





## Chapter 3- Aviation Demand Forecasts

The Grand Canyon National Park Airport (GCN) is currently the third most active commercial service airport in the State, following Phoenix Sky Harbor International Airport and Tucson International Airport. GCN enplaned nearly 331,000 passengers and experienced approximately 97,500 aircraft operations in 2002. An Economic Impact Study of the GCN was conducted by The Economic Outlook Center of the College of Business, Arizona State University. This study estimated the total combined economic impact produced by the Airport included nearly 900 jobs and more than \$50 million dollars in annual economic benefit to the northern Arizona Region, Coconino County, as well as the Community of Tusayan.

As one of the most recognizable natural wonders of the world, the Grand Canyon National Park hosts approximately 4.3 million visitors each year. At the same time, the “Canyon Country” portion of the State attracts 13.9 percent of the estimated 26.9 million domestic visitors each year. Outdoor, nature, touring, and sightseeing activities account for nearly half of the tourism activities occurring in the State. While the global economy has experienced decline in recent years, and the United States is recovering from recession, tourism in the State has also experienced a reduction in numbers. Despite these recent declines, tourism and park visitation are expected to rebound and continue to grow in the future.

Forecasts of various segments of aviation demand have been prepared and are presented in this chapter to assist the Arizona Department of Transportation, Aeronautics Division, in the evaluation of the performance-based needs of GCN during the next 20 years. The forecasts are organized in the following manner:

- ✦ Air Carrier:
  - Annual Passenger Enplanement Activity;
  - Commercial Service Aircraft Fleet Mix; and
  - Annual Operations.
  
- ✦ General Aviation:
  - Based Aircraft;
  - Annual Operations; and
  - General Aviation Fleet Mix.
  
- ✦ Instrument Operations: - Annual Instrument Approach Operations (AIAs)

### Introduction/Purpose of Demand Forecasts

Grand Canyon Park National Airport is unlike almost any other commercial service airport in the country. As indicated earlier, it is the third busiest commercial service airport in the State, but has very little resident population to service, which is a unique characteristic. The economy of the community is dominated by tourism and service. There are virtually no manufacturing, financial services, or government sectors within the local economy. Therefore, the vast majority of activity at the Airport is tourism related.



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The airport master plan forecast element is used as a method to determine the need for possible future capital development, as well as investment in the overall facility. Essential to this determination is the generation of forecasts and projected facility growth and increases in airport activity. Demand forecasts provide a means for determining the type, extent, size, location, timing, and financial feasibility of capital development. Consequently, demand forecasts influence virtually all remaining phases of the master planning process.

Forecasting in general is as much art as it is science. This is particularly true with respect to forecasting aviation activity. Aviation activity and tourism are both highly dependant on economic activity and growth. Although the forecaster relies on econometric models, statistical analysis and arithmetic formulas in order to quantify and model parameters for the future, they must also be intimately familiar with the background and character of the airport, because numbers alone cannot tell the entire story of where the airport has been or where it will be in the future. Therefore, it is important to conduct demand forecast analyses with a degree of both optimism and conservatism while paying close attention to historical trends. Because of the unique nature of GCN, the selection of appropriate and reliable indicators of aviation demand is a challenge.

Forecasting aviation and passenger activity requires more than an extrapolation of past trends and the application of statistical measures to relate the future aviation demand to the forecast projections of population, economic activity, and tourism activity. Demand forecasting requires the application of professional judgment and experience, as well as an understanding of the market forces that will tend to promote or limit aviation activity. In the case of GCN, the market forces that are thought to relate directly to activity at the Airport are represented by Las Vegas gaming revenue, Grand Canyon National Park attendance, currency exchange rates, and various regional and U.S. economic data.

National aviation trends and projections, from which a baseline of growth rate data was established, are found in the publication entitled *FAA Aerospace Forecasts (FY 2003-2014)*. These trends and projections can be substituted when local information is not available and also are used for comparison purposes.

## Aviation Trends at the National Level

September 11, 2001 ended a decade-long period of unprecedented growth within the aviation industry in which the United States, as well as world commercial and civil aviation manufacturers, experienced record demand for aviation products and profitability. The affects of the terrorist attacks on the United States impacted the economy, travel markets and economic growth, as well as travel demand on a global scale. Immediately following the attacks (2001-2002), demand for commercial air travel in the U.S. as well as abroad declined sharply, particularly in 2002, and forced domestic and foreign air carriers to reduce costs by cutting flight routes and canceling flights. The worldwide decline in travel demand during the same period further forced air carriers to adjust flight schedules downward.

September 11<sup>th</sup> produced varying impacts on different countries and world travel markets. With recovery on the horizon, the events of the timing and strength of economic recovery



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is yet to be determined. Initial indications are that domestic air carriers and travel demand have recovered at a faster pace than foreign carriers. Also, the lower-cost and regional domestic carriers have performed better than their larger air carrier counterparts. For the calendar year 2002, U.S. travel demand showed a decline of 8.6 percent from the previous year. In addition, available seat miles (ASM) were down 3.9 percent, revenue passenger miles (RPM) declined 2.2 percent, while enplanements decreased 2.8 percent. However, the average load factor for 2002 was 71.0 percent, representing the second highest load factor on record.

The performance numbers for large air carriers in 2002 showed that ASMs declined by 9.8 percent, while RPMs and enplanements declined 9.7 and 10.5 percent, respectively. The decline in system capacity, as well as system demand, is reflective of the economic slow down and the fact that major air carriers have recently pared down the size of their fleet of aircraft resulting in fewer seats to carry passengers. However, the large air carrier load factor during the same period remained a constant 71.2 percent. This phenomenon is a result of major air carriers flying passengers in fewer aircraft at higher passenger loads.

The regional and commuter carriers' response to the events of September 11<sup>th</sup> was opposite that of the major air carriers in that market routes relinquished by the major carriers were assumed by the regional carriers. The regional/commuter ASM increased by 16.6 percent in 2002 yielding a 17.7 percent increase in domestic markets. Furthermore, RPMs increased 23.1 percent in domestic markets in 2002 while achieving a record breaking 61.3 percent load factor, up 2.6 percent from the previous year. Additionally, regionals/commuters enplaned approximately 90.7 million passengers in FY02, representing an increase of 8.5 percent over the previous year.

At the end of 2002 the U.S. commercial air carrier fleet totaled 7,735 aircraft including 4,180 large air carrier aircraft (over 70 seats), 2,521 regional/commuter aircraft accounting for approximately 87 percent of the overall fleet. The remaining 13 percent of the fleet (1,034 aircraft) consisted of cargo jets. The large air carrier passenger fleet has declined by 3.7 percent (292 aircraft) over the past two years while the regional/commuter fleet has increased 3.1 percent (247 aircraft) in the past two years. Cargo aircraft declined by a total of 30 aircraft during the prior two-year period. Piston regional/commuter and regional jet aircraft declined by 215 aircraft and increased by 462 aircraft during the past two years, respectively.

The General Aviation Revitalization Act of 1994, which established an 18-year product liability limitation for the design or manufacturing of general aviation aircraft and components, contributed to the re-birth of the general aviation industry. The events of September 11<sup>th</sup> impacted the demand for general aviation products and services in the form of "no fly zones," as well as other operational restrictions. However, the economic recession and declining industry profits are viewed as the primary factor in the reduction of demand for general aviation products and services over the past two years. Given these two scenarios, on the heels of a five year period of sustained growth, aircraft shipments and billings were down 16.9 percent and 25.2 percent, respectively. Business jet aircraft shipments also indicated a slide of 5.6 percent. In contrast, the general



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aviation fleet consisting of 211,447 aircraft flew an estimated 29.1 million hours in 2001 and is estimated to increase by 1.1 percent throughout the planning period. The majority of the flight hours will be conducted by turbine powered aircraft. Business and corporate turbine powered aircraft appear to be the emerging saving grace of the industry including growth in fractional ownership companies and options, as well as interests in the on-demand charter industry.

During the two year period from 2001-2002 shipments of U.S. produced helicopters decreased 22.2 percent, falling from 415 units in 2001 to 323 units in 2002. During the 2001-2002 reporting periods there were approximately 6,783 rotorcraft registered in the United States, while at the same time the number of active turbine rotorcraft was estimated to be 4,491 units and active piston rotorcraft was 2,292 units. These estimates represent an overall decrease of approximately 14.0 percent from 2000. Factors most responsible for affecting the rotorcraft segment of the industry are believed to be availability of infrastructure, improved safety image, price-to-performance ratio, and environmental impacts.

## Travel Industry Overview

The travel industry in the United States is the country's third largest retail sales industry. According to the *Travel Industry Association of America*, domestic and international travelers spent \$525.1 billion, nearly 3.5 percent of the U.S. Gross Domestic Product during 2002. Despite the fact that the travel industry has been hard hit by the impact of the events of September 11<sup>th</sup>, the use of the goods and services of transportation carriers, tour operators, commercial accommodations, restaurants, campgrounds, and attractions is predicted to rebound and continue to grow through the end of the decade.

Currently, the travel and tourism industry employs over 7.4 million individuals directly, and generates an additional 10 million induced jobs. Travel industry employment constituted 12.9 percent of total U.S. nonagricultural employment during 2002. Travel generates \$170.2 billion in payrolls - one of every eight people in the U.S. civilian labor force is directly or indirectly employed in travel and tourism. Jobs directly generated by domestic traveler expenditures accounted for 85 percent of total travel-generated employment, while international travelers generated approximately 970,000 jobs.

The U.S. Travel Data Center's *National Travel Survey* indicates the jobs were generated domestically by U.S. residents who took over 1.01 billion personal trips (traveling 50 miles or more) in 2002. Pleasure trips accounted for 76 percent of these trips, while business travel generated 13 percent and combined business/pleasure the remainder. Pleasure travel has increased 50 percent in the past decade. Over half of all pleasure trips are to visit friends or relatives (51 percent), while another third (31 percent) are for entertainment purposes. Overwhelmingly, pleasure travelers used motor vehicles for their travels (74 percent). Continuing a trend from previous years, the use of hotels and motels for accommodations continued to rank ahead of staying in private homes, with 51 percent of travelers choosing paid lodging and 41 percent staying with friends and relatives.

According to the U.S. Department of Commerce International Trade Administration, 41.8 million international travelers visited the U.S. in 2002, down 6.7 percent from the previous



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year, and almost 20 percent below the arrivals from 2000. This marks the second year in a row that international arrivals have declined. However, arrivals from Mexico increased slightly and the decline in Canadian visitation was minimal (these are Arizona's biggest international markets). International tourists spent \$87.8 billion in the U.S. in 2002, creating a nearly \$7.5 billion trade surplus and making tourism one of America's largest service exports.

### North American Visitors- Long Term Forecast to 2006:

- ✦ The U.S. top two markets, Mexico and Canada, comprising over half of the International visitation to the country, will actually gain a market share point in the long term.
- ✦ Canada showed positive signs of growth in the first couple of months of 2003. With strength in their currency and economic fundamentals, they represent a positive growth market for 2003 and beyond. According to the Department of Commerce, this growth will continue at 6 and 7 percent annual rates over the next few years, and 24 percent over the 2002 level to 16.1 million visitors.
- ✦ Tourism from the Mexican market is expected to gradually increase throughout the forecast period and is estimated to contribute an overall 21 percent expansion from the 2002 levels to nearly 12 million visitors.
- ✦ The United States is the primary destination for Mexicans, accounting for 85 percent of all of their outbound travel.

"Adventure travel" continues to rank second behind shopping in travel activities. According to the Travel Industry Association, nearly 65 million Americans say they have taken at least one trip of 50 miles or more away from home to visit a national or state park. This equates to 31 percent of all U.S. adults. The highest visitation comes from the Baby Boomer market, age 35-54.

### Arizona and the Grand Canyon

Tourism in the state of Arizona experienced a decline in 2002, hosting 26.9 million domestic visitors, versus 27.1 million in 2001. But these visitors spent approximately \$12 billion, a 3.7 percent increase over 2001. This spending created over 368,000 jobs in 2002, a 0.8 percent decrease over 2001. The impact of tourism is evident throughout the state. Each of Arizona's counties benefited from tourism in 2002. Not only did urban areas with extensively developed tourism infrastructure receive millions of dollars in tourism spending, but so did many rural areas which offer primarily natural attractions and rustic support facilities. According to the Arizona Hospitality Research and Resource Center, of the 26.9 million visitors to the state, 13 million concentrated their visit in Phoenix and the Valley of the Sun. The Flagstaff/Grand Canyon area received 3.4 million visitors, and Pima County (Tucson) hosted 4 million.

Ten states generate 79 percent of Arizona's visitors, with California leading the way. Almost 28 percent of the state's visitors travel from California, while 24 percent of the



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state's tourism activity is generated by residents of Arizona. Texas and New Mexico follow with 6.3 percent and 3.5 percent respectively.

Outdoor recreational attractions are by far the most popular visitor destination in the state. Almost 55 percent of the state's visitors come for outdoor recreation, nature-based tourism, or sports-related activities. Leisure travel generates 74 percent of the visits to Arizona, while meetings, conventions and business travel are responsible for only 1 in 4 trips to the state. Auto travel remains the dominate form of transportation, with 58 percent of those arriving to the state in private cars. Air travel generates 32 percent of the arrivals, with motor coach and rail comprising 10 percent.

Hotel occupancy across the state did manage a slight gain over 2001; however, rates are significantly down from their 2000 levels and forecasts don't provide much hope for significant increases in either occupancy or rate for the foreseeable future. Not surprisingly, the Grand Canyon is the state's most visited site, followed by Lake Meade and the Glen Canyon National Recreation Area. **Table 3.1** outlines the top attractions in the State.

## Grand Canyon West

The Grand Canyon West Airport and tour services on the Hualapai Indian Reservation are a growing competitive alternative to businesses operating to and from Grand Canyon Airport.

Approximately 150 ground miles from Las Vegas, the Grand Canyon West Airport lacks many of the features and services currently offered at GCN. Because of its isolated location and the lack of adequate ground access, the facility is dependent on air tours and charter service from the Las Vegas and Phoenix areas. The drive is a minimum of 15 miles of dirt road if coming from the north on Highway 93, or 50 miles of canyon- hugging switchbacks across rough terrain from the south if coming on Highway 66. A four-wheel drive vehicle is necessary to make the trip. Gas for automobiles is available for purchase from a storage truck at \$4.50 a gallon.



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**Table 3.1**  
*Travel Industry Overview- Arizona Attractions Attendance*  
**Grand Canyon National Park Airport**

Historical/Cultural Attractions	Number of Visitors	National, State Parks & Recreational Attractions	Number of Visitors
Canyon De Chelly Nat'l Monument	772,620	Grand Canyon Nat'l Park	3,997,236
London Bridge	407,759	Saguaro Nat'l Park	577,672
Arizona Temple Visitor Center	1,200,00	Glen Canyon Nat'l Recreation Area	1,610,334
Phoenix Zoo	0	Petrified Forest Nat'l Park	571,585
Montezuma Castle Nat'l Monument	1,000,00	Sunset Crater Nat'l Monument	150,664
Rawhide	0	Organ Pipe Cactus Nat'l Monument	294,434
Arizona/Sonora Desert Museum	875,000	Lake Havasu State Park	407,759
Wupatki Nat'l Monument	598,533	Slide Rock State Park	175,036
Heard Museum	236,394	Patagonia Lake State Park	207,235
Hubble Trading Post	252,230	Lake Meade	1,698,828
	196,374		

**Source:** U.S. National Park Service; Arizona Office of Tourism, August 2003.

The facility itself is limited to a small terminal that houses a gift shop, tour desk, snack bar, and airport manager's office. Tin-covered huts or tents serve as the gathering spot for visitors wishing to take helicopter tours. Visitors arriving by ground can travel as part of a group by taking a "bluebird" type school bus to the Canyon floor and enjoying a basic picnic lunch for \$37.

Ground visitors may also take a combination helicopter/boat tour for \$129 or a helicopter/boat/bus trip for \$139. Although all the services are basic, the product does have a significant advantage – that being the ability to see the Grand Canyon in its "natural state" and not being limited by the NPS regulations in place at Grand Canyon South Rim.

Most of the scenic overlooks and picnic areas are not "protected zones." There is no guardrail between picnic tables and the edge of the Canyon. Helicopter tours have the ability to land on the floor of the Canyon and disburse passengers to waiting boats on the Colorado River. The entire experience is best described as "less controlled." Air tour operators interviewed appear to prefer the airport for many reasons, including less flight time from Las Vegas, which means the ability to do more trips, and more competitive pricing. King Airlines offers tours starting at \$129. Air tours from Phoenix that include lunch, helicopter, bus, and boat are approximately \$479.

## Travel Industry Overview Summary

The growth of airline passenger activity has also stalled. Phoenix Sky Harbor International Airport saw a flat year in 2002, while Tucson International saw a decline of 120,000 passengers. Grand Canyon National Park Airport continues to experience a downward trend, finishing almost 20 percent below 2001 numbers. At its peak in 1999, GCN hosted almost 1.2 million passengers, and remained flat in 2000. Since that point, the Airport





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has recorded a 43 percent decline in passenger activity. That decline continued through the first six months of 2003, with almost 4,000 fewer enplanements than in 2002.

The Grand Canyon National Park and community of Tusayan have approximately 2,000 hotel rooms evenly divided between those within the confines of the Park and the community. Interviews with hotels operators indicate that almost none of the overnight stays in the area are generated by the Grand Canyon Airport. The vast majority of overnight visitors arrive by individual automobile, and the remainder on tour motor coaches. Although there may be limited demand generated by meetings and incentive travel, the vast majority of tourists are visiting for leisure activity.

Public transportation for arriving and departing passengers to local lodgings/ establishments is provided either via hotel vans or taxi service, which is limited in availability. Enterprise Car Rental, which is the only rental facility in the area, survives primarily on local employees who don't own automobiles. There is some question in the short term that this will remain open for business which would leave arriving passengers, not part of a pre-formed tour, with no transportation options. Although not part of the original master plan of the Grand Canyon mass transit system, National Park officials confirm that a link to the Airport is under consideration in the Phase II plan. Such a link would make scheduled passenger service for those not purchasing a package tour through one of the sightseeing companies much more viable.

Airport management indicated that the facility in the past has hosted charter flights arriving on aircraft as large as Boeing 737, but that they have declined drastically in numbers due to the fall in international visitation, primarily from Asian markets. Such charters currently stress the abilities of the Airport, requiring TSA personnel from Flagstaff to make the 90-minute journey to process enplaning passengers.

Until the domestic travel industry stabilizes and the public again feels comfortable with air travel for leisure purposes, leisure demand at the Grand Canyon Airport will be closely tied to the fortunes of Las Vegas as a destination, and the marketing successes of the air tour companies currently serving the facility. There also appears to be a viable charter market for the Airport, both for domestically and international pre-formed groups. Consideration should be given to facilities which could handle the arrival and departure of groups of up to 100 passengers, including baggage handling and passenger processing.

## Forecast Conditions and Assumptions

Based on information obtained in the inventory process, and the understanding of the airport character developed during that process, the following conditions and assumptions have been incorporated into the aviation demand forecasts for the Grand Canyon National Park Airport. Again it must be remembered just how unique the character and operating profile the GCN is in comparison to other commercial service airports.

- ✦ The demand forecasts for the GCN are based on constrained conditions. Constrained forecast conditions take into account the affects of the SFAR cap



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on overflights, operations and passenger enplanements, as well as the influence of the Grand Canyon West Airport upon the future activity of GCN.

- ✦ The U.S. and world economies will recover strongly in the short-term planning period allowing moderate and sustained growth over the next decade. The principal world economies that will witness sustained recovery include the Asia/Pacific, as well as the European economies. Economic recovery of these markets is important in that they have a substantial impact on tourism and economy including tourist stops in Arizona and Nevada, as well as the remainder of the southwestern U.S.
- ✦ Domestic and international passenger traffic will achieve positive growth within the short-term phase of airport development as consumer confidence in utilizing commercial service, and flying in general, approaches pre-9/11 activity and confidence levels. Additionally, the impact of additional security measures at airports as they relate to cost and travel convenience will also lessen as passenger confidence rebounds.
- ✦ Regional/commuter (air taxi) passenger traffic will continue to increase at a rate faster than those of large commercial air carriers directly impacting the increased demand for smaller turbine powered aircraft at GCN.
- ✦ 19-seat turbo-prop aircraft will continue to support the bulk of the passenger activity being served by fixed wing aircraft. Rotorcraft will continue to carry a significant number of passenger enplanements at the Airport due to the number of units within the helicopter fleet and the demand for aerial tours conducted by helicopters.

## Demand Forecast Approach

The development of the aviation demand forecasts for the Grand Canyon National Park Airport were generated by conducting a series of analytical, statistical, arithmetic, and judgmental processes. These analytical and statistical processes compare mathematical relationships to analyze historic data and define their relationship to the operational parameters (i.e. aircraft operations, passenger enplanements, and based aircraft) at the Airport.

The initial step in generating demand forecasts is to research and assess historic operational and demographic trends. Historic data regarding the annual aviation operational activity, based aircraft, and annual passenger enplanements were analyzed for the preceding 20 year period. Additionally, outside factors affecting the operational environment of the Airport include Grand Canyon National Park attendance, currency exchange rates, economic wealth of nearby metropolitan areas, population centers, as well as global economy. Comparisons between these variables yield relationships that will enable reasonable demand forecasts to be generated.

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The following discussion offers definitions of different methodologies that were utilized as part of the process to generate aviation demand forecasts for the Grand Canyon National Park Airport.

- ✦ *Linear Trend Line/Trend Extension:* Among the simplest and most familiar forecasting techniques, linear trend line analysis is one of the most frequently used models in the industry. Simply put, historic data is projected into the future providing an estimate of the aviation demand throughout the planning period. The basic assumption of the linear trend line method is that historic levels of aviation activity will continue to exert a similar influence on future demand levels. As broad and presumptive as this method might be, it is often a reliable benchmark against which other forecasting models may be compared.
- ✦ *Regression/Multiple Regression Analysis:* The regression model projects the forecast of aviation demand parameter (dependent variable) on the basis of one or more external factors or indicators (independent variable(s)). Historic values for both variables are analyzed and compared to determine the mathematical relationship and the degree of correlation between the independent and dependent variables. This relationship is then utilized to forecast the dependent variable with a projection of the independent variable. Elements of aviation such as enplanements, based aircraft, and annual operations are dependent variables. Per capita income, population, economic factors, and socioeconomic data are frequently utilized as independent variables.
- ✦ *Market Share:* The market share method of forecasting involves the comparison of the airport's share of activity as compared to a larger aviation market. The market share analysis allows a "top-down" approach with which to check or compare the validity of other forecasting methods utilized for a particular study.
- ✦ *Judgmental/Professional Process:* Following the completion of the demand forecast analysis by utilizing several statistical methodologies, judgment or professional experience is applied to the generated forecast projections. Intangible factors such as specific information regarding the airport, operating environment, industry trends, potential development to attract aviation activity, or local area economic or socio-economic information generally are taken into account when formulating a judgmental or professional opinion in arriving at a preferred forecast.

## Commercial Service Demand Forecasts

Passenger enplanements are the most basic indicator of commercial service activity at an airport. All other commercial demands are dependant on this indicator. Passenger enplanements are important because they will dictate the need for commercial facilities and services.

Commercial service demand forecasts were developed for the Grand Canyon National Park Airport taking into account passengers enplaned on nonscheduled/on-demand air carriers, commuters or small certificated air carriers, as well as large certificated route air carriers. A review of the historical data reveals that approximately 60 separate certificated carriers have enplaned passengers at GCN during the past two decades. During the course of developing passenger enplanement projections, multiple variables have been analyzed and numerous iterations of the above defined methodologies have been completed in order to arrive at a reasonable expectation of passenger activity at the Airport during the 20-year planning period.

The following discussion will begin with enplanement forecasts and continue with the generation of forecasts for the following commercial service subjects.

- ✦ Passenger Enplanements;
- ✦ Commercial Service Aircraft Fleet Mix; and
- ✦ Annual Aircraft Operations;
- ✦ Peaking Characteristics.

### Passenger Enplanements

#### *Linear Trend Line/Trend Extension*

Historic passenger enplanement data, highlighted in **Table 3.2**, was received from the ADOT, Aeronautics Division for the last two decades. The historic enplanement data indicated that approximately 180,000 passengers were enplaned in 1980. This activity continued a steady increase over the period when passenger enplanements peaked in 1996. In that year, approximately 642,200 passenger enplanements took place at the Airport. Subsequent to 1996, several events served to depress the demands not only at GCN Airport, but around the world, including an economic recession, the events of 9/11 and SARS outbreak in Asia, Canada and elsewhere. The following table illustrates the historic passenger enplanement data dating back to 1980.



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**Table 3.2**  
*Historic Annual Passenger Enplanement Activity*  
*Grand Canyon National Park Airport*

Year	Passenger Enplanements	Year	Passenger Enplanements
1980	183,000	1992	483,243
1981	157,000	1993	533,808
1982	205,000	1994	549,113
1983	199,000	1995	535,656
1984	186,000	1996	642,221
1985	69,000	1997	533,867
1986	136,000	1998	386,321
1987	450,000	1999	582,388
1988	421,800	2000	536,877
1989	393,687	2001	411,138
1990	207,734	2002	330,980
1991	436,049	2003	-

**Source:** ADOT, Aeronautics Division, 2003.

A linear trend analysis was performed on the above data. This analysis resulted in a correlation coefficient of 0.72 and an estimated annual increase in passenger enplanements of approximately 2.8 percent. Utilizing this model would result in a projection of 930,900 passenger enplanements in the year 2022. It should be noted that the closer a correlation coefficient is to 1.0, the greater the likelihood that the data is directly related. Refer to **Table 3.3** for additional information regarding short and mid-term linear trend analysis forecasts.

### *Regression/Multiple Regression Analysis*

A degree of judgment and discretion are required in order to focus on those factors having the most significance or direct relationship to the analysis on passenger enplanements. It is clear that activities at GCN are heavily dominated by tourism. The contribution to airport activity of the local population and economic activity is negligible. Therefore, indicators of tourism and economic activity on a more regional level were investigated. Two parameters in particular are believed to have a direct bearing on passenger enplanements at the Airport. Grand Canyon National Park visitation and gaming revenues generated in the Las Vegas market are regional indicators of tourism and were selected to model against passenger enplanements.

Annual Park attendance, highlighted in **Table 3.3**, is an obvious choice to relate to future enplaned passengers due to the large number of park visitors that arrive in the Grand Canyon by means of air transportation. Initially, in order to draw a correlation between park attendance and future enplanements, historic annual park visitation/attendance numbers were collected dating back to 1980. Secondly, since the National Park Service does not forecast park visitation, the historic park visitation data was projected forward using a trend line analysis. This analysis projected park visitation forward throughout the



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20-year forecast period, and resulted in a projection of approximately 7.6 million park visitors by the year 2022.

When historic passenger enplanement data was compared to historic park attendance data, the two sets of data produced a correlation coefficient of 0.87. The projections of park visitation were then used to forecast future passenger enplanements for the Airport. Based on the projections of park visitation (the independent variable), an estimate of approximately 973,900 passengers (dependent variable) was produced.

As reported in the Travel Industry Overview, as the travel industry and economy stabilizes/ recovers, and public confidence in air travel is renewed, the desirability of Las Vegas as a travel destination will also rebound. The prosperity of Las Vegas can be represented or measured by the increases or declines in gaming revenue. The demands at GCN will be closely tied to the prosperity of Las Vegas as a travel destination. Therefore, Las Vegas gaming revenue was chosen as a second variable on which to forecast future enplanement activity at GCN.

**Table 3.3**  
**Historic Grand Canyon National Park Attendance**  
**Grand Canyon National Park Airport**

Year	Park Attendance	Year	Park Attendance
1980	2,618,713	1992	4,547,027
1981	2,674,117	1993	4,928,509
1982	2,499,799	1994	4,704,070
1983	2,448,545	1995	4,908,073
1984	2,360,767	1996	4,730,682
1985	2,983,436	1997	4,851,931
1986	3,347,872	1998	4,578,089
1987	3,513,084	1999	4,937,625
1988	3,858,708	2000	4,816,559
1989	3,968,605	2001	4,400,823
1990	3,752,901	2002	4,339,139
1991	3,905,989	2003	-

**Source:** U.S. Park Service, Grand Canyon National Park, 2003.

To define the relationship between Las Vegas gaming revenue and passenger enplanements at GCN, historic data on annual gaming revenue was collected from the Nevada State Gaming Board for Clark County dating back to 1989. As with determining future park attendance based on historic data, assumptions were made regarding the future gaming revenue of Clark County. Again, a linear trend-line analysis was applied to the historic Clark County gaming revenue and projected forward throughout the 20-year planning period. This analysis produced a correlation coefficient of 0.23. Current gaming revenue for Clark County is nearly \$7.63 billion. Based on this model it can be expected that, on average, Clark County gaming revenues will increase approximately 4 percent annually. By the year 2022 these revenues will amount to \$14.8 billion annually. When passenger enplanement data was compared to gaming revenues, an annual



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enplanement forecast of approximately 624,300 passengers in the year 2022 was produced.

A multiple regression analysis comparing gaming revenue and Park visitation was completed. The result of combining these two independent variables into one arithmetic model served to strengthen the overall relationship and increase the correlation coefficient to 0.93. The result of the multiple regression technique yielded a forecast of 1,045,900 enplaned passengers by the year 2022. Refer to **Table 3.4** for additional information regarding short and mid-term regression analysis forecasts. It should be noted that within the table, enplanement projections have been rounded to the nearest hundred for simplicity.

**Table 3.4**  
*Summary of Passenger Enplanement Forecasts*  
*Grand Canyon National Park Airport*

Year	Market Share (Las Vegas MSA)	Linear Trend Line/ Trend Extension	Regression/ Multiple Regression Analysis
Existing	331,000	331,000	331,000
2007	667,500	660,800	708,800
2012	774,300	750,800	821,200
2017	881,000	840,900	933,600
2022	987,800	930,900	1,045,900

**Source:** BWR, Summary Forecast of Passenger Enplanements, August 2003.

### *Market Share Analysis*

As stated earlier, a market share analysis reflects an allocation or distribution of a larger market to a specific portion of that market. In this case the nearest metropolitan area is Las Vegas. The Las Vegas Metropolitan Statistical Area (MSA) was selected not only because of its proximity to GCN, but also because a majority of air tour companies and small air carriers operating between Las Vegas and the Grand Canyon originate in the Las Vegas MSA.

The Grand Canyon National Park Airport derives a significant portion of its enplanements from the Las Vegas market (MSA). The airports located in the Las Vegas MSA were studied to determine if and how many of those which enplane passengers eventually travel to the Grand Canyon. McCarran International Airport (LAS), North Las Vegas Airport (VGT), and Henderson Executive Airport (HND) were all found to currently enplane, or have in the recent past, enplaned passengers that would contribute to a passenger enplanement market.

During 2002, LAS enplaned approximately 16.54 million passengers, VGT enplaned 144,000 passengers, and while HND did not enplane passengers during 2002, the last year the airport reported passenger activity was 2000 with 14,100 enplanements. The total passenger activity contributed by all three airports in 2000 was 17.20 million enplanements. In 2002 LAS and VGT combined for a total of 16.68 million enplanements. The next course of action to determine a passenger enplanement market share for GCN was to assume steady growth for all three facilities throughout the planning period. By

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applying a forecast methodology for the three Las Vegas airports, an accurate forecasted market share of passenger activity could be determined. A trend line analysis was applied to each airport enplanement activity level which yielded 30.32 million enplanements for LAS, 249,500 enplanements for VGT, and 89,200 enplanements for HND, totaling 30.65 million passenger enplanements for the Las Vegas MSA in 2022.

In all, three market share analyses were conducted as a means to determine GCN's market share of Las Vegas passengers. The first analysis included a post-9/11 market share which yielded 667,200 enplaned passengers in 2022. The second market share scenario, representing a 10-year segment from 1992-2002, yielded 1.12 million passengers in 2022. The final market share scenario, a 22-year market share analysis from 1980 to 2002 yielded 1.16 million passengers enplaned. When averaged, the three market share scenarios yield 987,800 annual passengers enplaned in 2022. Refer to **Tables 3.4 and 3.5** for information regarding market share scenario forecasts.

**Table 3.5**  
**Summary of Passenger Enplanement Market Share Analysis**  
**Grand Canyon National Park Airport**

Year	Post 9/11 LV MSA Market Share	10-Year LV MSA Market Share (1992-2002)	22-Year LV MSA Market Share (1980-2002)	Average of LV MSA Market Share(s)
Existing	331,000	331,000	331,000	331,000
2007	450,800	763,200	788,400	667,500
2012	522,900	885,300	914,500	774,300
2017	595,000	1,007,400	1,040,600	881,000
2022	667,159	1,129,500	1,166,700	987,800

Note: Enplanement projections have been rounded to the nearest hundred for simplicity.

**Source:** BWR, Summary Forecast of Passenger Enplanement Market Share Analysis, August 2003.

In projecting the total passenger enplanement forecast for the GCN, a representative percentage of domestic passengers versus international passengers was not determined due to the fact that information regarding passenger origin and type was not available. For the purposes of this study it is assumed that 100 percent of the enplaned passengers are domestic passengers given the commercial service operational characteristics at the Airport.

All three enplanement forecast methodologies and their results are tabulated and depicted in graphic form in **Exhibit 3.1**, as well as within **Table 3.5**. As can be seen a range of forecast information is presented, the low end forecast is the Post 9/11 Las Vegas Market Share and the high end is the 22 year Las Vegas Market Share. The consultants' recommended forecast for passenger enplanements is the Multiple Regression Analysis.





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## *Planning Advisory Committee Enplanement Forecast Recommendation*

The unconstrained passenger enplanement forecasts take in multiple factors and assumptions. With the economy on an upturn coupled with historic operational performance at the Airport, with anticipated social and economic stability, the overall operational activity at GCN could experience rapid growth throughout the planning period. Still the fact remains that the Special Flight Rules Area (SFAR 50-2), which governs the number of Canyon overflights by sightseeing aircraft, will undoubtedly have a lasting impact on the activity at GCN. The Special Flight Rules Area (SFAR 50-2) Final Rule limits the number of air tour and commercial aircraft overflights above the Grand Canyon below 14,500 feet MSL. It also establishes a curfew for operating. This constraint will keep the air tour operators (helicopter and fixed wing) from attaining the unconstrained forecast levels.

The maximum amount of enplanements achievable is based on the annual overflights allowed for each type of operator, passenger seats per operation, as well as passenger load factor. Once an average passenger per over flight is established, by multiplying the revenue passenger seats by load factor, that number is multiplied by overflights per operator category to determine the maximum enplanements allowed. The factors that will allow more passenger enplanements include increasing the size of aircraft operating fleet (larger aircraft) and increasing the load factors. This analysis determining the maximum number of overflights based on enplanements is shown in **Table 3.6**.

**Table 3.6**  
**Summary of Grand Canyon Overflight (SFAR 50-2) Limitations**  
**Grand Canyon National Park Airport**

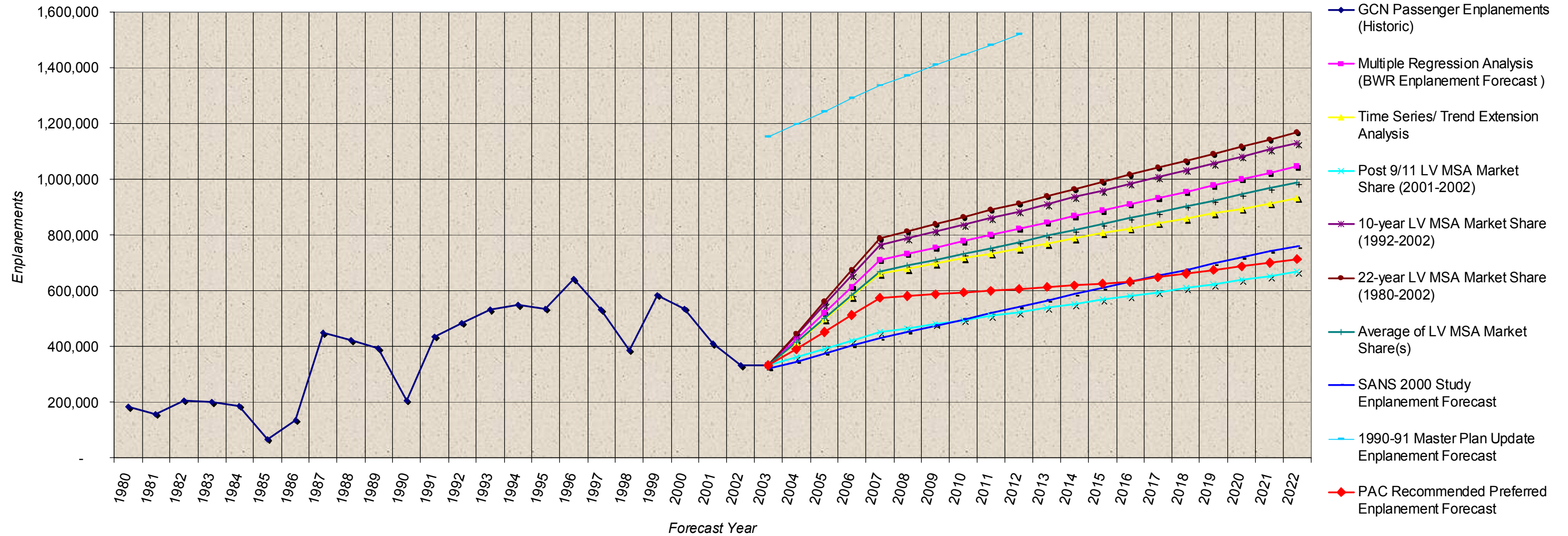
Air Tour Operator Category	Annual Air Tours Allowed	Revenue Seats per Operation	Passenger Load Factor	Passengers per Overflight	Total Maximum Allowable Enplanements
GCN Airplane Operators	11,400	15	0.613	11.25	104,823
GCN Helicopter Operators	32,800	6	0.84	5.04	163,344
LV Airplane Operators	38,100	19	0.613	14.25	443,751
LV Helicopter Operators*	7,900	n/a	n/a	n/a	n/a
<b>Total Canyon Overflights</b>	<b>90,200</b>	<b>n/a</b>	<b>n/a</b>	<b>n/a</b>	<b>711,918</b>

(\*) Not applicable to GCN

**Source:** BWR, Summary Forecast Total Grand Canyon Overflights, August 2003.

Included in the PAC discussion that lead the choice for the forecast were issues concerning quiet technology for aircraft, increasing the fleet size, impacts of Grand Canyon west, and, of course, the SFAR 50 overflight rules. The issue of quiet technology has been raised for both helicopters and fixed wing aircraft. For helicopters a primary aspect that will reduce noise is the addition of rotor blades to four; current configuration is two blades. This upgrade would be costly, as retooling the rotors and labor would be needed. Additional training would be needed for the pilots. At this time, with the overflight cap, there is no incentive to upgrade because the flight allocation is not tied to, nor are there provisions for, increases in the allocation with quieter aircraft; therefore, no anticipated changes have been made regarding quiet technologies.

**Exhibit 3.1: Annual Commercial Service Passenger Enplanement Forecast Summary**





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Increasing the fleet size of the aircraft in operation was also a consideration that the PAC discussed. For helicopters this is not an effective option for three reasons. First is the cost of the upgrade, the potential diminished viewing quality for the passenger and finally because a larger helicopter will require more lift capability which in turn will lead to more noise even if these larger helicopters were outfitted with additional rotors. The fixed wing operators share the same concerns. The deHavilland Dash-8, a 37-passenger seat aircraft, is considered a viable larger aircraft because of its high wing and two abreast seating, but changing the window size would be necessary. The fixed wing operators have already made these investments in the current fleet and upgrading to larger aircraft would require a similar investment. While increasing the passenger seats is a potential long term option it does not give enough advantage to the operator to do it until the economy fully recovers, the return on investment to upgrade the current fleet has been realized and the fixed wing operators continually reach the SFAR Cap.

The Grand Canyon West development operated by the Hualapai Indian Nation has been continually seeing increases in marketing and tourism. In 2002, 29,000 passenger enplanements were recorded at the Grand Canyon West Airport with use by fixed wing and helicopters. While it is arguable that the Canyon West experience is not as breathtaking as the South Rim, it does offer a quicker travel and return time from Las Vegas. The Hualapai Indian Nation does not have the same constraints placed on them that the GCN operators have because they operate within their reservation. To date, Grand Canyon West Airport has applied for grant money for the facility from ADOT including runway lengthening to 6,500 feet, constructing a parallel taxiway, and increasing the size of the apron. The affect of increased tourism at Canyon West has had an impact on activity at the South Rim.

After reviewing the proposed unconstrained enplanement projections for GCN during the 20-year planning horizon and taking into account potential constraints and other travel options, the GCN Planning Advisory Committee (PAC) chose to recognize the impacts of SFAR 50-2 on the future growth of the Airport. With the present cap of 90,200 (82,300 at GCN) total Canyon overflights by sightseeing aircraft is not anticipated to increase and unlikely to occur; the projected maximum allowable number of annual enplanements at GCN is 711,918. This estimate takes into account the operational commercial service fleet mix at the Airport, current and forecast passenger load factor(s), number of available passenger seats, as well as the number of air tour operators currently conducting business at the Airport. **Table 3.7** depicts the PAC recommended commercial service passenger enplanement forecast as they relate to the other enplanement projections yielded by the different methodologies.



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**Table 3.7**  
**Summary of Passenger Enplanement Forecasts- Includes PAC Recommended Preferred Forecast**  
**Grand Canyon National Park Airport**

Year	Market Share (Las Vegas MSA)	Linear Trend Line/ Trend Extension	Regression/ Multiple Regression Analysis	PAC Enplanement Recommendation
Existing	331,000	331,000	331,000	<b>331,000</b>
2007	667,500	660,800	708,800	<b>573,300</b>
2012	774,300	750,800	821,200	<b>606,800</b>
2017	881,000	840,900	933,600	<b>649,700</b>
2022	987,800	930,900	1,045,900	<b>711,900</b>

**Source:** Summary Forecast of Passenger Enplanements, Including PAC Recommendation, November 2003.

## Commercial Service Aviation/ Aircraft Operational Activity

Commercial service aircraft activity is typically broken down into three categories. The categories listed below are used to define the operational characteristics of an airport. These factors will be particularly important at GCN because of its unique service character and operating profile.

- ✦ Air Cargo
- ✦ Annual Commercial Service Operations
- ✦ Aircraft Fleet Mix (Aircraft Size & Type)
- ✦ Aircraft Load Factor

These factors all address how the passenger volumes projected previously will be accommodated. They address issues of frequency, volume and density. Frequency (Annual Operations) refers to how often operations are conducted, volume (Fleet Mix) refers to how many passengers can be accommodated with each operation, and density (Load Factor) refers to how many passengers are accommodated relative to how many seats are available. It is quite common to observe these factors moving in opposite directions.

## Commercial Air Cargo

There are neither records that have been provided nor discussions regarding air cargo operations taking place at GCN. Therefore, significant cargo operations do not occur at GCN and are not part of the forecast of aviation demand. The remainder of this chapter will focus on the aircraft operations activity as it relates to commercial service and based aircraft operations.

## Commercial Service Aircraft Fleet

An inventory was conducted of all the commercial operators currently serving GCN or had served the Airport within the last five years. This survey yielded a commercial service aircraft fleet of approximately 69 aircraft including all categories of fixed-wing aircraft and rotor-wing aircraft. Here again, the unique operating profile of GCN produces a highly atypical fleet mix compared to other commercial service airports. The current aircraft fleet



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mix is shown in the **Table 3.8**. It should be noted that a portion of this total fleet number - approximately 51 aircraft - is based at GCN while the remainder of the fleet, primarily the turbine powered fixed wing aircraft, are based at other facilities primarily within the Las Vegas MSA.

Once a total existing commercial aircraft operational fleet was established, *FAA Aerospace Forecast* growth rates for commercial air carriers and regional/ commuters were applied to turbine/jet aircraft and turbo-prop and multi-engine aircraft, respectively. General aviation growth rates were applied to single engine aircraft, while helicopter growth rates of the fleet were arrived at through analyzing the current helicopter operating conditions at the Airport. Currently, the operational rotorcraft fleet has decreased from 22 units down to 17 units. This phenomenon is primarily caused by the near saturation of rotorcraft within the commercial fleet as well as the cost of operating helicopters. The downturn in the economy, high operational costs, coupled with a decrease in tourism activity at the Canyon, have contributed to the decline of the rotorwing fleet at GCN.

The aircraft fleet mix at GCN is largely comprised of commercial service aircraft of various types. These types of aircraft are selected by their operators based on economics, performance and the role the aircraft is to serve. The commercial activity at the Airport is based almost exclusively on tourism and is expected to remain so. And since these aircraft have been selected, in part, based on their present configuration, speed, maneuverability and visibility, the proportion of aircraft types are expected to remain relatively constant throughout the planning period.

Assuming the above scenario is correct, that means the forecast growth in passenger enplanements must be accommodated by either increasing load factors or increasing the number of fixed wing operations and/or fixed wing aircraft, or both. Either of these alternatives would likely occur prior to replacing one aircraft type with another or introducing a new type of aircraft into the mix, while at the same time air tour operators paring down their existing rotorcraft fleet. Such is the case given the current operational characteristics and economic situation.



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**Table 3.8**  
**GCN Based Aircraft Inventory Data for the Year 2002**  
**Grand Canyon National Park Airport**

N-Number	Manufacturer/ Model	Owner/ City of Record	Aircraft Category
N8379A	Cessna 170B	Private Individual- Fredonia, AZ	Classic Fixed Wing- Land
N1455Y	Cessna 172C	Private Individual- Phoenix, AZ	Fixed Wing- Land
N13479	Cessna 172	Private Individual- Grand Canyon, AZ	Fixed Wing- Land
N3495S	Cessna 182	Windrock Aviation, LLC- Prescott, AZ	Fixed Wing- Land
N62DB	Cessna T206F	Airwest Helicopter- Phoenix, AZ	Fixed Wing- Land
N9527M	Cessna T207	D'Alessio Enterprises, Inc.- Albuquerque, NM	Fixed Wing- Land
N9962M	Cessna T207A	AirStar Helicopters, Inc.- Grand Canyon, AZ	Fixed Wing- Land
N333AS	AS350-B2	AirStar Helicopters, Inc.- Grand Canyon, AZ	Rotorcraft
N31AS	AS350-B2	AirStar Helicopters, Inc.- Grand Canyon, AZ	Rotorcraft
N544AS	AS350-B2	AirStar Helicopters, Inc.- Grand Canyon, AZ	Rotorcraft
N175PA	Bell 407	Monarch Enterprises, Inc.- Kirkland, WA	Rotorcraft
N8533F	Bell 206B	Monarch Enterprises, Inc.- Kirkland, WA	Rotorcraft
N83037	Bell 206B	Monarch Enterprises, Inc.- Kirkland, WA	Rotorcraft
N90065	Bell 206B	Monarch Enterprises, Inc.- Kirkland, WA	Rotorcraft
N177PA	Bell 206 L-1	Monarch Enterprises, Inc.- Kirkland, WA	Rotorcraft
N27694	Bell 206 L-1	Monarch Enterprises, Inc.- Kirkland, WA	Rotorcraft
N333ER	Bell 206 L-1	Monarch Enterprises, Inc.- Kirkland, WA	Rotorcraft
N178PA	Bell 206 L-1	Monarch Enterprises, Inc.- Kirkland, WA	Rotorcraft
N4227E	Bell 206 L-1	Monarch Enterprises, Inc.- Kirkland, WA	Rotorcraft
N57491	Bell 206 L-1	Monarch Enterprises, Inc.- Kirkland, WA	Rotorcraft
N5745Y	Bell 206 L-1	Monarch Enterprises, Inc.- Kirkland, WA	Rotorcraft
N5743C	Bell 206 L-1	Monarch Enterprises, Inc.- Kirkland, WA	Rotorcraft
N3895D	Bell 206 L-1	Monarch Enterprises, Inc.- Kirkland, WA	Rotorcraft
N10761	Bell 206 L-1	Monarch Enterprises, Inc.- Kirkland, WA	Rotorcraft
N20316	Bell 206 L-1	Monarch Enterprises, Inc.- Kirkland, WA	Rotorcraft
N38885	Bell 206 L-1	Monarch Enterprises, Inc.- Kirkland, WA	Rotorcraft
N22425	Bell 206 L-1	Monarch Enterprises, Inc.- Kirkland, WA	Rotorcraft
N2072M	Bell 206 L-1	Monarch Enterprises, Inc.- Kirkland, WA	Rotorcraft
N3893U	Bell 206 L-3	Monarch Enterprises, Inc.- Kirkland, WA	Rotorcraft
N977MY	Bell 407	Monarch Enterprises, Inc.- Kirkland, WA	Rotorcraft
N179PA	MD 900	Monarch Enterprises, Inc.- Kirkland, WA	Rotorcraft

**Source:** ADOT, Aeronautics Division, 2003.



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Analysis indicated that the total fleet, due to a stagnant global economy and less than optimistic FAA fleet growth rates and restrictions placed on Canyon air tour overflights, is expected to remain static throughout the planning period. According to the analysis, rotorcraft are projected to remain steady at 17 units, down from 22 units in 2002, due to the decreasing rotorcraft fleet at the Airport brought about by high operating costs coupled with projected constraints on air tour operators conducting flights over the Grand Canyon. Multi-engine turbo-props will witness the least amount of growth. Based on this information and judgment, the aircraft fleet mix at GCN is portrayed as an operational fleet mix and includes aircraft that are based at the Airport. Refer to **Table 3.9** for information regarding the projected commercial service operational fleet mix at the Grand Canyon National Park Airport throughout the 20-year planning period.

**Table 3.9**  
*Summary of Operational Commercial Service Aircraft Fleet Forecast*  
*Grand Canyon National Park Airport*

Year	Operating Fleet	Single Engine	Multi-Engine	Turbo-Prop (15 Seats)	Turbo-Prop (19 Seats)	Turbine/Jet	Rotor-wing
Existing	69	2	1	9	34	1	22
2007	65	3	1	9	34	1	17
2012	68	4	1	9	34	2	17
2017	69	5	1	9	34	2	17
2022	69	6	1	9	34	2	17

**Source:** BWR, Summary Forecast of Operational Commercial Aircraft Fleet, August 2003 (Revised December 2003).

## Commercial Service Annual Operations/ Load Factors

Once a forecast of annual enplanements and commercial aircraft fleet had been determined, an analysis was conducted to forecast the annual commercial aircraft operational activity. The analysis set out to make annual commercial aircraft operations a function of (dependant on) the forecast enplanements and commercial fleet size. The reasoning that led to this methodology is that as passenger demand increases so will aircraft utilization (operations). When aircraft utilization can no longer be increased additional aircraft will be added to the fleet. The additional aircraft will result in incremental increases in the number of aircraft operations.

Initially, the aircraft fleet was analyzed to determine the share or percentage of each aircraft category within the overall commercial aircraft fleet. On determining the share of category of aircraft within the fleet, assumptions regarding the number of seats per aircraft within each representative category of the fleet were established. The analysis then concluded with determining a reasonable load factor throughout the planning period for each operational category of aircraft.

The load factor for each aircraft category included in the analysis is based on *FAA Aerospace Forecast* assumptions and projections, as well as local demand and operating conditions provided by the operators themselves. Operational projections beyond 2014 use the load factor for that phase of development (long-term), with the exception of the





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rotor-wing load factor, and carry it through the remainder of the operational forecasts. This exception was made due to the unique operational and passenger activity characteristics of rotor-wing activity at GCN. Refer to **Table 3.10** for information regarding the projected aircraft category share of the commercial service fleet, the representative number of passenger seats for each category of aircraft, and projected passenger load factors.

Once the projections regarding the commercial service fleet mix were established, the next step of the operations estimates was to relate the enplanement estimates to the aircraft category fleet projections. To accomplish this, the total number of projected enplanements was multiplied by the share of the fleet represented by a particular category of aircraft. This relationship yielded an enplanement projection for each category of aircraft throughout the planning period.

Utilizing the same method and associated projections, aircraft departures conducted by each category of the commercial service fleet were determined by taking the number of passenger seats for each respective aircraft category and applying the appropriate load factor. The results of this calculation were then divided by the projected enplanements for each category which yielded the total number of annual departures. Lastly, the departures were doubled to represent a takeoff and landing which resulted in an annual operational estimate for each development phase of the planning period. Refer to **Table 3.11** for information regarding the projected aircraft category share of passenger enplanements, annual departures, and annual operations. It should be noted that the operational activity projections contained within the table have been rounded to the nearest hundred for simplicity.

The Grand Canyon National Park Airport commercial service aircraft operational activity forecasts are tabulated and depicted in graphic form within **Exhibits 3.2, 3.3, and 3.4**.



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**Table 3.10**  
**Summary of Commercial Service Aircraft Category Share of Fleet, Passenger Seats and Load Factor(s)**  
**Grand Canyon National Park Airport**

Variable	Operating Fleet	Single Engine	Multi-Engine	Turbo-Prop (15 Seats)	Turbo-Prop (19 Seats)	Turbine/Jet	Rotor-wing
<b>Existing</b>							
Aircraft	69	2	1	9	34	1	22
Share		2.9%	1.5%	13.1%	49.6%	0.7%	32.1%
Seats		6	8	15	19	97	5
Load Factor		0.75	0.75	0.613	0.613	0.775	0.83
<b>2007</b>							
Aircraft	65	3	1	9	34	1	17
Share		4.7%	1.6%	14.0%	52.7%	0.8%	26.4%
Seats		6	8	15	19	97	5
Load Factor		0.75	0.75	0.583	0.583	0.734	0.91
<b>2012</b>							
Aircraft	67	4	1	9	34	1	17
Share		6.0%	1.5%	13.5%	51.1%	2.3%	25.6%
Seats		6	8	15	19	97	5
Load Factor		0.75	0.75	0.62	0.62	0.75	0.91
<b>2017</b>							
Aircraft	68	5	1	9	34	1	17
Share		7.4%	1.5%	13.3%	50.4%	2.2%	25.2%
Seats		6	8	15	19	97	5
Load Factor		0.75	0.75	0.64	0.64	0.75	0.91
<b>2022</b>							
Aircraft	69	6	1	9	34	2	17
Share		8.7%	1.4%	13.0%	49.3%	2.9%	24.6%
Seats		6	8	15	19	97	5
Load Factor		0.75	0.75	0.64	0.64	0.75	0.95

**Source:** BWR, Summary Forecast of Commercial Service Aircraft Category Share of Fleet, Passenger Seats and Load Factor(s), August 2003 (Revised December 2003).



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**Table 3.11**  
*Summary of Commercial Service Aircraft Category Share of Passenger Enplanements, Departures and Annual Operations*  
**Grand Canyon National Park Airport**

Projections		Single Engine	Multi-Engine	Turbo-Prop (15 Seats)	Turbo-Prop (19 Seats)	Turbine/Jet	Rotor-wing
<b>Existing</b>							
Enplanements	331,000	9,700	4,800	43,500	164,300	2,400	106,300
Departures	47,350	2,100	800	4,700	14,100	50	25,600
Annual Operations	<b>94,800</b>	<b>4,300</b>	<b>1,600</b>	<b>9,400</b>	<b>28,200</b>	<b>100</b>	<b>51,200</b>
<b>2007</b>							
Enplanements	573,200	26,600	8,900	80,000	302,200	4,400	151,100
Departures	77,100	5,900	1,500	9,100	27,300	50	33,200
Annual Operations	<b>154,100</b>	<b>11,800</b>	<b>3,000</b>	<b>18,200</b>	<b>54,600</b>	<b>100</b>	<b>66,400</b>
<b>2012</b>							
Enplanements	606,700	36,500	9,100	82,100	310,200	13,700	155,100
Departures	79,000	8,100	1,500	8,800	26,300	200	34,100
Annual Operations	<b>158,000</b>	<b>16,200</b>	<b>3,000</b>	<b>17,600</b>	<b>52,600</b>	<b>400</b>	<b>68,200</b>
<b>2017</b>							
Enplanements	649,600	48,100	9,600	86,600	327,300	14,400	163,600
Departures	84,400	10,700	1,600	9,000	26,900	200	36,000
Annual Operations	<b>168,800</b>	<b>21,400</b>	<b>3,200</b>	<b>18,000</b>	<b>53,800</b>	<b>400</b>	<b>72,000</b>
<b>2022</b>							
Enplanements	711,900	61,900	10,300	92,900	350,800	20,600	175,400
Departures	91,200	13,800	1,700	9,700	28,800	300	36,900
Annual Operations	<b>182,400</b>	<b>27,600</b>	<b>3,400</b>	<b>19,400</b>	<b>57,600</b>	<b>600</b>	<b>73,800</b>

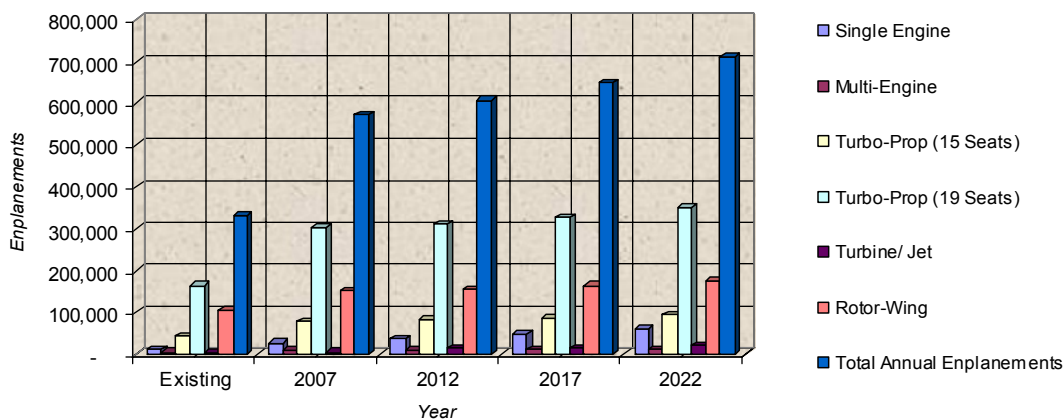
**Source:** BWR, Summary Forecast of Commercial Service Aircraft Category Passenger Enplanements, Departures, and Annual Operations, August 2003 (Revised December 2003).



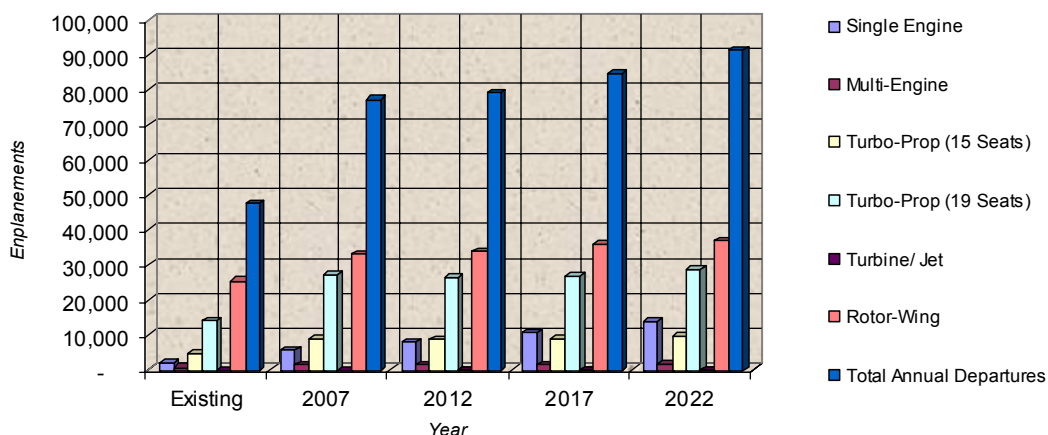
# Grand Canyon National Park Airport

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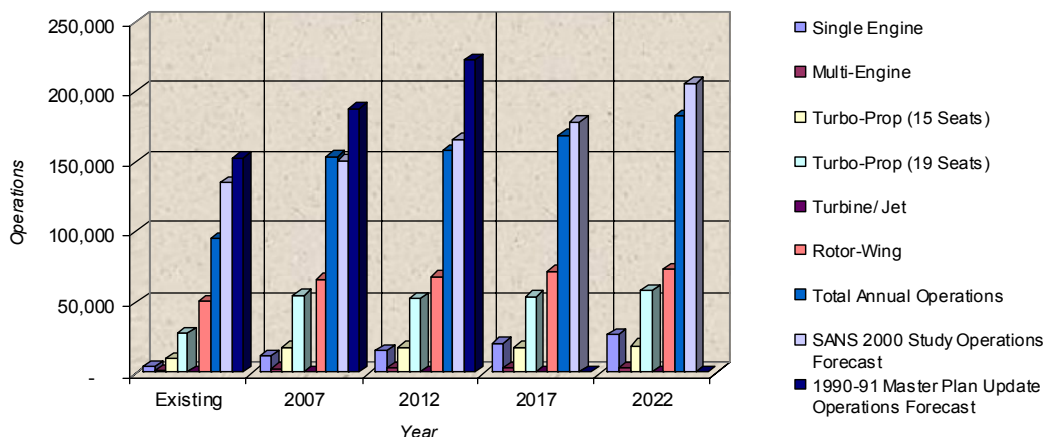
**Exhibit 3.2: PAC Preferred Commercial Service Aircraft Fleet Enplanement Forecast by Aircraft Category**



**Exhibit 3.3: PAC Preferred Commercial Service Aircraft Fleet Annual Departure Forecast**



**Exhibit 3.4: PAC Preferred Commercial Service Aircraft Fleet Annual Operations**



## Based Aircraft Demand Forecasts

General aviation is defined as all aviation activities except those that are performed by commercial air carriers, including regionals and commuters, as well as military aircraft. Generally, most commercial service airports support a large amount of general aviation activity. A basic indicator of general aviation activity at an airport is often gauged by the number of based aircraft at the facility. In the case of GCN, a vast majority of the based aircraft and overall operational activity at the Airport are commercial service aircraft. General aviation contributes only a small number of based aircraft and operations to the overall activity at the Airport. The current based general aviation aircraft total for GCN is three (3) single engine aircraft which contribute approximately 150 annual operations per year.

Demand forecasts have been developed for the following general aviation demand indicators.

- ✦ Based Aircraft;
- ✦ Annual Operations; and
- ✦ Annual Instrument Approaches (AIAs).

In evaluating the current conditions at the Airport, it was determined that approximately 51 aircraft are currently based at GCN, of which 48 are an assortment of aircraft categories ranging from single-engine to rotor-wing aircraft utilized primarily for commercial service activity. Three of the total based aircraft are owned by private individuals and all three are single engine aircraft.

During the past five years of based aircraft activity, the total number of based aircraft has ranged from 47 in 1998 up to the current inventory of approximately 51. A majority of based aircraft at GCN are rotorcraft with 27 units, followed by single engine aircraft which total 16 units. Currently, there are six (6) multi-engine piston aircraft, as well as two (2) multi-engine turbine aircraft based at the Airport.

In projecting the future based aircraft inventory of GCN, due to the fact that a vast majority of the aircraft based at the facility are related to commercial service activity, the based aircraft demand forecasts were predicated on the projected increase in annual passenger enplanements, as well as total annual operations. In determining the based aircraft estimated for GCN, a series of methodologies were utilized. Just as with the commercial service forecasts, the based aircraft estimates are a result of conducting linear trend-line/trend extension analyses, regression and multiple regression analyses, and *FAA Aerospace Forecast* growth rates. **Table 3.12** summarizes the various forecasts of based aircraft prepared for the Grand Canyon National Park Airport throughout the 20-year planning period.



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**Table 3.12**  
**Summary of Based Aircraft Forecasts – Total Aircraft**  
**Grand Canyon National Park Airport**

Year	Regression/ Multiple Regression Analysis	Linear Trend-Line/ Trend Extension	1990-91 Master Plan Update	AZ State Aviation Needs Study (SANS) 2000	Preferred Based Aircraft
Existing	51	51	58	53	51
2007	47	57	64	58	47
2012	53	66	76	63	53
2017	59	75	87	68	59
2022	65	84	99	74	65

**Source:** BWR, Summary Forecast of Total Based Aircraft, August 2003 (Revised November 2003).

## Aircraft Operations Demand Forecast

There are two types of aircraft operations local and itinerant. Local operations consist of activity where a flight originates or terminates within 25 nautical miles of the facility. At GCN, local operations account for a mere 0.14 percent (approximately 150 operations) annually. This phenomenon is a result of the low percentage of general aviation aircraft based at the Airport, as well as the high operational activity of commercial service operations.

Itinerant operations are those where a flight originates or terminates beyond a distance of 25 nautical miles. Itinerant operations consist mainly of air carrier, air taxi, commuter, and military, as well as some element of general aviation generated by airports in the region other than GCN. Currently, the Airport experiences an itinerant operational tempo of approximately 100 percent due to the high volume of air tour and unscheduled/on-demand flight activity. **Table 3.13** summarizes the forecasts of local versus itinerant operational activity for the Grand Canyon National Park Airport throughout the 20-year planning period.

As already indicated, the air carrier and air taxi/commuter annual operations were determined as part of the commercial service activity forecasts. In determining the future military operational activity, an analysis was completed to determine the military share of itinerant annual operations at the Airport. This percentage or share of the operational activity was projected throughout the remainder of the planning period yielding nearly 2,000 annual military operations by primarily fixed wing aircraft from military installations located in the Phoenix and Las Vegas areas.

Although not prevalent at GCN, the itinerant general aviation component of the annual operational activity is expected to double during the planning period given current general aviation aircraft demand and industry trends. This growth in general aviation, although slight, will yield approximately 10,500 annual operations at the conclusion of the 20-year planning period, representing approximately three percent of the overall



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operational activity. Similarly, the local general aviation operational activity is expected to increase at a reasonable rate when compared to existing operational levels. The estimated existing utilization rate of the local general aviation component is estimated to be 125 operations per aircraft per year. The ultimate operational projection assumes the addition of one privately owned general aviation aircraft per each phase of the 20-year planning period.

**Table 3.13**  
**Summary of Annual Aircraft Operations**  
**Grand Canyon National Park Airport**

Year	Itinerant Operations				Local Operations	Total Annual Operations
	Air Carrier	Air Taxi/Commuter	Military	General Aviation	GCN	
Existing	100	94,800	600	5,200	150	100,850
2007	100	154,100	1,300	6,300	400	162,200
2012	400	158,000	1,500	7,400	800	168,100
2017	400	168,800	1,700	8,500	1,100	180,500
2022	600	182,400	1,900	10,500	1,500	196,900

Note: Total annual operations, with the exception of air carrier operations, have been rounded to the nearest hundred for simplicity. Air carrier operations need to be accurate due to their importance in determining a future critical aircraft for the facility.

**Source:** BWR, Summary Forecast of Total Aircraft Operations, August 2003 (Revised November 2003).

## Annual Instrument Approach (AIA) Forecast

Forecasts of annual instrument approach (AIA) operations are generated to provide guidance in determining requirements for navigational aid (NAVAID) equipment. Based on the volume of this type of operation, the type and timing of possible future NAVAID's can be determined. Technological and equipment (air borne as well as ground based) improvements will also affect NAVAID installation and instrument approach procedures.

According to GCN tower records there were approximately 5,100 annual instrument operations (2,550 instrument approaches) conducted by commercial service (air carrier and commuter/air taxi), military and general aviation aircraft in 2002. Instrument operations and approaches accounted for approximately 1.3 percent of the total annual operational activity that year. Based on existing conditions, annual AIAs will increase at a rate consistent with the growth in commercial service operational activity and account for 1.4 percent of the annual operational activity at the conclusion of the planning period.

**Table 3.14** summarizes the forecast of annual instrument approaches (AIA) for GCN during the 20-year planning period.



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**Table 3.14**  
**Summary of Annual Instrument Approaches (AIAs)**  
**Grand Canyon National Park Airport**

Year	Itinerant Operations (Commercial)	Itinerant Operations (Military)	Total Itinerant Operations	Percent IFR Rated Pilots	Percent IMC Conditions	Itinerant AIA Operations	Actual Itinerant AIAs (Arrivals)
Existing	94,800	600	100,600	44.8%	3.1%	2,800	1,400
2007	154,100	1,300	161,700	44.8%	3.1%	4,500	2,250
2012	158,000	1,500	166,900	45.5%	3.1%	4,700	2,350
2017	168,800	1,700	192,800	46.3%	3.1%	5,100	2,550
2022	182,400	1,900	194,800	47.0%	3.1%	5,700	2,850

Note: 'Total Itinerant Operations' includes itinerant general aviation operations.

Source: BWR, Summary Forecast of Annual Instrument Approaches, August 2003 (Revised November 2003).

## Aviation Demand Forecast Summary

**Table 3.15** summarizes the results of various forecast elements. The forecasts developed in this chapter portray a continuation of growth over the long term. However it must be remembered that this growth has not, and will not, progress at a constant rate. It is almost a certainty that there will be conditions and/or events occurring in the future that will serve to both stimulate growth and to depress demand throughout the planning period.

These forecasts, combined with the inventory data, will be used to develop the future facility requirements for Grand Canyon National Park Airport. The next chapter, Facility Requirements, will identify the types and sizes of facilities required to adequately accommodate the demand levels identified in this chapter. The principle analyses that will be conducted as part of the Facility Requirements chapter will include commercial service and general aviation peaking characteristics, runway length analysis, as well as an annual service volume (ASV) analysis to determine capacity and delay at the Airport.



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*Table 3.15  
Aviation Demand Forecast Summary  
Grand Canyon National Park Airport*

	Existing	2007 (5 year)	2012 (10 year)	2017 (15 year)	2022 (20 year)
<b>Total Forecast Based Aircraft</b>					
Single-Engine Aircraft	16	14	16	18	19
Piston Multi-Engine Aircraft	6	5	6	7	7
Turbine Multi-Engine Aircraft	2	2	1	1	2
Business Jet Aircraft	0	0	0	0	0
Helicopters	22	17	17	17	17
<b>Total Based Aircraft</b>	<b>46</b>	<b>38</b>	<b>40</b>	<b>43</b>	<b>45</b>
<b>Forecast Commercial Service Aircraft Fleet Operational Activity</b>					
Single-Engine Aircraft	4,200	11,800	16,200	21,400	27,600
Piston Multi-Engine Aircraft	1,600	3,000	3,000	3,200	3,400
Turbine Multi-Engine Aircraft (15 Seat)	9,400	18,200	17,600	18,000	19,400
Turbine Multi-Engine Aircraft (19 Seat)	28,200	54,600	52,600	53,800	57,600
Turbine/ Jet Aircraft	100	100	400	400	600
Helicopters	51,200	66,400	68,200	72,000	73,800
<b>Forecast Commercial Service Aircraft Fleet Share of Passenger Enplanements</b>					
Single-Engine Aircraft	9,700	26,000	36,500	48,100	61,900
Piston Multi-Engine Aircraft	4,800	8,900	9,100	9,600	10,300
Turbine Multi-Engine Aircraft (15 Seat)	43,500	80,000	82,100	86,600	92,900
Turbine Multi-Engine Aircraft (19 Seat)	164,300	302,200	310,200	327,300	350,800
Turbine/ Jet Aircraft	2,400	4,400	13,700	14,400	20,600
Helicopters	106,300	151,100	155,100	163,600	175,400
<b>Total Forecast Annual Aircraft Operational Activity</b>					
Local Operations	150	400	800	1,100	1,500
Air Carrier Operations	100	100	400	400	600
Air Taxi/ Commuter Operations	94,900	154,100	158,000	168,800	182,400
Military Operations	600	1,300	1,500	1,700	1,900
General Aviation	5,200	6,300	7,400	8,500	10,500
<b>Total Annual Operations</b>	<b>100,950</b>	<b>162,200</b>	<b>168,100</b>	<b>180,500</b>	<b>196,900</b>
<b>Annual Passenger Enplanements</b>	<b>331,000</b>	<b>573,200</b>	<b>606,700</b>	<b>649,600</b>	<b>711,900</b>
<b>Annual Instrument Approaches (AIA)</b>	<b>1,400</b>	<b>2,250</b>	<b>2,350</b>	<b>2,550</b>	<b>2,850</b>

*Source:* BWR, Summary of the Aviation Demand Forecasts, August 2003 (Revised December 2003).