of these studies required some minor adjustments to the direct visitor spending impacts to be consistent with the methodology used to assess visitor spending impacts at the other Arizona airports.

For the six airports where results from an existing study were projected forward to estimate the 2019 economic impacts, the following process was used:

- Data from the existing study were segmented into three main sources of economic impact: airport operations, capital improvements, and visitor spending.
- The following steps were used to estimate airport operations:
  - Converted the monetary results from the existing study from the study's base year dollars to 2019 dollars using county-specific deflators from IHS Markit's US Regional Economic Service.
  - Estimated how various airport operations subcategories grew from the base year to 2019 by using the historical growth rates for either categorical revenue data from the airport's Comprehensive Annual Financial Report (CAFR) or a combination of IHS Markit economic data series as proxies. For example, the historical growth rate for "Contractual Services" in the Phoenix CAFR was used as a proxy for the growth of Sky Harbor's "Airport Contractors" subcategory reported in the existing *Phoenix Study*. In addition, FFZ provided 2019 tenant headcount data, and actual capital contribution data were provided by COP, TAA, and FFZ.
  - Estimated 2019 employment for each airport operations subcategory by holding constant the ratio of employment to economic activity from the existing study.
  - Estimated the follow-on economic impacts by holding constant the ratio of follow-on activity to direct activity from the existing report.
- The 2021 Arizona AEIS team obtained actual 2019 capital improvement spending data from each airport or its overseeing authority. These data were used as direct inputs to the appropriate county economic impact model, consistent with the methodology for the other Arizona airports in the 2021 Arizona AEIS.
- For direct visitor spending, the number of passengers arriving at each airport in 2019 was calculated using the same methodology used for the other Arizona airports in the 2021 Arizona AEIS. Each study had a per-person visitor spending estimate and that was brought up to 2019 by using the annual growth rate in average per-person visitor spending published by the Arizona Office of Tourism. As with all other airports covered by the 2021 Arizona AEIS, total direct visitor spending is the product of the per-person average spend and total passengers.

As the process outlined above implies, only the economic impacts of airport operations needed to be estimated for 2019. The other two economic impact sources were either obtained directly from the airports (capital improvement project spending) or utilized the standard methodology used for other Arizona airports (visitor spending). The following sections describe how the 2019 economic impacts from airport operations were derived for the COP Airport System, TAA airports, and Falcon Field.

Projecting the Economic Impacts of the COP Airport System in 2019

The economic impacts from airport operations reported in the *Phoenix Study* were estimated through the compilation of direct employment, earnings, and economic activity (or output) from activities directly relevant to the three airports in the COP Airport System–PHX, DVT, and GYR. Indirect and induced economic impacts were then estimated using an IMPLAN model. The study describes detailed business activities that occur at PHX and the distribution of employment by place of residence, though it is unclear if payroll impacts were distributed to each employee's county of residence during the modeling process. The economic impacts associated with the Sky Harbor Center, a business park located on PHX property, were also included in the Phoenix Study's airport operations analysis. The business park houses several types of industries that, in aggregate, employed 10,504 workers who earned an average of $62,200 in fiscal year (FY) 2016.

Table D.2 presents a summary of the economic impacts of airport operations presented in the existing *Phoenix Study* (2016) and their projected estimates for 2019. These estimates were shared with and approved for use in the 2021 Arizona AEIS by the COP Aviation Department.

Table D.2. COP Airport System – Summary of Airport Operations Impacts, 2016 - 2019

Economic Impact Sources	2016	2019	CAGR
Employment			
Direct Impacts			
Phoenix Sky Harbor International	46,928	52,433	3.8%
Phoenix Deer Valley	965	1,068	3.4%
Phoenix Goodyear	363	374	1.0%
Sky Harbor Center Business Park	10,504	11,785	3.9%
Total airport direct impacts	58,760	65,660	3.8%
Secondary airport impacts	86,849	97,089	3.8%
Total airport impacts	145,609	162,749	3.8%
Earnings (thousands of dollars)			
Direct Impacts			
Phoenix Sky Harbor International	$3,073,149	$3,602,725	5.4%
Phoenix Deer Valley	$72,325	$84,300	5.2%
Phoenix Goodyear	$26,876	$29,660	3.3%
Sky Harbor Center Business Park	$653,504	$775,867	5.9%
Total airport direct impacts	$3,825,854	$4,492,552	5.5%
Secondary airport impacts	$4,630,767	$5,438,917	5.5%
Total airport impacts	$8,456,621	$9,931,469	5.5%
Economic Activity (thousands of dollars)			
Direct Impacts			
Phoenix Sky Harbor International	$10,262,875	$11,980,419	5.3%
Phoenix Deer Valley	$196,189	$229,168	5.3%
Phoenix Goodyear	$67,345	$73,835	3.1%
Sky Harbor Center Business Park	$2,057,558	$2,430,254	5.7%

Economic Impact Sources	2016	2019	CAGR
Total airport direct impacts	$12,583,967	$14,713,676	5.3%
Secondary airport impacts	$12,326,365	$14,413,372	5.4%
Total airport impacts	$24,910,332	$29,127,048	5.4%

Note: Including capital improvement projects. Sources: Seidman Research Institute 2016, IHS Markit 2021

The direct impact categories from **Table D.2** were reported at a more granular level in the existing study. **Table D.3** shows the detailed subcategories for each airport and the Sky Harbor Business Center Park. The monetary results from the existing report were converted from 2016 dollars to 2019 dollars using a conversion factor of 1.0609.[1] **Table D.3** also shows the corresponding proxy series and growth rates that were then used to project the economic activity to 2019.

Table D.3. Detailed Airport Operations Impact Subcategories and Proxy Growth Series

Economic Impact Sources	Proxy Series	Source	CAGR
Phoenix Sky Harbor International Airport			
Commercial Airlines	Terminal Fees + Landing Fees	CAFR	2.7%
Air Cargo & Couriers	Air Cargo and Hangar Rental	CAFR	3.1%
Terminal Businesses	Terminal - Food and Beverage; Terminal - Retail + Rental; Cars + Parking	CAFR	1.2%
Passenger Services	Non-Aeronautical Revenue	CAFR	2.4%
Fixed Base & Ramp Operations	Air Cargo and Hangar Rental; Other Aeronautical Revenue	CAFR	2.8%
Ground Transportation	Ground Transportation	CAFR	13.0%
Airport Contractors	Contractual Services	CAFR	2.5%
Industrial Facilities	Non-Aeronautical Revenue	CAFR	2.4%
Government Services	Total Revenues	CAFR	2.5%
Capital Improvement Projects	Actual Capital Contributions	COP	N/A
Sky Harbor Business Center Park			
Aerospace & Electronics	Employment, Manufacturing	IHSM	3.4%
Insurance & Financial	Employment, Other Services (NAICS 81)	IHSM	3.1%
All Other Private Services	Employment, Financial Activities (NAICS 52-53)	IHSM	4.8%
Public Sector Services	Employment, Government	IHSM	1.4%
Phoenix Deer Valley			
Airport Businesses	Non-Aeronautical Revenue	CAFR	2.4%
Government Services	Total Revenues	CAFR	2.5%
Capital Improvement Projects	Actual Capital Contributions	COP	N/A
Phoenix Goodyear			
Airport Businesses	Non-Aeronautical Revenue	CAFR	2.4%
Government Services	Total Revenues	CAFR	2.5%
Capital Improvement Projects	Actual Capital Contributions	COP	N/A

Sources: Seidman Research Institute 2016, COP CAFR 2019, IHS Markit 2021, COP 2021

1 IHS Markit US Regional Service, economic data for Maricopa County, Arizona

Projecting the Economic Impacts of the TAA Airport System in 2019

The *Tucson Study* presented a high-level analysis that summarized the key elements used to estimate the economic and fiscal impact of the two TAA system airports – Tucson International (TUS) and Ryan Airfield (RYN). The direct economic impacts from airport operations at TUS and its Reliever, RYN, were derived based on the following elements:

- A tenant operations survey, of which 35% of companies responded (accounting for 80% of estimated employment. Note that for this analysis, it was assumed that this figure covers general aviation activities at Ryan Airfield as well.)
- Jet A fuel sales
- Commercial leasing revenue
- Parking revenues

Indirect and induced results were derived using an IMPLAN model.

Table D.4 presents a summary of the economic impacts of airport operations presented in the existing *Tucson Study* (2017) and the projected estimates for 2019. These estimates were shared with and approved for use in the 2021 Arizona AEIS by the TAA.

Table D.4. TAA – Summary of Airport Operations Impacts: 2017 and 2019

Economic Impact Sources	2017	2019	CAGR
Employment			
Tucson Airport Authority - Total	31,493	32,949	2.3%
Direct	16,181	16,872	2.1%
Indirect	7,483	7,868	2.5%
Induced	7,829	8,209	2.4%
Tucson International Airport	30,851	32,650	2.9%
Direct	15,779	16,699	2.9%
Indirect	7,378	7,808	2.9%
Induced	7,694	8,143	2.9%
Ryan Airfield	96	102	3.3%
Direct	40	43	3.3%
Indirect	31	33	3.3%
Induced	25	27	3.3%
Capital Improvement Projects	546	197	-40.0%
Direct	362	130	-40.0%
Indirect	74	27	-40.0%
Induced	110	40	-40.0%

Economic Impact Sources	2017	2019	CAGR
Earnings (millions of dollars)			
Tucson Airport Authority - Total	$1,959.2	$2,144.9	4.6%
Direct	$1,322.5	$1,448.0	4.6%
Indirect	$327.6	$359.0	4.7%
Induced	$309.1	$337.9	4.6%
Tucson International Airport	$1,930.8	$2,130.4	5.0%
Direct	$1,304.3	$1,439.1	5.0%
Indirect	$322.7	$356.1	5.0%
Induced	$303.8	$335.2	5.0%
Ryan Airfield	$5.3	$5.9	5.5%
Direct	$2.8	$3.1	5.5%
Indirect	$1.5	$1.7	5.5%
Induced	$1.0	$1.1	5.5%
Capital Improvement Projects	$23.1	$8.7	-38.7%
Direct	$15.4	$5.8	-38.7%
Indirect	$3.4	$1.3	-38.7%
Induced	$4.3	$1.6	-38.7%
Economic Activity (millions of dollars)			
Tucson Airport Authority - Total	$6,476.5	$7,086.5	4.6%
Direct	$4,536.6	$4,966.1	4.6%
Indirect	$915.2	$1,001.5	4.6%
Induced	$1,024.7	$1,118.8	4.5%
Tucson International Airport	$6,384.0	$7,043.8	5.0%
Direct	$4,475.6	$4,938.2	5.0%
Indirect	$900.9	$994.0	5.0%
Induced	$1,007.5	$1,111.6	5.0%
Ryan Airfield	$22.1	$24.6	5.5%
Direct	$14.4	$16.0	5.5%
Indirect	$4.5	$5.0	5.5%
Induced	$3.2	$3.6	5.5%
Capital Improvement Projects	$70.4	$18.1	-49.3%
Direct	$46.6	$12.0	-49.3%
Indirect	$9.8	$2.5	-49.3%
Induced	$14.0	43.6	-49.3%

**Note: including capital improvement projects. Sources: Elliott D. Pollack & Company 2017, IHS Markit 2021*

The monetary results from the existing report were converted from 2017 dollars to 2019 dollars using a conversion factor of 1.0425.[2] **Table D.5** shows the corresponding proxy series and growth rates that were used to project the economic activity to 2019. From 2017 to 2019, about 94.9% of the direct capital improvement project spending occurred at TUS, with the remaining 5.1% occurring at RYN. These shares were applied when compiling the total economic impacts of each airport.

Table D.5. TAA Airport Operations Impact Categories and Proxy Growth Series

Economic Impact Sources	Proxy Series	Source	CAGR
Tucson International Airport Operations	Total Operating Revenues + Passenger Facility Charges (PFCs)	CAFR	2.9%
Ryan Airfield Operations	Landing Fees	CAFR	3.3%
Capital Improvement Projects	Actual Capital Contributions	TAA	N/A

Sources: TAA CAFR 2019, TAA 2021

Projecting the Economic Impacts of FFZ in 2019

The *Falcon Field Study* was obtained from Appendix D from a larger master plan study and was conducted by ASU's Seidman Research Institute (2018). On-airport activities included 110 on-airport employers, primarily comprised of private aviation companies, construction firms, and local and federal government agencies. The aviation companies included fixed-base operator (FBO) servicing and fueling, flight training, helicopter services, and maintenance and repair. The *Falcon Field Study* gathered its direct employment data through on-site interviews and airport administrative records. Direct payroll estimates were sourced from the U.S. Bureau of Labor Statistics Quarterly Census of Employment and Wages using Maricopa County data. Ninety-five percent of on-airport employers were in the private sector. Non-aviation employers included manufacturing, health care, and business and financial services. Indirect and induced impacts were derived using an IMPLAN model.

Table D.6 presents a summary of the economic impacts of airport operations presented in the existing *Falcon Field Study* (2018) and their projected estimates for 2019. Falcon Field provided actual capital improvement spending and the direct number of employees for 2019. The 2019 estimates were shared with and approved for use in the 2021 Arizona AEIS by the Falcon Field airport administration.

Table D.6. FFZ – Summary of Airport Operations Impacts: 2018 and 2019

Economic Impact Sources	2018	2019	CAGR
Employment			
Direct – On-Airport	1,486	1,463	-1.5%
Private Aviation Employers	832	824	-1.0%
Government Aviation Employers	86	69	-19.8%
Non-aviation Employers	555	556	0.2%
Capital Improvement Projects (5-year average)	13	14	7.7%
Secondary Benefits	2,390	2,505	4.8%
Indirect Benefits	822	861	4.8%
On-airport	789	827	4.9%

2 IHS Markit US Regional Service, economic data for Pima County, Arizona

Economic Impact Sources	2018	2019	CAGR
Off-airport	33	34	3.1%
Induced Benefits	1,568	1,643	4.8%
On-airport	1,499	1,572	4.9%
Off-airport	69	71	3.1%
Earnings (thousands of dollars)			
Direct – On-Airport	$104,367	$104,913	0.5%
Private Aviation Employers	$66,564	$66,946	0.6%
Government Aviation Employers	$8,466	$8,515	0.6%
Non-aviation Employers	$28,712	$28,877	0.6%
Capital Improvement Projects (5-year average)	$625	$577	-7.7%
Secondary Benefits	$129,323	$138,570	7.2%
Indirect Benefits	$52,216	$55,956	7.2%
On-airport	$50,484	$54,130	7.2%
Off-airport	$1,732	$1,826	5.4%
Induced Benefits	$77,107	$82,613	7.1%
On-airport	$73,594	$78,910	7.2%
Off-airport	$3,513	$3,704	5.4%
Economic Activity (thousands of dollars)			
Direct – On-Airport	$434,335	$463,796	6.8%
Private Aviation Employers	$354,970	$380,609	7.2%
Government Aviation Employers	$14,467	$15,019	3.8%
Non-aviation Employers	$62,962	$66,382	5.4%
Capital Improvement Projects (5-year average)	$1,936	$1,787	-7.7%
Secondary Benefits	$361,798	$387,669	7.2%
Indirect Benefits	$145,497	$155,912	7.2%
On-airport	$140,243	$150,372	7.2%
Off-airport	$5,254	$5,539	5.4%
Induced Benefits	$216,301	$231,757	7.1%
On-airport	$207,008	$221,960	7.2%
Off-airport	$9,293	$9,798	5.4%

Sources: Seidman Research Institute 2018, IHS Markit 2021

The monetary results from the existing report were converted from 2018 dollars to 2019 dollars using a conversion factor of 1.0224.[3] **Table D.7** shows the corresponding proxy series and growth rates that were used to project the economic activity to 2019.

3 Source: IHS Markit US Regional Service, economic data for Maricopa County, Arizona

Table D.7. FFZ Airport Operations Impact Categories and Proxy Growth Series

Economic Impact Sources	Proxy Series	Source	CAGR
Direct – On-airport			
Private Aviation Employers	Actual Direct On-airport Employment, aggregated by IHS Markit	FFAZ, IHSM	-1.0%
Government Aviation Employers	Actual Direct On-airport Employment, aggregated by IHS Markit	FFAZ, IHSM	-19.8%
Non-aviation Employers	Actual Direct On-airport Employment, aggregated by IHS Markit	FFAZ, IHSM	0.2%
Capital Improvement Projects	Actual Capital Contributions	FFZ	N/A
Indirect and Induced Benefits			**4.8%**
On-airport	Real GSP, Professional, Scientific, and Technical Services	IHSM	4.9%
Off-airport	Real Retail Sales	IHSM	3.1%

Sources: Seidman Research Institute 2018, IHS Markit 2021, FFZ 2021

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Appendix E. Detailed Forecast Tables

Table E.1 and **Table E.2** provide detailed economic forecast tables for Arizona through the 2040 forecast horizon of the 2021 Arizona Aviation Economic Impact Study (2021 Arizona AEIS). These economic forecasts were developed by IHS Markit's Regional Economic Service which provides 30-year economic forecasts for 9 regions, 50 states, 380+ metropolitan areas and 3,100+ counties. IHS Markit's U.S. Regional data includes top-down analysis from its award-winning U.S. national model and bottom-up data from our industry experts within IHS Markit. IHS Markit's complete August 2021 outlook for Arizona is presented in its entirety in **Table E.1** and **Table E.2** of Appendix E.

As detailed in **Chapter 3. Key Aviation Activities and State Aviation Fund Forecasts,** select series from IHS Markit's Regional Economic Service's August 2021 Arizona forecast were utilized in the development of forecasts for certain components of the 2021 Arizona AEIS. Those detailed tables are provided in the following tables of Appendix E:

- **Table E.1.** Arizona Long-term Economic Outlook: Part 1, 2019 (actual) - 2040 (projected)
- **Table E.2.** Arizona Long-term Economic Outlook: Part 2, 2019 (actual) - 2040 (projected)
- **Table E.3.** Detailed Economic Impact Forecasts – Commercial Service Airports, 2019 (actual) - 2040 (projected)
- **Table E.4.** Detailed Economic Impact Forecasts – GA Airports, 2019 (actual) - 2040 (projected)
- **Table E.5.** Detailed Economic Impact Forecasts – Tourism, 2019 (actual) - 2040 (projected)
- **Table E.6.** Detailed Economic Impact Forecasts – Aviation Education, 2019 (actual) - 2040 (projected)
- **Table E.7.** Detailed Economic Impact Forecasts – Principal Military Installations, 2019 (actual) - 2040 (projected)
- **Table E.8.** Detailed Economic Impact Forecasts – Aerospace Manufacturing and Research, 2019 (actual) - 2040 (projected)

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Table E.1. Arizona Long-term Economic Outlook: Part 1, 2019 (actual) - 2040 (projected)

Indicator	2019	Forecast				Compound Annual Growth Rate (CAGR)			
		2025	2030	2035	2040	2019 - 2025	2025 -2030	2030 -2035	2035 -2040
Establishment Employment (thousands)									
Total Non-Agricultural	2,942.6	3,226.3	3,404.9	3,579.5	3,769.4	1.5%	1.1%	1.0%	1.0%
Manufacturing	178.0	180.4	179.0	177.7	179.8	0.2%	-0.1%	-0.1%	0.2%
Durables	134.3	137.2	136.5	135.7	138.3	0.4%	-0.1%	-0.1%	0.4%
Comp. & Elec. Prod.	33.1	32.9	31.2	31.1	31.6	-0.1%	-1.0%	-0.1%	0.3%
Nondurables	43.7	43.2	42.5	42.0	41.6	-0.2%	-0.3%	-0.3%	-0.2%
Non-Manufacturing	2,764.6	3,045.9	3,225.9	3,401.8	3,589.5	1.6%	1.2%	1.1%	1.1%
Construction & Mining	183.5	196.4	224.8	246.3	271.5	1.1%	2.7%	1.8%	2.0%
Trade, Trans., & Utilities	544.4	559.0	556.1	577.7	597.1	0.4%	-0.1%	0.8%	0.7%
Wholesale Trade	98.6	114.6	114.9	111.5	107.8	2.5%	0.0%	-0.6%	-0.7%
Retail Trade	326.2	285.1	279.3	306.8	336.3	-2.2%	-0.4%	1.9%	1.9%
Trans. & Warehousing	107.3	148.2	151.6	149.3	142.9	5.5%	0.4%	-0.3%	-0.9%
Utilities	12.3	11.0	10.3	10.1	10.0	-1.7%	-1.3%	-0.5%	0.0%
Information	49.4	52.7	51.7	52.6	56.5	1.1%	-0.4%	0.4%	1.4%
Financial Activities	228.0	252.7	247.6	259.8	271.2	1.7%	-0.4%	1.0%	0.9%
Finance & Insurance	170.9	196.4	189.6	199.9	212.1	2.3%	-0.7%	1.1%	1.2%
Real Estate & Rental	57.0	56.3	58.0	59.8	59.1	-0.2%	0.6%	0.6%	-0.3%
Prof. & Business Svcs.	447.6	537.9	596.1	632.7	690.8	3.1%	2.1%	1.2%	1.8%
Prof, Scientific, & Tech	158.9	200.0	217.5	228.3	253.6	3.9%	1.7%	1.0%	2.1%
Management	34.2	35.4	31.7	29.0	26.9	0.6%	-2.2%	-1.8%	-1.5%
Admin & Waste Svcs	254.5	302.5	347.0	375.4	410.3	2.9%	2.8%	1.6%	1.8%
Educ & Health Services	463.0	520.4	561.9	607.7	642.7	2.0%	1.5%	1.6%	1.1%
Educational Services	68.5	76.9	77.5	72.0	66.6	2.0%	0.2%	-1.5%	-1.5%
Health Care	394.5	443.4	484.4	535.7	576.1	2.0%	1.8%	2.0%	1.5%
Leisure & Hospitality	332.0	385.6	413.4	425.9	431.0	2.5%	1.4%	0.6%	0.2%
Arts, Entertainment, & Recreation	45.9	58.0	67.4	72.1	75.7	4.0%	3.1%	1.4%	1.0%
Accom & Food Svcs	286.1	327.6	346.0	353.8	355.2	2.3%	1.1%	0.4%	0.1%
Other Services	94.4	104.0	113.6	116.4	121.6	1.6%	1.8%	0.5%	0.9%
Government	422.4	437.3	460.6	482.7	507.3	0.6%	1.0%	0.9%	1.0%
Federal	56.4	58.9	61.9	61.8	66.1	0.7%	1.0%	0.0%	1.3%
State & Local	366.0	378.3	398.6	420.9	441.2	0.6%	1.1%	1.1%	0.9%
Resident Employment & Unemployment (thousands)									
Total Employment	3,366.7	3,776.4	3,991.3	4,174.5	4,399.6	1.9%	1.1%	0.9%	1.1%
Labor Force	3,538.6	3,942.1	4,180.8	4,387.4	4,622.9	1.8%	1.2%	1.0%	1.1%
Labor Force Participation Rate	62.4	63.3	62.8	62.1	62.0	0.2%	-0.2%	-0.2%	0.0%
Number Unemployed	171.9	165.7	189.5	213.0	223.3	-0.6%	2.7%	2.4%	1.0%
Unemployment Rate	4.9	4.2	4.5	4.9	4.8	-2.4%	1.5%	1.4%	-0.1%

Indicator	2019	Forecast				Compound Annual Growth Rate (CAGR)			
		2025	2030	2035	2040	2019 - 2025	2025 -2030	2030 -2035	2035 -2040
Other Economic Indicators									
CPI (Pct. Ch. Ann. Rate)	2.3	2.1	2.4	2.3	2.4	2.2%	2.2%	2.3%	2.4%
Retail Sales (billions $)	116.2	147.9	187.4	229.0	270.3	4.1%	4.8%	4.1%	3.4%
Vehicles, Parts, & Gas	39.4	48.7	58.1	70.3	84.3	3.6%	3.6%	3.9%	3.7%
Excl. Vehicles, Parts, & Gas	76.8	99.2	129.3	158.7	186.1	4.4%	5.4%	4.2%	3.2%
Personal Consumption Expenditures (billions $)	276.9	369.9	488.5	637.8	822.2	4.9%	5.7%	5.5%	5.2%
New Car Registrations (ths)	385.8	387.9	388.8	395.8	434.9	0.1%	0.0%	0.4%	1.9%
Manufacturing Shipments (billions 82$)	29.6	30.8	32.8	34.6	36.9	0.7%	1.2%	1.1%	1.3%

Source: IHS Markit U.S. Regional Service, August 2021 forecast

Table E.2. Arizona Long-term Economic Outlook: Part 2, 2019 (actual) - 2040 (projected)

Indicator	2019	Forecast				CAGR			
		2025	2030	2035	2040	2019 - 2025	2025 - 2030	2030 - 2035	2035 - 2040
Personal Income (billions $)									
Total Personal Income	335.2	459.7	607.4	791.0	1,009.7	5.4%	5.7%	5.4%	5.0%
Real Personal Income	318.1	386.2	460.4	540.1	622.8	3.3%	3.6%	3.2%	2.9%
Real Disposable Income	285.5	344.6	410.9	480.3	550.2	3.2%	3.6%	3.2%	2.8%
Real Per Capita Income (ths)	44.9	50.7	57.1	63.4	69.5	2.1%	2.4%	2.1%	1.9%
Median Household Income (ths)	62.1	73.9	87.0	102.0	117.9	3.0%	3.3%	3.2%	3.0%
Average Annual Wage (ths)	56.0	74.4	91.6	113.0	139.5	4.9%	4.3%	4.3%	4.3%
By Place of Work									
Wages and Salaries	164.7	240.0	312.0	404.6	522.9	6.5%	5.4%	5.3%	5.3%
Manufacturing	14.3	19.4	23.5	28.9	36.1	5.3%	3.9%	4.2%	4.5%
Construction & Mining	11.6	16.3	23.2	31.4	39.9	5.9%	7.2%	6.2%	5.0%
Trade, Trans., & Utilities	27.4	37.8	47.0	59.4	74.6	5.6%	4.4%	4.8%	4.7%
Information	3.9	6.0	7.6	10.1	14.2	7.3%	4.9%	5.9%	7.0%
Financial Activities	18.3	28.8	35.2	45.9	59.4	7.8%	4.1%	5.5%	5.3%
Prof & Business Svcs.	27.1	43.2	58.8	76.9	104.1	8.1%	6.4%	5.5%	6.3%
Educ & Health Services	24.8	36.7	49.0	65.6	85.5	6.8%	5.9%	6.0%	5.5%
Leisure & Hospitality	9.8	15.5	21.0	27.1	34.3	8.0%	6.3%	5.2%	4.8%
Other Services	4.8	7.4	10.0	12.5	16.0	7.4%	6.4%	4.5%	5.0%
Government	22.9	28.8	36.8	47.0	58.9	3.9%	5.0%	5.0%	4.7%
Other Labor Income	36.8	52.4	69.3	90.6	116.0	6.1%	5.7%	5.5%	5.1%
Less: Social Insurance	26.3	38.7	50.6	65.9	86.3	6.6%	5.5%	5.4%	5.5%

Indicator	2019	Forecast				CAGR			
		2025	2030	2035	2040	2019 - 2025	2025 - 2030	2030 - 2035	2035 - 2040
By Place of Residence									
Residence Adjustment	1.8	2.1	2.4	2.6	2.8	2.4%	2.1%	2.1%	1.7%
Property Income	66.1	81.4	111.5	147.7	181.6	3.5%	6.5%	5.8%	4.2%
Proprietor's Income	22.1	24.7	29.1	33.4	39.1	1.9%	3.3%	2.8%	3.2%
Farm Proprietor	1.0	0.6	0.4	0.4	0.3	-9.4%	-5.5%	-1.9%	-4.4%
Business Proprietor	21.0	24.1	28.7	33.0	38.8	2.3%	3.5%	2.9%	3.3%
Transfer Payments	66.5	90.2	120.8	158.1	201.3	5.2%	6.0%	5.5%	5.0%
Real Gross State Product, NAICS Based (billions 2012$)									
Total GSP	323.6	386.8	444.6	512.4	587.7	3.0%	2.8%	2.9%	2.8%
Agriculture	3.8	3.4	3.7	4.0	4.2	-1.8%	1.6%	1.7%	1.2%
Manufacturing	30.0	37.3	42.9	49.0	56.3	3.7%	2.9%	2.7%	2.8%
Mining	5.7	7.3	7.3	7.3	6.8	4.1%	0.2%	-0.2%	-1.4%
Construction	13.8	14.7	16.5	18.0	20.1	1.0%	2.4%	1.7%	2.2%
Trade, Trans., & Util.	58.1	69.4	80.5	95.7	112.7	3.0%	3.0%	3.5%	3.3%
Information	14.6	21.9	30.1	41.7	58.9	7.0%	6.6%	6.7%	7.2%
Financial Activities	68.3	83.0	94.9	109.5	123.3	3.3%	2.7%	2.9%	2.4%
Prof. & Business Svcs.	38.7	53.4	65.0	78.4	95.9	5.5%	4.0%	3.8%	4.1%
Educ & Health Services	32.3	37.2	42.2	47.8	52.7	2.4%	2.5%	2.5%	2.0%
Leisure & Hospitality	14.2	16.5	19.0	20.8	22.4	2.6%	2.8%	1.9%	1.5%
Other Services	6.0	6.5	7.2	7.6	8.1	1.2%	2.2%	1.1%	1.2%
State & Local Govt.	27.9	28.3	29.9	31.8	33.1	0.2%	1.1%	1.2%	0.8%
Federal Govt.	7.1	8.5	9.1	9.6	9.9	2.9%	1.4%	1.2%	0.6%
Housing									
Total Housing Starts (ths)	44.2	52.8	52.6	50.9	51.5	3.0%	-0.1%	-0.6%	0.2%
Single-Family (ths)	35.3	44.4	44.5	43.8	43.6	3.9%	0.0%	-0.3%	-0.1%
Multi-Family (ths)	8.9	8.4	8.1	7.1	7.9	-0.8%	-0.9%	-2.4%	2.0%
New Median Price ($)	253,104	356,929	424,288	N/A	N/A	5.9%	3.5%	N/A	N/A
Unit Sales, Existing (ths)	137.7	129.5	137.7	N/A	N/A	-1.0%	1.2%	N/A	N/A
Existing Median Price ($)	255,975	392,585	471,761	N/A	N/A	7.4%	3.7%	N/A	N/A
Population (thousands)									
Total Population	7,087.1	7,614.6	8,062.0	8,519.0	8,961.0	1.2%	1.1%	1.1%	1.0%
Under 14 years	1,319.7	1,285.2	1,303.4	1,352.9	1,404.3	-0.4%	0.3%	0.7%	0.7%
15 to 24 years	948.2	986.1	1,008.7	1,023.8	1,043.8	0.7%	0.5%	0.3%	0.4%
25 to 44 years	1,853.2	2,018.4	2,128.9	2,220.1	2,295.8	1.4%	1.1%	0.8%	0.7%
45 to 64 years	1,682.7	1,799.8	1,935.6	2,091.7	2,245.7	1.1%	1.5%	1.6%	1.4%
65 years and over	1,283.3	1,525.2	1,685.4	1,830.5	1,971.4	2.9%	2.0%	1.7%	1.5%
Net Migration	81.0	69.2	74.1	76.7	79.4	-2.6%	1.4%	0.7%	0.7%
Households	2,734.4	3,051.0	3,270.8	3,502.0	3,730.6	1.8%	1.4%	1.4%	1.3%

Source: IHS Markit U.S. Regional Service, August 2021 forecast

Table E.3. Detailed Economic Impact Forecasts – Commercial Service Airports, 2019 (actual) - 2040 (projected)

Indicator	2019	Forecast				CAGR				
		2025	2030	2035	2040	2019 - 2025	2025 - 2030	2030 - 2035	2035 - 2040	2019 - 2040
Economic Impact										
Employment	85,224	92,856	105,058	115,425	126,194	1.4%	2.5%	1.9%	1.8%	1.9%
Wages (millions $)	6,156	7,075	8,719	10,759	13,316	2.3%	4.3%	4.3%	4.4%	3.7%
Output (millions $)	20,515	25,762	32,147	39,042	46,437	3.9%	4.5%	4.0%	3.5%	4.0%
Additional Indicators										
Employment, Leisure & Hospitality (NAICS 71-72) (thousands)	332	386	413	426	431	2.5%	1.4%	0.6%	0.2%	1.2%
Employment, Professional & Business Svcs (NAICS 54-56) (thousands)	448	538	596	633	691	3.1%	2.1%	1.2%	1.8%	2.1%
Employment, Management of Companies and Enterprises (NAICS 55) (thousands)	34	35	32	29	27	0.6%	-2.2%	-1.8%	-1.5%	-1.1%
Enplanements (thousands)	25,989	28,316	32,037	35,198	38,482	1.4%	2.5%	1.9%	1.8%	1.9%
GSP, Leisure & Hospitality (millions $)	17,675	24,457	31,909	39,584	47,887	5.6%	5.5%	4.4%	3.9%	4.9%
GSP, Professional & Business Services (millions $)	42,205	66,950	92,936	127,151	175,511	8.0%	6.8%	6.5%	6.7%	7.0%
GSP, Transportation & Warehousing (millions $)	11,985	15,050	18,780	22,808	27,128	3.9%	4.5%	4.0%	3.5%	4.0%
Inflation (CPI)	2.65	3.01	3.36	3.76	4.23	2.2%	2.2%	2.3%	2.4%	2.3%

Note: The economic impacts of commercial service airports presented here include those generated by on-airport activities and visitor spending. The economic impact of tourism presented below (Table E.5) includes the visitor spending portion only. As such, the impacts presented in these sections cannot be added together to avoid duplication. Source: IHS Markit 2021

Table E.4. Detailed Economic Impact Forecasts – GA Airports, 2019 (actual) - 2040 (projected)

Indicator	2019	Forecast				CAGR				
		2025	2030	2035	2040	2019 - 2025	2025 - 2030	2030 - 2035	2035 - 2040	2019 - 2040
Economic Impact										
Employment	6,682	7,400	7,975	8,594	9,257	1.7%	1.5%	1.5%	1.5%	1.6%
Wages (millions $)	485	557	687	847	1,049	2.3%	4.3%	4.3%	4.4%	3.7%
Output (millions $)	1,592	1,999	2,494	3,029	3,603	3.9%	4.5%	4.0%	3.5%	4.0%
Additional Indicators										
Population, U.S. (thousands)	330,461	338,216	347,415	356,262	363,790	0.4%	0.5%	0.5%	0.4%	0.5%
Population, Arizona (thousands)	7,088	7,615	8,062	8,519	8,961	1.2%	1.1%	1.1%	1.0%	1.1%

Source: IHS Markit 2021

Table E.5. Detailed Economic Impact Forecasts – Tourism, 2019 (actual) - 2040 (projected)

Indicator	2019	Forecast				CAGR				
		2025	2030	2035	2040	2019 - 2025	2025 -2030	2030 -2035	2035 - 2040	2019 - 2040
Economic Impact										
Employment	92,257	96,775	103,797	113,900	121,559	0.8%	1.4%	1.9%	1.3%	1.3%
Wages (millions $)	2,998	3,727	4,676	5,835	7,257	3.7%	4.6%	4.5%	4.5%	4.3%
Output (millions $)	8,074	9,741	11,859	14,541	17,833	3.2%	4.0%	4.2%	4.2%	3.8%

Indicator	2019	Forecast				CAGR				
		2025	2030	2035	2040	2019 - 2025	2025 -2030	2030 -2035	2035 - 2040	2019 - 2040
Additional Indicators										
GSP, Leisure & Hospitality (millions $)	17,675	24,457	31,909	39,584	47,887	5.6%	5.5%	4.4%	3.9%	4.9%
GSP, Professional & Business Services (millions $)	42,205	66,950	92,936	127,151	175,511	8.0%	6.8%	6.5%	6.7%	7.0%
Employment, Leisure & Hospitality (NAICS 71-72) (thousands)	332	386	413	426	431	2.5%	1.4%	0.6%	0.2%	1.2%
Employment, Professional & Business Svcs (NAICS 54-56) (thousands)	448	538	596	633	691	3.1%	2.1%	1.2%	1.8%	2.1%
Average Wages, Leisure & Hospitality (NAICS 71-72) (thousands $)	29	40	51	64	79	5.4%	4.8%	4.6%	4.6%	4.9%

Note: The economic impacts of commercial service airports and GA airports presented in the tables above (Source: IHS Markit U.S. Regional Service, August 2021 forecast and Table E.4. Detailed Economic Impact Forecasts – GA Airports, 2019 (actual) - 2040 (projected), respectively) also include the economic impact of tourism activity. As such, impacts presented in these sections cannot be added together to avoid duplication. Source: IHS Markit 2021

Table E.6. Detailed Economic Impact Forecasts – Aviation Education, 2019 (actual) - 2040 (projected)

Indicator	2019	Forecast				CAGR				
		2025	2030	2035	2040	2019 - 2025	2025 - 2030	2030 - 2035	2035 - 2040	2019 - 2040
Economic Impact										
Employment	1,791	2,746	3,006	3,262	3,466	7.4%	1.8%	1.6%	1.2%	3.2%
Wages (millions $)	146.6	231.2	286.6	326.1	366.4	7.9%	4.4%	2.6%	2.4%	4.5%
Output (millions $)	316	528	735	1,014	1,387	8.9%	6.9%	6.6%	6.5%	7.3%
Additional Indicators										
Wage Disbursements, Educational Services (NAICS 61) (millions $)	2,697.5	4,255.5	5,275.6	6,002.4	6,744.3	7.9%	4.4%	2.6%	2.4%	4.5%

Source: IHS Markit 2021

Table E.7. Detailed Economic Impact Forecasts – Principal Military Installations, 2019 (actual) - 2040 (projected)

Indicator	2019	Forecast				CAGR				
		2025	2030	2035	2040	2019 - 2025	2025 - 2030	2030 - 2035	2035 - 2040	2019 - 2040
Economic Impact										
Employment	45,059	45,059	45,059	45,059	45,059	0.0%	0.0%	0.0%	0.0%	0.0%
Wages (millions $)	2,324	2,775	3,218	3,730	4,324	3.0%	3.0%	3.0%	3.0%	3.0%
Output (millions $)	5,876	7,016	8,133	9,429	10,931	3.0%	3.0%	3.0%	3.0%	3.0%

Sources: The Maguire Company 2017, IHS Markit 2021

Table E.8. Detailed Economic Impact Forecasts – Aerospace Manufacturing and Research, 2019 (actual) - 2040 (projected)

Indicator	2019	Forecast				CAGR				
		2025	2030	2035	2040	2019 - 2025	2025 -2030	2030 - 2035	2035 -2040	2019 - 2040
Economic Impact										
Employment	41,883	37,351	36,935	37,605	37,436	-1.9%	-0.2%	0.4%	-0.1%	-0.5%
Wages (millions $)	5,572	6,147	7,410	9,332	11,427	1.6%	3.8%	4.7%	4.1%	3.5%
Output (millions $)	37,210	40,570	49,846	62,317	76,407	1.5%	4.2%	4.6%	4.2%	3.5%
Additional Indicators										
Employment (Total Number and Percent Distribution by Industry Subsector)										
Total Employment (no.)	41,883	37,351	36,935	37,605	37,436	-1.9%	-0.2%	0.4%	-0.1%	-0.5%
Aircraft Mfg. (NAICS 336411)	34%	36%	37%	38%	38%	1.0%	0.7%	0.3%	0.1%	N/A
Aircraft Engine and Engine Parts Mfg. (NAICS 336412)	25%	19%	15%	13%	11%	-4.3%	-3.9%	-3.6%	-3.0%	N/A
Other Aircraft Parts and Auxiliary Equipment Mfg. (NAICS 336413)	17%	20%	22%	25%	26%	2.9%	2.5%	1.8%	1.4%	N/A
Guided Missile and Space Vehicle Mfg. (NAICS 336414)	20%	19%	18%	18%	17%	-0.5%	-1.0%	-0.7%	-0.6%	N/A
Guided Missile and Space Vehicle Propulsion Unit and Propulsion Unit Parts Mfg. (NAICS 336415)	5%	6%	6%	7%	7%	3.4%	1.6%	1.6%	1.2%	N/A
Other Guided Missile and Space Vehicle Parts and Auxiliary Equipment Mfg. (NAICS 336419)	0%	0%	0%	0%	0%	2.6%	1.1%	4.5%	1.0%	N/A
Output (Total Millions $ and Percent Distribution by Industry Subsector)										
Total Output	37,210	40,570	49,846	62,317	76,407	1.5%	4.2%	4.6%	4.2%	3.5%
Aircraft Mfg. (NAICS 336411)	27%	32%	35%	36%	37%	3.2%	1.2%	0.7%	0.5%	N/A
Aircraft Engine and Engine Parts Mfg. (NAICS 336412)	19%	17%	14%	12%	11%	-1.6%	-3.4%	-3.2%	-2.6%	N/A
Other Aircraft Parts and Auxiliary Equipment Mfg. (NAICS 336413)	14%	18%	21%	23%	26%	4.6%	3.0%	2.3%	1.8%	N/A
Guided Missile and Space Vehicle Mfg. (NAICS 336414)	32%	25%	22%	21%	19%	-4.3%	-2.0%	-1.7%	-1.7%	N/A
Guided Missile and Space Vehicle Propulsion Unit and Propulsion Unit Parts Mfg. (NAICS 336415)	8%	8%	8%	8%	8%	-1.4%	0.6%	0.6%	0.1%	N/A
Other Guided Missile and Space Vehicle Parts and Auxiliary Equipment Mfg. (NAICS 336419)	0%	0%	0%	0%	0%	-3.1%	0.1%	3.5%	-0.2%	N/A
Establishments (Total Number of Establishments and Industry Subsectors)										
Total Establishments	104	109	114	123	130	0.8%	0.9%	1.5%	1.1%	1.1%
Aircraft Mfg. (NAICS 336411)	19	21	22	24	24	1.7%	0.9%	1.8%	0.0%	
Aircraft Engine and Engine Parts Mfg. (NAICS 336412)	30	26	24	24	25	-2.4%	-1.6%	0.0%	0.8%	
Other Aircraft Parts and Auxiliary Equipment Mfg. (NAICS 336413)	48	56	63	70	76	2.6%	2.4%	2.1%	1.7%	
Guided Missile and Space Vehicle Mfg. (NAICS 336414)	*	*	*	*	*	N/A	N/A	N/A	N/A	N/A
Guided Missile and Space Vehicle Propulsion Unit and Propulsion Unit Parts Mfg. (NAICS 336415)	*	*	*	*	*	N/A	N/A	N/A	N/A	N/A
Other Guided Missile and Space Vehicle Parts and Auxiliary Equipment Mfg. (NAICS 336419)	*	*	*	*	*	N/A	N/A	N/A	N/A	N/A

**Note: Denotes less than 10 establishments. Source: IHS Markit 2021*

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