APPENDIX B

AVIATION DEMAND FORECAST

Index

B.1

Aviation Activity Forecasts Report

APPENDIX B

AVIATION ACTIVITY FORECASTS REPORT

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Aviation Activity Forecasts Report

I. Purpose and Context

As a part of the FAA's ongoing National Airspace Redesign (NAR) effort, the NY/NJ/PHL Metropolitan Airspace Redesign study is investigating various alternative designs for the air traffic routes and airspace in the New York and Philadelphia Metropolitan and surrounding areas. In order to thoroughly evaluate these alternatives and meet NEPA requirements it is necessary to conduct both operational and environmental modeling of the future baseline conditions as well as each alternative. A key element in the development of accurate modeling for these conditions is the forecasting of future air traffic operational levels expected in the area and at the airports of interest. Although the FAA's office of Aviation Policy and Plans (APO) develops and regularly updates the Terminal Area Forecasts (TAF) for some 3,400 airports throughout the country, these forecasts may not undergo a rigorous forecast update for several years for a given airport. Furthermore, the TAF forecasts generally do not provide sufficient detail (aircraft type, destination, etc.) for environmental modeling. Accordingly, it was determined that an independent forecasting effort be undertaken for each of the airports evaluated in this study.

The area of interest for this study is geographically designated as the Greater New York/New Jersey/Philadelphia Metropolitan region (the "Region") including the City of New York, Long Island, New Jersey, Southern Connecticut, Eastern Pennsylvania, Philadelphia, and the northern portion of Delaware. **Exhibit 1** presents a map of the Study Area identified for this project. Because there are a large number of public and private airports that are located within this area it was necessary to undertake an evaluation process to determine the airports that would require full environmental analysis and modeling. This effort is discussed in **Section 1.6 of Chapter 1** of the EIS document. **Attachment A,** located at the end of this report, presents a listing of the airports evaluated along with some key statistics and a brief summary of the rational for inclusion or exclusion from the study analysis. The evaluation resulted in the identification of 21 airports to be included in the study modeling. In order to provide data for the operational and environmental impacts analysis, a forecast for IFR operations in 2006 and 2011 at each of these Study airports was developed for this project. The airports in this analysis are identified in **Table 1**.

The Region is among the most congested aeronautical sectors in the National Air Space System and is expected to grow throughout the next decade as both commercial and general aviation demands compete for more airport and airspace capacity (See **Exhibit 1**). Serving as primarily a business corridor, flight frequency as opposed to aircraft gauge expansion will be an issue affecting traffic levels in the region. The purpose of the IFR forecast is to provide data input into the operational and environmental impacts analysis for both existing conditions as well as the projected levels of operations over the next decade. It will also serve as a schedule for the Total Airport and Airspace Modeler (TAAM) simulation to be conducted for the 90^{th} percentile schedule.

The FAA sought an independent review of the FAA's Terminal Area Forecasts ("TAFs") for the Region's airports. The Region's airport forecasts from this study provide considerably more detail than TAFs including gauge and load factor assumptions of the air carriers' arriving and departing flights for the forecast benchmark years. Considerable analytical attention was also applied to the general aviation sector. In particular, the corporate aviation market is expected to grow at a more robust rate than scheduled airline service given the success and growth profile of fractional ownership programs for corporate/high end leisure aircraft.[1] The forecast for overflights or "en route" aircraft operations are also included in this document.

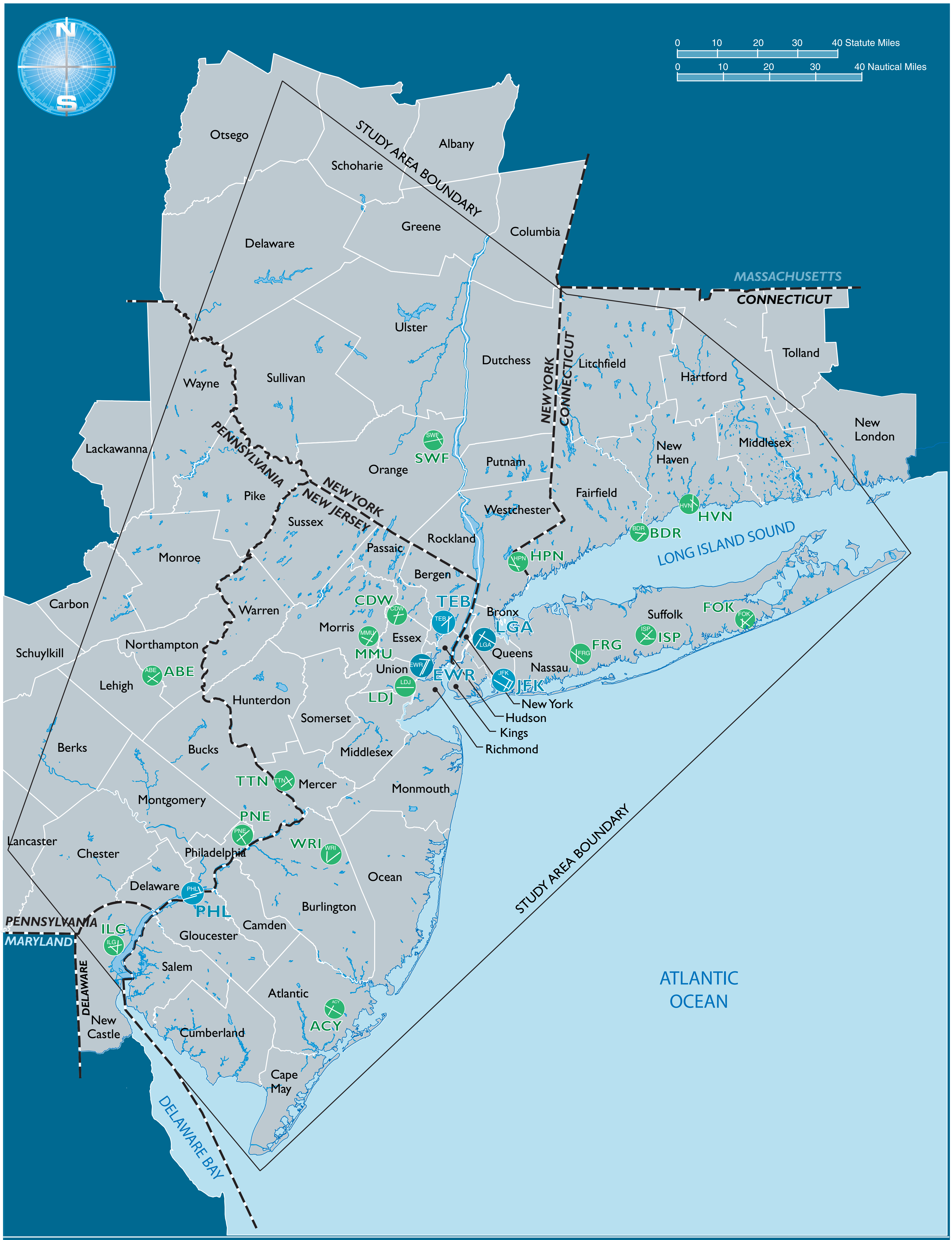
Table 1
Airports Included in Forecast Analysis

Airport Name	Airport Code	Type of Service
Allentown/Lehigh Valley International	ABE	Scheduled, GA, Mil, Cargo
Atlantic City International	ACY	Scheduled, GA, Mil, Cargo
Bridgeport/Igor I. Sikorsky Memorial	BDR	GA, Cargo
Caldwell/Essex County	CDW	GA
Newark Liberty International	EWR	Scheduled, GA, Cargo
Westhampton Beach/The Francis S. Gabreski	FOK	GA
Republic *	FRG	Scheduled, GA, Cargo
White Plains/Westchester County	HPN	Scheduled, GA
New Haven/Tweed-New Haven	HVN	Scheduled, GA
Wilmington/New Castle County *	ILG	GA, Mil, Cargo
Islip Long Island MacArthur	ISP	Scheduled, GA, Cargo
John F. Kennedy International	JFK	Scheduled, GA, Cargo
Linden	LDJ	GA
LaGuardia	LGA	Scheduled, GA
Morristown Municipal	MMU	GA, Cargo
Philadelphia International	PHL	Scheduled, GA, Cargo
Northeast Philadelphia	PNE	GA
Newburgh/Stewart International	SWF	Scheduled, GA, Mil, Cargo
Teterboro	TEB	Scheduled, GA, Cargo
Trenton/Mercer County	TTN	Scheduled, GA
McGuire AFB	WRI	Mil

** Both Republic and New Castle have limited/occasional scheduled air service.*

All forecasts are estimates of future activity based upon assumptions about the continuation of, or changes to past air service trends. The accuracy of forecasts depends upon the accuracy of these assumptions. While past activity is not a guarantee of the course of future events, the

[1] 2000 FAA Aerospace Forecast



- La Guardia
- John F. Kennedy Intl.
- Newark Liberty Intl.
- Teterboro
- Philadelphia Intl.
- Allentown/Lehigh Valley Intl.
- Atlantic City Intl
- Bridgeport/Igor I. Sikorsky Memorial
- Caldwell/Essex County
- Westhampton Beach/The Francis S. Gabreski
- Linden Airport
- McGuire AFB
- Newburgh/Stewart Intl.
- New Haven/Tweed-New Haven
- Northeast Philadelphia
- Republic Airport
- Trenton/Mercer County
- Wilmington/New Castle County
- Morristown Municipal
- Islip/Long Island
- White Plains/Westchester County
- County intersected by Study Area Boundary
- Major Waterway
- State Boundary

Airports within the Study Area

Exhibit 1

application of reasonable trend extrapolations do add to the confidence level in the forecast results.

II. Key Assumptions

Commercial passenger demand is projected to experience sustained growth throughout the forecast period (through 2011). International passenger activity is expected to continue to grow at a pace that exceeds the growth of U.S. Gross Domestic Product over the forecast period. Among the most pronounced changes in commercial passenger fleets in recent years has been the replacement of turboprop aircraft with regional jets. The growth in regional jet traffic has primarily been limited by the ability of the manufacturers to produce sufficient new aircraft to meet demand. The continued growth in regional jet use is expected to drive an increase in the average seating configuration of regional airline markets. A number of other general assumptions and factors affecting demand were also considered in the forecast exercise including, but not limited to, the following:

- ***Aviation Security*** - Passenger confidence in enhanced aviation security will return.

- ***U.S. Economy*** - The U.S. economy will recover beginning in the second half of 2002. Many economists believe that the recovery will be slower than from recent recessions.

- ***Regional Airport Trends*** - The basic character of each of the study airports will not change during the forecast period. Airports with only general aviation activity will remain GA-only airports while major facilities such as JFK, LGA, EWR, and PHL will remain the dominant airports in the region.

- ***Commercial Service*** - No new commercial service airports will be constructed in the region during the forecast period.

- ***Airline Yield*** - Airline yield will continue to decline on a constant dollar basis as projected by the FAA. The latest FAA aviation forecast predicts a 0.9 percent annual decrease in real (inflation-adjusted) U.S. domestic airline yield between 2001 and 2013. Yield is the revenue per flight mile received by the airlines for carrying each passenger. Since deregulation, the decline in real yield has accelerated, so that by 2001 real yield fell to 13.94 cents, an average yearly decline of 2.1 percent from 1978.

- ***New Aircraft*** - Only one new class of aircraft is assumed to be introduced throughout the forecast period. A widebody with an estimated capacity of 550 passengers is assumed to enter the international fleet in a very limited way before the end of the forecast period.

- ***Adaptation of Air Carriers in a New Aviation Economy*** - U.S. airlines experienced strong profits in the late 1990's, and 2000 was one of the airlines' best years in history. In 2001 however, the U. S. major airlines collectively lost over $7 billion, even after a governmental infusion of about $4 billion. In 2002, the U.S. majors are expected to post losses of about $4 billion. Due to the combined affects of the current economic recession and the events of September 11, many in the industry see more than just the swings of a cyclical business. They believe a changing of the guard may have begun. Low-fare carriers now account for nearly 20 percent of domestic air capacity, up from 6 percent in the early 1990s. Southwest has surpassed Northwest, Continental, and US Airways in terms of revenue passenger miles flown domestically.

- ***Fuel Costs*** - Fuel costs are a significant, yet variable, component of an airline's operating expenses. Generally, there has been an overall decline in fuel costs since 1981, which has reduced the operating costs of airlines, and therefore, the cost of air travel. In the short-term, such factors as weather, demand for heating oil, shipping incidents, political conflicts and production difficulties caused by unusual circumstances may impact fuel costs. However, these events have had little long-term effect on the overall cost of air travel. This report makes the assumption that fuel will continue to be available in sufficient quantities, that only short-term shifts will occur in the cost of fuel and that the overall trend in fuel cost increases will be moderate during the forecast period. It is also assumed that the new fuel-efficient aircraft will moderate the impact of long-term fluctuations in fuel costs and that fuel costs will not significantly impact long-term average ticket prices. Therefore, it is assumed that air travel demand will not be adversely impacted by fuel costs or availability over the forecast period.

- ***Long-term Economic Indicators*** - A basic assumption inherent in any forecast of aviation demand is the overall condition of the U.S. and world economies. Long-term, continued economic stability, reasonable consumer confidence, and growth of disposable personal income are foreseen by most economists. All are positive influences on future air travel growth.

- ***Teleconferencing*** – Industry observers have considered the impacts of communications technology on air travel demand. No reliable empirical evidence has surfaced to date that quantifies the impact of technology on air travel demand. Therefore, it is assumed that air travel demand will not be adversely impacted by teleconferencing during the forecast period.

- ***Hub-and-Spoke Effects*** - Airlines have always concentrated air service at a limited number of airports, usually in major cities. Since airline deregulation in 1978, there has been an even more pronounced emphasis on developing hub and spoke route systems centered on a limited number of airports. The hub and spoke route networks offer the most economically efficient system to move passengers and cargo throughout the country. For most international service, using hubs as gateways is almost the only way to provide the economies of scale sufficient to operate long-range, high capacity aircraft across the Atlantic, Pacific or to other distant international destinations. No significant change in the hub-and-spoke system is foreseen in the forecast period. However, new routes and new service points will continually be developed as markets expand and as new carriers appear, new marketing niches develop and other events affect the travel market.

- ***Re-regulation of Air Carriers*** - Passenger airlines were first released from federal regulation in 1978 with regard to domestic route selection, fare levels, and certain other operating conditions. Air cargo carriers were also de-regulated in the same time period after aggressive lobbying by FedEx. Since 1978, numerous airline bankruptcies have resulted in carrier consolidation and the emergence of dominant market share situations at numerous airports, resulted in layoffs and other employment issues, and raised questions about safety that have been blamed on deregulation, creating some pressure in Washington to re-regulate the airline industry. Re-regulation of airlines is conceivable, but it is assumed in this forecast to be unlikely.

- ***Hypersonic Aircraft*** - Like the new large aircraft, new hypersonic aircraft, capable of crossing the Pacific in only a few hours, are being discussed by both airlines and aircraft manufacturers. These could be updated, longer-range versions of the Concorde now operating across the Atlantic or an entirely new vehicle. For hypersonic aircraft to become a reality, technical, environmental and economic hurdles must be overcome. No aircraft manufacturer has yet committed to such an undertaking. However, it is doubtful a hypersonic aircraft could be designed, built and introduced to service until after the end of the forecast period. Consequently, the impact of hypersonic aircraft during the forecast period was not considered.

III. Sources

The forecasting process requires thorough and detailed baseline data. The first task involved the assembly of all necessary data to develop the forecast model for the 21 airports. Data sources used for the regional passengers and operations forecasts included the following:

- ***Official Airline Guide ("OAG"), October 31, 2000*** – For scheduled airline service, historical aircraft, seat configurations, frequency, and city-pairs among other metrics were culled and analyzed. For each airport with scheduled airline service, a 10-year city-pair add-drop matrix was developed. An add-drop matrix illustrates how air carriers at a particular station provide a predictable pattern of air service depending on whether that station is a hub [i.e., Philadelphia International ("PHL")] or a spoke [i.e., MacArthur-Islip ("ISP")]. The add-drop matrix informs the analysts about future new city pairs and frequencies going forward. In addition, the OAG data provides key aircraft gauge (i.e., average aircraft size) trends, although it should be noted the AIR 21 reversed the aircraft gauge trends at LaGuardia ("LGA"). Although, aircraft gauge had been steadily increasing at LGA, AIR 21 (Congressional legislation passed in 1999) lifted the high density rule and allowed increased flight frequency at LGA. Carriers responded to AIR-21 by scheduling an increase in regional jet activity. **Table 2** shows an example of an add-drop matrix for 6 markets indicating the year in which the market is dropped with a "-1" and the year in which a market is added with a "1".

Table 2
Sample Add & Drop Matrix

Destination	1995	1996	1997	1998	1999	2000	2001
Allentown, PA (ABE)	-1	1	-1			1	
Albuquerque, NM (ABQ)		-1				1	
Acapulco, MEX (ACA)		1				-1	
Nantucket, MA (ACK)			-1				1
Atlantic City, NJ (ACY)				-1			1
Bader Field, NJ (AIY)	1		-1			1	

- ***U.S. Department of Transportation 10% Ticket Survey (O&D Data), 1990-2000*** **–** Passenger Origin & Destination ("O&D") data provide a wealth of airline specific data for all domestic markets served at the Region's airports. The database examined average load factors and average yield. Again, these historical measures provide important clues into how air carriers may sustain, expand or reduce air service in select airport markets within the study area.

- ***Terminal Area Forecasts (TAF), 2001-2015*** **–** The most recent TAFs, published in December of 2001, were downloaded from the FAA website and modified in format for ease of analysis. In addition, the airline yield trends and projections necessary for demand forecasting were provided by the FAA. Yield is a key proxy variable for the price of air travel and a critical part of any aviation demand forecast equation.

- ***J. P. Fleets, 2001-2002*** **–** Projected airline aircraft orders and options were provided by J.P. Fleets, a vendor that specializes in providing this data. Fleet forecasts provide insight into gauge assumptions and aircraft engine types (a critical variable for noise analysis).

- ***Woods & Poole, 1990-2015*** **–** Socio-economic data including population, per capita income, employment and earnings were provided by Woods & Poole. Woods & Poole is an independent vendor and nationally recognized firm that provides expert economic and demographic analysis.

- ***Airframe Manufacturers Forecast, 2000*** **–** Boeing, Airbus and Bombarier all provide their own forecasts of aircraft, passengers and revenue passenger miles. These reports were examined for comparability purposes.

- ***Enhanced Traffic Management System (ETMS), January/November 2000*** **–** provides FAA radar data including aircraft, airlines, flight paths and flight times for air traffic that filed IFR flight plans only.

- ***Collection and Analysis of Terminal Records (CATERLOG), 2000*** – provides similar data as ETMS for those airports operated by the Port Authority of NY & NJ including John F. Kennedy ("JFK"), Newark ("EWR"), and LGA airports for calendar year 2000.

- ***Internet*** – A good deal of data was culled from various internet sights mostly relating to corporate aviation and fractional ownership companies.

- ***Airport Statistics***[2] – Data were requested from selected airports on annual operations and passengers as well as connecting rates and other airline statistics.

- ***Airport Staff Interviews*** – Select in-person or telephone interviews were conducted to query airport operators about current market conditions, airline strategies, demand trends and development plans. Among the airports interviewed were: JFK, LGA, EWR, Teterboro Airport ("TEB"), Stewart Airport ("SWF"), ISP and Westchester County Airport ("HPN").

IV. Passenger and Operations Forecasts

This section presents the approach, methodologies and results of the regional passenger and operations forecasts for the 21 airports. All forecasts were prepared for the future years of interest; 2006 and 2011. **Exhibit 2** presents an overview of the forecasting methodology employed for this analysis in a flow chart form.

The forecasting effort culminated in the development of detailed operational schedules for each of the study airports for each future year. Because the operational modeling (airspace simulation) and the environmental modeling (noise modeling) focus on different issues, they require different operational scenarios for their analysis. In order to ensure that a given airspace/route design is sufficiently robust to accommodate a typical busy day of traffic, the airspace simulation effort analyzes the 90th-percentile (90-P) day, or 37th busiest day of traffic at the facility of interest. For the noise analysis, however; the FAA requires the evaluation to be based on the average annual day (AAD) of operations in the year of interest. This forecasting effort provides both an AAD and a 90-P schedule for each airport of interest in the study area.

Table 3 presents the forecast profile for each of the airports in the study resulting from the analysis. These profiles generally identify the expected role of the airport in the future and provide a summary of key issues affecting the expected future activity at each airport.

[2] Source: Port Authority of New York & New Jersey

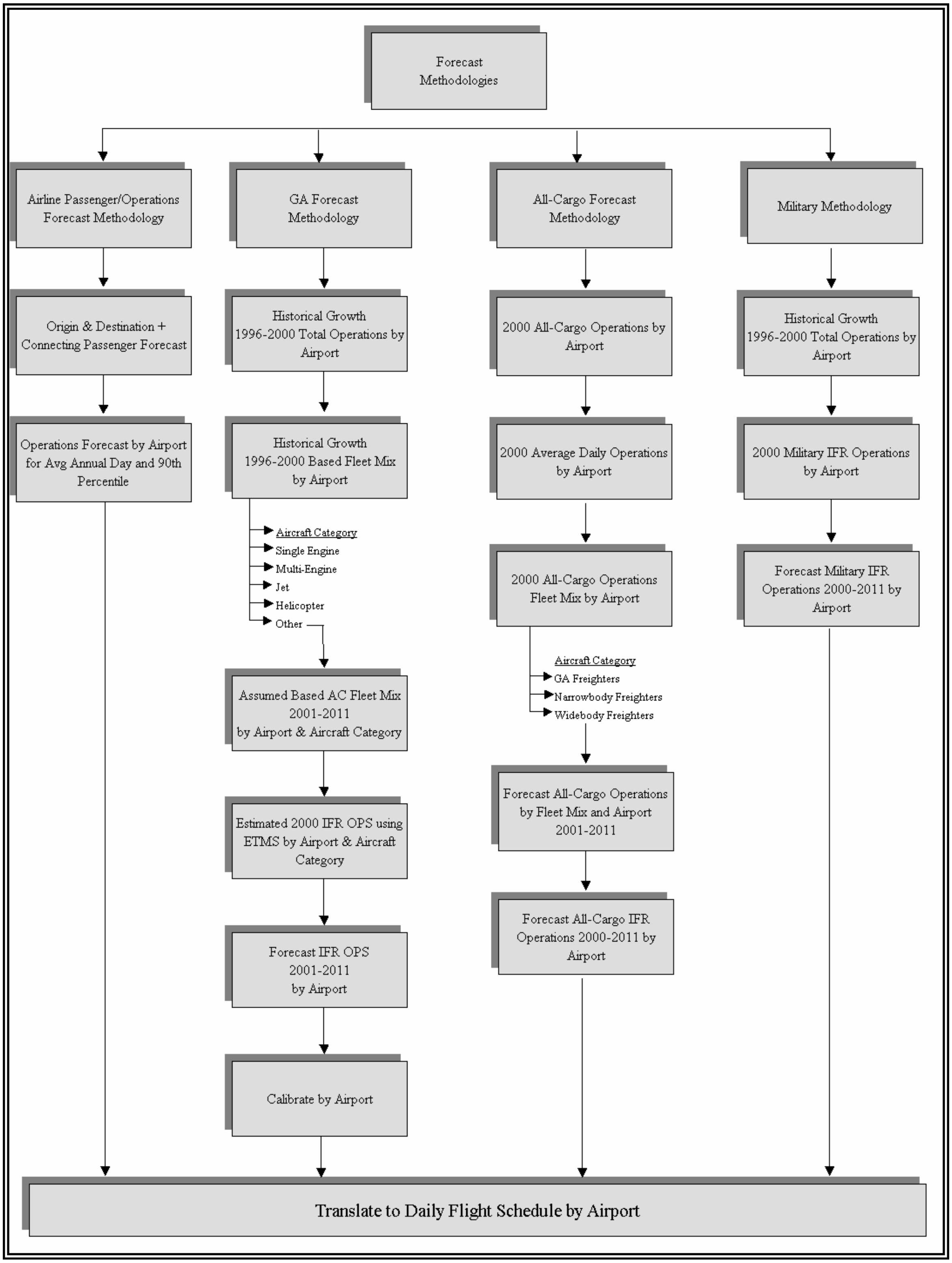


Exhibit 2
General Forecasting Methodology

Table 3
Forecast Analysis - Airport Profiles

Class/Airport	2006	2011	*Observations*
Large Hub			
EWR	Continental mega-hub; airfield constraints	Continued hub maturation; increased gauge	
JFK	jetBlue sustains and expands operations, American completes terminal (+27 gates)	Delta expands domestic and international operations; incremental growth	
LGA	Congestion pricing/other solution implemented	Increasing gauge/load factors	
PHL	Remains a viable air carrier hub	Remains a viable air carrier hub	
Regional			
ABE	Incremental spoke service growth, Some upgauging of aircraft	Incremental Spoke Service Growth, Some Upgauging of Aircraft, No low fare operator	*May benefit in long term from metro sprawl; good eastern (NJ) access*
ACY	Low incremental spoke service growth, Some upgauging of aircraft	Low incremental spoke service growth, Some upgauging of aircraft	*Largely surface mode destination Military maintains operations*
HPN	Low incremental spoke service growth, Robust GA activity	Low incremental spoke service growth, Limited upgauging of aircraft	*Highly constrained facilities; local operating restrictions will remain in place*
ISP	Incremental spoke service growth, Limited expansion by WN	Incremental spoke service growth, Limited expansion by WN	*Facility constraints will remain in place*
SWF	Incremental spoke service growth, Some upgauging of aircraft and GA activity	Incremental spoke service growth, Introduction of WN spoke	*New GE corporate aircraft base; ANG maintains operations; will benefit from metro sprawl*
HVN	Low incremental spoke service growth	Low incremental spoke service growth	
Reliever			
CDW	Remains robust corporate facility	Remains robust corporate facility	
LDJ	Remains GA reliever to EWR	Remains GA reliever to EWR	
WRI	Active AFB	Active AFB	
MMU	Increased corporate activity	Increased corporate activity	*Major GA reliever to EWR; Bizjet potential*
IGL	Remains GA reliever to PHL	Remains GA reliever to PHL	*Has not sustained scheduled air service*
PNE	Remains GA reliever to PHL	Remains GA reliever to PHL	
FRG	Remains GA reliever to LGA/JFK	Remains GA reliever to LGA/JFK	*Has not sustained scheduled air service*
BDR	Remains GA reliever	Remains GA reliever	
FOK	GA field for eastern Long Island	GA field for eastern Long Island	*ANG Search & Rescue units maintained*
TEB	Remains robust corporate facility	Remains robust corporate facility	*Bizjet and air charter restrictions intended*
TTN	Limited regional service	Limited regional service	

IV-A. Passenger Forecasts

Air transportation demand is derived from the demographic and economic profile of a region. Origin & Destination (O&D) passengers are those passengers who arrive at or depart from the airport of interest; they do not change aircraft at the subject airport. The total number of O&D passengers is a reflection of a region's attractiveness as a place in which to live, visit, work, and conduct business. O&D passengers include both resident and non-resident air travelers.

The forecast employed regression analysis, a methodology that has been successfully used and accepted by most major airports and the FAA. A regression equation describes the mathematical relationship between two sets of variables referred to as the "dependent" and the "independent" variables. For example, in the case of aviation activity, the dependent variable is the annual number of passengers. The independent variable(s) are those economic and demographic drivers that generate passenger demand such as population, employment and airline ticket prices.

Historical O&D passenger data (the dependent variable) was paired against population, employment, per capita personal income, and domestic yield (the independent variables) to establish a statistical relationship between the demographic and economic variables and the demand for air travel among the 11 airports with commercial air service.

With this mathematical relationship (the regression equation) established, the forecasts of demographic variables were combined with airline yield data to project future levels of O&D passengers.

Following the O&D passenger projections, estimated connecting passenger activity was "layered" on to the O&D passenger volumes to derive total passenger volumes for each airport. In cases where airline-specific hub activity is expected to remain stable, industry analysts typically hold connecting passenger volumes constant as a result of long-term industry-wide historical trends. Consequently, the connecting passenger volumes at the major airports in this study were assumed to remain constant over the forecast horizon at or about current levels. Connecting passengers are present at only the large hub airports in the area, including JFK, EWR, LGA, and PHL. After developing the passenger forecasts for each airport in the study region using the bottom-up approach described above, the individual forecasts were compared to the FAA's Terminal Area Forecast (TAF) as an order-of-magnitude check. **Table 4** presents the enplanement forecasts for the 11 study area airports that have air carrier service.

Generally, the new passenger forecasts were well within 10 percent of the TAF levels. The weighted average variance for total operations and the aggregate TAFs passenger forecasts for 2006 is less than 1 percent. The weighted average variance in 2011 from the TAF is less than 2 percent. The FAA uses a 10 percent threshold as a rule-of-thumb for accepting non-FAA forecasts as the basis for planning and environmental studies. For SWF, the forecast included the introduction of new low-fare service (as previously noted) that was not anticipated in the TAF. The FAA's 2000 TAF forecast for Trenton (TTN) overstated enplanement levels due to the mid-year withdrawal of service by Westwind Airlines. The FAA was briefed on this variance from the TAF and accepted the reasoning and results.

Table 4
Passenger Forecast Summary & TAF Comparison

	2000 Enplanements			**2006 Enplanements**			**2011 Enplanements**		
	Forecast	**FAA TAF**	**% Diff**	**Forecast**	**FAA TAF**	**% Diff**	**Forecast**	**FAA TAF**	**% Diff**
ABE	478,758	473,849	1.0%	545,912	535,219	2.0%	600,359	586,361	2.3%
ACY	462,055	468,718	-1.4%	516,208	514,815	0.3%	565,408	553,229	2.2%
EWR	17,542,172	17,273,978	1.5%	21,041,615	21,494,456	-2.2%	24,270,685	25,011,523	-3.1%
HPN	551,810	536,774	2.7%	696,960	670,534	3.8%	807,476	781,999	3.2%
HVN	45,325	46,487	-2.6%	56,758	56,243	0.9%	66,000	64,373	2.5%
ISP	1,146,983	1,153,996	-0.6%	1,572,500	1,547,233	1.6%	1,920,710	1,874,391	2.4%
JFK	16,658,684	16,225,758	2.6%	21,511,399	21,726,620	-1.0%	25,328,606	25,451,874	-0.5%
LGA	12,335,092	12,198,016	1.1%	15,150,110	15,122,859	0.2%	16,930,178	16,360,924	3.4%
PHL	12,566,838	12,270,835	2.4%	16,055,655	15,677,479	2.4%	18,603,018	18,516,348	0.5%
SWF	307,562	317,020	-3.1%	357,211	360,669	-1.0%	754,119	397,044	47.3%
TTN	32,412	67,000	-106.7%	50,239	76,130	-51.5%	81,293	83,739	-3.0%
Total	62,127,690	61,032,431	1.8%	77,554,567	77,782,257	-0.3%	89,927,852	89,681,805	0.3%

Source: Landrum & Brown Analysis, 2001

IV-B. Operations Forecasts

After developing the passenger forecasts for the region, airport-specific operations forecasts were developed for airline, general aviation, freighter and military operations. Based on the annual operations forecast, two sets of operational schedules were developed for each airport: Average Annual Day ("AAD") and 90th Percentile ("90P") day schedules. The 90P schedule is essentially a representation of the 37th busiest day of the year for the study airports. This is reflective of a moderately busy day of air traffic that is often used for analysis of airport and air traffic systems. The AAD forecast is used for environmental planning purposes, while the 90P is more commonly used for operational planning purposes. For each airport, the AAD and 90P forecast schedules were developed for the baseline year of 2000 and the forecast years of 2006 and 2011. These forecast schedules included daily and annual operations for airline, general aviation, freighter and military IFR operations components.

The approach and methodology for each forecast component is outlined below.

- ***Airline Operations Forecasts*** – For each airport with scheduled airline service, current average day airline schedules for Friday, October 13, 2000, were culled from the OAG. This baseline schedule was then calibrated by applying average historical load factors. These schedules were then annualized so that they reflected near actual annual volumes.

1. *Adding Frequencies* – Insofar as air carriers add and drop city pairs and frequencies, analysts performed a similar exercise building from the baseline schedule. By analyzing air service trends, they added new flights to markets at the appropriate time of day where demand warranted. For example, in 2006 it can be expected that Southwest Airlines would have additional departures from ISP to its East Coast focus city at Baltimore/Washington International Airport ("BWI"). Therefore, the 2006 schedule would reflect this increased service at an average Southwest load factor. This exercise was repeated (and tested) for every airline and every airport with commercial air service. This "bottom-up" approach containing increased scheduled activity also enables analysts to provide considerable detail including aircraft and engine types for environmental analysis.

2. *Dropping Frequencies* – If the data, combined with industry trends, indicated that a particular city pair would not likely be sustainable by 2006 and 2011, that service would be dropped. There are several noticeable examples, including the unlikely sustainability of the Atlantic City ("ACY")-PHL city pair served by a US Airways regional affiliate. Data has suggested that ACY is a market served mainly by passengers traveling in automobiles and buses, especially from locations within a radius of 250 miles.

3. *Change of Gauge* – A review of airline fleet mix and fleet orders/options indicated that certain city pairs served by specific carriers would potentially increase (or decrease) the size of deployed aircraft. For example, the Boeing 737-800 as a replacement aircraft for earlier models has considerably more seat capacity (depending on carrier and configuration). In addition, the new Airbus A380 [New Large Aircraft ("NLA")] was assumed to serve JFK within the forecast horizon (i.e., included in 2011 JFK schedules).

4. *New Entrants* – Over the planning horizon, select airports and select new entrants were included. In addition to the likely introduction of a number of international carriers (primarily at JFK, PHL and EWR), the expansion in the region of two low-fare carriers, in particular, was modeled. The successful commencement of service and aggressive growth by jetBlue Airways at JFK was developed. The commencement and a modest expansion of service by Southwest at ISP were also modeled. Also, it was assumed that Southwest Airlines (or an equivalent low-fare operator) would commence service to SWF by 2011. The airport operator and analysts have sound reason to believe that such an event would occur in the forecast horizon.

Each arrival and departure flight was linked (matched) based on the applicable average ground time requirement for each city pair, the type of flight (domestic/international), type of equipment (widebody/narrowbody/regional), and particular carrier.

- ***General Aviation Operations Forecasts*** **–** For each airport, a general aviation (GA) IFR operations forecast was developed. The approach to GA included analysis and observations regarding the types of aircraft used based on the FAA categorization of GA aircraft including single engine piston, multi-engine piston, turbo prop, jet, helicopter and experimental aircraft types. Each of these aircraft types has different growth profiles. The FAA's projected growth in each aircraft type was applied to the based-aircraft fleet at each airport. For example, the FAA and industry observers expect that the jet component in the GA market will grow at or about 4 percent per annum over the forecast horizon.[3] If a particular airport has a large percentage of based and itinerant aircraft that are jets (i.e., HPN, TEB), the FAA jet growth rate was also applied to the single/multiple piston activity. It was further assumed that most single engine and multi-engine piston aircraft were VFR operations, and thus not part of the IFR operations forecast. If a particular airport exhibited historically a large percentage of local operations and was known to have flight schools, a much lower IFR rate was applied (e.g., FRG). All jet (corporate) operations at all airports were assumed to be IFR flight activity. Helicopter and experimental aircraft were assumed to be VFR-only operations, and were therefore excluded from the IFR projections.

- ***Freighter Operations Forecasts*** **–** All cargo or freighter operations were examined on an airport-specific basis. Known hubs for express/integrator carriers like FedEx at Newark or UPS at PHL were individually evaluated for the forecast of operations and fleet mix. Other airports with limited freighter operations (i.e., check runners at TEB) were extrapolated by trend analysis. All freighter operations were assumed as IFR only.

- ***Military Operations Forecasts*****–** Many of the airports in the Region handle a combination of tactical, strategic and helicopter operations conducted by the military. Because future military operations projections are difficult to forecast, analysts relied on FAA military projections for each airport. It should be noted that all military helicopter operations were assumed as VFR while all military jet operations were assumed as IFR in nature.

- ***Overflight Operations Forecast*** **–** Overflight operations were examined as congestion also occurs with aircraft bypassing this busy airspace on approach to other airports in the vicinity or "en route" to more distant destinations. For the purposes of this analysis this category of operations is defined as IFR flight planned traffic that neither traverses some portion of the study area, is below 14,000 feet MSL altitude, and neither originates ore is destined anywhere within the study area. Overflight projections were derived with the aid of the FAA En route forecast contained in the 2000 FAA Aerospace Forecast.

[3] Source: 2000 FAA Aerospace Forecast

V. Forecast Results – IFR Operations

Annual operations and aircraft fleet mix information were compiled for Overflights and each of the 21 airports in the study based on the methodologies and analysis presented in the previous sections. **Table 5** presents a summary of the forecast annual IFR operations level for each airport and for the study area overflights. In general, continued operational growth is expected at most of the study airports as well as with the overflights of the study area. With the exception of LGA, IFR operations at the major (JFK, EWR, PHL, TAB) airports in the study are expected to initially grow in double digits through 2006. This operational growth is expected to continue at a reduced pace between 2006 and 2011. At LGA, modest initial operational growth is expected through 2006 followed by a plateau through 2011 due to airfield constraints.

Table 5
Forecast Summary
Study Area Annual IFR Flight Operations

Identifier	Airport	2000	2006	2011
LGA	La Guardia	387,995	416,465	416,465
JFK	John F. Kennedy International	347,115	413,910	451,505
EWR	Newark Liberty International	451,505	506,985	524,140
TEB	Teterboro	144,175	162,790	184,325
PHL	Philadelphia International	407,340	550,420	598,600
MMU	Morristown Municipal	36,500	40,880	45,990
ISP	Islip Long Island MacArthur	51,100	64,240	74,095
HPN	White Plains/Westchester County	96,360	116,435	125,195
ABE	Allentown/Lehigh Valley International	44,530	47,815	52,195
ACY	Atlantic City International	25,550	27,375	30,295
BDR	Bridgeport/Igor I. Sikorsky Memorial	8,030	8,760	9,490
CDW	Caldwell/Essex County	5,110	5,475	5,475
FOK	Westhampton Beach/The Francis S. Gabreski	1,095	1,460	1,460
LDJ	Linden	365	365	365
WRI	McGuire AFB	10,585	10,585	10,585
SWF	Newburgh/Stewart International	32,120	40,515	54,385
HVN	New Haven/Tweed-New Haven	8,030	8,760	9,490
PNE	Northeast Philadelphia	13,505	14,965	16,425
FRG	Republic	18,250	20,075	21,535
TTN	Trenton/Mercer County	22,630	20,805	24,090
ILG	Wilmington/New Castle County	22,995	26,280	30,660
OVF	Overflights	553,340	641,705	726,030
Total		2,688,225	3,147,065	3,412,795

Source: Landrum & Brown Analysis, 2001

Overall, IFR traffic in the Study Area (including overflights) is expected to grow some 17 percent by 2006 to 3.15M annual operations. This growth is expected to continue at a reduced rate resulting in some 3.41M annual operations by 2011. This is a 27 percent increase over the baseline 2000 conditions. While the overall future operational growth is largely driven by increased aviation demand in the form of passengers and corporate aviation, the operational numbers are intensified by changes in the future fleet mix. Among the most pronounced changes in commercial passenger fleets in the late 1990's has been the replacement of turboprop aircraft with regional jets. This trend toward the use of regional jets has continued in recent years with many major airlines replacing narrow body aircraft with regional jets in search of more profitable operations. While this "down-gauging" of aircraft results higher efficiency and profits for the airlines, it takes more flights to serve the same number of passengers. Thus, operational levels increase while accommodating the same number of passengers as before.

Table 6 presents a generalized fleet mix summary for each forecast year by study airport. As the table indicates, the IFR operational fleet mix in the study area is expected to gradually transition to a higher proportion of jets throughout the planning horizon. Currently, just over 70 percent of the IFR operations in the study area are conducted by jet aircraft. This is expected to increase to 86 percent by 2006 and 92 percent by 2011. The percentage of operations conducted by piston engine aircraft operations is expected to stay relatively flat at the 2.5 to 3 percent that is currently seen. Thus, the majority of the shift to jet operations comes from the turbo-prop category. Detailed fleet mix tables for each airport in the study are presented in **Attachment B** at the end of this appendix.

Table 6
Generalized Fleet Mix Summary- Existing & Forecast

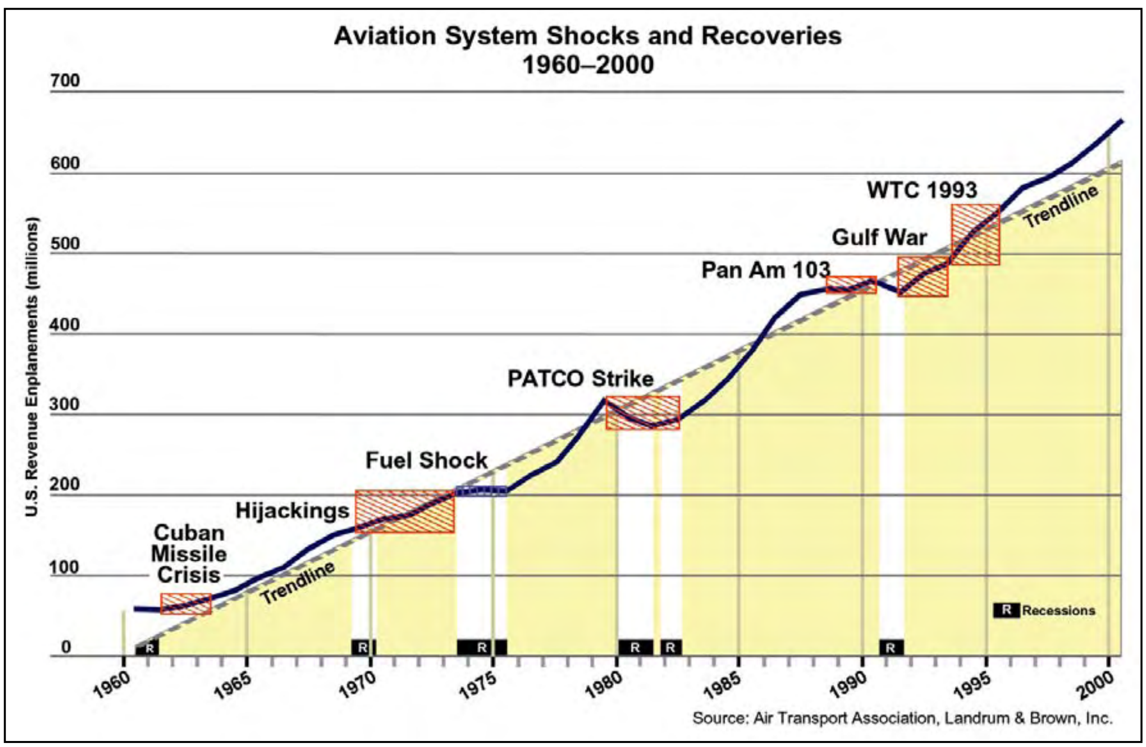
		Percent Fleet Mix								
		2000			2006			2011		
Identifier	Airport	Jets	Turbo-props	Props	Jets	Turbo-props	Props	Jets	Turbo-props	Props
LGA	La Guardia	80.9%	19.1%	0.0%	98.5%	1.2%	0.3%	99.4%	0.4%	0.2%
JFK	John F. Kennedy International	67.9%	32.1%	0.0%	89.6%	10.3%	0.2%	99.4%	0.6%	0.0%
EWR	Newark Liberty International	85.3%	14.6%	0.0%	96.0%	3.5%	0.5%	98.7%	0.9%	0.4%
TEB	Teterboro	82.0%	7.8%	10.1%	66.2%	21.6%	12.2%	69.9%	19.1%	11.0%
PHL	Philadelphia International	72.7%	26.4%	1.0%	87.1%	12.1%	0.8%	95.6%	3.7%	0.7%
MMU	Morristown Municipal	68.2%	12.2%	19.6%	67.0%	19.3%	13.8%	64.5%	21.8%	13.7%
ISP	Islip Long Island MacArthur	64.8%	34.6%	0.6%	74.3%	24.0%	1.7%	89.6%	8.9%	1.5%
HPN	White Plains/Westchester County	46.9%	52.9%	0.2%	70.7%	27.8%	1.6%	88.6%	10.0%	1.5%
ABE	Allentown/Lehigh Valley International	52.8%	45.2%	2.0%	73.3%	22.9%	3.8%	85.9%	11.3%	2.8%
ACY	Atlantic City International	50.8%	38.2%	11.0%	62.7%	32.0%	5.3%	62.7%	32.5%	4.8%
BDR	Bridgeport/Igor I. Sikorsky Memorial	46.0%	18.1%	35.8%	50.0%	29.2%	20.8%	50.0%	30.8%	19.2%
CDW	Caldwell/Essex County	2.9%	12.1%	85.0%	6.7%	66.7%	26.7%	6.7%	60.0%	33.3%
FOK	Westhampton Beach/The Francis S. Gabreski	70.4%	14.8%	14.8%	75.0%	25.0%	0.0%	75.0%	25.0%	0.0%
LDJ	Linden	0.0%	12.5%	87.5%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%
WRI	McGuire AFB	94.0%	5.3%	0.7%	79.3%	20.7%	0.0%	79.3%	20.7%	0.0%
SWF	Newburgh/Stewart International	71.6%	25.8%	2.6%	84.7%	11.7%	3.6%	89.9%	7.4%	2.7%
HVN	New Haven/Tweed-New Haven	20.4%	65.7%	13.9%	50.0%	45.8%	4.2%	80.8%	15.4%	3.8%
PNE	Northeast Philadelphia	41.0%	19.3%	39.7%	36.6%	34.1%	29.3%	40.0%	33.3%	26.7%
FRG	Republic	39.8%	19.2%	41.0%	51.8%	30.4%	17.9%	53.3%	30.0%	16.7%
TTN	Trenton/Mercer County	40.0%	45.2%	14.7%	43.9%	52.6%	3.5%	68.2%	28.8%	3.0%
ILG	Wilmington/New Castle County	62.5%	20.7%	16.8%	62.5%	23.6%	13.9%	61.9%	25.0%	13.1%
	TOTAL	73.3%	23.9%	2.8%	85.9%	11.5%	2.6%	92.2%	5.7%	2.2%

Source: 2/00, 4/00, 7/00 Radar data & Landrum & Brown Analysis - 2001

VI The Impact of the Events of September 11 on Forecast Task

The bulk of this forecast effort was conducted before the events of September 11, 2001. Given the relatively long forecast horizon, 2001-2011, any short-term suppression of aviation demand is expected to recover by the first benchmark year of 2006. Outlined below are some observations that support the position that aviation growth will rebound over the forecast horizon.

As the aviation industry struggles with reduced traffic and a shaken confidence in aviation security resulting from the events of September 11, most industry stakeholders are searching for some comparable system shock in an effort to estimate the short- and long-term impacts on aggregate aviation demand. In the post-September 11 world, industry stakeholders wonder whether aviation activity will return to the sustainable and even healthy levels to which airport operators had grown accustomed. There is no comparable event to what occurred on September 11. However, when analysts look back over the last 40 years and examine aviation traffic in light of an impressive listing of system shocks, reason for optimism is not unfounded. The 1960s led with the Cuban Missile Crisis, while the 1970s introduced aircraft highjackings and their effect on international aviation demand in particular. The 1980s opened with the PATCO strike, while the Persian Gulf War created temporary travel uncertainty in the early 1990s. The new millennium brings us a new war against worldwide terrorism that presents its unique set of uncertainties. If aviation history provides any guidance, this downturn will be offset by a pronounced recovery. As illustrated below, sharp recoils have been followed by discernable recoveries.



It should be noted that every aforementioned decade-defining industry episode was adjoined by an economic recession. The rash of highjackings in the mid-1970s was concurrent with OPEC actions and economic hardship in the United States and abroad. Months before the Reagan Administration replaced civilian air traffic controllers with military controllers; the nation was well into a deep and debilitating recession. The Persian Gulf War was prosecuted as economic malaise gripped the nation. An economic recession was also well underway before the events of September 11. Economic recessions have always been the industry's single greatest threat to profitability, competition and traffic volumes. Provided that confidence in aviation security returns, an industry rebound will likely occur as previously observed.

The industry's capacity and congestion debate has been temporarily sidelined as air carriers have slashed their schedules by as much as 20 percent or more in some markets. However, capacity and congestion relief is believed to be temporary. Those same forces of supply and demand that threatened the efficiency of the nation's air transportation system prior to September 11 will re-emerge at severely constrained airports including two subject airports – Newark and LaGuardia.

Therefore, for the purposes of this forecast task, both the events of September 11 and the current economic conditions are considered short-term and are not expected to affect long-term demand at the subject airports.

Attachment A

STUDY AREA AIRPORT EVALUATION SUMMARY

Study Area Airport Evaluation Summary
Operation Counts and Rationale for Inclusion or Exclusion

3letterID	Name	State	Published Approach?	avg daily total ops	avg daily jet ops	avg daily %jet	Include: Yes/No	Rationale for Inclusion or Exclusion
EWR	Newark International Airport	NJ	Yes	1243	1085	87%	**Yes**	Primary Affected Airports
HPN	Westchester County Airport	NY	Yes	319	188	59%	**Yes**	Primary Affected Airports
ISP	Long Island Mac Arthur Airport	NY	Yes	145	83	57%	**Yes**	Primary Affected Airports
JFK	John F. Kennedy International Airport	NY	Yes	926	702	76%	**Yes**	Primary Affected Airports
LGA	La Guardia Airport	NY	Yes	1102	899	82%	**Yes**	Primary Affected Airports
MMU	Morristown Municipal Airport	NJ	Yes	88	57	64%	**Yes**	Primary Affected Airports
PHL	Philadelphia International Airport	PA	Yes	1243	927	75%	**Yes**	Primary Affected Airports
TEB	Teterboro Airport	NJ	Yes	378	269	71%	**Yes**	Primary Affected Airports
ABE	Lehigh Valley (Allentown) International Airport	PA	Yes	137	69	51%	**Yes**	Potential Change
ACY	Atlantic City International Airport	NJ	Yes	90	48	53%	**Yes**	Potential Change
SWF	Stewart International Airport	NY	Yes	74	47	63%	**Yes**	Ops > 20
BDR	Igor I Sikorsky Memorial Airport	CT	Yes	28	12	43%	**Yes**	Ops > 20
FRG	Republic Airport	NY	Yes	62	26	42%	**Yes**	Ops > 20
ILG	New Castle County (Wilmington) Airport	DE	Yes	62	34	54%	**Yes**	Ops > 20
PNE	North Philadelphia Airport	PA	Yes	40	13	33%	**Yes**	Ops > 20
TTN	Trenton Mercer Airport	NJ	Yes	65	24	37%	**Yes**	Ops > 20
CDW	Essex County Airport	NJ	Yes	17	1	4%	**Yes**	IFR Traffic Mix
FOK	Suffolk **(JETS)**	NY	Yes	20	13	66%	**Yes**	Ops=20; mainly jets
HVN	Tweed-New Haven Airport **(United 737's)**	CT	Yes	27	5	20%	**Yes**	Ops > 20
WRI	McGuire AFB	NJ	No	29	23	80%	**Yes**	Special Interest
LDJ	Linden Airport	NJ	No	3	0	8%	**Yes**	IFR Traffic Mix
39N	Princeton Airport	NJ	Yes	3	0	0%	No	Ops < 20
BLM	Allaire Airport	NJ	Yes	17	8	46%	No	Ops < 20
N51	Solberg-Hunterdon	NJ	Yes	2	0	0%	No	Ops < 20
17N	Cross Keys Airport	NJ	Yes	1	0	0%	No	Ops < 20
1N9	Allentown Queen City Municipal Airport	PA	Yes	3	0	0%	No	Ops < 20
44N	Sky Acres Airport	NY	Yes	1	0	10%	No	Ops < 20
BDL	Bradley International Airport	CT	Yes	391	290	74%	No	Exclude since outside boundary
DXR	Danbury Municipal Airport	CT	Yes	15	2	14%	No	Ops < 20
DYL	Doylestown Airport	PA	Yes	4	0	5%	No	Ops < 20
GON	Groton-New London Airport	CT	Yes	26	7	27%	No	Excluded since controlled by Boston Center, no changes proposed

3letterID	Name	State	Published Approach?	avg daily total ops	avg daily jet ops	avg daily %jet	Include: Yes/No	Rationale for Inclusion or Exclusion
HTO	East Hampton	NY	Yes	18	7	36%	No	Ops < 20
MGJ	Orange County Airport	NY	Yes	4	0	5%	No	Ops < 20
MJX	Robert J. Miller Airpark Airport	PA	Yes	3	1	27%	No	Ops < 20
N43	Braden Airpark Airport (Easton)	PA	Yes	1	0	0%	No	Ops < 20
N82	Wurtsboro-Sullivan County Airport	NY	Yes	0	0	0%	No	Ops < 20
N99	Brandywine Airport	PA	Yes	5	0	4%	No	Ops < 20
OXC	Waterbury-Oxford	CT	Yes	16	10	61%	No	Ops < 20
POU	Dutches County	NY	Yes	17	3	18%	No	Ops < 20
PVD	Theodore Francis Green State Airport	RI	Yes	246	183	74%	No	Exclude since outside boundary
SMQ	Somerset Airport	NJ	Yes	4	0	0%	No	Ops < 20
VAY	South Jersey Regional Airport	NJ	Yes	3	0	0%	No	Ops < 20
RDG	Reading Regional/Carl A Spaatz Field	PA	Yes	49	9	18%	No	Exclude since outside boundary
12N	Aeroflex-Andover	NJ	Yes	0	0	0%	No	Ops < 20
N85	Alexandria	NJ	Yes	1	0	0%	No	Ops < 20
47N	Central Jersey Regional (Kupper)	NJ	Yes	2	0	0%	No	Ops < 20
N87	Trenton-Robbinsville	NJ	Yes	1	0	0%	No	Ops < 20
N37	Monticello	NY	Yes	0	0	0%	No	Ops < 20
06N	Randall	NY	Yes	0	0	0%	No	Ops < 20
40N	Chester County G O Carlson	PA	Yes	11	5	47%	No	Ops < 20
N57	New Garden	PA	Yes	1	0	0%	No	Ops < 20
PTW	Pottstown Limerick	PA	Yes	15	1	7%	No	Ops < 20
3B9	Chester	CT	Yes	2	0	0%	No	Ops < 20
MMK	Meriden Markham Muni	CT	Yes	1	0	0%	No	Ops < 20
1N7	Blairstown	NJ	Yes	1	0	0%	No	Ops < 20
N81	Hammonton Muni	NJ	Yes	1	0	0%	No	Ops < 20
MIV	Millville Muni	NJ	Yes	4	1	23%	No	Ops < 20
3N6	Old Bridge	NJ	Yes	1	0	0%	No	Ops < 20
N40	Sky Manor	NJ	Yes	1	0	0%	No	Ops < 20
1N4	Woodbine Muni	NJ	Yes	1	0	0%	No	Ops < 20
MTP	Montauk	NY	Yes	1	0	0%	No	Ops < 20
46N	Sky Park	NY	Yes	1	0	0%	No	Ops < 20
MSV	Sullivan County International	NY	Yes	2	1	30%	No	Ops < 20
22N	Jake Arner Memorial	PA	Yes	1	0	0%	No	Ops < 20
N10	Perkiomen Valley	PA	Yes	1	0	0%	No	Ops < 20

3letterID	Name	State	Published Approach?	avg daily total ops	avg daily jet ops	avg daily %jet	Include: Yes/No	Rationale for Inclusion or Exclusion
MPO	Pocono Mountains Muni	PA	Yes	3	0	13%	No	Ops < 20
UKT	Quakertown	PA	Yes	1	0	0%	No	Ops < 20
N67	Wings Field	PA	Yes	6	0	0%	No	Ops < 20
NEL	Lakehurst NAEC	NJ	No				No	No Instrument Approach
HFD	Hartford-Brainard Airport	CT	No				No	No Instrument Approach
HWV	Brookhaven Airport	NY	No				No	No Instrument Approach
N70	Pennridge Airport	PA	No				No	No Instrument Approach
11N	Candlelight Farms	CT	No				No	No Instrument Approach
42B	Goodspeed	CT	No				No	No Instrument Approach
22B	Mountain Meadow Airstrip	CT	No				No	No Instrument Approach
4B8	Robertson Field	CT	No				No	No Instrument Approach
9B8	Salmon River Airfield	CT	No				No	No Instrument Approach
N41	Waterbury	CT	No				No	No Instrument Approach
00N	Bucks	NJ	No				No	No Instrument Approach
31E	Eagles Nest	NJ	No				No	No Instrument Approach
N05	Hackettstown	NJ	No				No	No Instrument Approach
29N	Kroelinger	NJ	No				No	No Instrument Approach
N50	Li Calzi	NJ	No				No	No Instrument Approach
N07	Lincoln Park	NJ	No				No	No Instrument Approach
3N5	Newton	NJ	No				No	No Instrument Approach
3N7	Pemberton	NJ	No				No	No Instrument Approach
N75	Twin Pine	NJ	No				No	No Instrument Approach
2N6	Redwing	NJ	No				No	No Instrument Approach
25N	Rudys	NJ	No				No	No Instrument Approach
7N7	Spitfire Aerodrome (Old Mans)	NJ	No				No	No Instrument Approach
13N	Trinca	NJ	No				No	No Instrument Approach
28N	Vineland-Downstown	NJ	No				No	No Instrument Approach
09N	Airhaven	NY	No				No	No Instrument Approach
K23	Cooperstown-Westville	NY	No				No	No Instrument Approach
1I5	Freehold	NY	No				No	No Instrument Approach
1A1	Green Acres	NY	No				No	No Instrument Approach
N89	Joseph Y. Resnick	NY	No				No	No Instrument Approach
N45	Kobelt	NY	No				No	No Instrument Approach
O00	Lufker	NY	No				No	No Instrument Approach

3letterID	Name	State	Published Approach?	avg daily total ops	avg daily jet ops	avg daily %jet	Include: Yes/No	Rationale for Inclusion or Exclusion
1N2	Spadaro	NY	No				No	No Instrument Approach
N69	Stormville	NY	No				No	No Instrument Approach
7N8	Butter Valley Golf Port	PA	No				No	No Instrument Approach
14N	Beltzville	PA	No				No	No Instrument Approach
8N4	Flying Dollar	PA	No				No	No Instrument Approach
P91	Flying M Aerodrome	PA	No				No	No Instrument Approach
O03	Morgantown	PA	No				No	No Instrument Approach
69N	Slatington	PA	No				No	No Instrument Approach
70N	Spring Hill	PA	No				No	No Instrument Approach
9N1	Vansant	PA	No				No	No Instrument Approach
N04	Griswold	CT	No				No	No Instrument Approach
AIY	Atlantic City Muni/Bader Field	NJ	No				No	No Instrument Approach
19N	Camden County	NJ	No				No	No Instrument Approach
WWD	Cape May County	NJ	No				No	No Instrument Approach
N14	Flying W	NJ	No				No	No Instrument Approach
4N1	Greenwood Lake	NJ	No				No	No Instrument Approach
N12	Lakewood	NJ	No				No	No Instrument Approach
26N	Ocean City Muni	NJ	No				No	No Instrument Approach
N73	Red Lion	NJ	No				No	No Instrument Approach
FWN	Sussex	NJ	No				No	No Instrument Approach
23N	Bayport Aerodrome	NY	No				No	No Instrument Approach
0B8	Elizabeth Field	NY	No				No	No Instrument Approach
20N	Kingston-Ulster	NY	No				No	No Instrument Approach
N00	Maben	NY	No				No	No Instrument Approach
21N	Mattituck	NY	No				No	No Instrument Approach
N72	Warwick Muni	NY	No				No	No Instrument Approach
N30	Cherry Ridge	PA	No				No	No Instrument Approach
N47	Pottstown Muni	PA	No				No	No Instrument Approach
N53	Stroudsburg-Pocono	PA	No				No	No Instrument Approach
C01	Southern Cross	NJ	No				No	No Instrument Approach
N31	Kutztown Airport	PA	No				No	No Instrument Approach

Attachment B

FORECAST FLEET MIX DATA TABLES

EWR Current & Future Fleet Mix

Aircraft Category	AC Type	2000	2006	2011
H	747400	0.7%	0.7%	0.8%
	767300	2.5%	3.2%	4.2%
	777200	0.9%	1.7%	2.0%
	74710Q	0.2%	0.7%	0.1%
	74720B	0.0%	0.1%	0.1%
	767CF6	0.0%	0.3%	1.2%
	A300	0.8%	0.7%	0.8%
	A310	0.8%	0.9%	1.0%
	A330	0.2%	0.3%	0.3%
	A340	0.2%	0.4%	0.5%
	DC1030	3.5%	1.1%	1.0%
	DC1040	0.2%	0.3%	0.2%
	DC870	0.7%	1.0%	1.0%
	MD11GE	0.2%	0.1%	0.2%
	L1011	0.0%	0.0%	0.0%
H Total		**11.1%**	**11.5%**	**13.6%**
M	737300	7.9%	9.4%	6.6%
	737400	0.7%	0.0%	0.0%
	737500	9.7%	2.7%	0.4%
	737700	8.9%	30.6%	39.0%
	727EM2	4.1%	1.1%	0.0%
	737N17	2.3%	0.0%	0.0%
	757PW	9.9%	9.5%	7.8%
	A319	0.4%	2.5%	2.4%
	A320	1.6%	2.8%	2.7%
	DC93LW	1.3%	0.1%	0.1%
	DC95HW	2.6%	0.0%	0.0%
	F10065	0.3%	0.5%	0.5%
	MD83	14.9%	3.4%	1.2%
	MD9025	0.3%	2.3%	2.5%
	717200	0.3%	0.0%	0.0%
M Total		**65.2%**	**64.8%**	**63.2%**

Aircraft Category	AC Type	2000	2006	2011
L	CL600	0.0%	2.1%	2.1%
	CL601	1.5%	3.5%	3.3%
	GIV	0.0%	0.4%	0.4%
	LEAR35	0.0%	0.3%	0.3%
	MU3001	0.0%	0.5%	0.4%
	FAL20	0.0%	0.0%	0.0%
L Total		**1.6%**	**6.7%**	**6.6%**
R	EMB145	7.4%	12.9%	15.2%
R Total		**7.4%**	**12.9%**	**15.2%**
K	LEAR25	0.1%	0.1%	0.1%
	GIIB	0.0%	0.0%	0.0%
K Total		**0.1%**	**0.1%**	**0.1%**
T	CNA441	0.0%	0.0%	0.0%
	DHC6	2.0%	0.1%	0.1%
	DHC8	8.4%	3.0%	0.5%
	GASEPF	0.4%	0.3%	0.3%
	HS748A	1.2%	0.0%	0.0%
	SF340	2.6%	0.1%	0.1%
	CVR580	0.0%	0.0%	0.0%
T Total		**14.7%**	**3.5%**	**0.9%**
P	BEC58P	0.0%	0.1%	0.1%
	GASEPV	0.0%	0.4%	0.3%
P Total		**0.0%**	**0.5%**	**0.4%**
Grand Total		**100.0%**	**100.0%**	**100.0%**

Source: Landrum & Brown, 2005

JFK Current & Future Fleet Mix

Aircraft Category	AC Type	2000	2006	2011
H	747400	5.8%	5.8%	5.2%
	767300	13.2%	18.0%	18.6%
	777200	0.3%	2.6%	3.6%
	74710Q	0.3%	0.2%	0.1%
	74720B	3.8%	1.0%	0.6%
	767CF6	8.5%	3.4%	0.7%
	A300	4.3%	0.8%	0.9%
	A310	1.7%	1.0%	0.7%
	A330	0.6%	0.7%	0.4%
	A340	0.6%	0.9%	1.4%
	DC1030	0.5%	0.5%	0.6%
	DC1040	0.7%	0.4%	0.2%
	DC870	1.4%	1.8%	2.0%
	KC135	0.0%	0.1%	0.1%
	MD11GE	0.7%	0.3%	0.1%
	L1011	0.2%	0.0%	0.0%
	CONCRD	0.7%	0.0%	0.0%
H Total		**43.4%**	**37.4%**	**35.3%**
M	737300	2.5%	10.4%	13.8%
	737500	0.0%	0.4%	0.3%
	737700	0.8%	3.2%	4.7%
	727EM2	1.9%	0.2%	0.2%
	737N17	0.4%	0.0%	0.0%
	757PW	7.8%	7.4%	6.6%
	A319	0.0%	0.4%	0.4%
	A320	2.4%	9.0%	12.1%
	DC95HW	0.9%	0.1%	0.1%
	MD83	5.5%	2.9%	0.1%
M Total		**22.2%**	**34.0%**	**38.2%**
L	CL600	0.0%	1.1%	1.2%
	CL601	0.1%	5.7%	9.8%
	GIV	0.0%	0.1%	0.2%
	LEAR35	0.0%	0.2%	0.2%
	MU3001	0.0%	0.4%	0.3%
L Total		**0.1%**	**7.5%**	**11.7%**
R	EMB145	2.5%	10.6%	14.3%
R Total		**2.5%**	**10.6%**	**14.3%**
K	LEAR25	0.0%	0.0%	0.0%
	GIIB	0.0%	0.0%	0.0%
K Total		**0.0%**	0.0%	0.0%
T	C130	0.0%	0.1%	0.1%
	CNA441	0.3%	0.4%	0.2%
	DHC6	1.4%	0.0%	0.0%
	GASEPF	0.1%	0.2%	0.2%
	SD330	0.0%	0.1%	0.1%
	SF340	30.0%	9.5%	0.0%
T Total		**31.8%**	**10.3%**	**0.6%**
P	BEC58P	0.0%	0.2%	0.0%
P Total		0.0%	**0.2%**	0.0%
Grand Total		**100.0%**	**100.0%**	**100.0%**

Source: Landrum & Brown, 2005

LGA Current & Future Fleet Mix

Aircraft Category	AC Type	2000	2006	2011
H	767300	0.8%	1.0%	1.7%
	767CF6	0.7%	0.1%	0.0%
H Total		**1.5%**	**1.1%**	**1.7%**
M	737300	12.0%	13.4%	12.4%
	737400	2.4%	1.4%	0.5%
	737500	0.5%	0.0%	0.0%
	737700	2.5%	17.9%	11.9%
	727EM2	11.4%	0.0%	0.0%
	737N17	1.6%	0.7%	0.0%
	757PW	7.8%	12.2%	19.9%
	A319	1.2%	1.4%	0.0%
	A320	4.0%	8.3%	12.4%
	DC93LW	2.5%	0.7%	0.0%
	DC95HW	3.9%	0.0%	0.0%
	F10065	0.3%	1.0%	0.0%
	MD83	16.9%	2.6%	2.6%
	MD9025	0.0%	2.5%	2.2%
	717200	0.1%	0.0%	0.0%
	7373B2	0.1%	0.0%	0.0%
M Total		**67.4%**	**62.2%**	**62.0%**
L	CL600	0.2%	1.8%	1.9%
	CL601	7.1%	12.4%	14.1%
	GIV	0.0%	0.6%	0.7%
	LEAR35	0.0%	0.4%	0.5%
	MU3001	0.0%	0.4%	0.3%
	FAL20	0.0%	0.0%	0.0%
L Total		**7.4%**	**15.6%**	**17.6%**
R	EMB145	4.6%	19.6%	18.2%
R Total		**4.6%**	**19.6%**	**18.2%**
K	GIIB	0.0%	0.0%	0.0%
K Total		**0.0%**	0.0%	0.0%
T	CNA441	0.0%	0.3%	0.2%
	DHC6	1.2%	0.0%	0.0%
	DHC8	11.9%	0.7%	0.0%
	GASEPF	0.0%	0.3%	0.3%
	SF340	6.0%	0.0%	0.0%
T Total		**19.2%**	**1.2%**	**0.4%**
P	BEC58P	0.0%	0.2%	0.1%
	GASEPV	0.0%	0.1%	0.1%
P Total		**0.0%**	**0.3%**	**0.2%**
Grand Total		**100.0%**	**100.0%**	**100.0%**

Source: Landrum & Brown, 2005

PHL Current & Future Fleet Mix

Aircraft Category	AC Type	2000	2006	2011
H	747400	0.0%	0.3%	0.3%
	767300	0.7%	0.7%	0.6%
	777200	0.0%	0.1%	0.2%
	74710Q	0.3%	0.0%	0.0%
	74720B	0.0%	0.1%	0.1%
	767CF6	0.2%	0.1%	0.1%
	A300	0.2%	0.1%	0.1%
	A310	0.1%	0.9%	1.0%
	A330	0.0%	0.9%	0.9%
	A340	0.0%	0.1%	0.1%
	DC870	1.0%	1.1%	1.0%
	KC135	0.0%	0.1%	0.1%
H Total		**2.6%**	**4.4%**	**4.3%**
M	737300	13.0%	10.7%	8.5%
	737400	7.4%	1.8%	0.1%
	737500	1.4%	1.6%	0.2%
	737700	3.6%	13.4%	18.8%
	727EM2	5.0%	1.1%	0.0%
	737N17	1.9%	0.0%	0.0%
	757PW	5.6%	8.2%	9.8%
	A319	2.7%	10.2%	11.5%
	A320	1.7%	6.6%	8.2%
	DC93LW	1.5%	0.0%	0.0%
	DC95HW	7.4%	0.1%	0.1%
	F10065	4.4%	0.1%	0.1%
	MD83	6.6%	3.6%	0.9%
	MD9025	0.0%	2.5%	2.9%
	717200	0.3%	0.0%	0.0%

Aircraft Category	AC Type	2000	2006	2011
M Total		**62.3%**	**59.9%**	**61.2%**
L	CL600	0.4%	2.5%	2.7%
	CL601	3.5%	7.8%	6.6%
	GIV	0.0%	0.9%	1.3%
	LEAR35	1.4%	1.3%	1.3%
	MU3001	0.1%	0.7%	0.5%
	FAL20	0.0%	0.0%	0.0%
L Total		**5.5%**	**13.0%**	**12.4%**
R	EMB145	2.1%	9.7%	17.7%
R Total		**2.1%**	**9.7%**	**17.7%**
K	LEAR25	0.1%	0.1%	0.0%
	GIIB	0.0%	0.0%	0.0%
K Total		**0.2%**	**0.1%**	0.0%
T	CNA441	1.2%	1.0%	0.9%
	DHC6	4.5%	1.9%	0.0%
	DHC8	17.2%	6.3%	0.7%
	GASEPF	0.0%	0.2%	0.2%
	HS748A	0.6%	2.3%	1.9%
	SF340	2.8%	0.5%	0.0%
T Total		**26.3%**	**12.1%**	**3.7%**
P	BEC58P	1.0%	0.6%	0.5%
	GASEPV	0.0%	0.2%	0.2%
P Total		**1.0%**	**0.8%**	**0.7%**
Grand Total		**100.0%**	**100.0%**	**100.0%**

Source: Landrum & Brown, 2005

ABE Current & Future Fleet Mix

Aircraft Category	AC Type	2000	2006	2011
M	737300	11.8%	15.4%	2.8%
	737400	0.6%	0.0%	0.0%
	737500	0.8%	1.5%	0.0%
	737700	2.0%	2.3%	11.3%
	727EM2	4.0%	0.0%	0.0%
	737N17	4.6%	0.0%	0.0%
	757PW	0.0%	13.8%	14.8%
	A319	0.0%	2.3%	5.6%
	A320	0.0%	1.5%	1.4%
	DC93LW	0.1%	0.0%	0.0%
	DC95HW	11.7%	0.0%	0.0%
	F10065	2.2%	0.0%	0.0%
	MD83	3.5%	0.0%	0.0%
M Total		**41.3%**	**36.9%**	**35.9%**
L	CL600	0.1%	6.2%	8.5%
	CL601	9.1%	21.5%	21.1%
	GIV	0.1%	0.8%	0.7%
	LEAR35	0.2%	0.0%	0.0%
	MU3001	0.0%	3.1%	2.8%
	FAL20	0.1%	0.0%	0.0%
L Total		**9.6%**	**31.5%**	**33.1%**
R	EMB145	0.0%	5.4%	16.9%
	BAE146	2.1%	0.0%	0.0%
R Total		**2.1%**	**5.4%**	**16.9%**
K	GIIB	0.0%	0.0%	0.0%
K Total		**0.0%**	0.0%	0.0%
T	C130	0.9%	0.8%	0.7%
	CNA441	0.1%	5.4%	7.7%
	DHC6	17.7%	0.0%	0.0%
	DHC8	23.3%	13.8%	0.0%
	GASEPF	1.3%	3.1%	2.8%
	SF340	2.2%	0.0%	0.0%
T Total		**45.5%**	**23.1%**	**11.3%**
P	BEC58P	0.1%	2.3%	2.1%
	GASEPV	1.4%	0.8%	0.7%
P Total		**1.4%**	**3.1%**	**2.8%**
Grand Total		**100.0%**	**100.0%**	**100.0%**

Source: Landrum & Brown, 2005

HPN Current & Future Fleet Mix

Aircraft Category	AC Type	2000	2006	2011
M	737300	0.4%	0.0%	0.0%
	737500	6.2%	3.8%	0.0%
	737700	0.0%	0.0%	2.3%
	A319	0.0%	0.0%	2.3%
	DC95HW	2.8%	0.0%	0.0%
	F10065	5.1%	4.4%	0.0%
	MD9025	0.0%	0.0%	4.1%
M Total		**14.6%**	**8.2%**	**8.8%**
L	CL600	9.8%	26.2%	28.2%
	CL601	6.1%	10.4%	9.7%
	GIV	1.1%	6.0%	5.6%
	LEAR35	0.6%	0.0%	0.0%
	MU3001	1.6%	7.6%	6.7%
	FAL20	0.2%	0.0%	0.0%
L Total		**19.4%**	**50.2%**	**50.1%**
R	EMB145	4.7%	12.3%	29.6%
	BAE146	8.5%	0.0%	0.0%
R Total		**13.2%**	**12.3%**	**29.6%**
K	LEAR25	0.0%	0.0%	0.0%
	GIIB	0.2%	0.0%	0.0%
K Total		**0.2%**	0.0%	0.0%
T	CNA441	0.2%	6.6%	7.9%
	DHC6	22.2%	0.0%	0.0%
	DHC8	19.8%	3.2%	0.0%
	GASEPF	0.0%	2.2%	2.1%
	HS748A	0.0%	12.0%	0.0%
	SF340	10.1%	3.8%	0.0%
T Total		**52.5%**	**27.8%**	**10.0%**
P	BEC58P	0.1%	1.6%	1.5%
	GASEPV	0.0%	0.0%	0.0%
P Total		**0.2%**	**1.6%**	**1.5%**
Grand Total		**100.0%**	**100.0%**	**100.0%**

Source: Landrum & Brown, 2005

ISP Current & Future Fleet Mix

Aircraft Category	AC Type	2000	2006	2011
M	737300	3.5%	11.4%	12.9%
	737500	0.0%	3.4%	3.0%
	737700	22.1%	29.7%	30.7%
	737N17	11.8%	0.0%	0.0%
	757PW	0.0%	1.1%	1.5%
	DC93LW	3.6%	0.0%	0.0%
	DC95HW	1.2%	0.0%	0.0%
	MD83	7.1%	0.0%	0.0%
M Total		**49.3%**	**45.7%**	**48.0%**
L	CL600	0.7%	5.7%	6.4%
	CL601	10.3%	10.9%	11.9%
	GIV	0.2%	1.7%	1.5%
	LEAR35	0.3%	0.0%	0.0%
	MU3001	0.3%	2.3%	2.0%
L Total		**11.8%**	**20.6%**	**21.8%**
R	EMB145	3.3%	8.0%	19.8%
R Total		**3.3%**	**8.0%**	**19.8%**
K	GIIB	0.3%	0.0%	0.0%
K Total		**0.3%**	**0.0%**	**0.0%**
T	C130	0.0%	0.6%	0.5%
	CNA441	0.1%	4.6%	5.0%
	DHC6	8.8%	0.0%	0.0%
	DHC8	11.4%	10.3%	0.0%
	GASEPF	0.1%	4.0%	3.5%
	SF340	14.2%	4.6%	0.0%
T Total		**34.6%**	**24.0%**	**8.9%**
P	BEC58P	0.1%	1.7%	1.5%
	GASEPV	0.6%	0.0%	0.0%
P Total		**0.7%**	**1.7%**	**1.5%**
Grand Total		**100.0%**	**100.0%**	**100.0%**

Source: Landrum & Brown, 2005

TEB Current & Future Fleet Mix

Aircraft Category	AC Type	2000	2006	2011
M	737300	0.0%	0.0%	0.0%
	737400	0.0%	0.0%	0.0%
	737700	0.0%	0.0%	0.0%
	737N17	0.0%	0.0%	0.0%
	DC93LW	0.0%	0.0%	0.0%
	DC95HW	0.0%	0.0%	0.0%
	BAC111	0.0%	0.0%	0.0%
M Total		**0.1%**	**0.0%**	**0.0%**
L	CL600	35.4%	36.9%	38.5%
	GIV	7.2%	8.9%	8.8%
	LEAR35	10.7%	10.9%	14.1%
	MU3001	14.9%	9.6%	8.4%
	FAL20	6.4%	0.0%	0.0%
L Total		**74.6%**	**66.2%**	**69.9%**
R	BAE146	0.0%	0.0%	0.0%
R Total		**0.0%**	**0.0%**	**0.0%**
K	LEAR25	0.8%	0.0%	0.0%
	GIIB	6.0%	0.0%	0.0%
K Total		**6.9%**	**0.0%**	**0.0%**
T	CNA441	7.1%	6.9%	6.1%
	DHC6	0.1%	0.2%	0.2%
	GASEPF	0.9%	14.4%	12.8%
T Total		**8.0%**	**21.6%**	**19.1%**
P	BEC58P	8.6%	10.4%	9.4%
	GASEPV	1.7%	1.8%	1.6%
P Total		**10.3%**	**12.2%**	**11.0%**
Grand Total		**100.0%**	**100.0%**	**100.0%**

Source: Landrum & Brown, 2005

ACY Current & Future Fleet Mix

Aircraft Category	AC Type	2000	2006	2011
H	74720B	0.0%	0.0%	0.0%
	A300	0.0%	0.0%	0.0%
	A310	0.1%	0.0%	0.0%
	A330	0.0%	0.0%	0.0%
	DC1030	0.2%	0.0%	0.0%
	KC135R	0.0%	0.0%	0.0%
H Total		**0.4%**	**0.0%**	**0.0%**
M	737300	0.0%	0.0%	0.0%
	737400	0.0%	0.0%	0.0%
	737700	0.1%	0.0%	0.0%
	727EM2	0.5%	0.0%	0.0%
	737N17	6.1%	0.0%	0.0%
	757PW	0.3%	16.0%	16.9%
	DC93LW	22.1%	0.0%	0.0%
	F10065	0.0%	0.0%	0.0%
	MD83	7.3%	24.0%	22.9%
M Total		**36.4%**	**40.0%**	**39.8%**
L	CL600	4.5%	8.0%	9.6%
	CL601	0.3%	10.7%	9.6%
	GIV	0.6%	0.0%	0.0%
	LEAR35	3.3%	0.0%	0.0%
	MU3001	3.6%	4.0%	3.6%
	FAL20	0.4%	0.0%	0.0%
	A7D	1.1%	0.0%	0.0%
	IA1125	0.0%	0.0%	0.0%
L Total		**13.8%**	**22.7%**	**22.9%**
R	EMB145	0.0%	0.0%	0.0%
R Total		**0.0%**	**0.0%**	**0.0%**
K	LEAR25	1.7%	0.0%	0.0%
	GIIB	0.6%	0.0%	0.0%
K Total		**2.3%**	**0.0%**	**0.0%**
T	C130	1.7%	8.0%	7.2%
	CNA441	10.3%	12.0%	14.5%
	DHC6	23.1%	0.0%	0.0%
	DHC8	0.2%	0.0%	0.0%
	GASEPF	0.0%	4.0%	3.6%
	HS748A	0.2%	8.0%	7.2%
	SD330	0.6%	0.0%	0.0%
	SF340	0.6%	0.0%	0.0%
	CVR580	0.0%	0.0%	0.0%
T Total		**36.7%**	**32.0%**	**32.5%**
P	BEC58P	4.4%	5.3%	4.8%
	GASEPV	6.0%	0.0%	0.0%
P Total		**10.4%**	**5.3%**	**4.8%**
Grand Total		**100.0%**	**100.0%**	**100.0%**

Source: Landrum & Brown, 2005

BDR Current & Future Fleet Mix

Aircraft Category	AC Type	2000	2006	2011
M	DC93LW	0.1%	0.0%	0.0%
M Total		**0.1%**	**0.0%**	**0.0%**
L	CL600	20.3%	29.2%	30.8%
	GIV	3.5%	4.2%	3.8%
	LEAR35	4.1%	0.0%	0.0%
	MU3001	12.9%	16.7%	15.4%
	FAL20	1.4%	0.0%	0.0%
	IA1125	0.1%	0.0%	0.0%
L Total		**42.3%**	**50.0%**	**50.0%**
R	BAE146	0.1%	0.0%	0.0%
R Total		**0.1%**	**0.0%**	**0.0%**
K	LEAR25	1.2%	0.0%	0.0%
	GIIB	2.5%	0.0%	0.0%
K Total		**3.7%**	**0.0%**	**0.0%**
T	CNA441	13.4%	16.7%	19.2%
	DHC6	0.6%	0.0%	0.0%
	DHC8	0.1%	0.0%	0.0%
	GASEPF	3.9%	12.5%	11.5%
	HS748A	0.2%	0.0%	0.0%
	SF340	0.1%	0.0%	0.0%
T Total		**18.2%**	**29.2%**	**30.8%**
P	BEC58P	11.5%	16.7%	15.4%
	GASEPV	24.2%	4.2%	3.8%
P Total		**35.6%**	**20.8%**	**19.2%**
Grand Total		**100.0%**	**100.0%**	**100.0%**

Source: Landrum & Brown, 2005

CDW Current & Future Fleet Mix

Aircraft Category	AC Type	2000	2006	2011
L	LEAR35	0.2%	0.0%	0.0%
	MU3001	2.5%	6.7%	6.7%
L Total		**2.7%**	**6.7%**	**6.7%**
K	LEAR25	0.2%	0.0%	0.0%
K Total		**0.2%**	**0.0%**	**0.0%**
T	CNA441	10.6%	20.0%	20.0%
	DHC6	0.4%	0.0%	0.0%
	GASEPF	1.3%	46.7%	40.0%
T Total		**12.3%**	**66.7%**	**60.0%**
P	BEC58P	35.2%	26.7%	26.7%
	GASEPV	49.6%	0.0%	6.7%
P Total		**84.8%**	**26.7%**	**33.3%**
Grand Total		**100.0%**	**100.0%**	**100.0%**

Source: Landrum & Brown, 2005

FOK Current & Future Fleet Mix

Aircraft Category	AC Type	2000	2006	2011
M	727EM2	0.3%	0.0%	0.0%
M Total		**0.3%**	0.0%	0.0%
L	CL600	30.5%	75.0%	75.0%
	CL601	0.1%	0.0%	0.0%
	GIV	8.1%	0.0%	0.0%
	LEAR35	5.5%	0.0%	0.0%
	MU3001	14.0%	0.0%	0.0%
	FAL20	2.7%	0.0%	0.0%
	A7D	0.1%	0.0%	0.0%
L Total		**60.9%**	**75.0%**	**75.0%**
K	LEAR25	1.0%	0.0%	0.0%
	GIIB	5.5%	0.0%	0.0%
K Total		**6.5%**	**0.0%**	**0.0%**
T	C130	4.9%	25.0%	25.0%
	CNA441	7.6%	0.0%	0.0%
	DHC6	3.2%	0.0%	0.0%
	GASEPF	1.1%	0.0%	0.0%
T Total		**16.9%**	**25.0%**	**25.0%**
P	BEC58P	7.8%	0.0%	0.0%
	GASEPV	7.6%	0.0%	0.0%
P Total		**15.4%**	**0.0%**	**0.0%**
Grand Total		**100.0%**	**100.0%**	**100.0%**

Source: Landrum & Brown, 2005

FRG Current & Future Fleet Mix

Aircraft Category	AC Type	2000	2006	2011
M	737300	0.1%	0.0%	0.0%
	737400	0.1%	0.0%	0.0%
	737700	0.0%	0.0%	0.0%
	727EM2	0.2%	0.0%	0.0%
	737N17	0.1%	0.0%	0.0%
	A320	0.0%	0.0%	0.0%
	DC93LW	0.1%	0.0%	0.0%
	DC95HW	0.2%	0.0%	0.0%
M Total		**0.7%**	**0.0%**	**0.0%**
L	CL600	14.1%	33.9%	35.0%
	GIV	4.1%	5.4%	5.0%
	LEAR35	5.4%	0.0%	0.0%
	MU3001	8.2%	12.5%	13.3%
	FAL20	3.2%	0.0%	0.0%
	CNA500	0.0%	0.0%	0.0%
L Total		**35.1%**	**51.8%**	**53.3%**
K	LEAR25	3.6%	0.0%	0.0%
	GIIB	3.0%	0.0%	0.0%
K Total		**6.6%**	**0.0%**	**0.0%**
T	CNA441	9.2%	16.1%	16.7%
	DHC6	5.7%	0.0%	0.0%
	DHC8	0.0%	0.0%	0.0%
	GASEPF	0.7%	14.3%	13.3%
	HS748A	0.0%	0.0%	0.0%
	SD330	0.4%	0.0%	0.0%
	SF340	0.0%	0.0%	0.0%
T Total		**16.0%**	**30.4%**	**30.0%**
P	BEC58P	23.5%	17.9%	16.7%
	GASEPV	18.1%	0.0%	0.0%
P Total		**41.6%**	**17.9%**	**16.7%**
Grand Total		**100.0%**	**100.0%**	**100.0%**

Source: Landrum & Brown, 2005

HVN Current & Future Fleet Mix

Aircraft Category	AC Type	2000	2006	2011
M	DC93LW	0.1%	0.0%	0.0%
M Total		**0.1%**	0.0%	0.0%
L	CL600	7.2%	16.7%	15.4%
	GIV	0.3%	0.0%	0.0%
	LEAR35	2.8%	0.0%	0.0%
	MU3001	6.7%	4.2%	3.8%
	FAL20	2.0%	0.0%	0.0%
L Total		**19.0%**	**20.8%**	**19.2%**
R	EMB145	0.0%	29.2%	61.5%
R Total		**0.0%**	**29.2%**	**61.5%**
K	LEAR25	0.5%	0.0%	0.0%
	GIIB	0.9%	0.0%	0.0%
K Total		**1.4%**	**0.0%**	**0.0%**
T	CNA441	5.9%	4.2%	3.8%
	DHC6	0.3%	0.0%	0.0%
	DHC8	58.6%	29.2%	0.0%
	GASEPF	0.7%	12.5%	11.5%
T Total		**65.4%**	**45.8%**	**15.4%**
P	BEC58P	6.5%	4.2%	3.8%
	GASEPV	7.7%	0.0%	0.0%
P Total		**14.2%**	**4.2%**	**3.8%**
Grand Total		**100.0%**	**100.0%**	**100.0%**

Source: Landrum & Brown, 2005

ILG Current & Future Fleet Mix

Aircraft Category	AC Type	2000	2006	2011
H	DC870	0.1%	0.0%	0.0%
H Total		**0.1%**	**0.0%**	**0.0%**
M	727EM2	0.1%	0.0%	0.0%
	DC93LW	0.1%	0.0%	0.0%
M Total		**0.2%**	**0.0%**	**0.0%**
L	CL600	25.2%	43.1%	45.2%
	CL601	0.0%	0.0%	0.0%
	GIV	5.0%	4.2%	3.6%
	LEAR35	8.9%	6.9%	6.0%
	MU3001	5.7%	8.3%	7.1%
	FAL20	6.4%	0.0%	0.0%
	IA1125	0.1%	0.0%	0.0%
L Total		**51.4%**	**62.5%**	**61.9%**
K	LEAR25	3.2%	0.0%	0.0%
	GIIB	7.7%	0.0%	0.0%
K Total		**11.0%**	**0.0%**	**0.0%**
T	C130	2.6%	4.2%	3.6%
	CNA441	11.0%	12.5%	15.5%
	DHC6	0.7%	0.0%	0.0%
	DHC8	3.0%	0.0%	0.0%
	GASEPF	2.7%	6.9%	6.0%
	HS748A	0.1%	0.0%	0.0%
	CVR580	0.4%	0.0%	0.0%
	L188	0.1%	0.0%	0.0%
T Total		**20.6%**	**23.6%**	**25.0%**
P	BEC58P	6.8%	11.1%	10.7%
	GASEPV	10.1%	2.8%	2.4%
P Total		**16.8%**	**13.9%**	**13.1%**
Grand Total		**100.0%**	**100.0%**	**100.0%**

Source: Landrum & Brown, 2005

LDJ Current & Future Fleet Mix

Aircraft Category	AC Type	2000	2006	2011
L	CL600	1.5%	0.0%	0.0%
	MU3001	3.1%	0.0%	0.0%
L Total		**4.6%**	**0.0%**	**0.0%**
T	CNA441	11.7%	0.0%	0.0%
	DHC6	1.5%	0.0%	0.0%
	GASEPF	0.7%	100.0%	100.0%
T Total		**14.0%**	**100.0%**	**100.0%**
P	BEC58P	32.2%	0.0%	0.0%
	GASEPV	49.1%	0.0%	0.0%
P Total		**81.4%**	**0.0%**	**0.0%**
Grand Total		**100.0%**	**100.0%**	**100.0%**

Source: Landrum & Brown, 2005

MMU Current & Future Fleet Mix

Aircraft Category	AC Type	2000	2006	2011
M	737N17	0.0%	0.0%	0.0%
M Total		**0.0%**	0.0%	0.0%
L	CL600	30.0%	43.6%	44.4%
	CL601	0.0%	0.0%	0.0%
	GIV	10.1%	9.1%	8.1%
	LEAR35	7.5%	0.0%	0.0%
	MU3001	12.5%	13.6%	12.1%
	FAL20	4.1%	0.0%	0.0%
	IA1125	0.0%	0.0%	0.0%
L Total		**64.1%**	**66.4%**	**64.5%**
K	LEAR25	0.9%	0.0%	0.0%
	GIIB	3.2%	0.0%	0.0%
K Total		**4.1%**	**0.0%**	**0.0%**
T	CNA441	8.5%	12.7%	16.1%
	DHC6	0.4%	0.0%	0.0%
	GASEPF	0.3%	6.4%	5.6%
	HS748A	0.3%	0.0%	0.0%
	SF340	2.8%	0.0%	0.0%
T Total		**12.3%**	**19.1%**	**21.8%**
P	BEC58P	8.6%	14.5%	13.7%
	GASEPV	10.9%	0.0%	0.0%
P Total		**19.4%**	**14.5%**	**13.7%**
Grand Total		**100.0%**	**100.0%**	**100.0%**

Source: Landrum & Brown, 2005

PNE Current & Future Fleet Mix

Aircraft Category	AC Type	2000	2006	2011
L	CL600	13.7%	22.0%	26.7%
	GIV	3.0%	2.4%	2.2%
	LEAR35	8.0%	0.0%	0.0%
	MU3001	11.6%	12.2%	11.1%
	FAL20	2.1%	0.0%	0.0%
L Total		**38.5%**	**36.6%**	**40.0%**
K	LEAR25	1.6%	0.0%	0.0%
	GIIB	0.5%	0.0%	0.0%
K Total		**2.1%**	**0.0%**	**0.0%**
T	CNA441	17.6%	22.0%	22.2%
	DHC6	0.8%	0.0%	0.0%
	GASEPF	0.4%	12.2%	11.1%
	HS748A	0.3%	0.0%	0.0%
T Total		**19.1%**	**34.1%**	**33.3%**
P	BEC58P	21.2%	29.3%	26.7%
	GASEPV	19.0%	0.0%	0.0%
P Total		**40.2%**	**29.3%**	**26.7%**
Grand Total		**100.0%**	**100.0%**	**100.0%**

Source: Landrum & Brown, 2005

SWF Current & Future Fleet Mix

Aircraft Category	AC Type	2000	2006	2011
H	74720B	0.7%	0.0%	0.0%
	DC870	4.0%	5.4%	4.0%
	KC135	0.0%	2.7%	2.7%
	707QN	0.4%	0.0%	0.0%
H Total		**5.1%**	**8.1%**	**6.7%**
M	737700	0.0%	0.0%	17.4%
	727EM2	2.6%	1.8%	1.3%
	757PW	0.9%	14.4%	14.1%
	DC93LW	0.1%	0.0%	0.0%
	DC95HW	4.3%	2.7%	2.0%
	F10065	12.1%	3.6%	0.0%
	MD9025	0.0%	7.2%	8.1%
M Total		**20.0%**	**29.7%**	**43.0%**
L	CL600	1.1%	7.2%	8.1%
	CL601	42.6%	32.4%	26.8%
	GIV	1.5%	2.7%	2.0%
	LEAR35	0.0%	0.0%	0.0%
	MU3001	1.1%	4.5%	3.4%
	FAL20	0.0%	0.0%	0.0%
L Total		**46.4%**	**46.8%**	**40.3%**
K	LEAR25	0.1%	0.0%	0.0%
	GIIB	0.0%	0.0%	0.0%
K Total		**0.1%**	**0.0%**	**0.0%**
T	C130	0.2%	0.0%	0.0%
	CNA441	0.2%	5.4%	5.4%
	DHC6	9.3%	0.0%	0.0%
	DHC8	8.2%	0.0%	0.0%
	GASEPF	0.0%	2.7%	2.0%
	SF340	7.8%	3.6%	0.0%
T Total		**25.7%**	**11.7%**	**7.4%**
P	BEC58P	2.0%	3.6%	2.7%
	GASEPV	0.8%	0.0%	0.0%
P Total		**2.8%**	**3.6%**	**2.7%**
Grand Total		**100.0%**	**100.0%**	**100.0%**

Source: Landrum & Brown, 2005

TTN Current & Future Fleet Mix

Aircraft Category	AC Type	2000	2006	2011
M	727EM2	0.2%	0.0%	0.0%
	BAC111	0.0%	0.0%	0.0%
M Total		**0.2%**	**0.0%**	**0.0%**
L	CL600	12.2%	22.8%	25.8%
	CL601	0.3%	0.0%	0.0%
	GIV	8.1%	7.0%	6.1%
	LEAR35	2.4%	0.0%	0.0%
	MU3001	9.3%	14.0%	12.1%
	FAL20	2.9%	0.0%	0.0%
L Total		**35.3%**	**43.9%**	**43.9%**
R	EMB145	0.0%	0.0%	24.2%
R Total		**0.0%**	**0.0%**	**24.2%**
K	LEAR25	1.4%	0.0%	0.0%
	GIIB	3.4%	0.0%	0.0%
K Total		**4.7%**	**0.0%**	**0.0%**
T	CNA441	7.9%	17.5%	16.7%
	DHC6	0.5%	0.0%	0.0%
	DHC8	36.8%	21.1%	0.0%
	GASEPF	0.7%	12.3%	10.6%
	HS748A	0.0%	0.0%	0.0%
	SD330	0.0%	1.8%	1.5%
T Total		**45.9%**	**52.6%**	**28.8%**
P	BEC58P	5.1%	3.5%	3.0%
	GASEPV	8.7%	0.0%	0.0%
P Total		**13.8%**	**3.5%**	**3.0%**
Grand Total		**100.0%**	**100.0%**	**100.0%**

Source: Landrum & Brown, 2005

B.2

A Comparative Analysis of the NY/NJ/PHL Forecast and 2005 Actual Traffic

MP 06W0000086

MITRE PRODUCT

A Comparative Analysis of the NY/NJ/PHL Forecast and 2005 Actual Traffic

April 2006

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Center for Advanced Aviation System Development
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Abstract

The air traffic demand used for the New York/New Jersey/ Philadelphia (NY/NJ/PHL) Metropolitan Area Airspace Redesign operational analysis is a forecast of air traffic in 2006 and 2011 extrapolated from observed operations in 2000. Since that year, unanticipated changes in airline schedules and fleet mix have occurred as the airline industry struggles to maintain profitability in a chaotic economy. Due to the potential changes in the NY/NJ/PHL schedule and fleet mix from 2000, it is necessary to investigate the implications of these changes on the forecast traffic and the associated impact these changes may have on the conclusions of the operational analysis. This paper describes a comparative analysis of the forecast traffic based on 2000 traffic data with more recent traffic (either current traffic or a more recent forecast). Based on the analysis, the forecasts used in the NJ/NY/PHL Metropolitan Area Airspace Redesign are accurate in that any differences found with the more recent traffic data would not change the conclusions of the operational analysis.

Keywords: Airspace, Airspace Redesign, Fleet Mix, Forecast, Traffic

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1 Introduction

Background

The air traffic demand used for the New York/New Jersey/ Philadelphia (NY/NJ/PHL) Metropolitan Area Airspace Redesign operational analysis[1] is a forecast of air traffic in 2006 and 2011 extrapolated from observed operations in 2000. Since 2000, unanticipated changes in airline schedules and fleet mix have occurred. These changes could affect the composition of the traffic in terms of traffic levels, schedule, and fleet mix and potentially impact the results of the operational analysis.

The ongoing restructuring in the airline industry has led to changes in schedule and fleet mix used on many routes. In some cases, airline schedules have changed to allow for a more constant flow of traffic throughout the day rather than a clustering of flights during certain times of the day. The need to reduce operating costs has resulted in the retirement of older, less efficient aircraft. Customer demand for increased frequency of service, combined with the retirement of older aircraft, has led to the replacement of many large narrowbody and widebody jets with regional jets (RJs).

Due to the potential changes in the NY/NJ/PHL schedule and fleet mix from 2000, it is necessary to investigate the implications of these changes on the forecast traffic and the associated impact these changes may have on the conclusions of the operational analysis. This paper describes a comparative analysis of the forecast traffic based on 2000 traffic data with more recent traffic (either current traffic or a more recent forecast) for the eight airports included in the NY/NJ/PHL Metropolitan Area Airspace Redesign: Newark Liberty International (EWR), John F. Kennedy International (JFK), LaGuardia (LGA), Philadelphia International (PHL), Teterboro (TEB), Westchester County (HPN), Long Island MacArthur (ISP), and Morristown Municipal (MMU). It includes a comparison of:

- The 2006 annual average day (AAD) forecast and an observed AAD in 2005,
- The 2006 90^{th} percentile day forecast and the observed 90^{th} percentile day in 2005, and
- The PHL 2011 AAD forecast and the 2012 AAD forecast used for the Capacity Enhancement Plan (CEP)

The analysis compares the following metrics:

- Traffic counts by each of the eight airports included in the NY/NJ/PHL Metropolitan Area Airspace Redesign
- Hourly arrivals and departures

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[1] Boan, et al., 2005, *NY/NJ/PHL Metropolitan Area Airspace Redesign*, MP050000090.

- Origin-Destination (O-D) distribution for each of the eight airports
- Fleet mix

A previous analysis[2] investigated the distribution of RJs and jumbo jets in the 2006 and 2011 forecast traffic, comparing them to 2004 Official Airline Guide (OAG) data. This study updates and augments the previous study by using more recent actual data, including a more in-depth analysis of the fleet mix, and covering more metrics including traffic counts, hourly throughput, O-D data, and overflights.

Approach

The approach used to compare the forecast traffic with current air traffic includes the following steps:

1. Identify the annual average and 90th percentile days for each airport in 2005 to be compared to the AAD and 90th percentile forecast traffic, respectively. The Operational Network (OPSNET) Instrument Operations data for each airport for 2005 was used for this purpose.
2. Obtain Enhanced Traffic Management System (ETMS) flight data for the AAD and 90th percentile days identified for each of the eight airports.
3. Analyze and compare the ETMS data to the equivalent forecast traffic in terms of the traffic counts, hourly arrivals and departures, origin-destination, and fleet mix.

Initially, it was assumed that the dates for the AAD and 90th percentile days for 2005 would be the same for the eight airports. Upon further analysis of the data, this was not the case. What appeared to be the AAD and the 90th percentile day for the sum of the flight counts for the eight airports did not show the same relationship on an airport-by-airport basis. In other words, there were cases where what was selected as the AAD and 90th percentile days for 2005 for the eight airports combined, resulted in the AAD for a specific airport having higher counts than the 90th percentile day for that same airport. Though this situation was unexpected, it did not affect nor detract from the results of this analysis.

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[2] Ibid., Appendix B: Traffic Sensitivity Analysis.

2 Results

Observed Annual Average Day 2005 vs. Forecast

Traffic Counts Comparison

The annual average day traffic count comparison for each airport is provided in Figure 1.

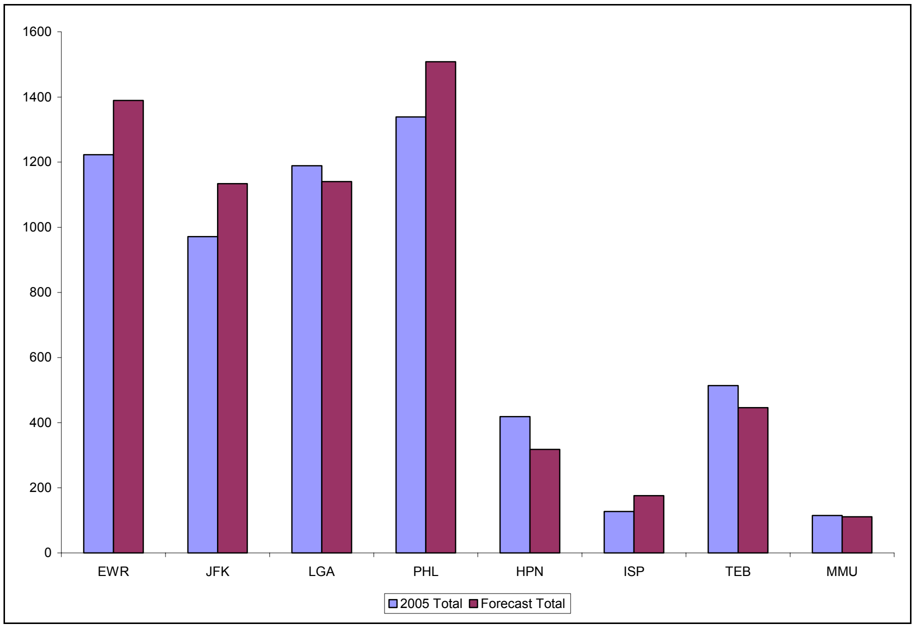


Figure 1. Observed 2005 vs. Forecast Annual Average Day Total Traffic Counts by Airport

The forecast traffic counts are higher than the actual 2005 traffic for EWR (+14%), JFK (+17%), PHL (+13%), and ISP (+39%); while they are lower for LGA (-4%), HPN (-24%), and TEB (-13%). The MMU forecast traffic counts are about the same as the actual 2005 traffic counts. Overall, the forecast has approximately 6% more flights than the 2005 traffic.

Hourly Throughput Comparison

A comparison of the hourly arrival and departure throughput for each airport is found in Figures 2 through 19.

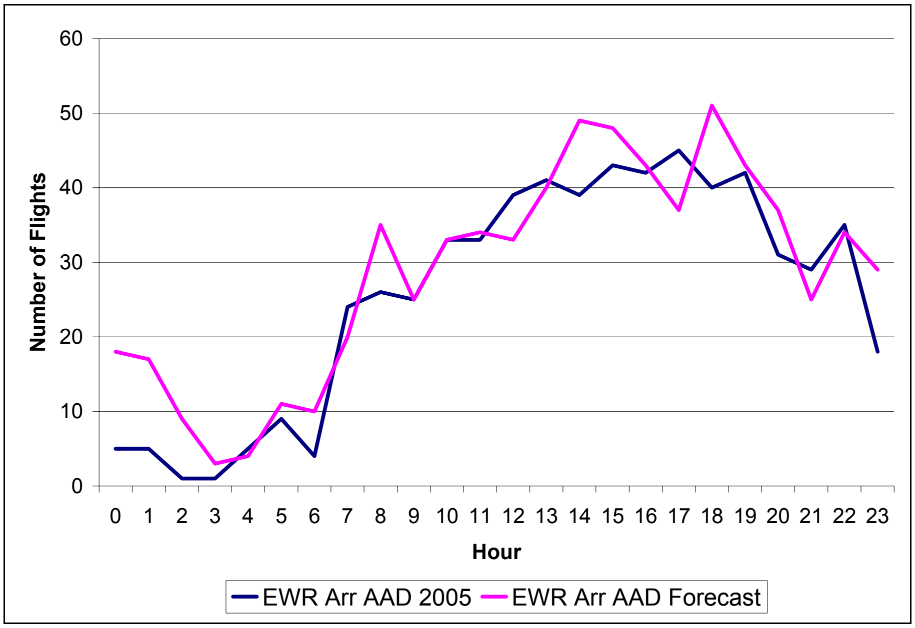


Figure 2. EWR AAD Arrivals by Hour

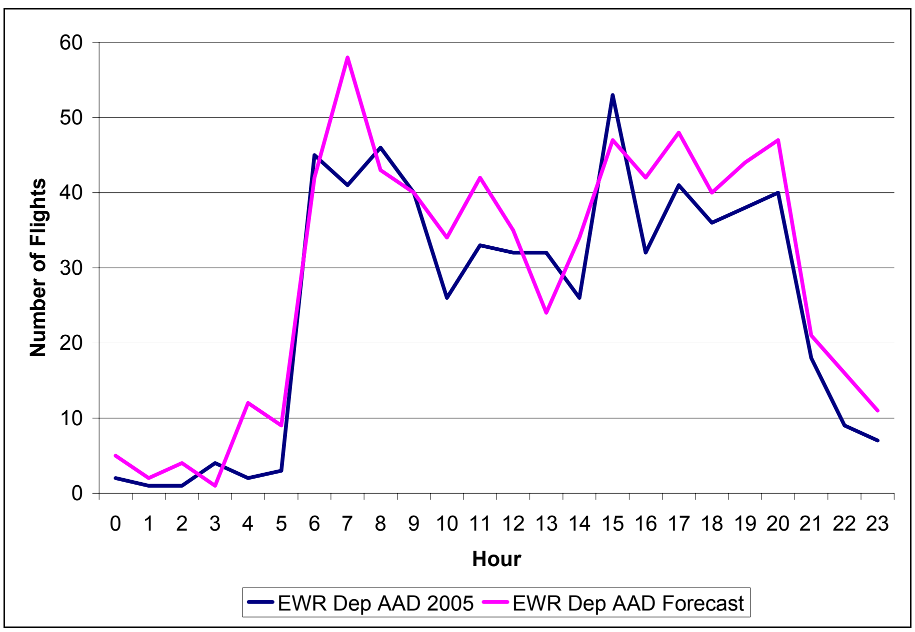


Figure 3. EWR AAD Departures by Hour

The EWR throughput curves show similar hourly trends with the differences between the 2005 traffic and the forecast being due to the previously discussed difference in the traffic counts.

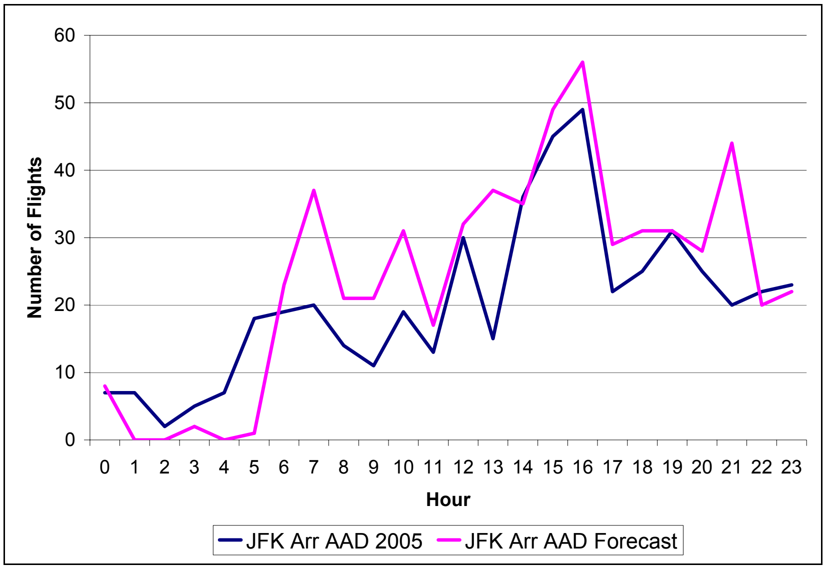


Figure 4. JFK AAD Arrivals by Hour

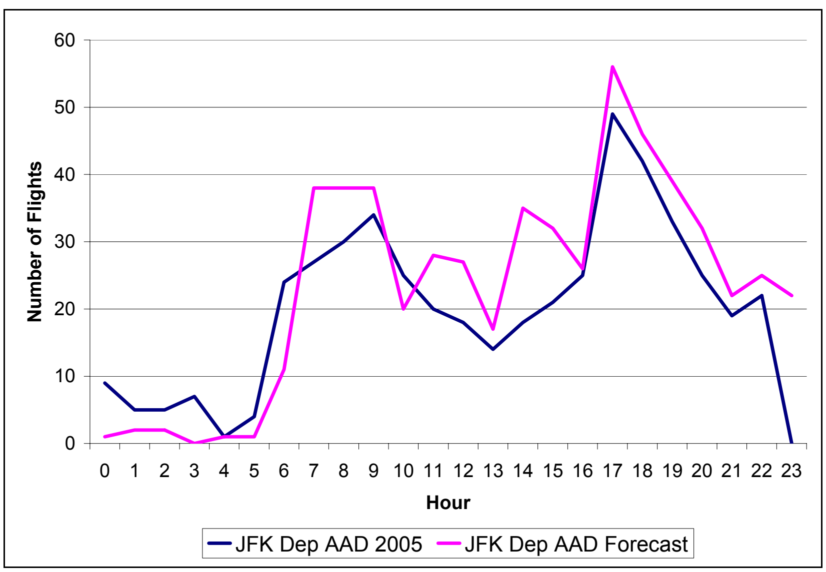


Figure 5. JFK AAD Departures by Hour

The JFK throughput curves show similar hourly trends with the differences between the 2005 traffic and the forecast being due to the previously discussed difference in the traffic counts.

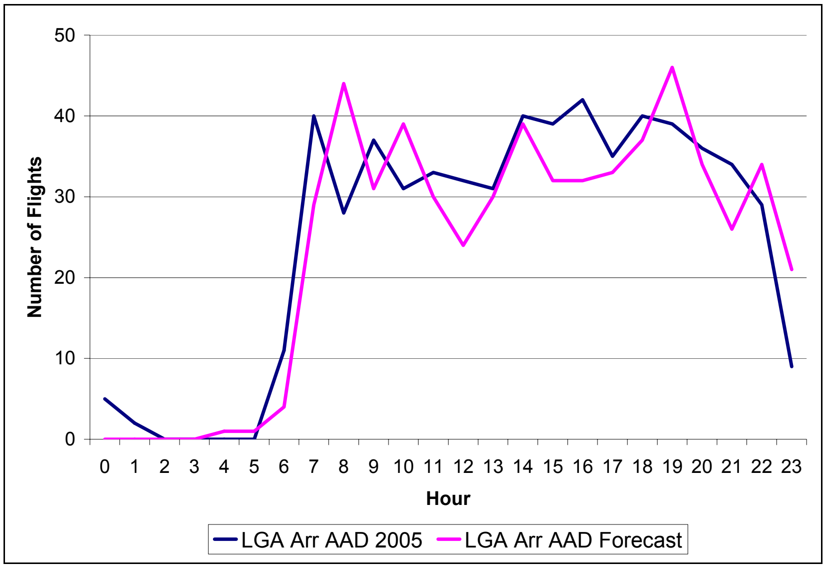


Figure 6. LGA AAD Arrivals by Hour

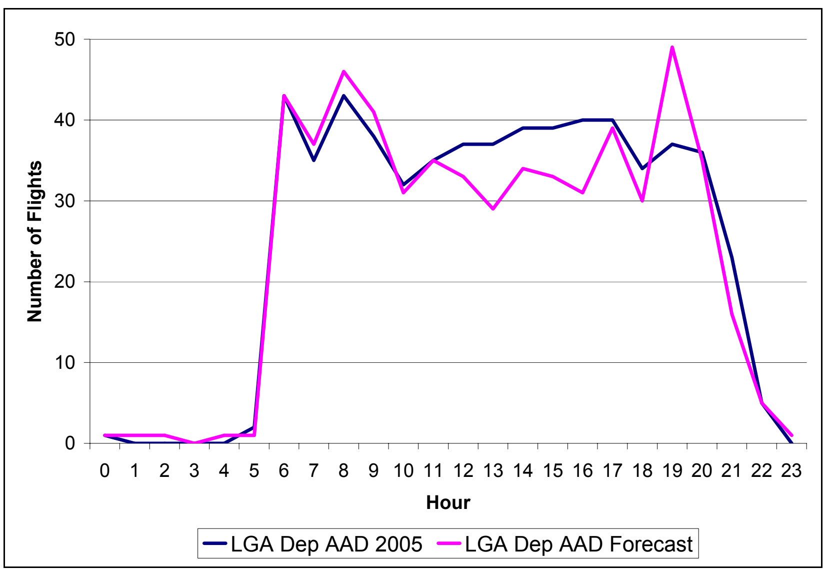


Figure 7. LGA AAD Departures by Hours

The LGA throughput curves show similar hourly trends with some differences seen in the arrival and departure peaks at the end of the day for the forecast traffic.

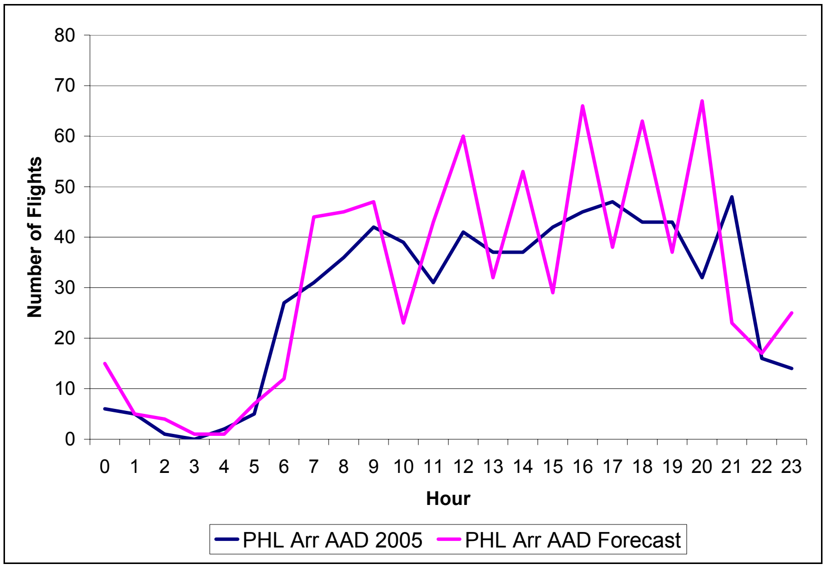


Figure 8. PHL AAD Arrivals by Hour

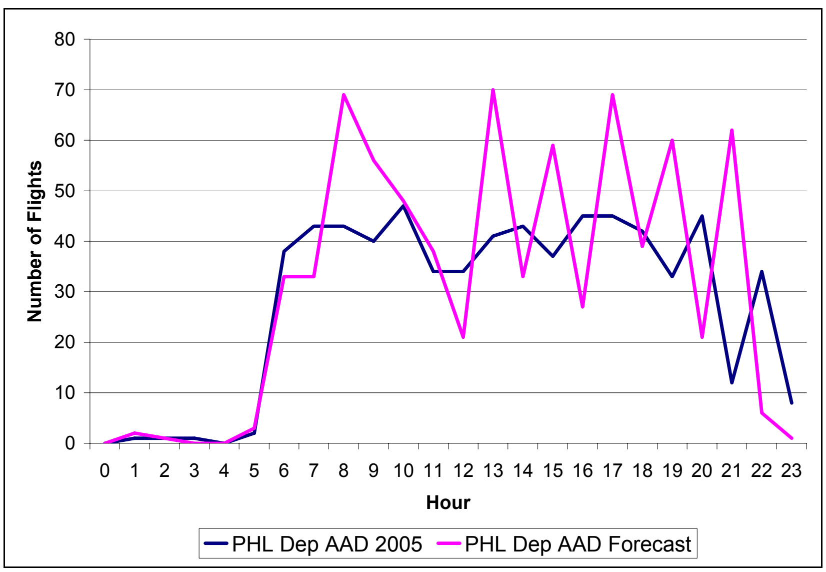


Figure 9. PHL AAD Departures by Hour

The PHL throughput curves show a change in the throughput trend from the time that the forecast was created in 2000 to the present time. The forecast shows high peaks, while the 2005 traffic shows a change to a smoother schedule with fewer peaks. An analysis of the OAG, which contains scheduled commercial flights, indicates that in 2005 the schedule was smoother for most of the year, but returned to the trend of high peaks. This trend in the OAG is shown in Figures 10 and 11. Since the PHL 2005 AAD is in May, this data reflects the smoother schedule.

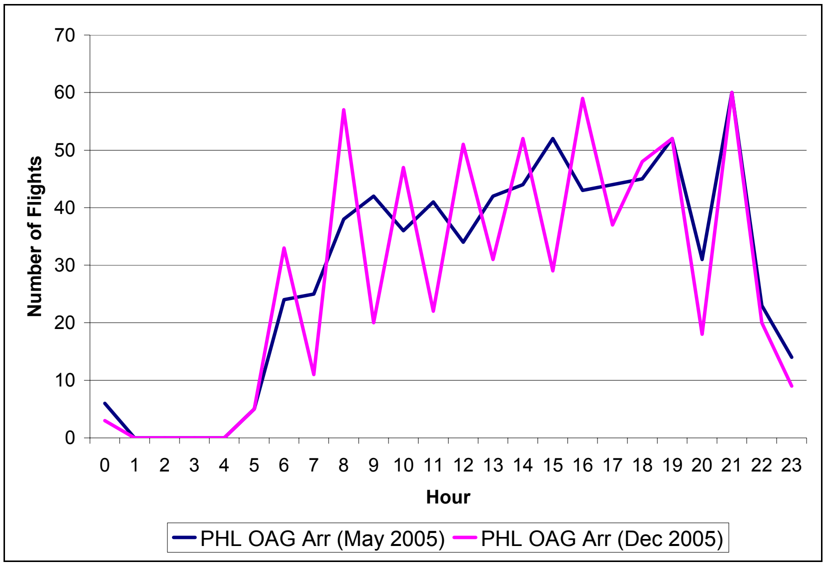


Figure 10. PHL OAG Arrival Data

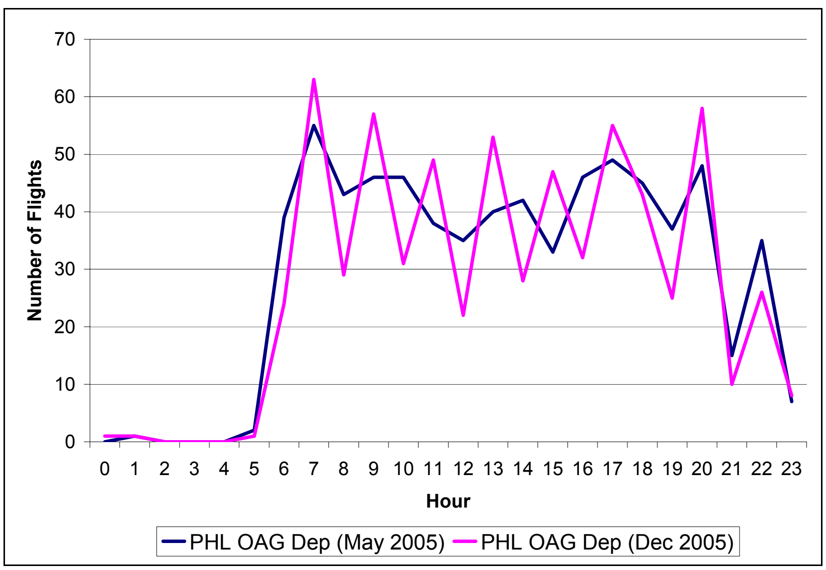


Figure 11. PHL OAG Departure Data

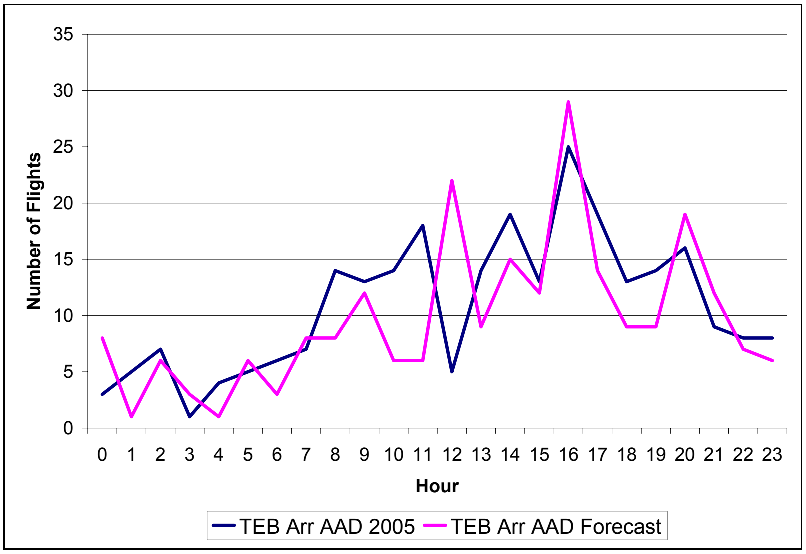


Figure 12. TEB AAD Arrivals by Hour

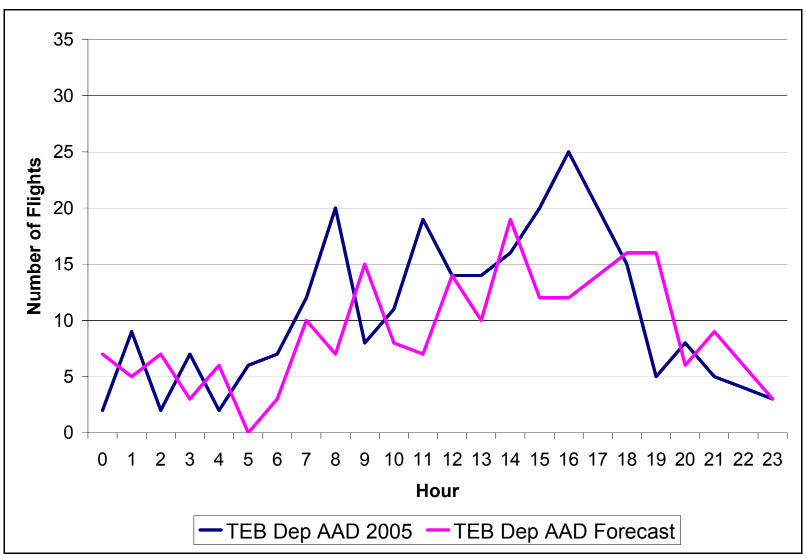


Figure 13. TEB AAD Departures by Hour

The TEB throughput curves show some variation in peak times and traffic counts between the 2005 traffic and the forecast. The main difference for arrivals occurs between the hours of 10 and 13, while the departures show more variation throughout the day.

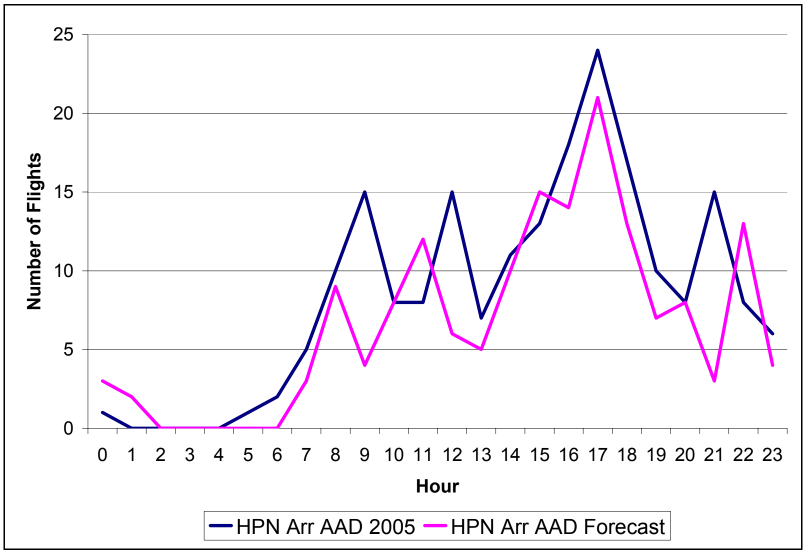


Figure 14. HPN AAD Arrivals by Hour

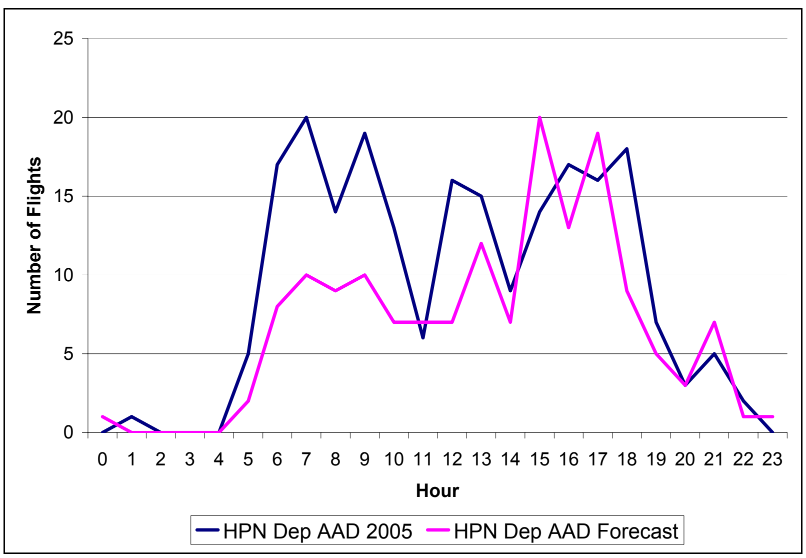


Figure 15. HPN AAD Departures by Hour

The HPN throughput curves show similar hourly trends with the differences between the 2005 traffic and the forecast being due to the difference in the total traffic counts. The shortfall in the forecast is particularly obvious for departures in the morning hours.

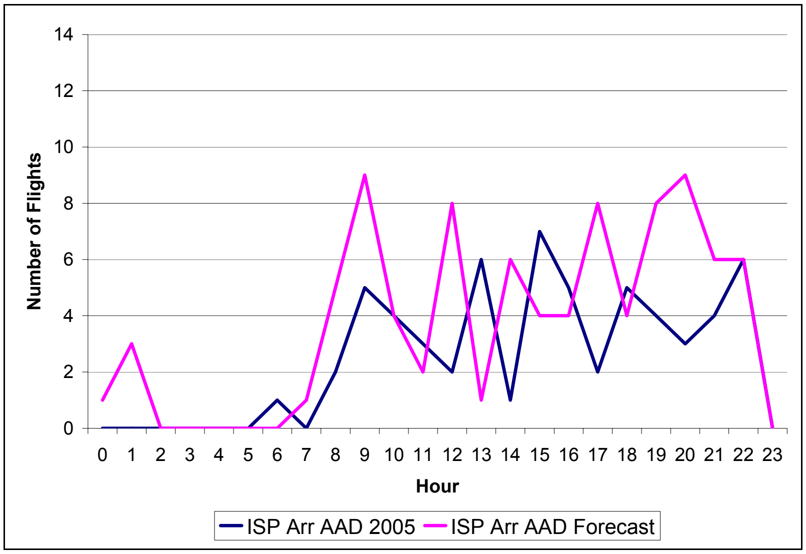


Figure 16. ISP AAD Arrivals by Hour

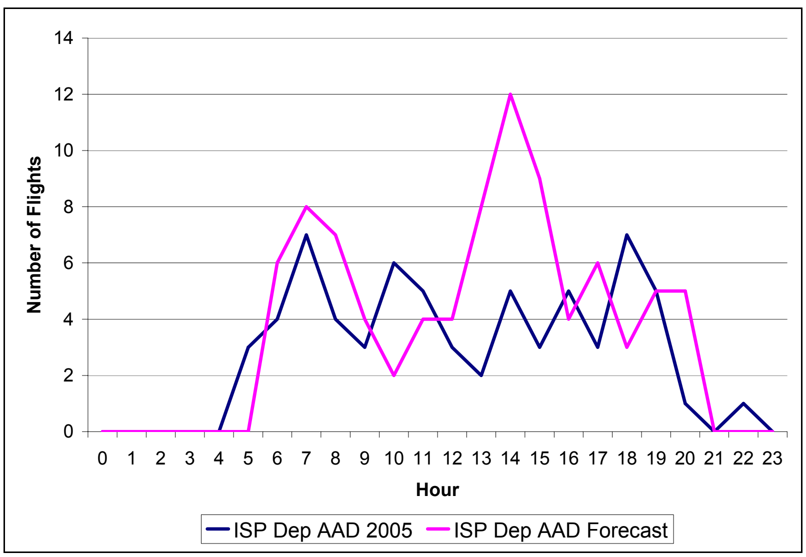


Figure 17. ISP AAD Departures by Hour

The ISP arrival curves show hour-by-hour differences in peak times. The ISP departure curves show similar trends with the difference between the 2005 traffic and the forecast being due to the difference in the traffic counts and some variation in peak times. The forecast departures show the peak at hour 14, which is not seen in the 2005 traffic, though the difference at this peak is 7 flights.

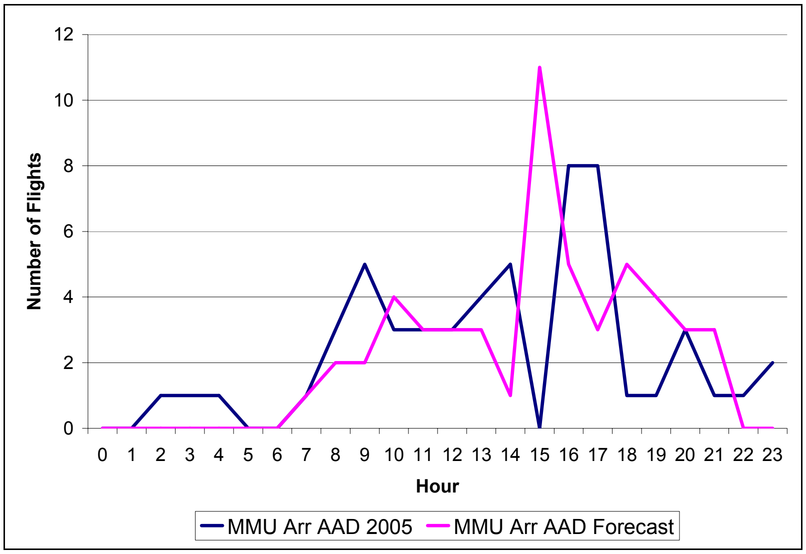


Figure 18. MMU AAD Arrivals by Hour

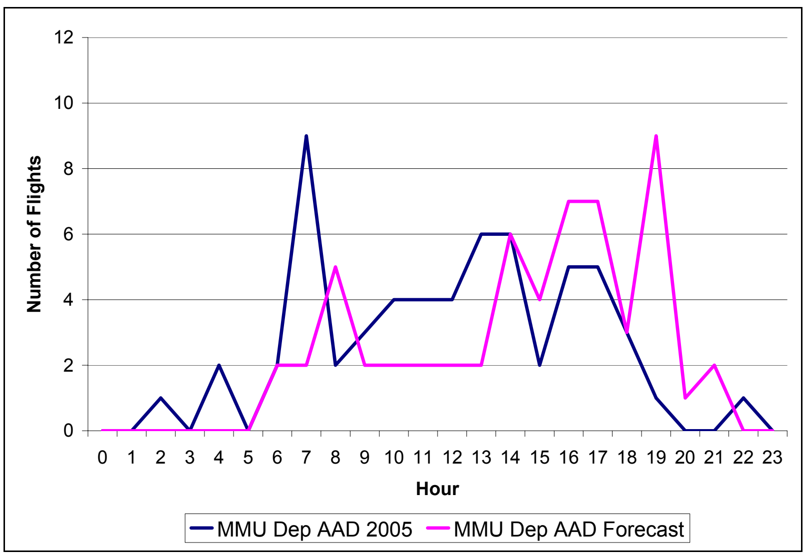


Figure 19. MMU AAD Departures by Hour

The MMU throughput curves show variation in hourly trends with differences in peak times between the 2005 and forecast traffic. The MMU forecast shows peak departures in hour 19, while the 2005 traffic experiences peak departures in hour 7, both with a peak of 9 departures.

Origin-Destination Comparison

The forecast traffic and the 2005 actual traffic were also compared in terms of the number of flights departing to or coming from other airports. The differences between the two traffic files were calculated for each O-D pair as the forecast O-D pair number of flights minus the 2005 actual O-D pair number of flights. For example, if the NY forecast traffic has 38 departures to Miami while the NY 2005 actual traffic has 34 departures to Miami, then the difference would be four flights. Overall, a majority of the differences are in the -3 to +3 range.

Operational Evolution Plan (OEP) Major Airports to/from NY

A comparison of the O-D pairs of some of the major OEP airports arriving at the NY airports is found in Figure 20. The map shows the difference of the forecast number of flights minus the 2005 number of flights. The highest differences are:

- BOS-NY (50 more flights in the forecast traffic than in 2005),
- DCA-NY (35 more flights in the forecast traffic than in 2005),
- ORD-NY (25 more flights in the forecast traffic than in 2005),
- PIT-NY, SFO-NY (18 more flight in the forecast traffic than in 2005 for each),
- MEM-NY (16 more flights in the forecast traffic than in 2005).

Figure 20. O-D, OEP Major Airport AAD Arrivals to NY (Forecast Traffic Minus 2005 Traffic)

A comparison of the O-D pairs of the non-OEP 35 airports arriving at the NY airports is found in Figure 21. The map shows the difference of the forecast number of flights minus the 2005 number of flights. A majority of the differences are in the -3 to +3 range. The highest differences are:

- ROC-NY (20 more flights in the forecast traffic than in 2005),
- PVD-NY (18 more flights in the forecast traffic than in 2005),
- RDU-NY (18 fewer flights in the forecast traffic than in 2005),
- SYR-NY (17 more flights in the forecast traffic than in 2005).

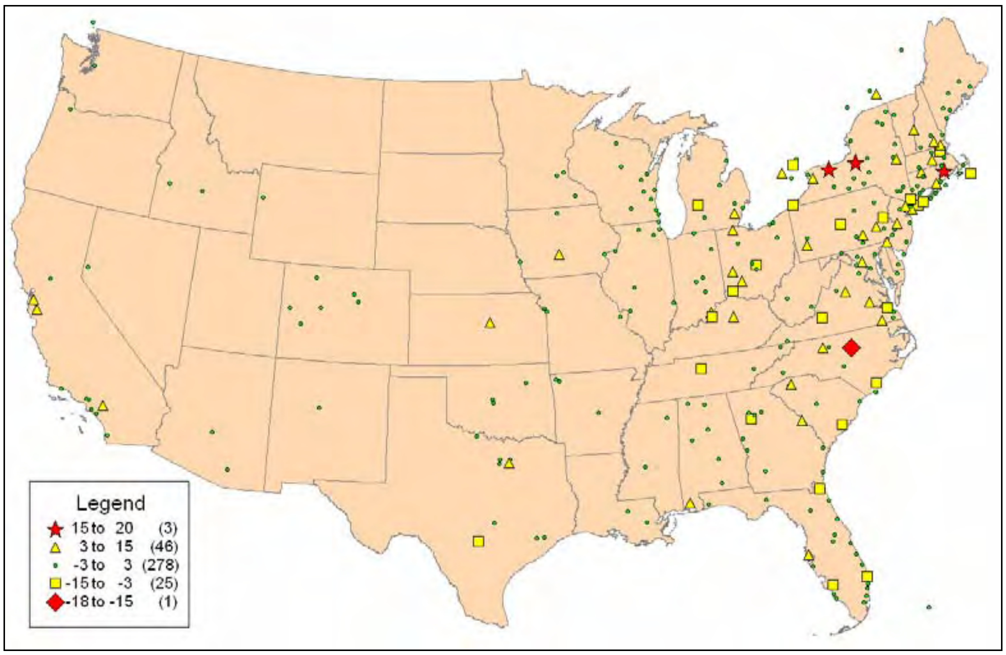


Figure 21. O-D, AAD Arrivals to NY (Non-OEP 35)
(Forecast Traffic Minus 2005 Traffic)

A comparison of the O-D pairs of some of the major OEP airports departing from the NY airports is found in Figure 22. The map shows the difference of the forecast number of flights minus the 2005 number of flights. The highest differences are:

- NY-BOS (56 more flights in the forecast traffic than in 2005),
- NY-DCA (40 more flights in the forecast traffic than in 2005),
- NY-IAD (25 more flights in the forecast traffic than in 2005),
- NY-ORD (20 more flight in the forecast traffic than in 2005 for each),

- NY-SFO (17 more flights in the forecast traffic than in 2005),
- NY-PIT (16 more flights in the forecast traffic than in 2005).

Figure 22. O-D, OEP Major Airport AAD Departures from NY (Forecast Traffic Minus 2005 Traffic)

A comparison of the O-D pairs of the non-OEP 35 airports departing from the NY airports is found in Figure 23. The map shows the difference of the forecast number of flights minus the 2005 number of flights. A majority of the differences are in the -3 to +3 range. The highest differences are:

- NY-PBI (18 fewer flights in the forecast traffic than in 2005),
- NY-PVD, ROC (16 more flights in the forecast traffic than in 2005),
- NY-CYYZ (16 fewer flights in the forecast traffic than in 2005).

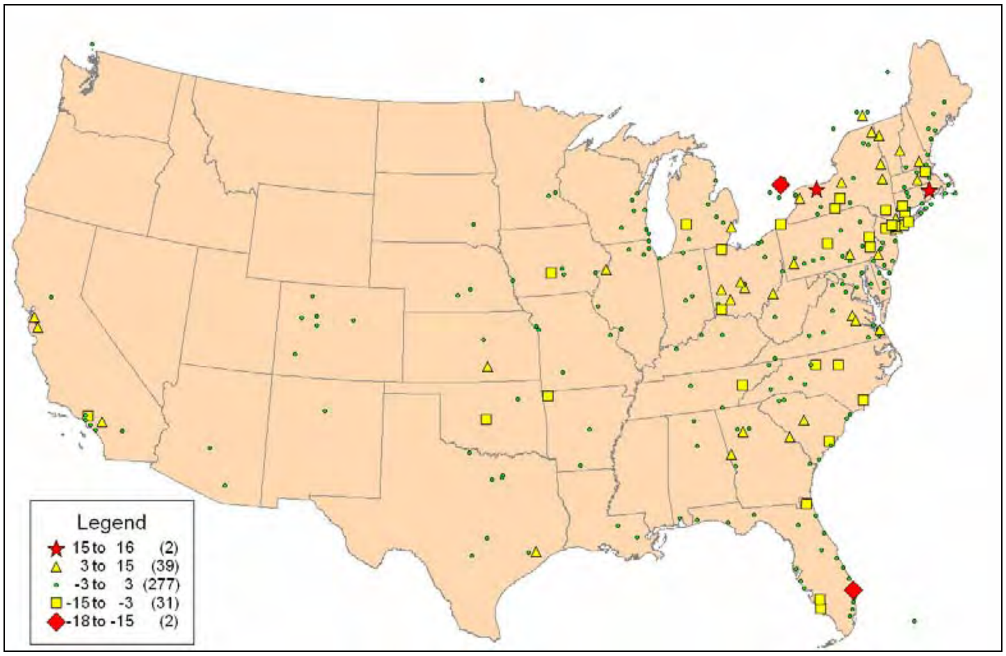


Figure 23. O-D, AAD Departures from NY (Non-OEP 35)
(Forecast Traffic Minus 2005 Traffic)

A comparison of the 2005 fleet mix and the forecast fleet mix for each airport is shown in Figures 24 through 31)

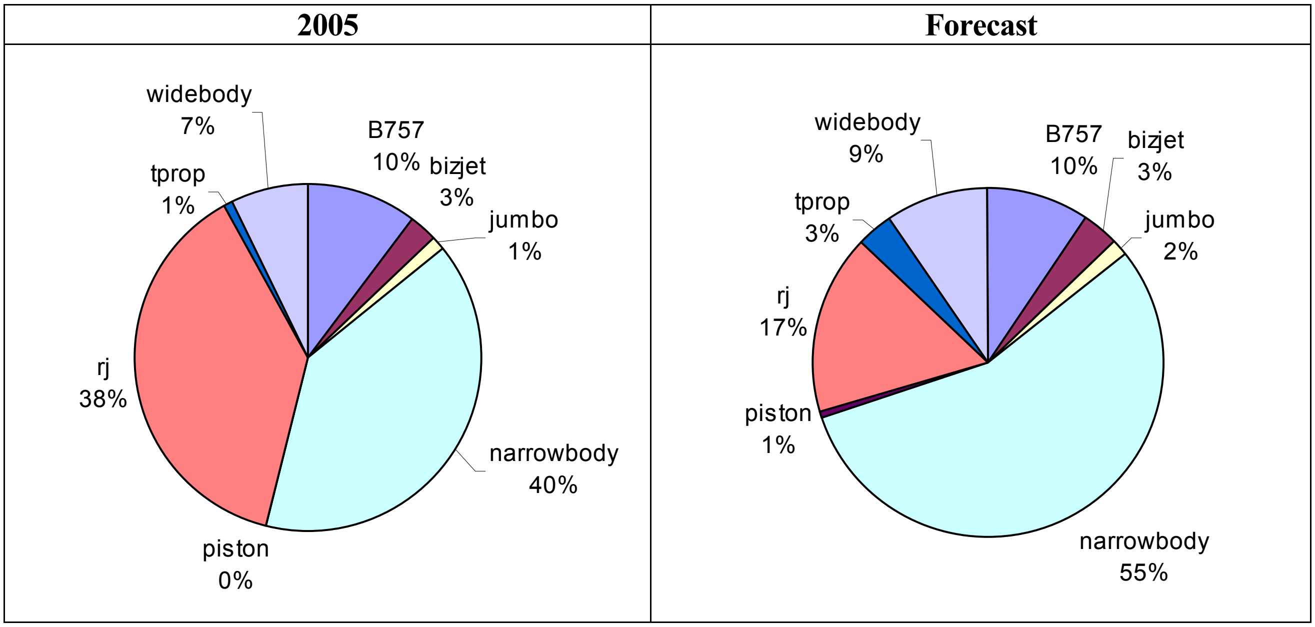
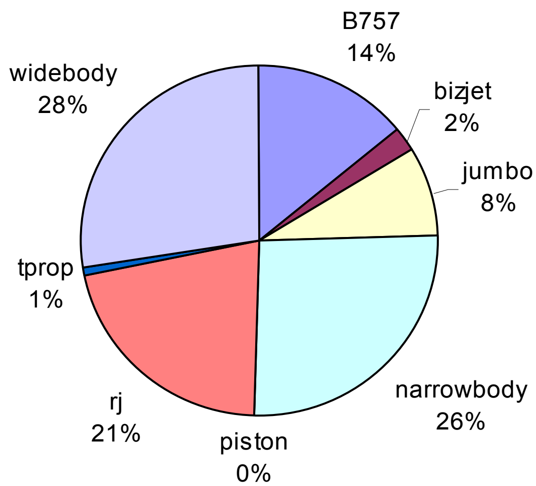


Figure 24. EWR AAD Fleet Mix Distribution

For EWR, the most noticeable difference is the significant increase in the use of RJs and the associated decrease in narrowbody jets, along with a slight decrease in turboprops, widebody and jumbo jets in the 2005 data over what was predicted for the forecast traffic. This increase in the use of RJs was also documented in Appendix B of *The NY/NJ/PHL Metropolitan Area Airspace Redesign* operational analysis.[3] The results of this analysis indicated that the relative ranking of the NY operational alternatives was not affected by the increased use of RJs.

[3] Ibid.

2005



Forecast

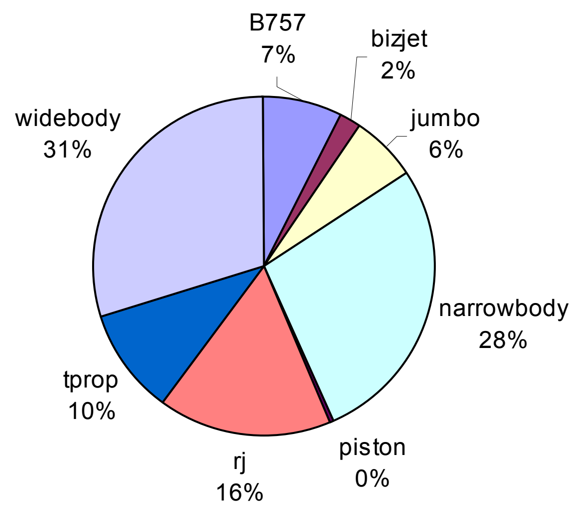
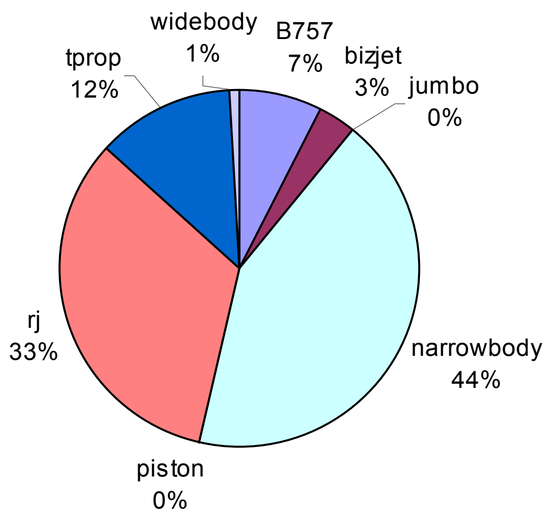


Figure 25. JFK AAD Fleet Mix Distribution

The JFK fleet mix shows a similar, though less significant increase in the use of RJs in the 2005 traffic over the forecast traffic. The JFK fleet mix has significantly fewer turboprops than was forecast. There were twice as many B757s in 2005 than was forecast.

2005



Forecast

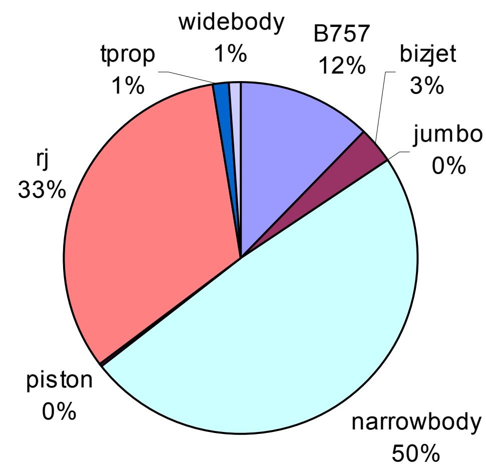


Figure 26. LGA AAD Fleet Mix Distribution

For LGA, the distribution of turboprops in 2005 was much higher than was forecast, while there were fewer B757s and narrowbody jets than was forecast. Unlike EWR and JFK, the distribution of RJs in 2005 is the same as was forecast.

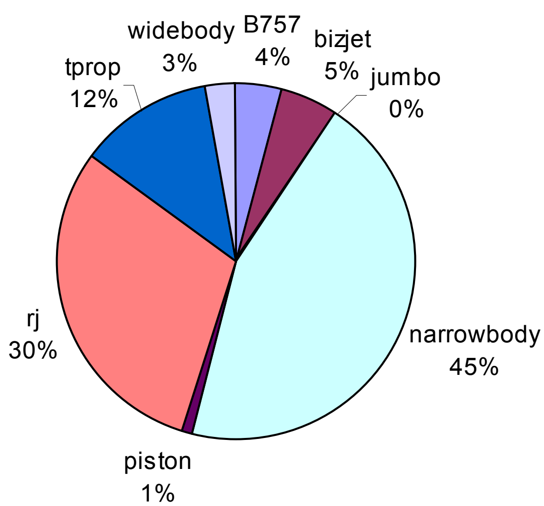
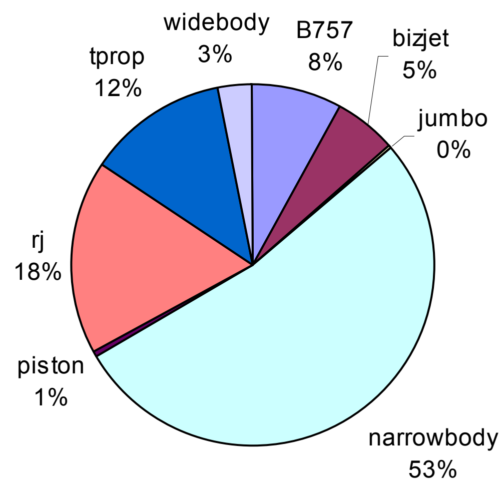
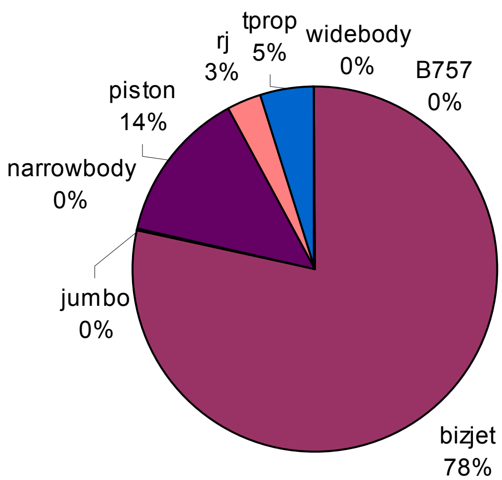
2005	Forecast
	

Figure 27. PHL AAD Fleet Mix Distribution

PHL had a significantly higher percentage of RJs than was forecast, along with a lower percentage of narrowbody jets and B757s.

2005



Forecast

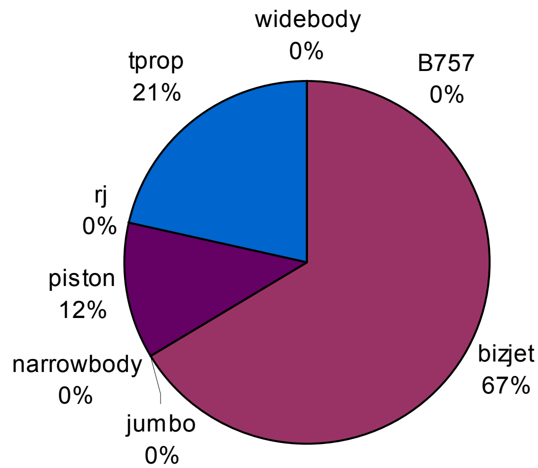


Figure 28. TEB AAD Fleet Mix Distribution

The 2005 fleet mix at TEB shows a higher percentage of business jets (bizjets), along with a much lower percentage of turboprops than was forecast. There was also a small percentage of RJs in 2005 that were not forecast.

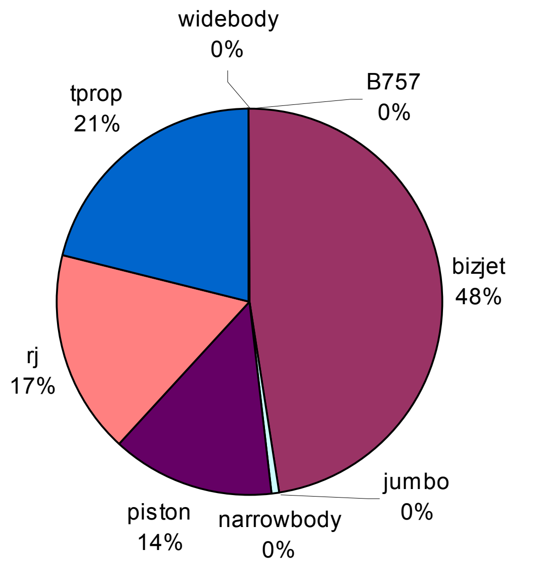
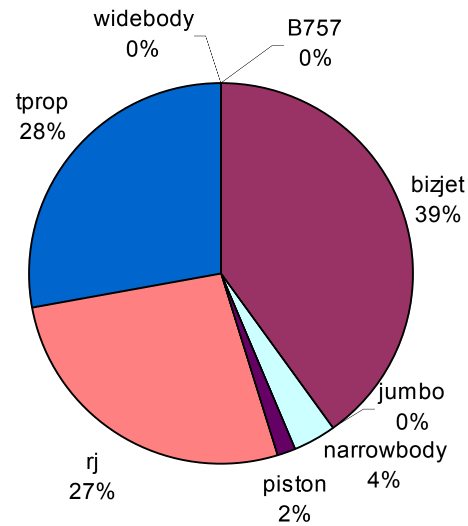
2005	Forecast
	

Figure 29. HPN AAD Fleet Mix Distribution

The HPN 2005 traffic has a higher percentage of bizjets and pistons and a lower percentage of RJs and turboprops than the forecast traffic.

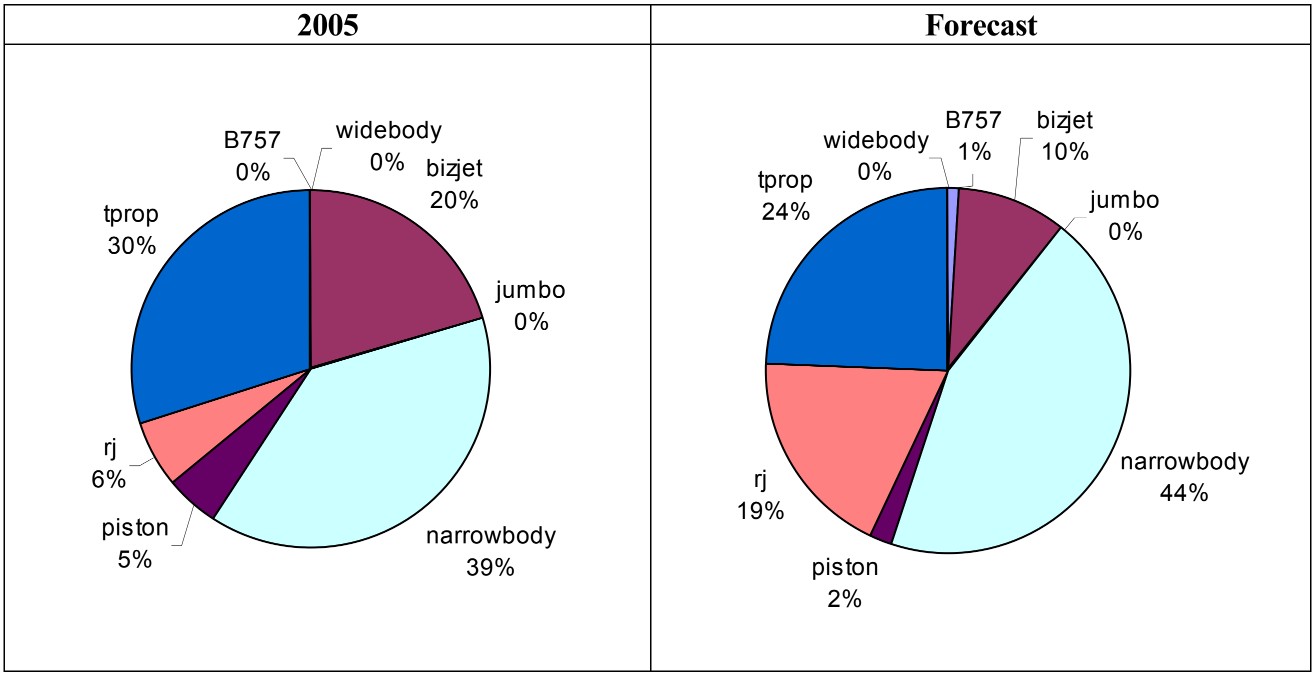


Figure 30. ISP AAD Fleet Mix Distribution

ISP shows a different trend for the 2005 traffic compared to the forecast in that the forecast includes a much higher percentage of RJs than the 2005 traffic. The 2005 traffic also has a higher percentage of turboprops and bizjets, along with a smaller percentage of narrowbody jets than the forecast.

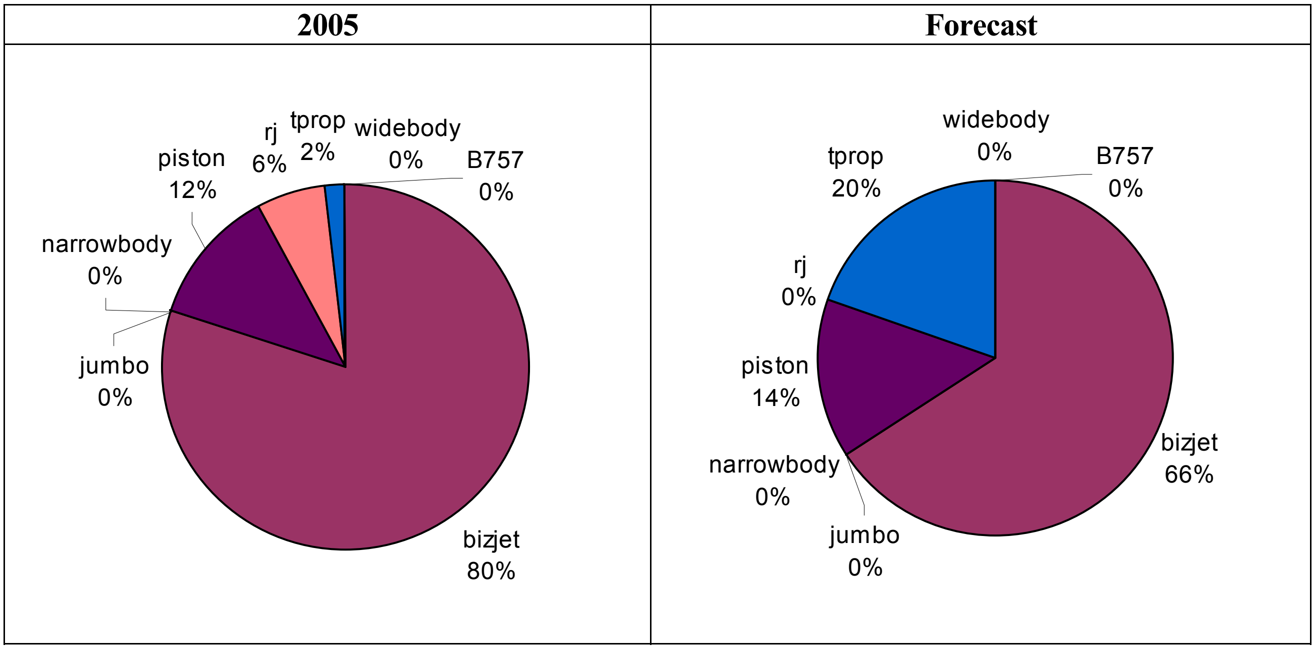


Figure 31. MMU AAD Fleet Mix Distribution

MMU shows a much higher percentage of bizjets, along with a much lower percentage of turboprops in 2005 than was forecast. The 2005 traffic includes RJs (6%) while the forecast does not.

As expected based on the 2004 fleet mix distribution study, the 2005 traffic has a significantly larger proportion of regional jets, and a corresponding lower percentage of narrowbody jets than the forecast traffic. The 2005 traffic has a slightly higher proportion of business jets with a corresponding lower percentage of widebody jets and turboprops than the forecast traffic.

Overflights

Overflights to the New York Center (ZNY) comprise approximately 30% of the flights in the center. Figure 32 shows the jet airways in ZNY used by these overflights.

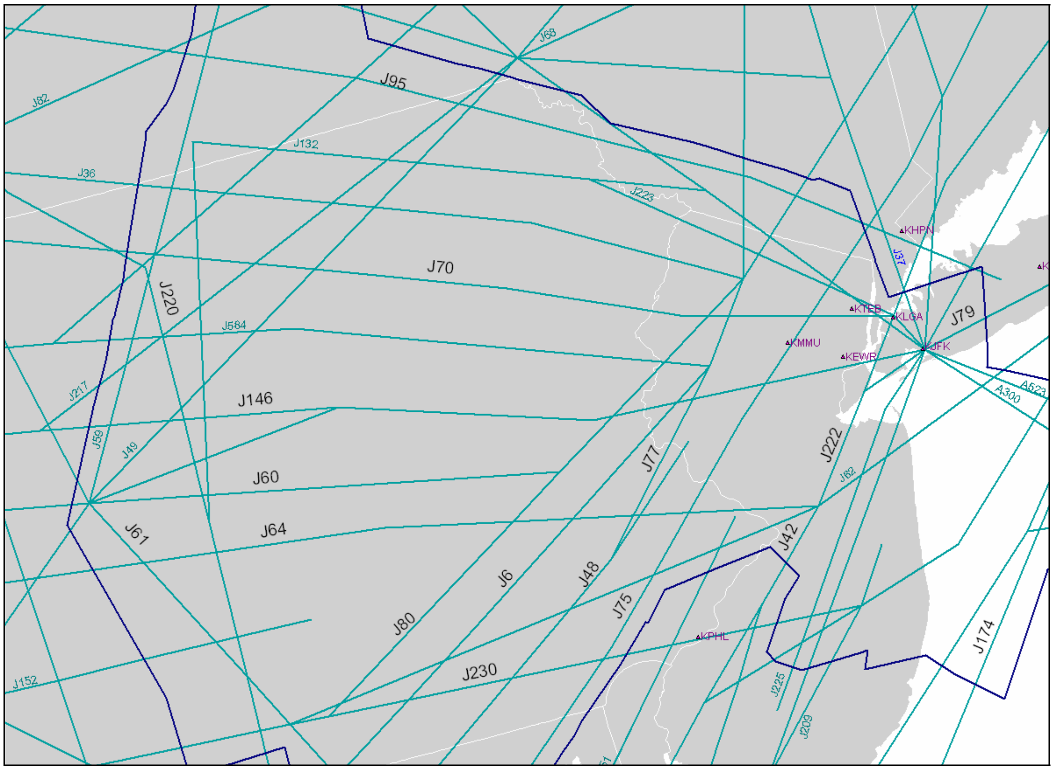


Figure 32. ZNY Jet Airways

Demand for jet airways is harder to forecast than demand for airports. Winds, weather, and congestion frequently cause airspace users to change their preferred route of flight. The operational analysis was conducted under the simplifying assumption that all flights between a given pair of airports flew the same route, after which route demand was balanced by moving flows as a block. This comparison is therefore testing both the forecast and the modeling assumption.

Figure 33 shows a visual comparison between the forecast overflight demand and the actual radar tracks flown on the AAD in 2005. The forecast tracks are dotted lines. Where the line appears solid is an indication that it is a high-demand airway on which many aircraft are superimposed. The figure shows that the major flows match. The primary demand, on the east side of ZNY, is between the Northeast and Southwest. On the west side of the map, the scattering of many lightly-traveled routes is consistent with the observed tracks. The biggest difference is the bundle of 2005 radar tracks that form an important flow on J220. The corresponding route in the forecast is not dominant in that area.

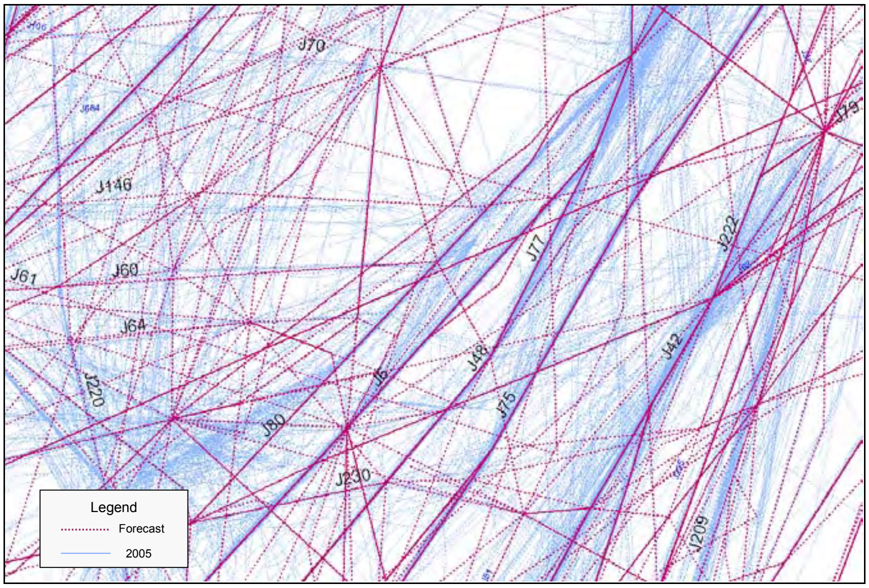


Figure 33. AAD 2005 and Forecast ZNY Overflights

The forecast overestimates traffic on airways overflying ZNY, just as it overestimates traffic at the New York airports. However, the ranking of airways by total traffic is roughly consistent: J42/J222 near the JFK VOR is the busiest single airway for overflights; J75 and J6 on the south side of ZNY are second and third, respectively.

J75 (#2 in traffic) and J48 (#5 or 6) are an adjacent pair of airways on the south side of ZNY. The forecast overestimates traffic on J75 and underestimates traffic on J48, but the sum of the two is within 4% of the observed count. The demand is correct within a reallocation of destination airports.

The forecast's under-representation of J220, on the western boundary of ZNY, is due to the presence of Independence Air (IDE) in the 2005 traffic. IDE ran frequent service out of Washington Dulles with small jets to small airports in Upstate New York and New England. This caused increased traffic on J220, not just because of IDE flights themselves, but because the congestion on the routes to IAD on the Northeast side became great enough that the alternate route to the west became more attractive to other airlines.

J60 and J64 are under-represented in the forecast. This is another consequence of the underestimation of traffic at smaller airports in the vicinity of New York and Philadelphia.

90th Percentile Day 2005 vs. Forecast

The 90th percentile day traffic count comparison for each airport is provided in Figure 34.

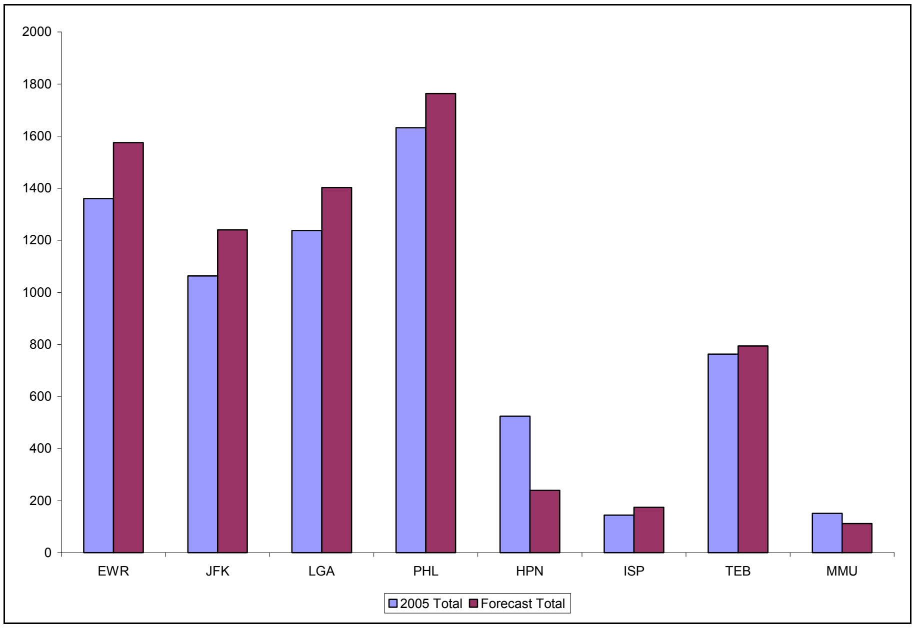


Figure 34. 2005 vs. Forecast 90th Percentile Day total Traffic Counts by Airport

The forecast traffic counts for all airports except HPN and MMU are higher than the actual 2005 traffic. Overall, the forecast traffic has approximately 8% more flights than the 2005 traffic.

A comparison of the hourly arrival and departure throughput for each airport is found in Figures 35 through 50.

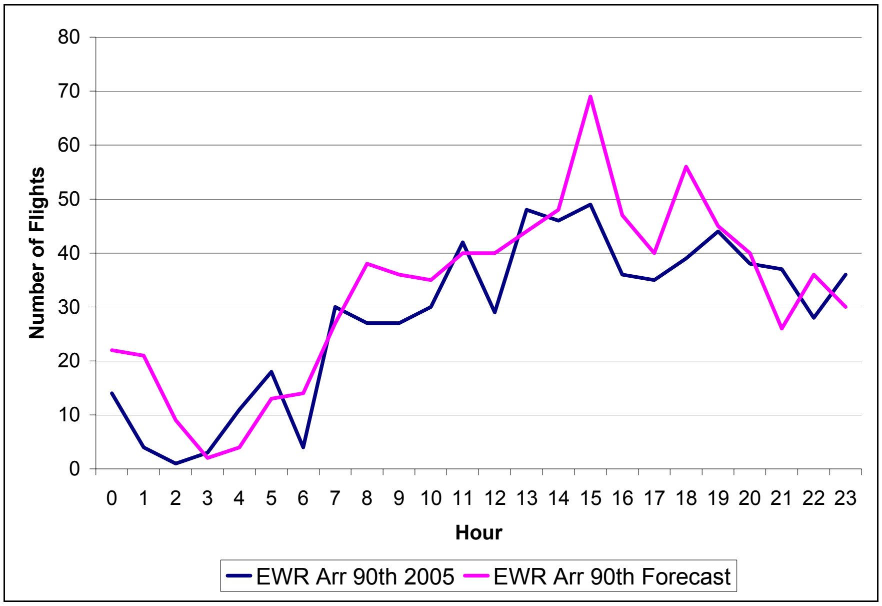


Figure 35. EWR 90th Percentile Day Arrivals by Hour

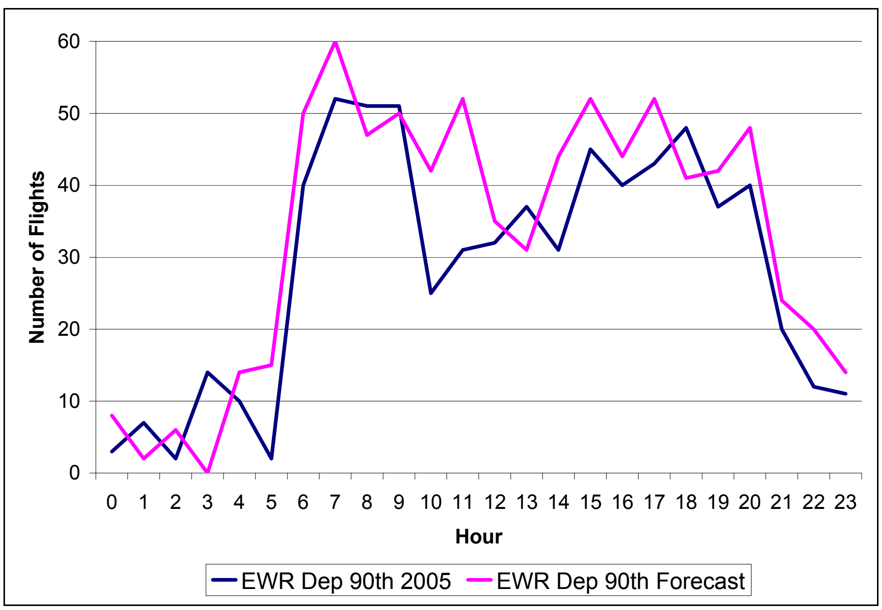


Figure 36. EWR 90th Percentile Day Departures by Hour

The EWR throughput curves show similar hourly trends with the differences between the 2005 traffic and the forecast being due to the difference in the traffic counts, particularly with the forecast arrival peak in the afternoon.

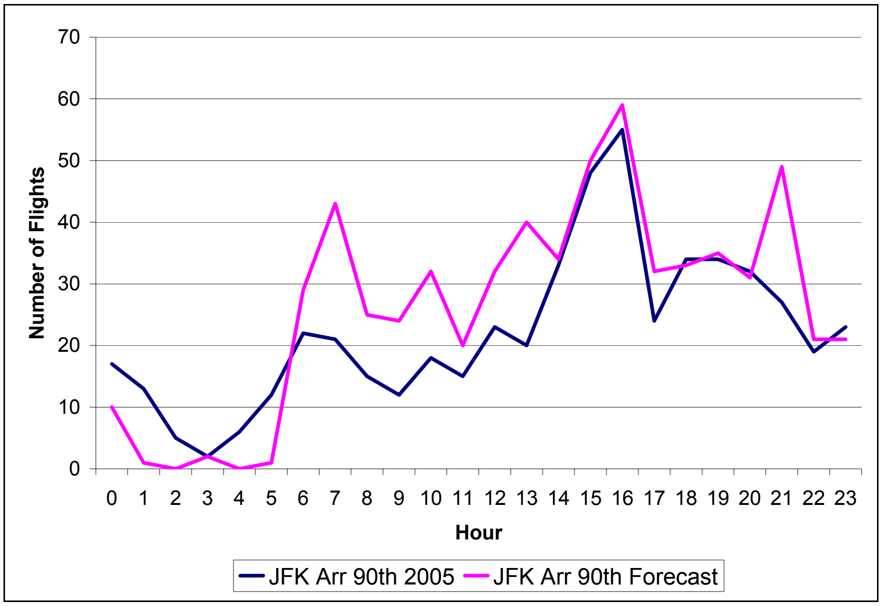


Figure 37. JFK 90th Percentile Day Arrivals by Hour

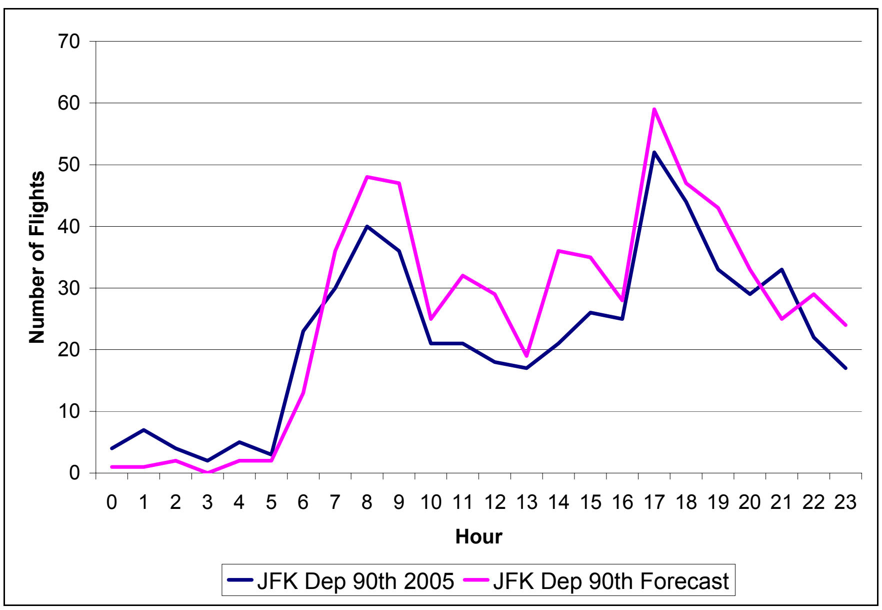


Figure 38. JFK 90th Percentile Day Departures by Hour

The JFK throughput curves show similar hourly trends with the differences between the 2005 traffic and the forecast being due to the differences in the traffic counts, particularly with the forecast arrival peaks in the morning and at night.

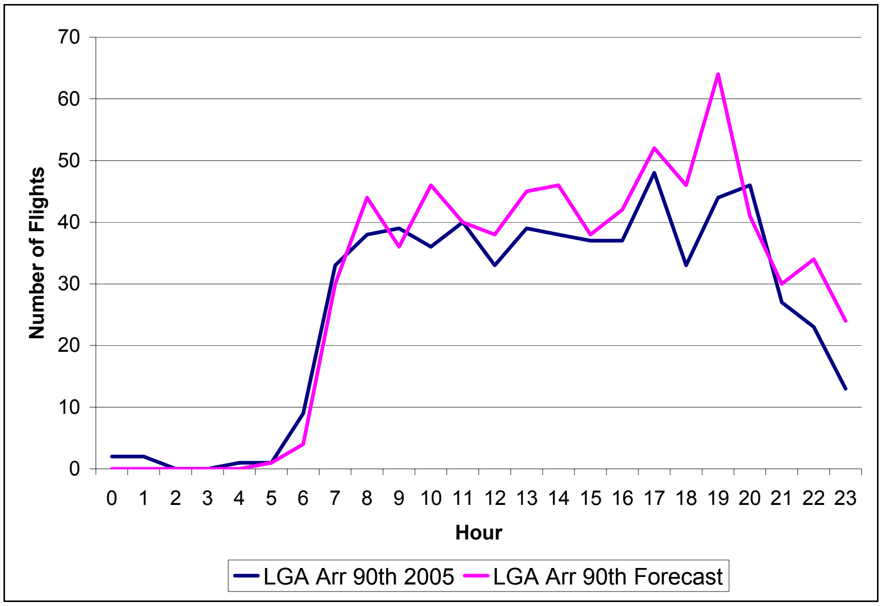


Figure 39. LGA 90th Percentile Day Arrivals by Hour

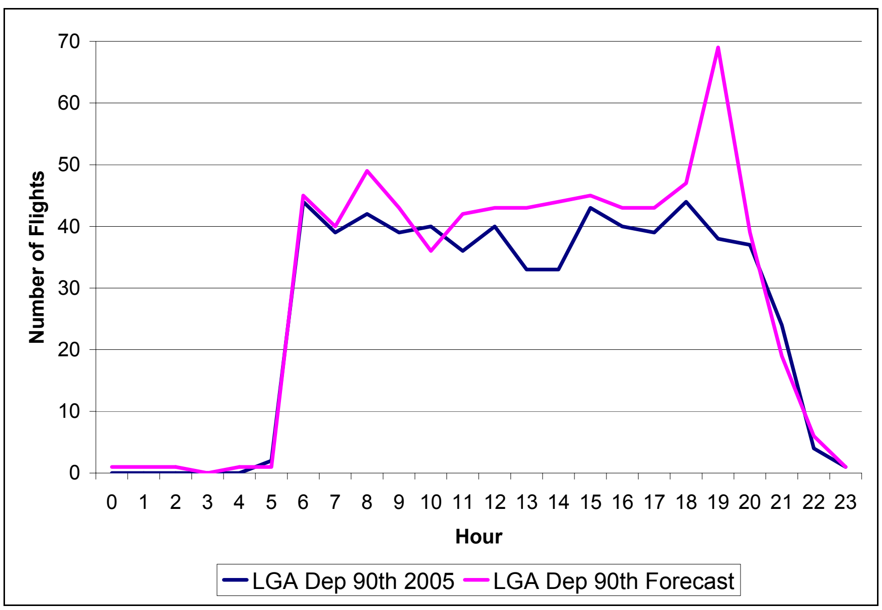


Figure 40. LGA 90th Percentile Day Departures by Hour

The LGA throughput curves show similar hourly trends with the differences between the 2005 traffic and the forecast being due to the difference in the traffic counts as seen in the arrival and departure peaks at the end of the day for the forecast traffic.

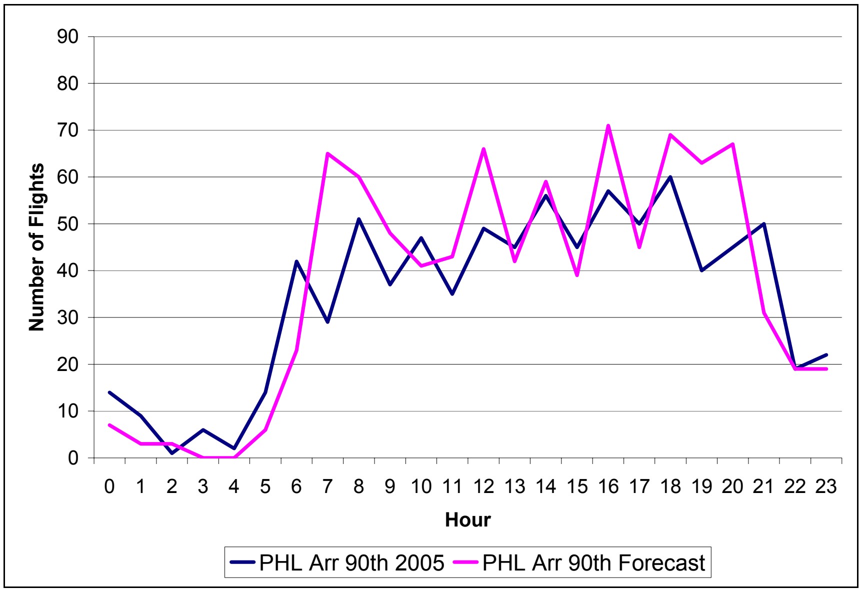


Figure 41. PHL 90th Percentile Day Arrivals by Hour

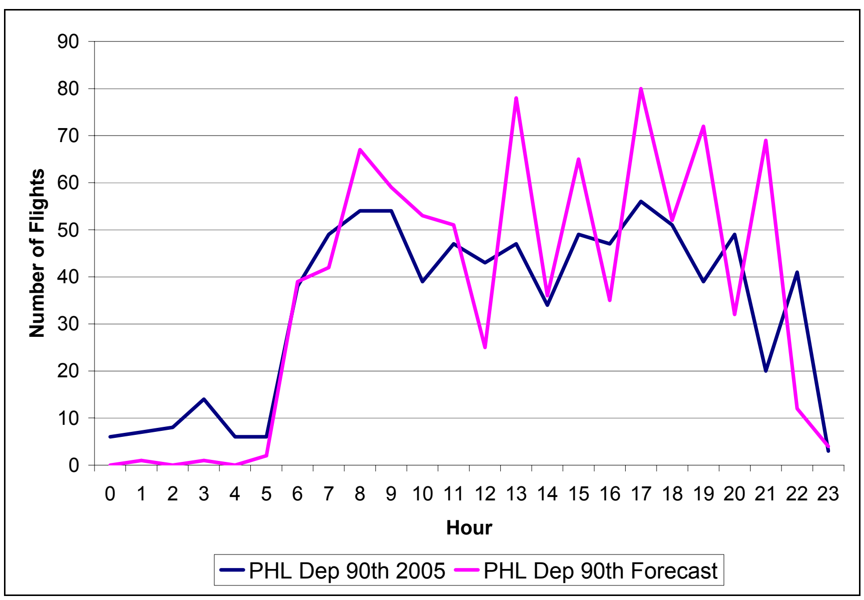


Figure 42. PHL 90th Percentile Day Departures by Hour

The PHL throughput curves reflect the change in schedule from the time that the forecast traffic was created in 2000 to the present time. The forecast traffic hourly trend shows high peaks. With the higher traffic at the 90th percentile level, the 2005 traffic has more peaks than the 2005 AAD traffic, though it is not as pronounced as the forecast traffic. An analysis of OAG data for the 90th percentile day shows the same trend as the 2005 90th percentile day traffic.

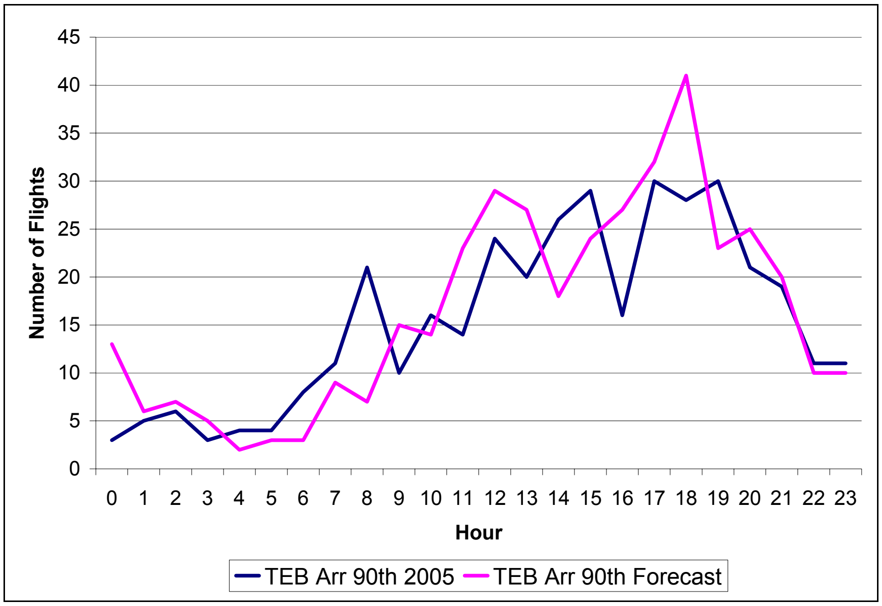


Figure 43. TEB 90th Percentile Day Arrivals by Hour

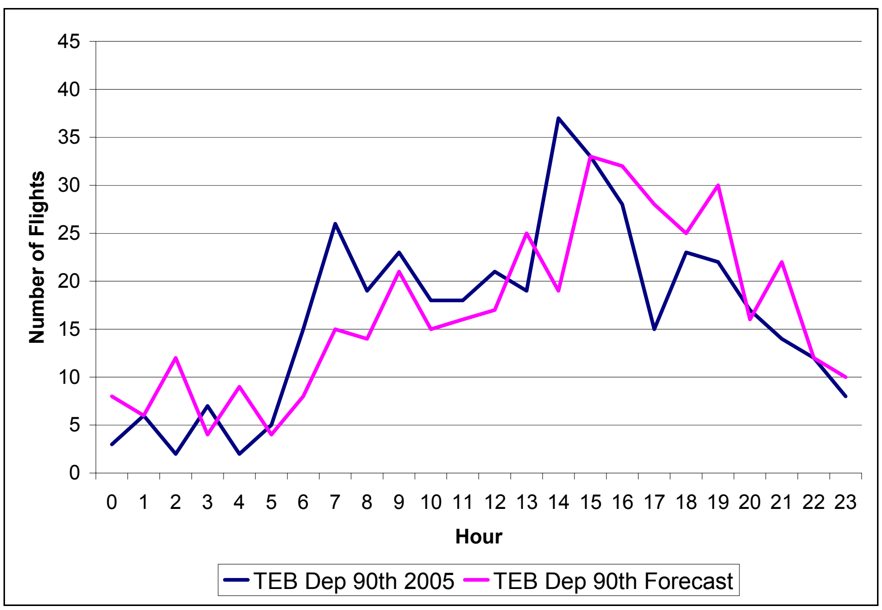


Figure 44. TEB 90th Percentile Day Departures by Hour

The TEB throughput curves show similar hourly trends with the difference between the 2005 traffic and the forecast being due to the difference in the traffic counts.

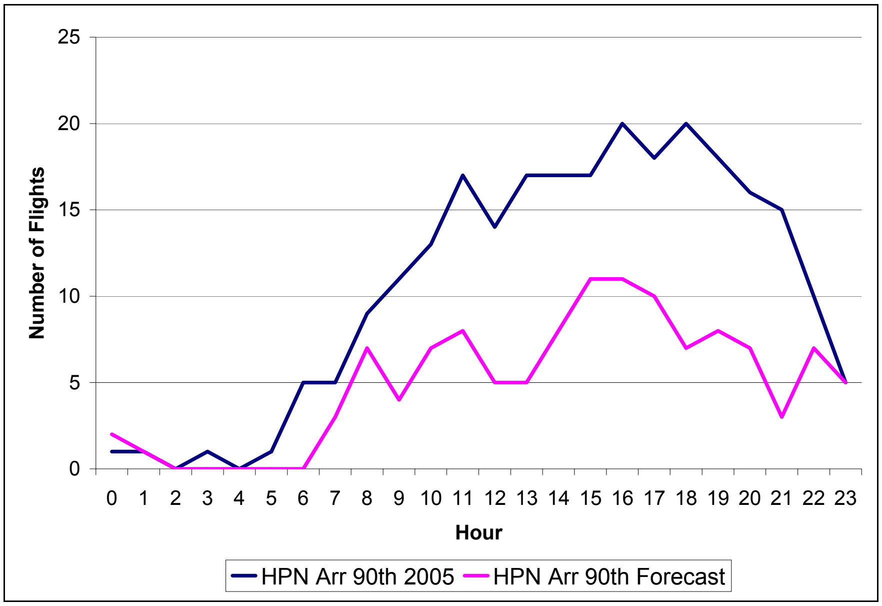


Figure 45. HPN 90th Percentile Day Arrivals by Hour

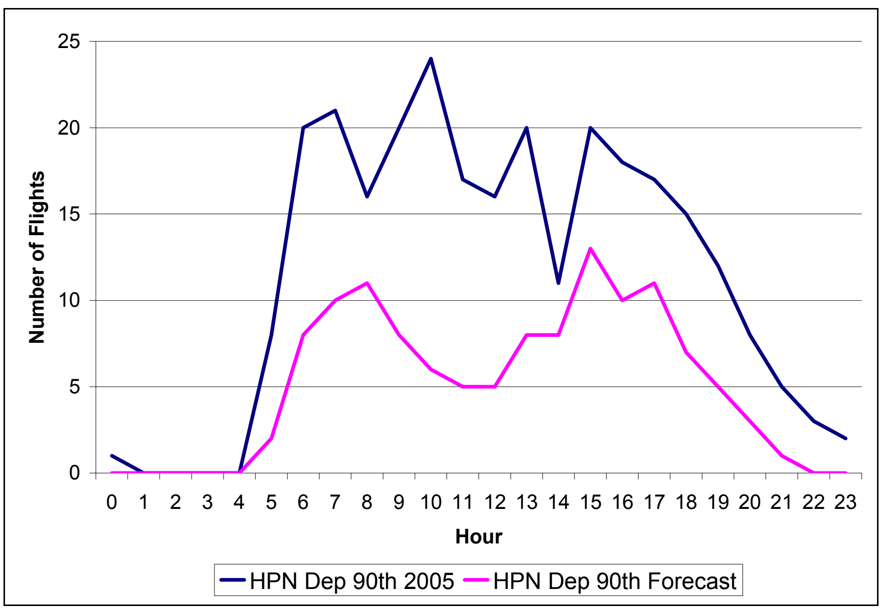


Figure 46. HPN 90th Percentile Day Departures by Hour

The HPN throughput curves show similar hourly trends with the differences between the 2005 traffic and the forecast being due to the difference in the traffic counts.

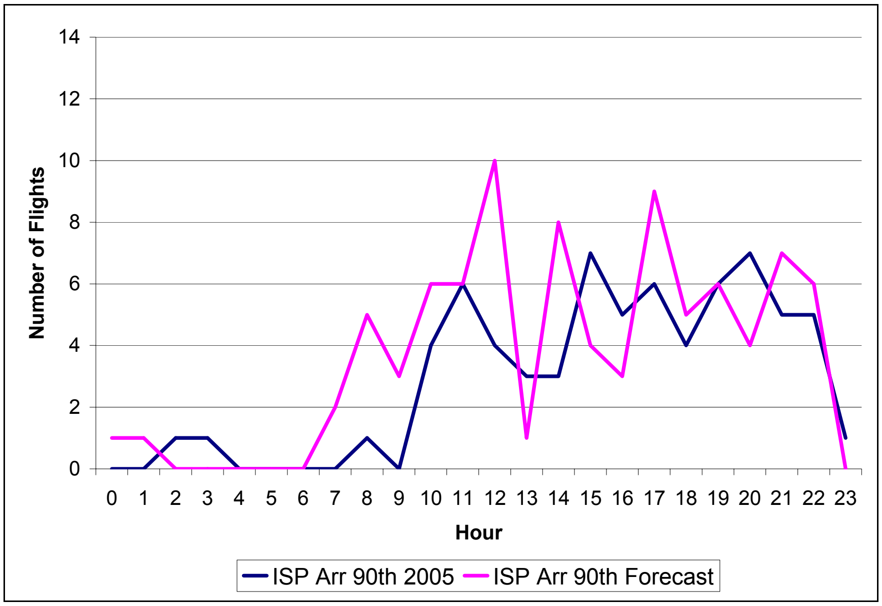


Figure 47. ISP 90th Percentile Day Arrivals by Hour

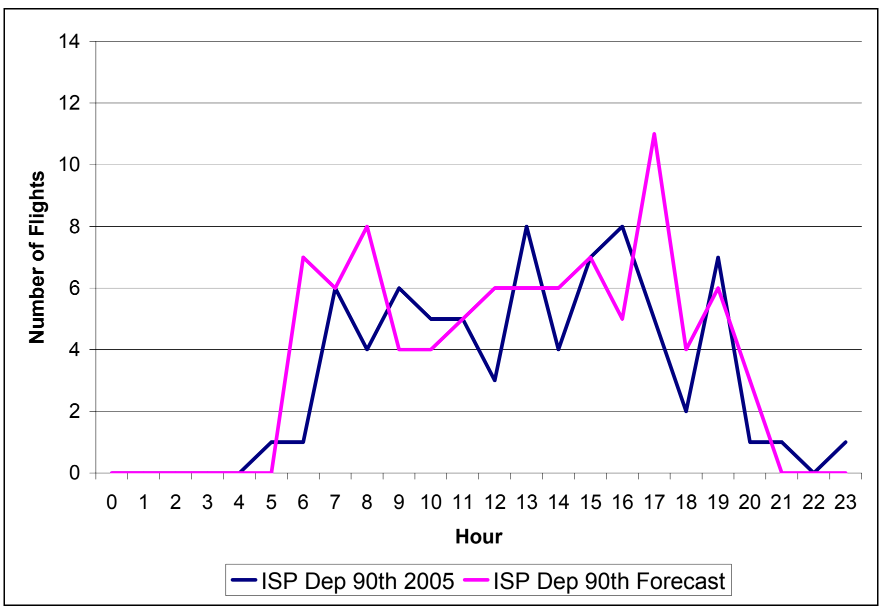


Figure 48. ISP 90th Percentile Day Departures by Hour

The ISP throughput curves show similar hourly trends with the difference between the 2005 traffic and the forecast being due to the difference in the traffic counts and some variation in peak times.

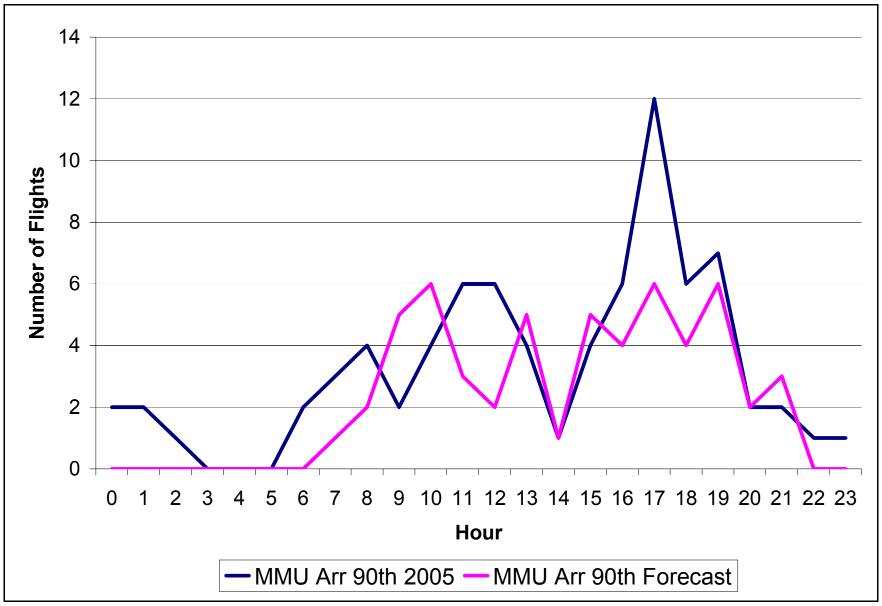


Figure 49. MMU 90th Percentile Day Arrivals by Hour

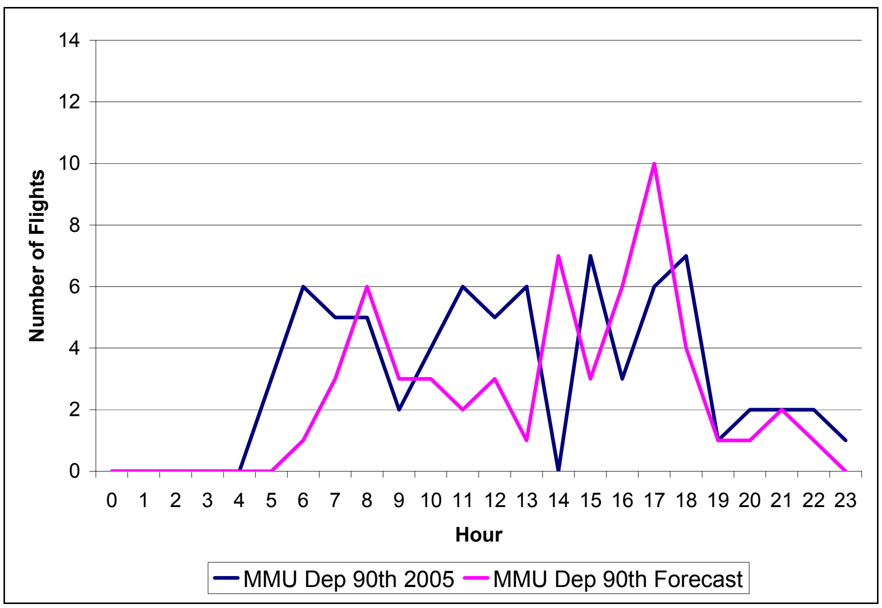


Figure 50. MMU 90th Percentile Day Departures by Hour

The MMU throughput curves show some differences in peak times between the 2005 and forecast traffic.

Origin-Destination Comparison

The forecast traffic and the 2005 actual traffic were also compared in terms of the number of flights departing to or coming from other airports. The differences between the two traffic files were calculated for each O-D pair as the forecast O-D pair number of flights minus the 2005 actual O-D pair number of flights. A majority of the O-D pair differences are in the -3 to +3 range.

OEP Major Airports to/from NY

A comparison of the O-D pairs of some of the major OEP airports arriving at the NY airports is found in Figure 51. The map shows the difference of the forecast number of flights minus the 2005 number of flights. The highest differences are:

- BOS-NY (57 more flights in the forecast traffic than in 2005),
- ORD-NY (47 more flights in the forecast traffic than in 2005),
- DCA-NY (41 more flights in the forecast traffic than in 2005),
- BWI-NY (24 more flights in the forecast traffic than in 2005),
- MCO-NY (21 more flight in the forecast traffic than in 2005 for each),
- LAX-NY, SFO-NY (20 more flights in the forecast traffic than in 2005),
- MIA-NY (19 more flights in the forecast traffic than in 2005),
- ATL-NY, DFW-NY (18 more flights in the forecast traffic than in 2005),
- CLE-NY (17 more flights in the forecast traffic than in 2005),
- PIT-NY (16 more flights in the forecast traffic than in 2005).

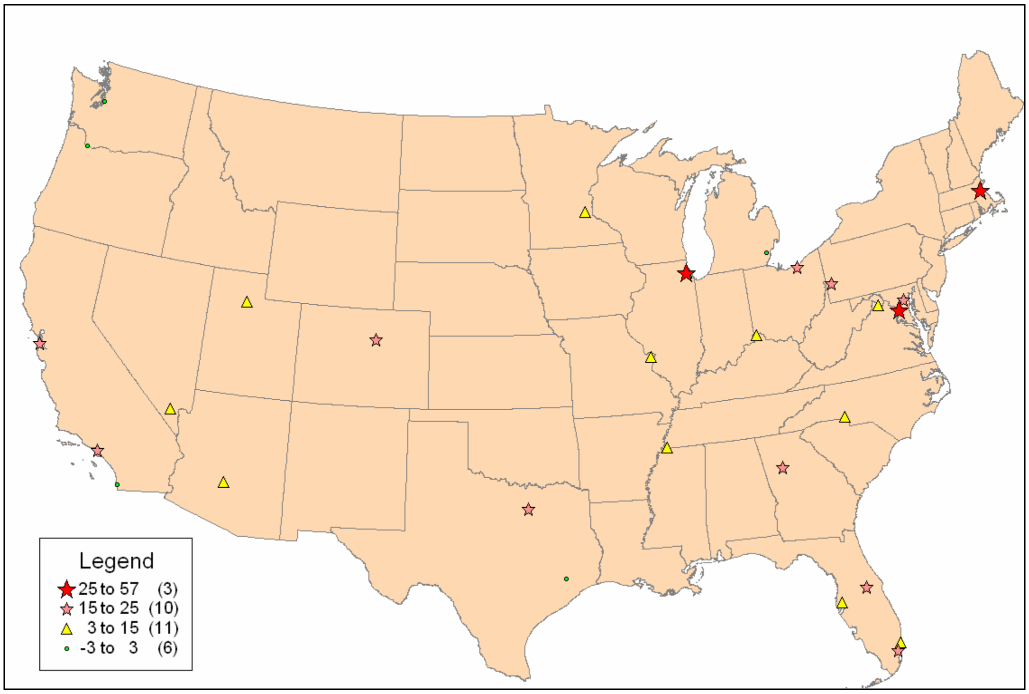


Figure 51. O-D, OEP Major Airport 90th Percentile Day Arrivals to NY (Forecast Traffic Minus 2005 Traffic)

A comparison of the O-D pairs of the non-OEP 35 airports arriving at the NY airports is found in Figure 52. The map shows the difference of the forecast number of flights minus the 2005 number of flights. A majority of the differences are in the -3 to +3 range. The highest differences are:

- ROC-NY (22 more flights in the forecast traffic than in 2005),
- PVD-NY (19 more flights in the forecast traffic than in 2005),
- PBI-NY (18 fewer flights in the forecast traffic than in 2005),
- BUF-NY (16 more flights in the forecast traffic than in 2005).

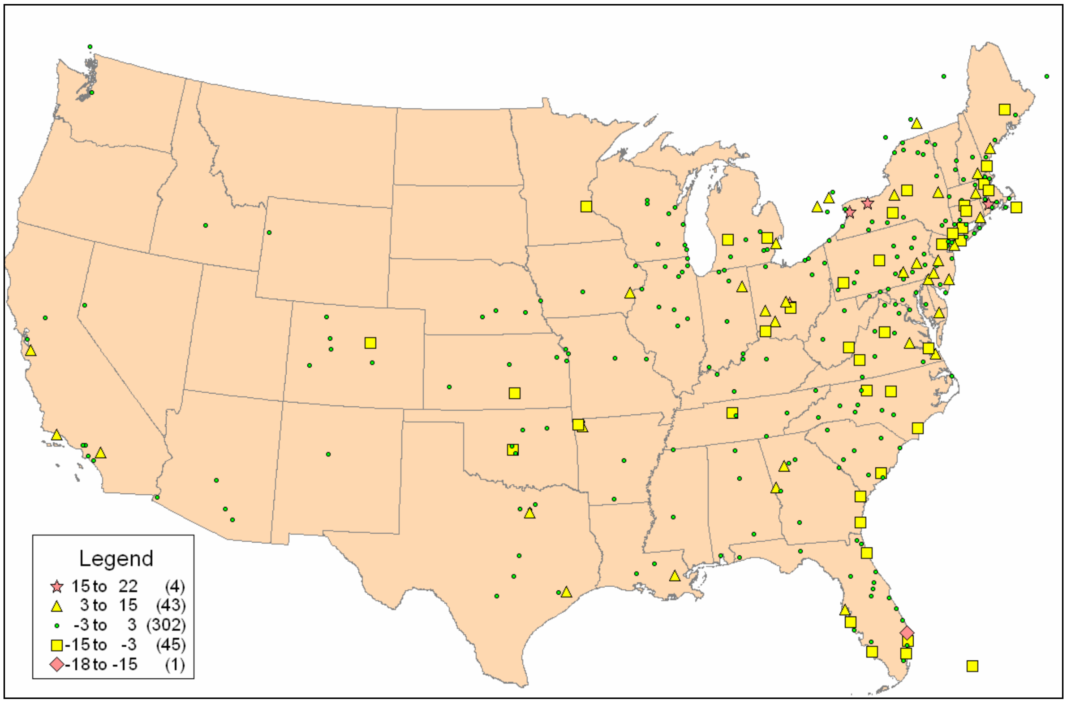


Figure 52. O-D, 90th Percentile Day Arrivals to NY (Non-OEP 35) (Forecast Traffic Minus 2005 Traffic)

A comparison of the O-D pairs of some of the major OEP airports departing from the NY airports is found in Figure 53. The map shows the difference of the forecast number of flights minus the 2005 number of flights. The highest differences are:

- NY-BOS (84 more flights in the forecast traffic than in 2005),
- NY-DCA, NY-ORD (45 more flights in the forecast traffic than in 2005),
- NY-BWI, NY-SFO (24 more flights in the forecast traffic than in 2005),
- NY-ATL, NY-DFW (21 more flight in the forecast traffic than in 2005 for each),
- NY-MCO (17 more flights in the forecast traffic than in 2005).

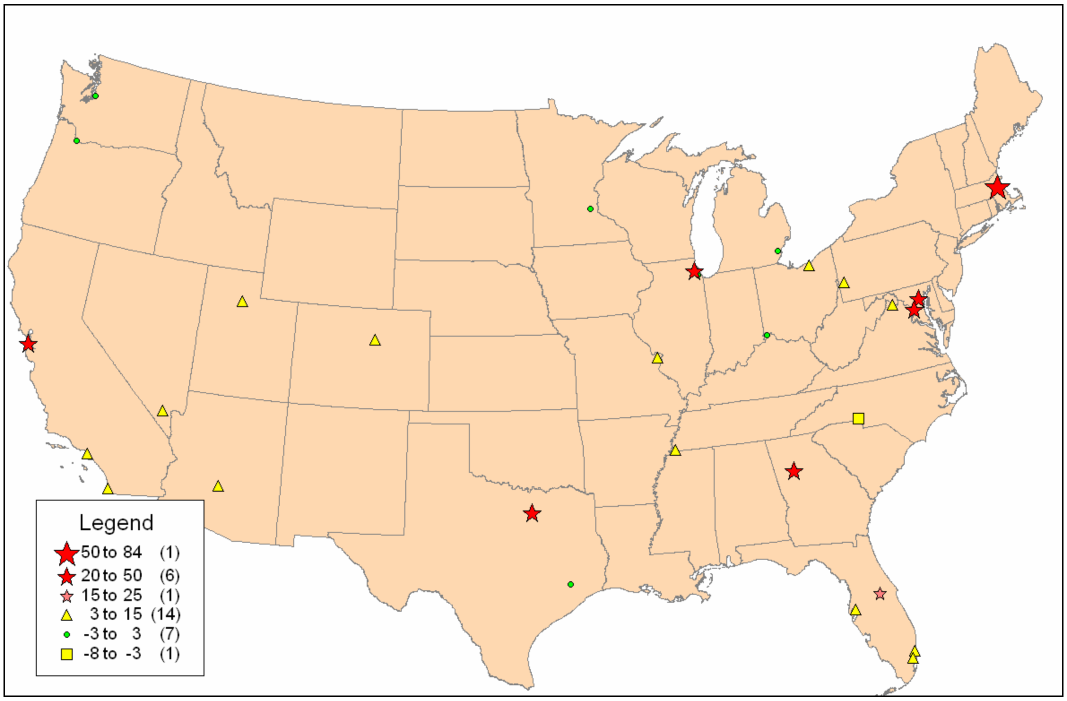


Figure 53. O-D, OEP Major Airport 90th Percentile Day Departures from NY (Forecast Traffic Minus 2005 Traffic)

A comparison of the O-D pairs of the non-OEP 35 airports departing from the NY airports is found in Figure 54. The map shows the difference of the forecast number of flights minus the 2005 number of flights. A majority of the differences are in the -3 to +3 range. The highest differences are:

- NY-ROC (22 more flights in the forecast traffic than in 2005),
- NY-SYR (21 more flights in the forecast traffic than in 2005),
- NY-BDL (21 fewer flights in the forecast traffic than in 2005),
- NY-BUF (20 more flights in the forecast traffic than in 2005),
- NY-ALB (17 more flights in the forecast traffic than in 2005),
- NY-TEB (17 fewer flights in the forecast traffic than in 2005),
- NY-PVD (16 more flights in the forecast traffic than in 2005).

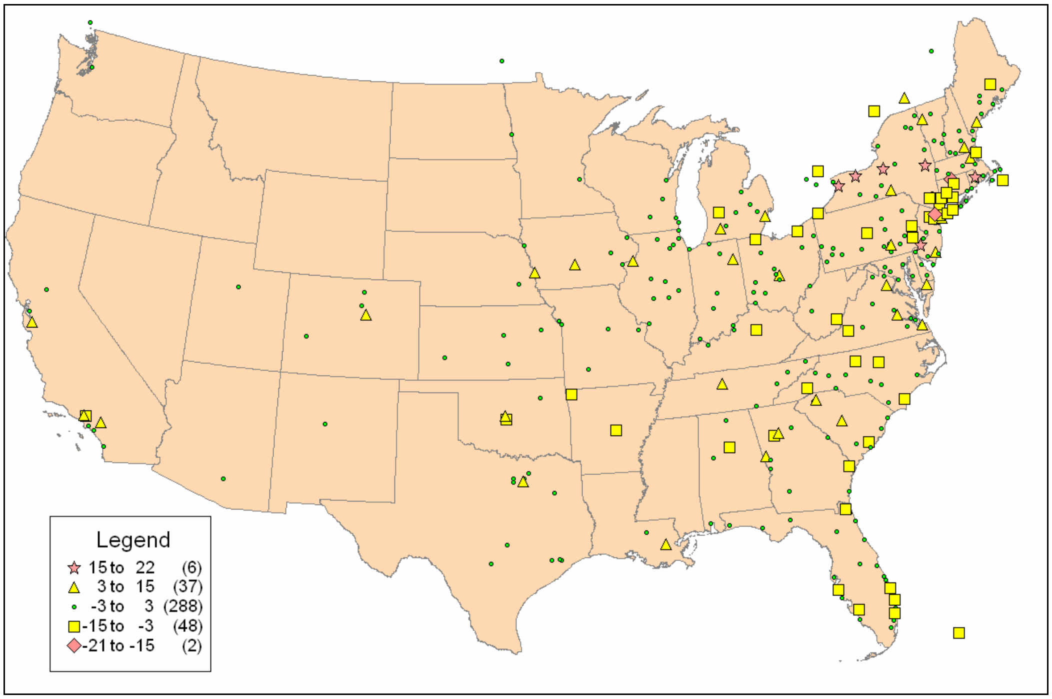
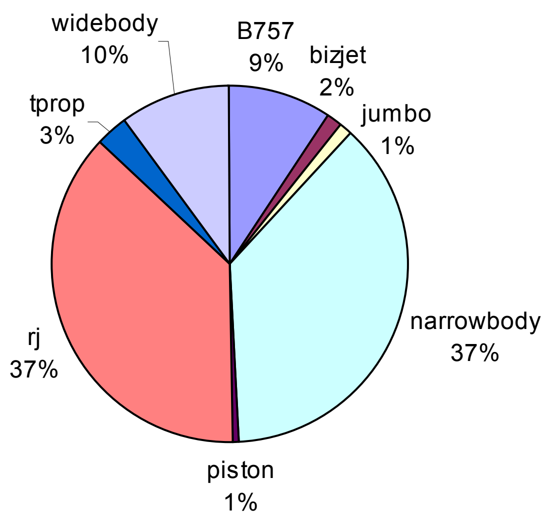


Figure 54. O-D, 90th Percentile Day Departures from NY (Non-OEP 35) (Forecast Traffic Minus 2005 Traffic)

Fleet Mix Comparison

A comparison of the 2005 fleet mix and the forecast fleet mix for each airport is shown in Figures 55 through 62.

2005



Forecast

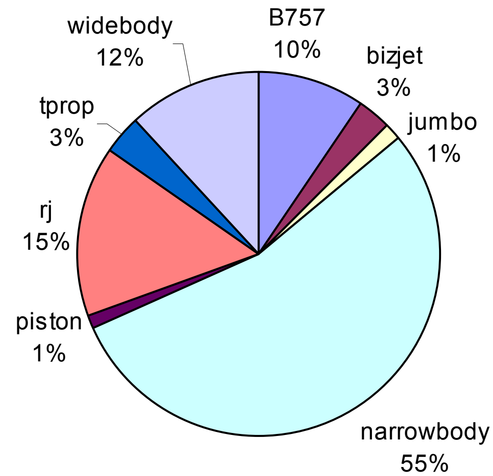
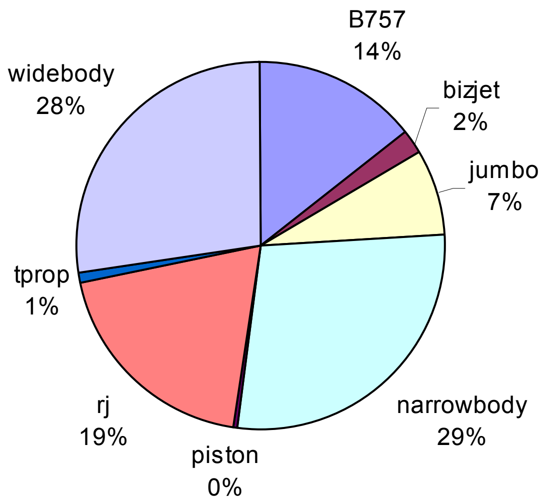


Figure 55. EWR 90th Percentile Day Fleet Mix Distribution

For EWR, the main difference is the significant increase in the use of RJs and the associated decrease in narrowbody jets, with a slight decrease in the proportion of widebody jets in the 2005 data as compared to the forecast traffic.

2005



Forecast

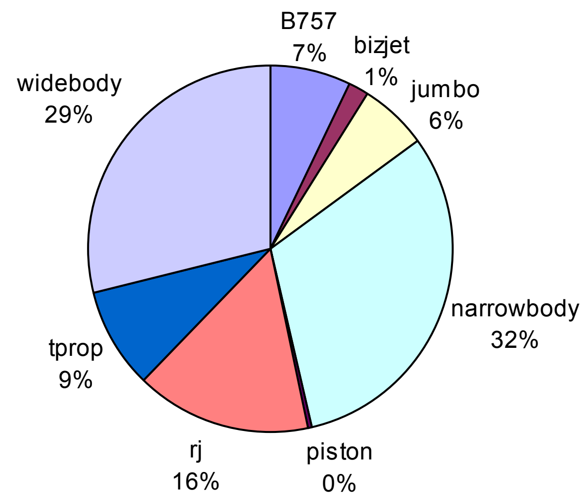
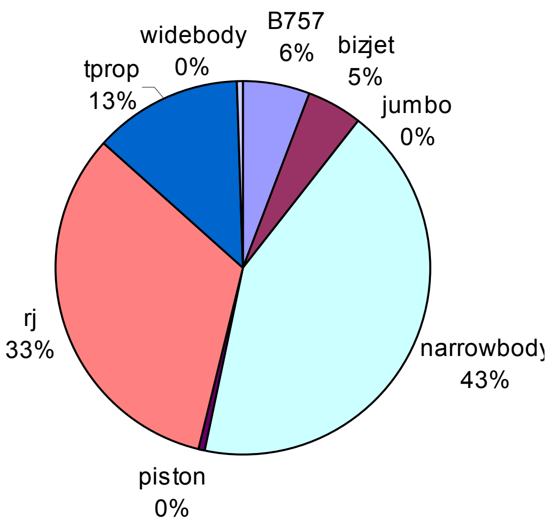


Figure 56. JFK 90th Percentile Day Fleet Mix Distribution

The JFK fleet mix has a significantly smaller proportion of turboprops than was forecast. The proportion of B757s is twice as much in 2005 than was forecast. There is a slight increase in the proportion of RJs and associated decrease in narrowbody jets in the 2005 traffic compared to the forecast traffic.

2005	Forecast



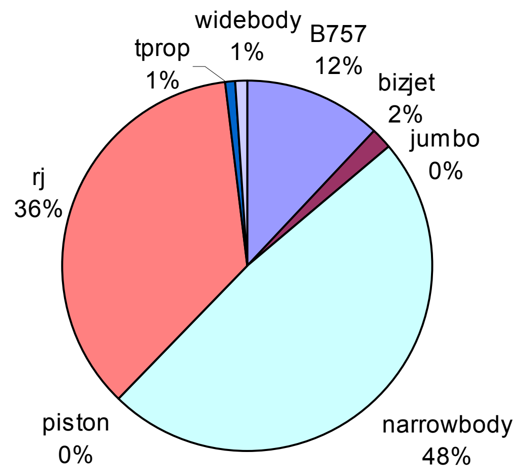
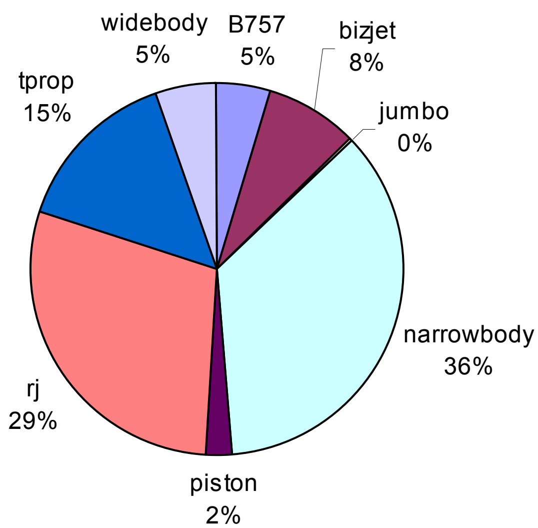


Figure 57. LGA 90th Percentile Day Fleet Mix Distribution

For LGA, the distribution of turboprops in 2005 is much higher than was forecast, while there are fewer B757s and narrowbody jets than was forecast. Unlike EWR and JFK, the distribution of RJs in 2005 is slightly lower than was forecast. The forecast traffic has a smaller percentage of bizjets than there was in 2005.

2005



Forecast

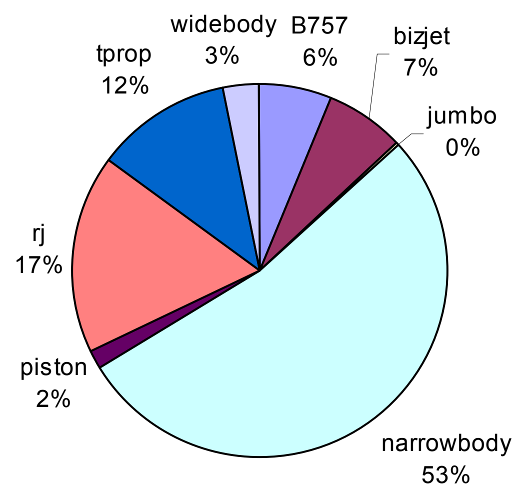


Figure 58. PHL 90th Percentile Day Fleet Mix Distribution

For 2005, PHL had a significantly higher percentage of RJs than was forecast, along with a lower percentage of narrowbody jets. In 2005, the proportion of turboprops and widebody jets is slightly higher than was forecast.

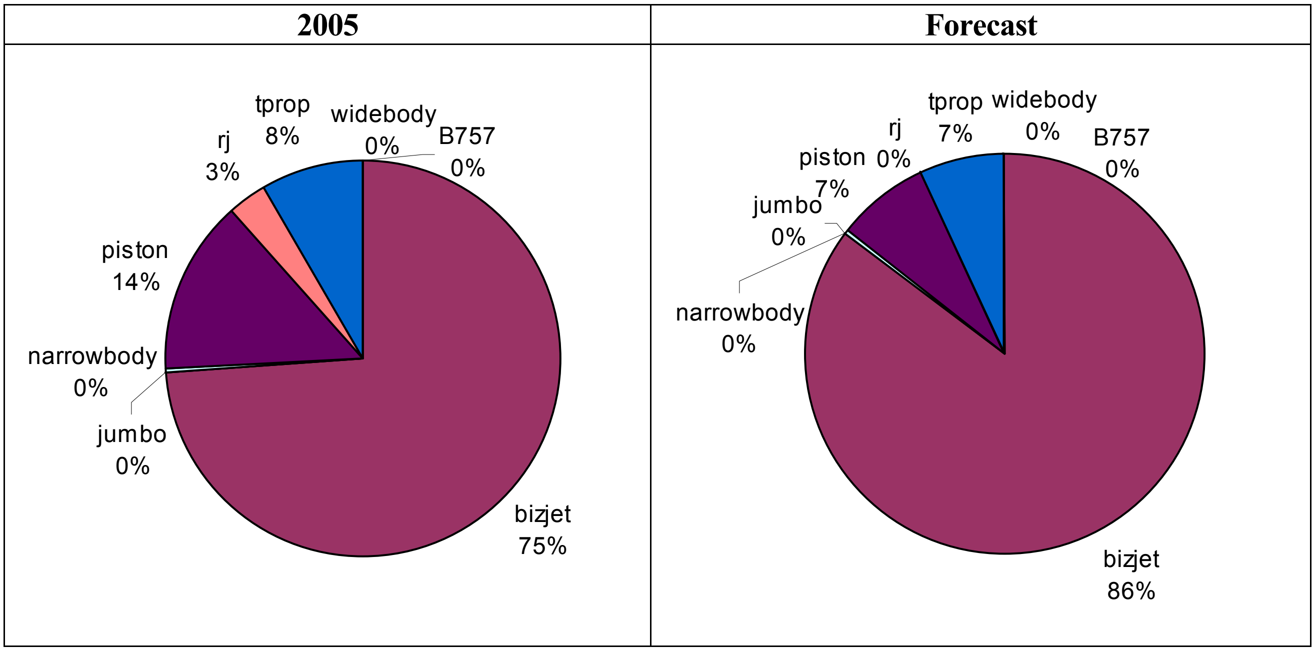
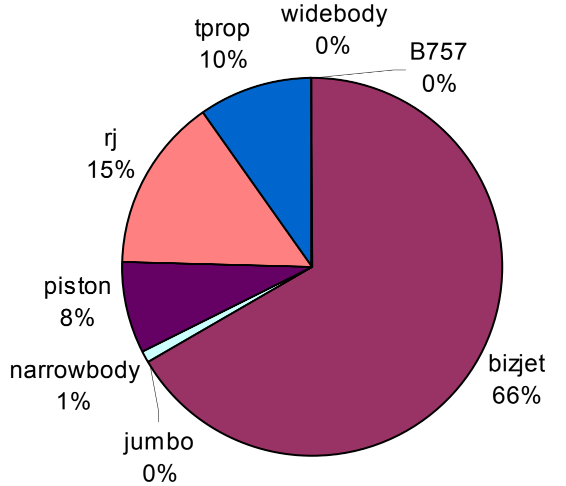


Figure 59. TEB 90th Percentile Day Fleet Mix Distribution

The fleet mix at TEB for 2005 shows a lower percentage of bizjets and a higher percentage of pistons than was forecast. There is also a small percentage of RJs in 2005 that was not in the forecast.

2005



Forecast

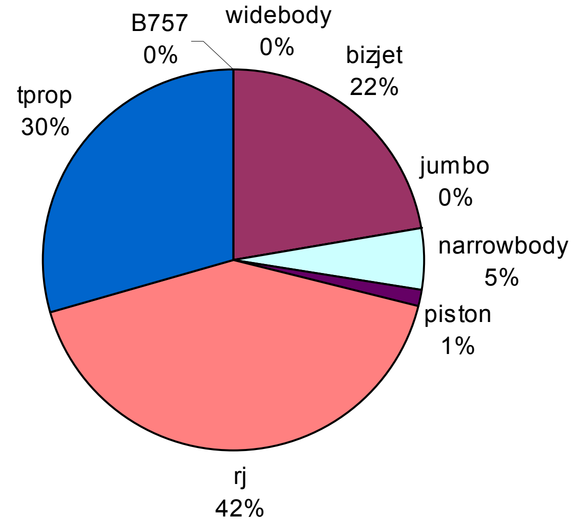
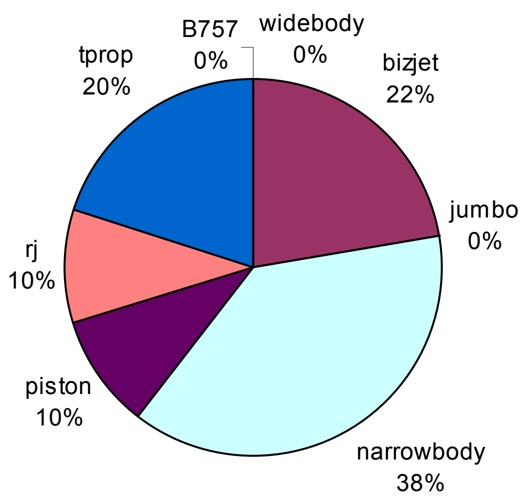


Figure 60. HPN 90th Percentile Day Fleet Mix Distribution

Unlike most airports, the HPN 2005 traffic has a much lower percentage of RJs than was forecast. The 2005 traffic also has a much higher percentage of bizjets and a somewhat higher percentage of pistons; along with a much lower percentage of turboprops and narrowbody jets than was forecast.

2005	Forecast



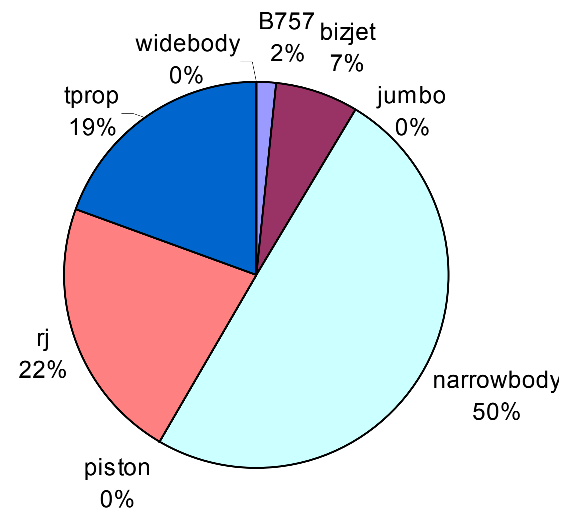
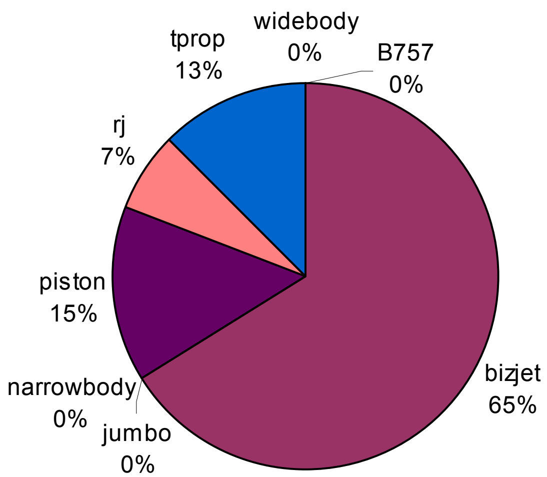


Figure 61. ISP 90th Percentile Day Fleet Mix Distribution

Similarly to HPN, the ISP fleet mix in 2005 has a much lower percentage of RJs than was forecast. The ISP 2005 fleet mix also has a much lower percentage of narrowbody jets and a higher percentage of bizjets and pistons than was forecast.

2005



Forecast

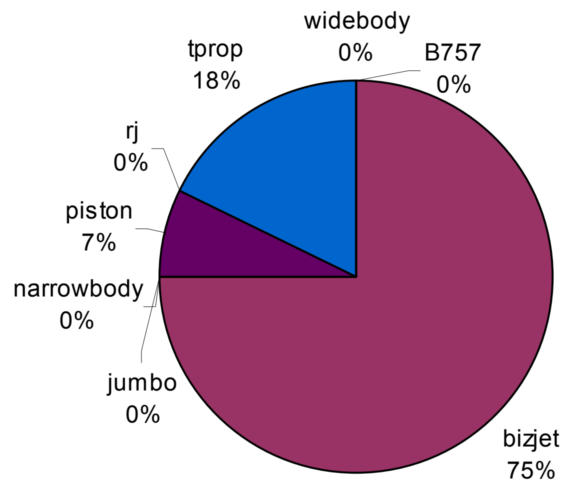


Figure 62. MMU 90th Percentile Day Fleet Mix Distribution

MMU shows a higher percentage of pistons, along with a lower percentage of bizjets and turboprops in 2005 than was forecast. The 2005 traffic includes RJs (7%) while the forecast does not.

Overall, the 2005 fleet mix has a larger proportion of RJs and bizjets, with a decreased proportion of narrowbody jets compared to the forecast traffic.

Overflights

Figure 63 shows a visual comparison between the forecast overflight demand and the actual radar tracks flown on the 90th percentile day in 2005. The forecast tracks are dotted lines. Where the line appears solid is an indication that it is a high-demand airway on which many aircraft are superimposed. The figure for the 90th percentile day shows similar trends to that of the annual average day, though more pronounced. The forecast overestimates traffic on airways overflying ZNY. The ranking of airways by total traffic is roughly consistent.

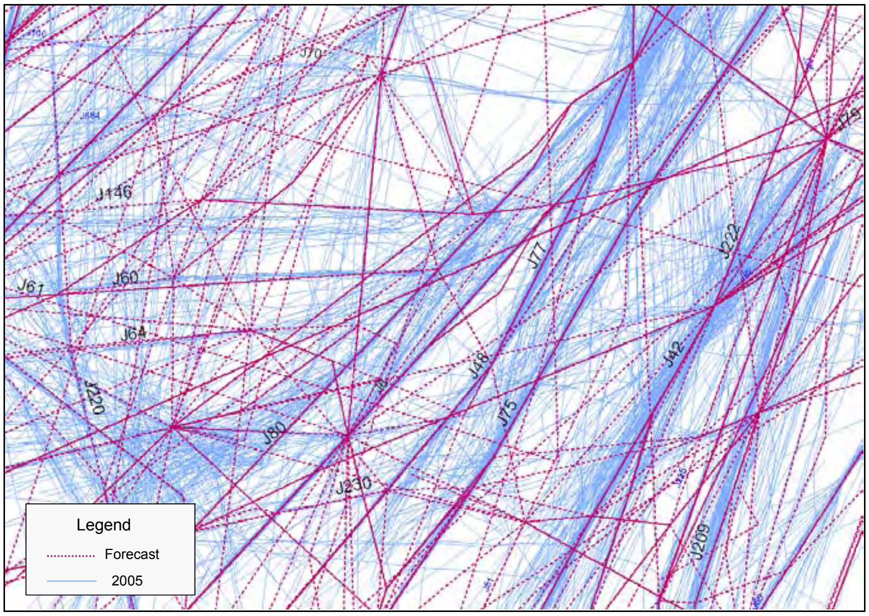


Figure 63. 90th Percentile Day 2005 and Forecast ZNY Overflights

PHL Annual Average Day 2012 vs. 2011 Forecast

The PHL CEP[4] was initiated to enhance the airport capacity to accommodate current and future growth. An analysis of the alternatives under consideration required the use of a forecast of future traffic. A forecast of 2012 PHL traffic was developed for this purpose. Since this traffic forecast was based on more recent data than the 2011 forecast, the 2012 PHL CEP forecast is compared to the 2011 traffic forecast.

Traffic Counts Comparison

The PHL 2011 forecast traffic counts are within 1% of the 2012 forecast traffic. The 2011 forecast has 1640 flights, and the 2012 forecast traffic has 1618 flights.

Hourly Throughput Comparison

A comparison of the hourly arrival and departure throughput for PHL is found in Figures 64 and 65, respectively.

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4 http://www.phl-cep-eis.com/

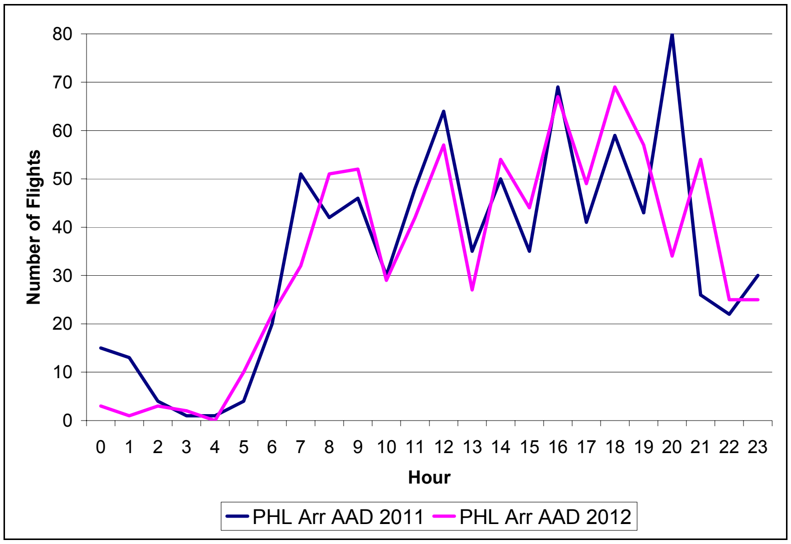


Figure 64. PHL 2011 vs. 2012 AAD Arrivals by Hour

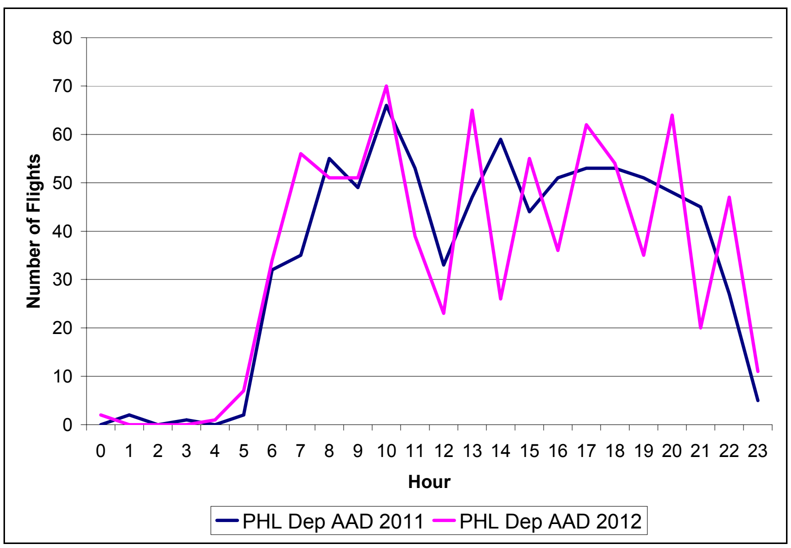


Figure 65. PHL 2011 vs. 2012 AAD Departures by Hour

The 2012 forecast shows the peaks seen in the more recent PHL schedule. The arrival throughput comparison is similar with the exception of the peak arrivals in the 2011 forecast occurring in hour 20 with 80 arrivals, while the 2012 forecast shows a very low throughput at that same time with 34 arrivals. The PHL departure throughput is similar in the early hours; the 2012 forecast shows peaks from hours 13 through the end of the day, where the 2011 traffic shows a somewhat smoother flow from hour 15 through the end of the day. These differences can be explained by the changes in the PHL schedule that has occurred over time.

Origin-Destination Comparison

The PHL 2012 forecast traffic and the 2011 forecast traffic were also compared in terms of the number of flights departing to/coming from other airports.

OEP Major Airports to/from PHL

A comparison of the O-D pairs of some of the major OEP airports arriving at PHL is found in Figure 66. The map shows the difference of the 2012 forecast number of flights minus the 2011 forecast number of flights. The highest differences are:

- MCO-PHL (15 more flights in the 2012 forecast than in the 2011 forecast),
- BOS, MEM, ORD-PHL (8 fewer flights in the 2012 forecast than in the 2011 forecast).

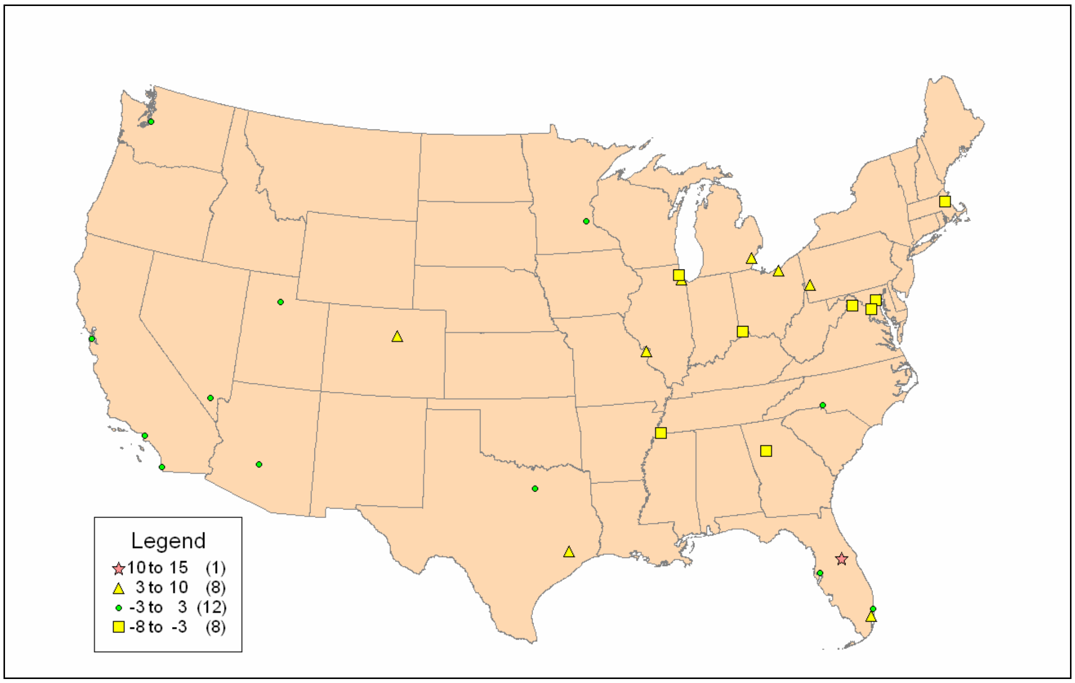


Figure 66. O-D, OEP Major Airport AAD Arrivals to PHL (2012 AAD Forecast Minus 2011 AAD Forecast)

A comparison of the O-D pairs of the non-OEP 35 airports arriving at PHL is found in Figure 67. The map shows the difference of the 2012 forecast number of flights minus the 2011 forecast number of flights. A majority of the differences are in the -3 to +3 range. The highest differences are:

- MHT-PHL (10 more flights in the 2012 forecast than in the 2011 forecast),

- JFK-PHL (9 fewer flights in the 2012 forecast than in the 2011 forecast),
- MDPC-PHL (8 more flights in the 2012 forecast than in the 2011 forecast),
- ORH-PHL (8 fewer flights in the 2012 forecast than in the 2011 forecast).

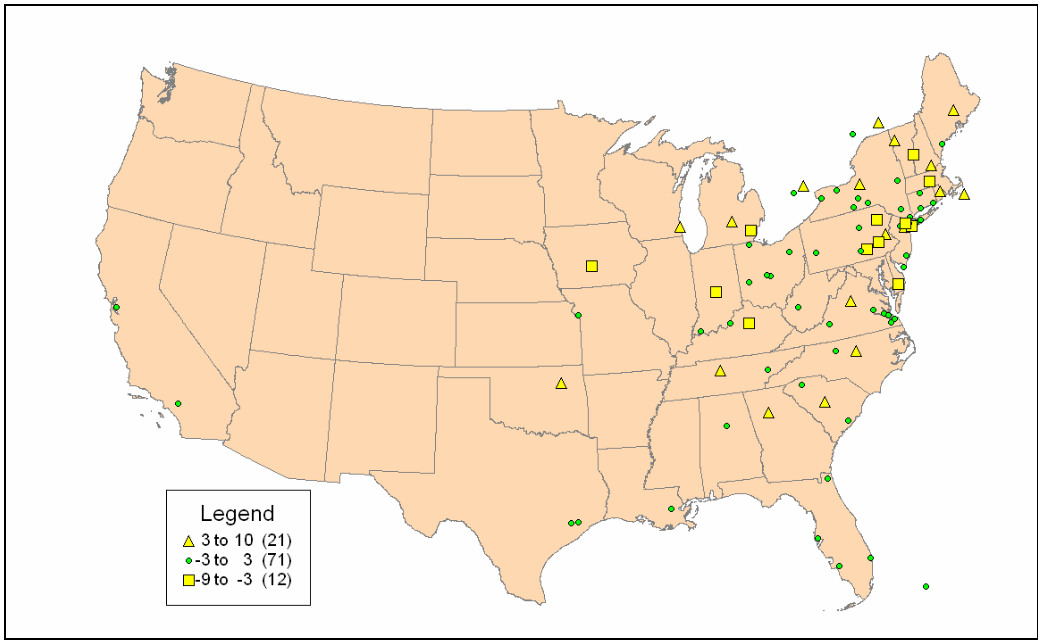


Figure 67. O-D, AAD Arrivals to PHL (Non-OEP 35)
(2012 AAD Forecast Minus 2011 AAD Forecast)

A comparison of the O-D pairs of some of the major OEP airports departing from PHL is found in Figure 68. The map shows the difference of the 2012 forecast number of flights minus the 2011 forecast number of flights. The highest differences are:

- PHL-BOS (12 fewer flights in the 2012 forecast than in the 2011 forecast),
- PHL-MCO (11 more flights in the 2012 forecast than in the 2011 forecast),
- PHL-DTW (10 more flights in the 2012 forecast than in the 2011 forecast),
- PHL-DFW (8 fewer flights in the 2012 forecast than in the 2011 forecast).

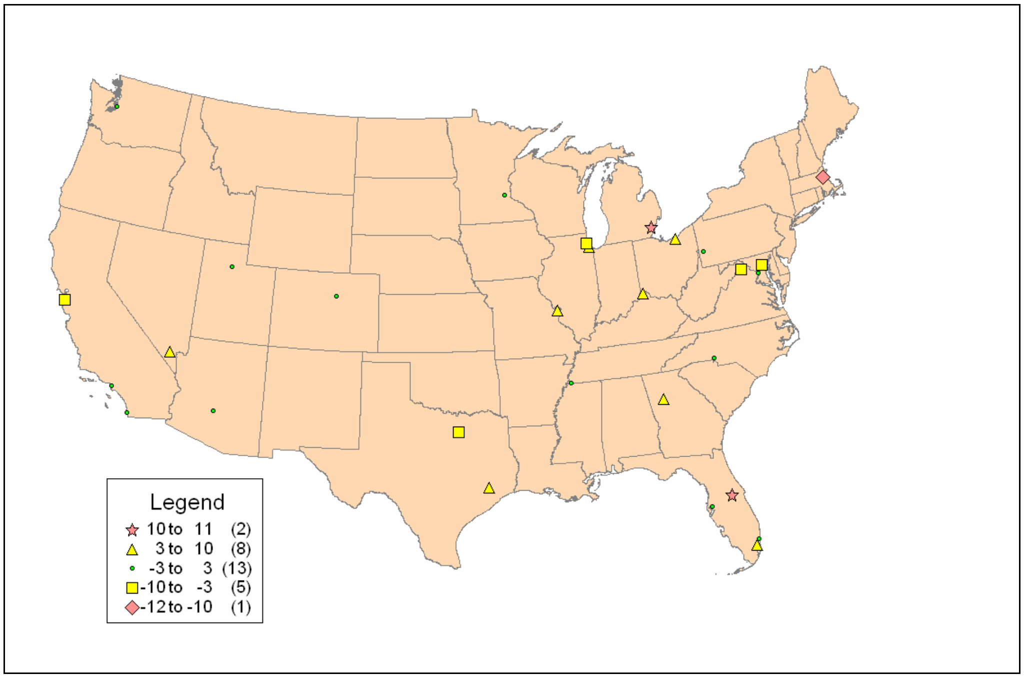


Figure 68. O-D, OEP Major Airport AAD Departures from PHL (2012 AAD Forecast Minus 2011 AAD Forecast)

A comparison of the O-D pairs of the non-OEP 35 airports departing from PHL is found in Figure 69. The map shows the difference of the 2012 forecast number of flights minus the 2011 forecast number of flights. A majority of the differences are in the -3 to +3 range. Longer-haul traffic is better forecast than regional traffic. The highest differences are:

- PHL-EWR (13 more flights in the 2012 forecast than the 2011 forecast),
- PHL-EEN (10 more flights in the 2012 forecast than the 2011 forecast),
- PHL-TTN (9 more flights in the 2012 forecast than the 2011 forecast),
- PHL-LGA (8 more flights in the 2012 forecast than the 2011 forecast).

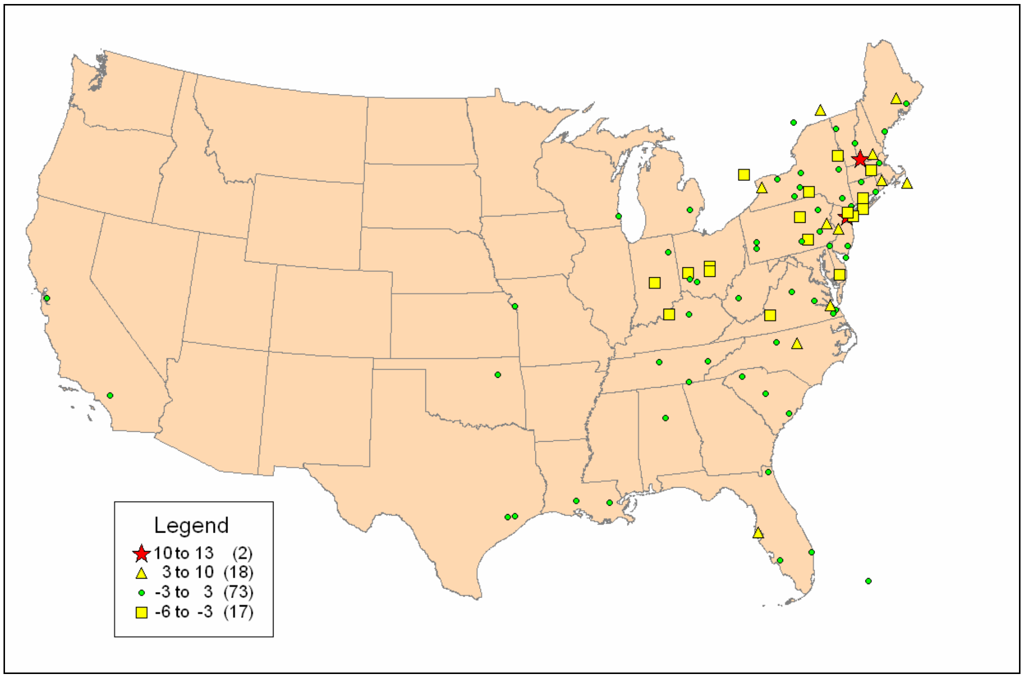
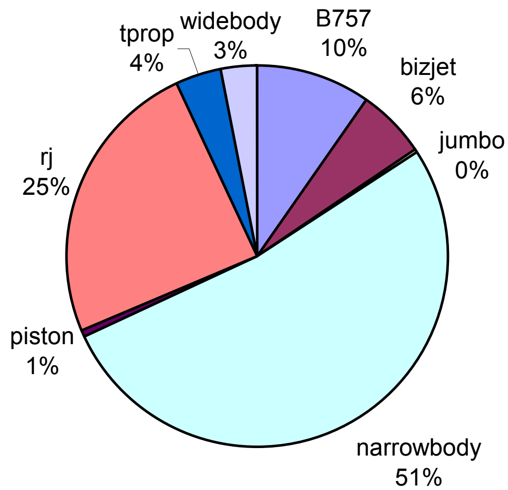


Figure 69. O-D, AAD Departures from PHL (Non-OEP 35)
(2012 AAD Forecast Minus 2011 AAD Forecast)

Fleet Mix Comparison

A comparison of the PHL AAD 2011 and 2012 fleet mix is shown in Figure 70. The most noticeable difference is the increase in the percentage of RJs and the decrease in B757 jets in the 2012 forecast compared to the 2011 forecast. There is also a slight increase in the percentage of widebody jets and slight decrease in narrowbody jets in the 2012 forecast compared to the 2011 forecast.

2011 Forecast



2012 Forecast

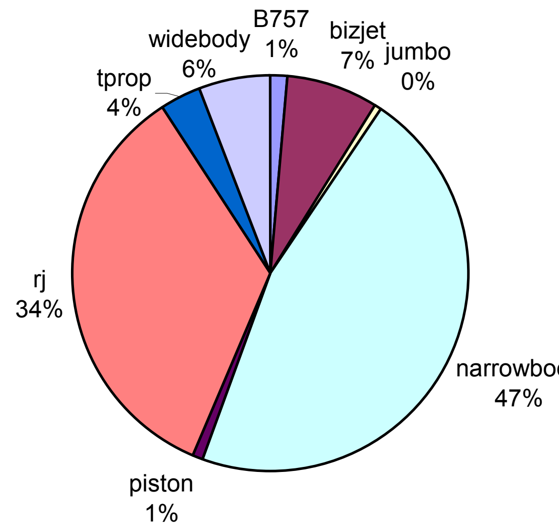


Figure 70. PHL 2011 vs. 2012 AAD Fleet Mix Distribution

3 Discussion

Traffic forecasting is an economic exercise, relying on the accuracy of predictive economic indicators. Economic indicators, while useful for discerning broad trends, invariably miss important details. In many of those details, the economic outlook from the year 2000 is far removed from today's reality. The last five years have seen an aviation industry changing, struggling to maintain profitability in a chaotic economy. Those changes led to discrepancies between the forecast traffic and the actual traffic. Although the majority of the traffic forecast matches patterns in today's air traffic, some parts do not. War, terrorism, Severe Acute Respiratory Syndrome (SARS), and bankruptcy would have been nearly impossible for any analyst to predict.

Features of the Forecast that are Essentially Correct

The overall forecast of traffic counts for 2006 was 6-8% above the observed levels in 2005 at the major airports in New York and Philadelphia metropolitan areas.

Of the airports modeled in detail for the operational analysis, LGA and EWR are qualitatively correct. Schedules at both airports are flow operations instead of hub-and-spoke operations, as predicted. JFK is reasonably correct in that the demand is dominated by the international peaks. At PHL, the de-peaking of the schedule was not foreseen.

At the smaller airports on the annual average day, there are large differences between the forecast and the actual traffic, but the differences lie within the natural variation that result when unscheduled operations dominate the traffic at an airport. On the 90th percentile day, the differences can be very large. Traffic at HPN is particularly underestimated, possibly due to the recent large increases in air taxi traffic. Air taxi traffic is notably absent from older data sources such as the ETMS version used to generate the baseline for these forecasts.

One example of how general economic trends led to correct predictions of the 2006 market is JetBlue. JetBlue began using JFK as a base hub in the year 2000. Population growth trends visible in 2000 led the forecasters to anticipate that JetBlue would expand its operations to the east, specifically to Boston; to the west; and to the Florida market. The patterns and magnitudes of traffic are well represented in the forecasted traffic.

Another example of a correct forecast is IDE. The market that IDE tried to exploit was not visible in 2000, so no such carrier was included in the 2006 forecast. As of February 2006, IDE does not use the airspace.

Trends Leading to Inaccuracies in the Forecast

Over the last five years, major carriers have changed the way they conduct business. USAir went through two bankruptcies before it consolidated with America West. United, Delta, and Northwest Airlines each went through a bankruptcy. These carriers, which maintain a major presence along the eastern corridor, have significantly changed their route services, impacting the New York markets, Philadelphia, and Pittsburgh. As a result, hub-to-hub service for Boston (BOS), Atlanta (ATL), and Chicago (ORD) were all overestimated in the traffic forecast by up to a factor of two.

A variety of cost factors contribute to making the traditional hub-and-spoke system expensive. As the airlines adapt their business policies to minimize this expense, the demand is affected in three ways. First, airlines may schedule flights during non-peak hours, resulting in a shift from a peaked demand at a given airport to a flow operation. The behavior of traffic at PHL for 2005 revealed a schedule shifting from peaked to flattened, which was not foreseen in the traffic forecast. This can be explained by the entry of Southwest Airlines into PHL.

The second effect on demand is in the mix of aircraft types. In the year 2000, it was expected that the airlines would replace their turboprops with RJs. However, as the airlines reacted to market competition and escalating fuel prices, they began to serve the same number of passengers with a fully loaded RJ rather than a partially loaded narrowbody jet, resulting in lower operating costs. The forecast included the effects of the replacement of turboprops, but underestimated the replacement of narrowbodies.

The third way demand is affected is by the growth of regional airlines at the expense of major hub-and-spoke carriers. In many cases, this does not affect the operational modeling of the airspace, since one jet is much like another to air traffic control. In one way, however, there is a difference. Second-tier airports are more important to regional carriers, so the forecast underestimated the traffic at many of those airports.

One final example of an economic change that is not accessible to macroeconomic analysis is the entry and subsequent exit of IDE from the aviation market. IDE was a type of hub-and-spoke operation out of Washington Dulles with small jets serving smaller airports across New York and New England. Traffic from an airline like this appears as overflights in the traffic forecast. This increase in RJ overflights is not included in the overflight traffic forecast and leads to a mismatch with the 2005 comparison year. This mismatch has no implications for the accuracy of the operational analysis of the airspace redesign, because IDE-type operations are not expected in the actual 2006 traffic.

PHL 2011 Comparison with the CEP Forecast

The NY/NJ/PHL airspace redesign forecast of PHL traffic for 2011 matches very well with the CEP forecast for 2012. The currently-observed hub-and-spoke pattern is visible in both demand profiles.

Conclusions

A forecast is accurate if it meets two criteria. First, it must support planning decisions. A forecast is not required to be exact in details, but to capture the general flow and magnitude of the traffic in a way that can show differences among the proposed alternatives. Second, it must be consistent with other forecasts that other bodies use to make their own decisions in their common area of interest. By that standard, the forecasts used in the NY/NJ/PHL Metropolitan Area Airspace Redesign are accurate.

The critical features of the traffic for the operational efficiency analysis are:

- Times of departure pushes,
- Usage of jet airways and departure fixes,
- Total demand,
- Mix of wake turbulence and engine type.

The forecast is an acceptable match on all counts. Its weakest feature is the structuring of departure banks out of PHL and the overall traffic counts at the minor airports. The tight departure banks at PHL will not appear in practice, because of the limitations of airport capacity. Though the demand for runways is in sharp spikes, the demand for the airspace will be smoothed out to a pattern that matches the observed traffic much better. As a result, the estimates of delay at PHL will be higher than actually observed, but the relative ranking of the alternatives will not be affected.

Another weakness of the forecast is in the traffic at minor airports, especially on the 90th percentile day. Fortunately, minor airports are underestimated, where the major airports are overestimated. The net demand at the departure fixes is acceptable.

The biggest difference in aircraft type between the forecast and the actual traffic is the unforeseen replacement of narrowbody jets by regional jets. This effect on the operational results has been addressed in Appendix B of the operational analysis;[5] the alternatives are all affected in the same way, so the relative ranking of the alternatives is unaffected.

The critical features of the traffic for the environmental analysis are:

- Usage of arrival and departure procedures,
- Total arrival and departure demand on the AAD,
- Day-night balance of traffic,
- Mix of engines.

The salient difference between the forecast and the actual traffic is in the change of demand from major airports to minor airports. These minor airports far from New York and Philadelphia would use the same airways, so the arrival and departure procedures at the hub airports are correctly used. The traffic counts of the AAD forecast are much closer to the 2005 actual AAD traffic than the 90th percentile day forecast is to the 2005 actual 90th percentile day traffic. The day-night balance is roughly correct, and the biggest unforeseen change in aircraft type was from narrowbody jets to regional jets, which is a minor change in noise and emissions characteristics.

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[5] Ibid.

Glossary

AAD	Annual Average Day
ALB	Albany County Airport
ATL	William B. Hartsfield Atlanta International Airport
BDL	Bradley International Airport
Bizjet	Business Jet
BOS	General Edward Lawrence Logan International Airport
BUF	Greater Buffalo International Airport
BWI	Baltimore-Washington International Airport
CEP	Capacity Enhancement Plan
CYYZ	Toronto/Pearson International Airport
DCA	Ronald Reagan Washington National Airport
DFW	Dallas/Fort Worth International Airport
DTW	Detroit Metropolitan Wayne County Airport
EEN	Dillant-Hopkins Airport
ETMS	Enhanced Traffic Management System
EWR	Newark Liberty International Airport
HPN	Westchester County Airport
IAD	Washington Dulles International Airport
IDE	Independence Air
ISP	Long Island MacArthur Airport
JFK	John F. Kennedy International Airport
LGA	LaGuardia Airport
MCO	Orlando International Airport
MDPC	Punta Cana International Airport
MEM	Memphis International Airport
MHT	Manchester Airport
MMU	Morristown Municipal Airport
OAG	Official Airline Guide
O-D	Origin-Destination

OEP	Operational Evolution Plan
OPSNET	Operational Network
ORD	Chicago O'Hare International Airport
ORH	Worcester Regional Airport
PBI	Palm Beach International Airport
PHL	Philadelphia International Airport
PIT	Pittsburgh International Airport
PVD	Theodore Francis Green State Airport
RDU	Raleigh-Durham International Airport
RJ	Regional Jet
ROC	Greater Rochester International Airport
SARS	Severe Acute Respiratory Syndrome
SFO	San Francisco International Airport
SYR	Syracuse Hancock International Airport
TEB	Teterboro Airport
TTN	Mercer County Airport
ZNY	New York Center