Wiley Post/Will Rogers Memorial Airport
MASTER PLAN UPDATE

Chapter 3
Forecast of Aviation Activity

DRAFT

December 2013

Prepared for

State of Alaska
Department of Transportation
& Public Facilities
2301 Peger Road
Fairbanks, AK 99709

Prepared by

PDC INC. ENGINEERS
1028 Aurora Drive
Fairbanks, AK 99709
T: 907.452.1414
F: 907.456.2707

12190FB

3 Forecast of Aviation Activity

Forecasts of future levels of aviation activity are the basis for making decisions in airport planning. A comprehensive forecast includes elements of socioeconomics, demographics, geography, and external factors. Barrow's location puts the community at the forefront of regional oil exploration and subsequently plays a large role in the aviation activity at Barrow Airport. In this aviation forecast, the impacts of increased oil exploration are discussed and presented as the high growth scenario in Section 3.4.2.

Reported base passenger enplanements at Barrow Airport for the year 2012 are 43,673. With a median 1.7% annual increase, enplanements could reach 61,183 by 2032.

Forecast operations for this Master Plan were developed using the same methodology as was used for the enplanement forecast; see Section 3.4.2. Operations at Barrow Airport are not formally recorded because there is no air traffic control tower. Consequently, operations estimates from a variety of sources were compiled to generate the base year estimate. The 2012 base year estimate of operations is 12,865, with 18,023 possible by 2032 using a mid-range growth rate of 1.7%.

The methodology used for the Barrow Airport air traffic forecast is based on the process recommended in FAA AC 150/5070-6B, *Airport Master Plans*, and in *Forecasting Aviation Activity by Airport* (FAA, 2001). These documents provide national guidance for the development of airport master plans and have been used since enactment of the Airport and Airways Development Act of 1970. Recommended steps include:

- **Step 1:** Identify aviation activity measures
- **Step 2:** Review previous airport forecasts
- **Step 3:** Gather data
- **Step 4:** Select forecast methods
- **Step 5:** Apply forecast methods and evaluate results
- **Step 6:** Compare forecast results with FAA's Terminal Area Forecasts
- **Step 7:** Obtain approval of the forecasts

This forecast is laid out according to these steps.

3.1 Step 1 – Identify Aviation Activity Parameters and Measures to Forecast

The level and type of aviation activity anticipated at an airport, as well as the nature of the planning to be done, determine the factors to be forecast. Generally, the most important activities for airfield planning are aircraft operations and the fleet mix, since these define the runway and taxiway requirements. Plans for general aviation airports require forecasts of aircraft operations and based aircraft to define runway, taxiway, and aircraft parking requirements. Airports with commercial service require forecasts of aircraft operations, fleet mix, and passenger enplanements. Enplanement numbers are particularly important, since they determine the size of important elements of airport infrastructure such as parking facilities and

access roads. Also, a large increase in passengers could trigger a change in future aircraft fleet mix through increased operations or larger aircraft. Barrow Airport is primarily a commercial services airport with some general aviation activity.

Practical considerations dictate the level of detail and effort that should go into an airport planning forecast (FAA, 2001). Air traffic activity at Barrow comprises commercial passenger and passenger-cargo-combination jets and turboprop aircraft, commercial cargo aircraft, single and twin-engine GA aircraft, corporate jets, and helicopters. Commercial operations, passenger enplanements, mail, and cargo have historically made up a significant percentage of the annual aviation activity. Other activities include military operations, regional search and rescue, touch-and-go operations, and other general aviation activities. The forecast for Barrow Airport will focus on:

- Passenger Enplanements: Air carrier, commuter/air taxi
- Aircraft Operations: Air carrier, commuter, general aviation, military
- Based aircraft: Single- and multi-engine, helicopter
- Air Cargo: Freight and mail

3.2 Step 2 – Collect and Review Previous Airport Forecasts

Relevant forecasts for Barrow and the surrounding area are summarized below. These include the FAA Terminal Area Forecast (TAF), the Alaska Aviation System Plan (AASP), the 2000 Barrow Airport Master Plan, the National Plan of Integrated Airport Systems (NPIAS), and the 2004 Northwest Alaska Transportation Plan.

3.2.1 Federal Aviation Administration Terminal Area Forecast

The FAA TAF projects the activity for airports across the nation. In Alaska, however, the TAF is not updated often and the data provided are not always accurate for non-towered airports. Nevertheless, the FAA guidance requires comparison of the Airport Master Plan (AMP) forecast with that of the TAF as part of the forecast approval process. The FAA TAF for Barrow Airport is summarized in Table 3-1. The TAF includes passenger enplanements, aircraft operations, and based aircraft for major uses of the airport (air carriers, air taxi and commuters, general aviation, and military).

Table 3-2 highlights the difference between historic TAF and actual passenger enplanements. Comparison of the TAF with the AMP forecast is presented in Section 3.7.

Table 3-1 – FAA Terminal Area Forecast (2012) Barrow Airport

Passenger Enplanements			Itinerant Aircraft Operations				Local GA Operations	Total Operations
Air Carrier	Commuter	Total	Air Carrier	Commuter/Air Taxi	GA	Military		
28,668	11,763	**42,077**	1,460	6,000	1,500	50	3,000	**12,010**

Table 3-2 – Passenger Enplanements (2004-2012), Barrow Airport

Source: FAA and US DOT, RITA

Year	TAF	ACAIS[1]	Difference (ACAIS – TAF)
2003	36,138	35,492	**(371)**
2004	35,240	35,178	**(62)**
2005	36,024	36,708	**684**
2006	38,013	38,888	**998**
2007	38,778	39,009	**231**
2008	40,197	40,503	**305**
2009	38,834	39,494	**660**
2010	40,907	40,141	**(767)**
2011	40,431	41,174	**421**
2012	42,077	43,673	**1,596**

3.2.2 Alaska Aviation System Plan

The AASP is a component of ADOT&PF's Statewide Transportation Plan. Most recently updated in 2008, the AASP contains forecasts of enplanements, cargo, operations, and based aircraft for 2015, 2020, and 2030. These forecasts are presented in Table 3-3.

Table 3-3 – Alaska Aviation System Plan Forecast, Barrow Airport

Barrow	2008 (base)	2015	2020	2030
Enplanements	**40,673**	**50,005**	**58,840**	**71,813**
Cargo Tonnage	**11,121**	**11,567**	**13,178**	**17,167**
Critical Aircraft	**737-200**	**737-200**	**737-200**	**737-200**
Aircraft Operations				
Commercial Operations	9,116	9,823	11,120	12,508
Based Aircraft – Single Engine	9	10	10	11
Based Aircraft – Multi-Engine	6	7	7	7
Based Aircraft – Jet	1	1	2	3
Based Helicopter	3	4	5	7
Military Operations	50	50	50	50
Total Aircraft Operations	**16,666**	**17,563**	**19,309**	**22,541**

[1] Air Carrier Activity Information System; see discussion in Section 3.3.1 for details

3.2.3 Barrow Airport Master Plan Update (2000)

In 2000, ADOT&PF updated the Barrow Airport Master Plan. This update forecasted aircraft operations and passenger enplanement forecasts as summarized below.

Table 3-4 – 2000 Barrow Airport Master Plan Update Aviation Forecast

	1998 (base)	2005	2010	2020
Enplanements	39,467	45,335	50,054	61,015
Cargo (tons)	12,000	14,362	16,329	21,107
Commercial Operations	12,050	12,376	12,634	13,226
GA Operations	3,900	4,238	4,514	5,173
Military Operations	50	50	50	50

3.2.4 National Plan of Integrated Airport Systems (NPIAS)

The NPIAS presents a five-year forecast of enplaned passengers and based aircraft. The current NPIAS forecast for Barrow (for the years 2013 to 2017, using 2011 as the base year) is presented in Table 3-5.

Table 3-5 – NPIAS Forecast Year 2013

Parameter	Qty.
Passenger Enplanements	40,141
Based Aircraft	8

3.2.5 Northwest Alaska Transportation Plan (2004)

The Northwest Alaska Transportation Plan was a multi-year effort to define and select a blueprint for the region's long-term transportation future. The plan is one of several regional, multi-modal transportation plans that are part of the Statewide Transportation Plan.

Table 3-6 – 2004 Northwest Alaska Transportation Plan Enplanement Forecast for Barrow[2]

Year	2005	2010	2015	2020	2025
Enplanements	41,305	44,544	47,680	50,998	54,301

3.3 Step 3 – Gather Data

FAA requires master plan forecasts to incorporate the number of aircraft operations for various categories of aircraft. Passenger enplanement, cargo, mail, and freight data are also required, and the governing AC specifies that population, employment rates, and socio-economic factors be included, as any of these can also affect the forecast.

[2] Base year 2000

Air traffic operations at Barrow Airport are not recorded on site because there is no air traffic control tower. Historical air traffic data for Barrow were collected from:

- FAA's Airport Master Record Form 5010
- FAA TAF
- U.S. Department of Transportation (USDOT) Bureau of Transportation Statistics
- NPIAS
- Northwest Alaska Transportation Plan
- AASP

Data also came from interviews with airport tenants, ADOT&PF maintenance personnel, oil companies, the US Coast Guard, and the Barrow FSS, as well as public meetings and user questionnaires provided data on operations, enplanements, and freight.

3.3.1 Historic Aviation Activity

The composition of aviation activity at BRW has changed considerably since the 2000 airport master plan. This is due to several factors, notably:

- Changes in the bypass mail program requiring USPS contract mail carriers to also carry passengers (2002)
- A series of mergers that consolidated Cape Smythe Air, Frontier Flying Service, Hageland Aviation, Era Aviation, and Arctic Circle Air into a single company, Era Alaska (2005-2010)[3]

These changes have significantly reduced both the number of air carriers and air taxis serving Barrow and the number of based aircraft. However, the number of operations and enplanements has steadily climbed. Likewise, renewed interest in regional oil exploration has brought additional charter and support aircraft to Barrow. The U.S. Coast Guard is also increasing its presence in the Arctic with additional operations utilizing Barrow Airport.

Historic passenger and cargo data are maintained by the FAA in the Air Carrier Activity Information System (ACAIS), a database that contains revenue passenger boarding and all-cargo data. USDOT is the main source of enplanement statistics for this database, collecting information from air carriers and commuters on Form 41 Schedule T-100. The USDOT Bureau of Transportation Statistics Research and Innovative Technology Administration (RITA) distributes these data through an online, query-able database.

[3] Note that even though these companies have merged, they still operate aircraft under the Hageland, Era, and Frontier names and report data on the Form 41 Schedule T-100 as individual carriers

Aircraft Operations

Table 3-7 contains aircraft operations forecast data for Barrow Airport from 2000 to 2012 as reported in the TAF.

Table 3-7 – TAF Historic Aircraft Operations (2000-2012), Barrow Airport

Year	Itinerant Operations				Local Operations		Total Operations
	Air Carrier	Air Taxi	GA	Military	GA	Military	
2000	3,200	4,000	1,500	50	3,000	0	**11,750**
2001	3,200	4,000	1,500	50	3,000	0	**11,750**
2002	3,200	4,000	1,500	50	3,000	0	**11,750**
2003	3,200	4,000	1,500	50	3,000	0	**11,750**
2004	3,200	4,000	1,500	50	3,000	0	**11,750**
2005	1,200	6,000	1,500	50	3,000	0	**11,750**
2006	1,200	6,000	1,500	50	3,000	0	**11,750**
2007	1,200	6,000	1,500	50	3,000	0	**11,750**
2008	1,200	6,000	1,500	50	3,000	0	**11,750**
2009	1,460	6,000	1,500	50	3,000	0	**12,010**
2010	1,460	6,000	1,500	50	3,000	0	**12,010**
2011	1,460	6,000	1,500	50	3,000	0	**12,010**
2012	1,460	6,000	1,500	50	3,000	0	**12,010**

In the absence of control tower records, the numbers of Airport Advisories issued by the Barrow FSS for the past six years were collected (Figure 3-1). Airport Advisories are generally requested by pilots before take-off and landing and thus can serve as an estimate of airport operations. Airport Advisories are not a complete count of operations, however, as pilots are not obligated to request one and they are only issued during FSS open hours. In Barrow, the FSS is open from 6:00 a.m. until 10:00 p.m.

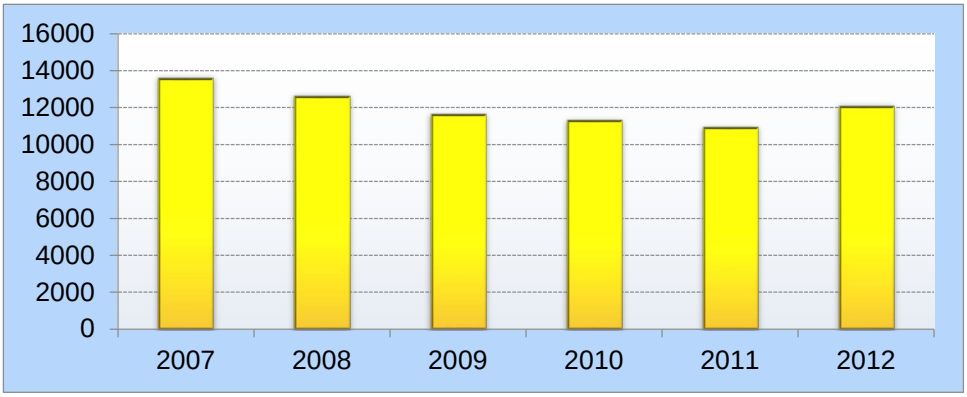

Figure 3-1 – Number of Aircraft Advisories Issued by Barrow FSS, 2007-2012

Source: FAA, 2013

The FAA's Form 5010, *Airport Master Record*, also estimates aircraft operations at Barrow Airport. Table 3-8 lists the operations estimated on the latest Form 5010 (dated March 7, 2013; last inspection date September 7, 2012).

Table 3-8 – Barrow Airport Master Record (Form 5010) Operations

Operation Type	Number of Operations
Air Carrier	1,460
Air Taxi	6,000
GA Local	3,000
GA Itinerant	1,500
Military	50
Total Operations	12,010

Fleet Mix and Based Aircraft

Table 3-9 below lists the fleet of aircraft, by commercial carrier or agency, that landed at Barrow Airport at least once during 2012 (RITA, 2013). Some smaller aircraft, such as the Cessna 200-series aircraft, are listed together as a single category.

Table 3-9 – Current Fleet Mix Using Barrow Airport

Carrier	Aircraft	
Alaska Airlines	▪ Boeing 737-400	▪ Boeing 737-700
Alaska Central Express	▪ Beech 1900	
Arctic Helicopters	▪ Robinson 44 (helicopter)	
Arctic Transportation	▪ Casa/Nurtanio C212 Aviocar	▪ Pilatus PC-12
Avjet Corporation	▪ McDonnell Douglas DC-8-72	
Bering Air Inc.	▪ Beech 1900 ▪ Beech 200 Super Kingair	▪ Cessna 208 Caravan
Era Aviation	▪ Beech 1900	▪ DeHavilland DHC-8
Frontier Flying Service	▪ Shorts 330	
Grant Aviation	▪ Beech 200 Super Kingair	
Hageland Aviation Service	▪ Beech 1900 ▪ Cessna 206/207/209/210 Stationair	▪ Cessna 208 Caravan ▪ Cessna 406 Caravan II ▪ Piper PA-31 Navajo
Lynden Air Cargo Airlines	▪ Lockheed L100-30	
Miami Air International	▪ Boeing 737-400	
North Slope Borough	▪ Beech 200 Super Kingair ▪ Bell 412 (helicopter)	▪ Learjet
Northern Air Cargo	▪ Boeing 737-100/200	▪ Boeing 737-300
Peninsula Airways, Inc.	▪ Saab-Fairchild 340/B	
Tatonduk Outfitters, Ltd.	▪ McDonnell Douglas DC-6A	▪ McDonnell Douglas DC-9-30
Warbelow's Air Ventures	▪ Piper PA-31 Navajo	
United States Coast Guard	▪ C-130	▪ MH-60 Jayhawk (helicopter)

The TAF identifies the number of based aircraft at Barrow as ranging from a high of 19 down to a low of eight over the past decade (see Table 3-10). The FAA's Form 5010, *Airport Master Record*, also indicates eight based aircraft.

Table 3-10 – Terminal Area Forecast Based Aircraft, 2003-2012

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Aircraft	18	19	19	19	19	19	8	8	8	8

Passengers

Passenger traffic at Barrow Airport has been increasing steadily over the past 10 years, growing at a compound annual rate of approximately 2.02% (Figure 3-2). A general upward trend in passenger traffic has continued since the early 1980s, with 2012 seeing an all-time high of 43,673 enplanements.

Figure 3-2 – Historic BRW Passenger Enplanements and Barrow Population, 2003-2012

Source: RITA, 2013

It is worthwhile to point out that passenger enplanements do not correlate with the resident population of Barrow. In Figure 3-2, you can see that while the population of Barrow declined from 2003 to 2007, enplanements continued to increase. The Barrow population has been steadily increasing since 2007, with a net population growth of 1.7%. During that same time period, passenger enplanements grew at a rate of 1.9%.

Oil prices and the overall economy may better explain the growth in passenger enplanements in Barrow. Figure 3-2 shows the increase in enplanements from 2006 to 2008 as oil prices rapidly increased and then a dip in 2009 as the Great Recession hit Alaska. There is then a recovery in enplanements in 2010 as the Alaska economy recovered and a sharper rise in 2011 as oil prices climbed back toward $100/barrel. This pattern is possibly attributable to rising NSB property tax revenues associated with higher oil prices, greater spending on capital projects, and more trips to Barrow associated with increased oil exploration.

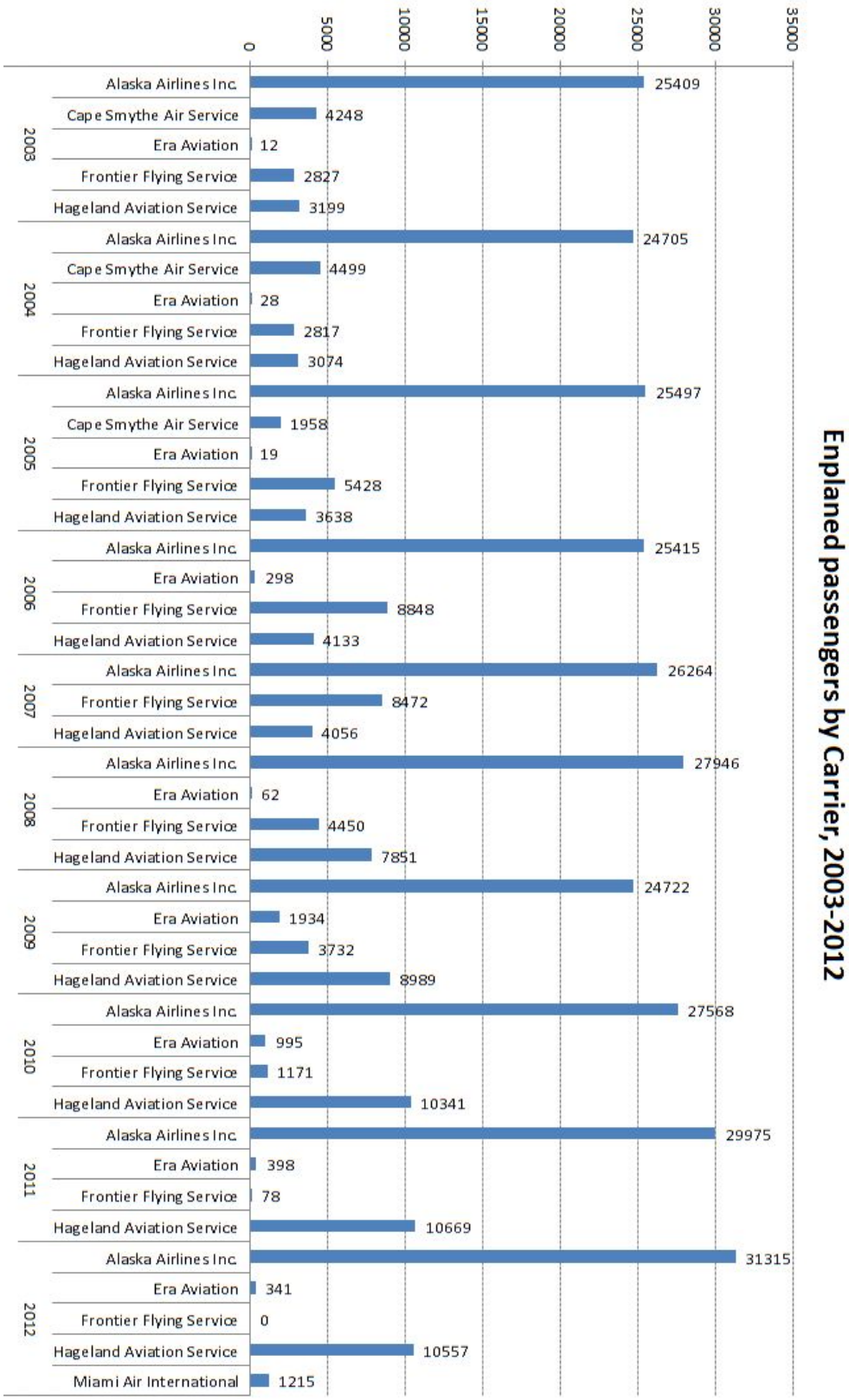

Figure 3-3 – Barrow Enplaned Passengers by Carrier, 2003-2012
source: ACAIS

Air carriers and air taxis currently providing scheduled passenger service to/from Barrow include:

- Alaska Airlines
- Era Alaska
  - Hageland Aviation Service
  - Era Aviation

Other air taxis provide periodic, on-demand passenger charters to Barrow from nearby villages and the larger population centers of Fairbanks and Anchorage. Additionally, Miami Air International provided chartered passenger service to Barrow for several weeks during 2012 to support Royal Dutch Shell's offshore oil exploration. The Miami Air charters carried 88 passengers aboard 737-400 aircraft direct from Anchorage. These passengers were transported to Shell's offshore oil exploration rigs via contract helicopters. Over 1,200 Shell workers passed through BRW, representing over 2% of total 2012 enplanements. There is also a seasonal helicopter charter operating from BRW.

Figure 3-3shows the breakdown of passenger enplanements by carrier. Since 2003, Barrow has seen an increase in passenger enplanements but a consolidation of passenger service to two primary carriers. Alaska Airlines accounts for the majority of scheduled passenger enplanements at BRW, with 31,315 in 2012. Hageland Aviation Service carries the next most passengers, with 10,557 enplanements in 2012.

Freight and Mail

Air transportation of freight and mail to rural Alaska is critical to the sustainability of communities that are not connected to the road system. Coastal communities such as Barrow can receive barge shipments during the ice-free months, but rely on air service to deliver goods the rest of the year.

The introduction of the bypass mail program in 1985 allowed rural Alaskans to send and receive First Class mail at Fourth Class rates. Delivery of mail by air at these favorable rates has facilitated the flow of goods to rural Alaska. Bypass mail destined for Barrow is trucked to Deadhorse and then flown to Barrow.

Figure 3-4 shows the historic mail volumes passing through BRW from 2003 to 2012. Mail volumes have been consistent during this time, with approximately 11 million pounds deplaned and 2.6 million pounds enplaned at BRW. Mail that is enplaned in Barrow is generally bound for the outlying North Slope villages.

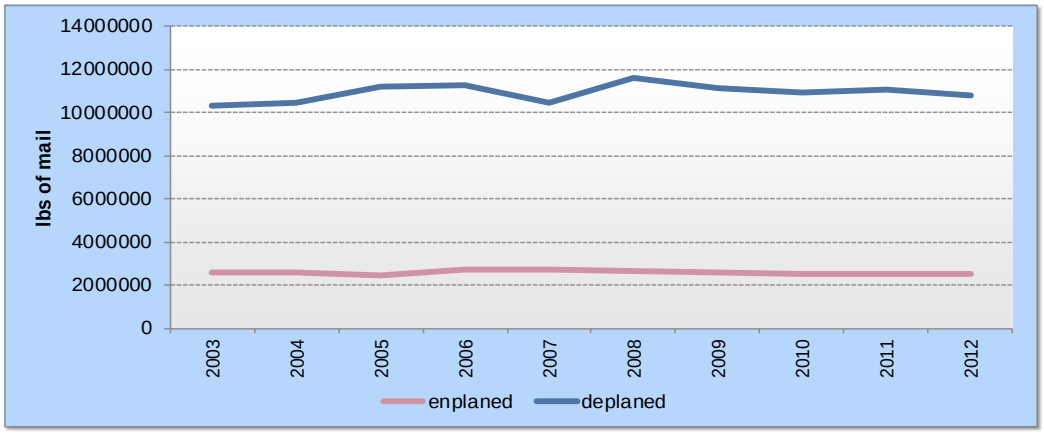

Figure 3-4 – BRW Mail Volumes, 2003-2012
Source: RITA, 2013

Figure 3-5 outlines the historic freight volumes passing through BRW. While not as consistent as the mail volumes, the 10-year trend for freight shows a slight increase in the amount of Barrow-bound freight (indicated as "deplaned") and a slight decrease in outbound freight (indicated as "enplaned"). The increase in inbound freight is likely due to recent large capital projects such as the airport reconstruction and the new hospital.

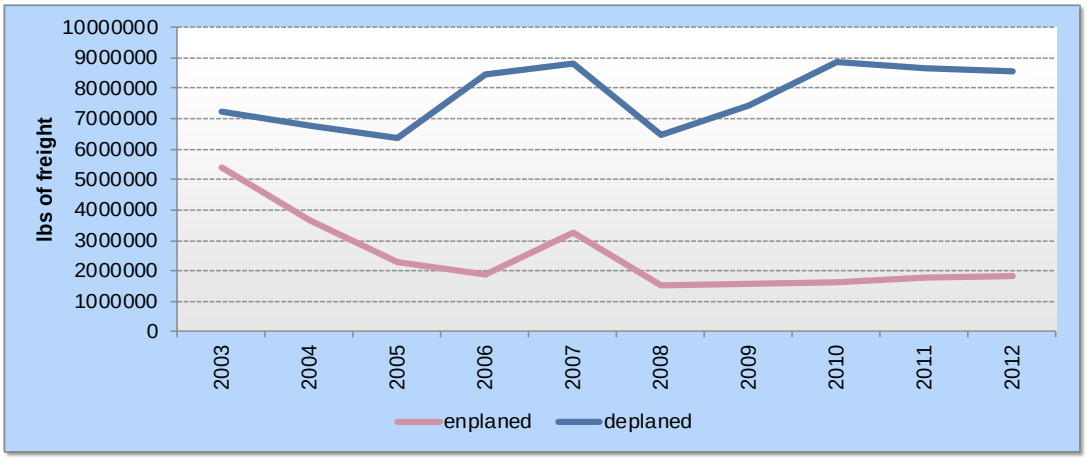

Figure 3-5 – BRW Freight Volumes, 2003-2012
Source: RITA, 2013

As at other Alaska hub airports, freight and mail destined for outlying communities are transported to Barrow on larger jet aircraft and then transferred to smaller commuter aircraft for distribution to these communities. This is clear in the breakdown of carriers transporting inbound versus outbound freight and mail (Figure 3-6; see Table 3-9 for a summary of the aircraft types each carrier uses).

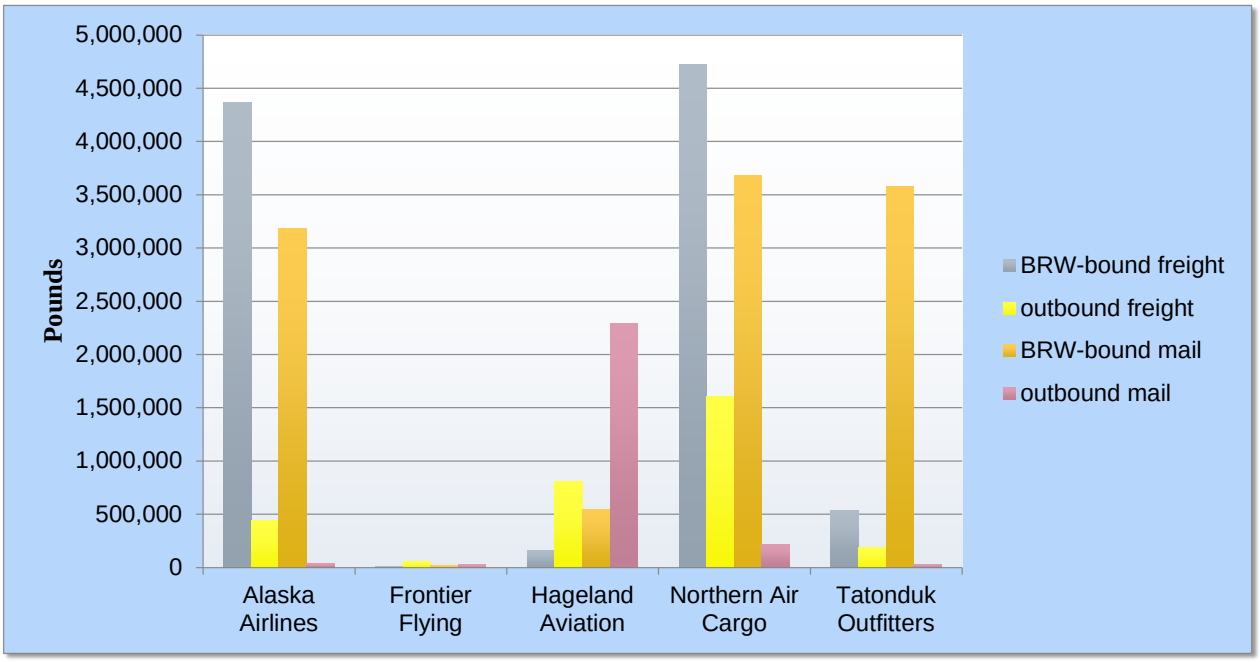

Figure 3-6 – Inbound versus Outbound Mail and Freight by Carrier, 2012
Source: RITA, 2013

As shown in Figure 3-6, Hageland Aviation delivers the majority of outbound mail to the surrounding communities, while Hageland and Northern Air Cargo carry the bulk of outbound freight. Conversely, Alaska Airlines, Northern Air Cargo, and Tatonduk Outfitters carry nearly all of the mail to Barrow, and Alaska Airlines and Northern Air Cargo transport most of the inbound airborne freight.

Air Traffic Data Collected During This Master Plan Update

The project team interviewed airport tenants and users, conducted online surveys, collected schedules, and factored in weather delays to supplement and validate published aircraft operation data. The resulting estimate of operations is presented in Table 3-11 below for comparison with the air traffic activity as reported by the FAA TAF, FAA 5010 Master Record, Northwest Alaska Transportation Plan, AASP, 2000 Barrow Airport Master Plan, and NPIAS.

The base year estimate of operations was compared with the number of Airport Advisories issued by the Barrow FSS. Since most pilots request this information during departure and landing, this served as a proxy for Air Traffic Control records that a towered airport would have. In 2012, FSS issued 12,060 Airport Advisories, which is close to the estimate of 12,865 operations.

Table 3-11 – Estimate of Aircraft Operations Based on Schedules and Contacts, 2012

Operator	Service	Scheduled Operations		Actual Operations[4]
		Frequency	Annual	
Alaska Airlines	Air Carrier	18/week	1,872	1,852
Era Alaska[5]	Commuter	46/week	4,784	4,473
Northern Air Cargo	Air Carrier	3/week	312	292
Everts Air Cargo	Air Carrier	3/week	312	292
Miami Air	Air Carrier	28/season	28	56
NSB SAR	GA	—		2,400
USCG	Military Transient	—		350
Air National Guard	Military Transient	—		150
Part 91 Transient	GA	—		2,000
Part 91 Local	GA	—		1,000

[4] Based on conversations with carriers and considering weather-related cancellations
[5] Era Alaska includes Era Aviation, Frontier Flying Service, and Hageland Aviation Service

Air Traffic Base-Year Summary

Table 3-12 presents a comparison of estimated base year (2012) aviation activity at Barrow Airport. The table includes data or estimates from the various sources identified in this report.

Table 3-12 – Historical and Forecast Air Traffic Data for Base Year 2012, Barrow Airport

	Forecast Year	Based Aircraft	Enplanements	Total Operations
2000 Barrow Airport Master Plan	2010	26	50,054	17,198
2004 Northwest Alaska Transportation Plan	2010	—	44,544	—
Alaska Aviation System Plan	2008	19	40,673	16,666
FAA TAF	2012	8	42,077	12,010
NPIAS	2013	8	40,141	—
FAA ACAIS	2012	—	43,673 (actual)	—
Form 5010	2012	8	—	12,010
PDC Estimate	**2012**	**9**	**43,673 (actual)**	**12,865**

3.4 Step 4 – Select Forecast Methods

While there are several acceptable techniques and procedures for forecasting aviation activity at a specific airport, most forecasts utilize basic statistical techniques such as linear regression, exponential smoothing, or share analysis. To determine which method is most appropriate, it is important to look at the factors affecting aviation demand. The following discussion is an overview of the factors affecting aviation demand at Barrow and the forecast method applied.

3.4.1 Economic Trends Affecting the Barrow Airport[6]

This section discusses economic trends affecting the Barrow Airport and provides a population forecast based on anticipated economic activity. While this analysis has considered both oil and gas activity and tourism, research suggests that tourism is going to have a minor impact on Barrow's population and the demand for aviation as compared to impacts of anticipated oil and gas activity.

Barrow Population Forecast

Northern Economics expects significant growth in the NSB and in Barrow as a result of future oil and gas activities. This section looks at a demographic-based population projection for 2010–2035 and then presents an economics-based projection that extends to 2050. Later sections go into detail about assumptions for oil and gas activities and tourism.

[6] Section 3.4.1 prepared by Northern Economics Inc.

The Alaska Department of Labor & Workforce Development (ADOL&WD) prepares population forecasts at the borough or census area level. The current forecast for the NSB, covering the years of 2010 through 2035, is shown in Figure 3-7. This projection is based on births, deaths, and migrations, and does not account for economic factors.

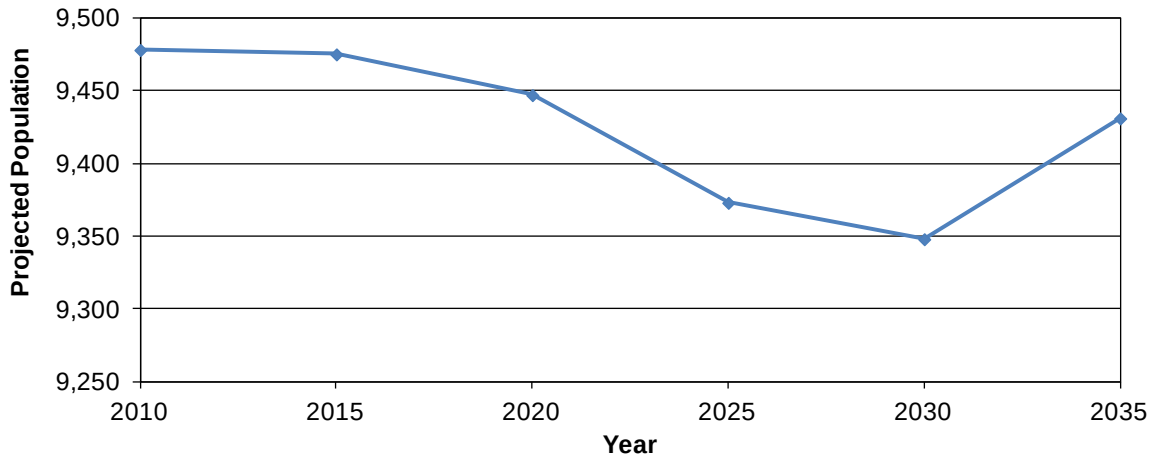

Figure 3-7 – Projected Population of the North Slope Borough, ADOL&WD, 2010–2035
Source: ADOL&WD (2013a) and Northern Economics, Inc. analysis

For planning purposes, it is important to consider the impact of economic conditions on population change in the NSB. As part of the socioeconomic studies associated with the Alaska Pipeline Project, Northern Economics used a dynamic economic impact model and a set of reasonably foreseeable future actions to develop population projections for the NSB for 2010–2050. Draft population projections from the regulatory filings are shown in Figure 3-8. These projections are based on the No Action Alternative, which does not include development associated with the Alaska Pipeline Project, but does include other anticipated oil and gas activities, as discussed in detail in the next section.

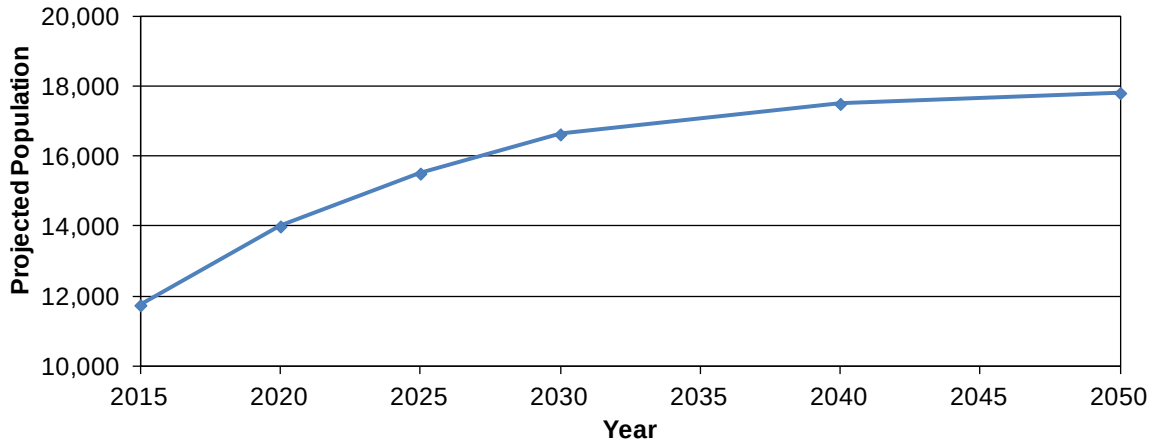

Figure 3-8 – Projected Population of the North Slope Borough, Alaska Pipeline Project's No Action Alternative, 2015–2050
Source: TransCanada and ExxonMobil (2011)

As shown in the figure, the NSB's population is anticipated to increase from 11,750 in 2015 to 17,810 in 2050 as a result of reasonably foreseeable future activities.

On average, Barrow has accounted for 60 percent of the NSB's population, based on U.S. Census Bureau counts and ADOL&WD estimates for 1980–2009 (from Northern Economics' internal database). The 2010 Census broke from the prior censuses and included several hundred oilfield workers who had not been recorded before. For the period of 2010 through 2012, Barrow has accounted for about 45 percent of the newly defined NSB population (ADOL&WD 2013b).

Assuming Barrow's 45 percent share of the borough's population holds true in the future, Figure 3-9 presents a population projection for Barrow for 2015–2050. The population is expected to grow to approximately 8,000 people by 2050 from an estimated 4,445 people as of 2012.

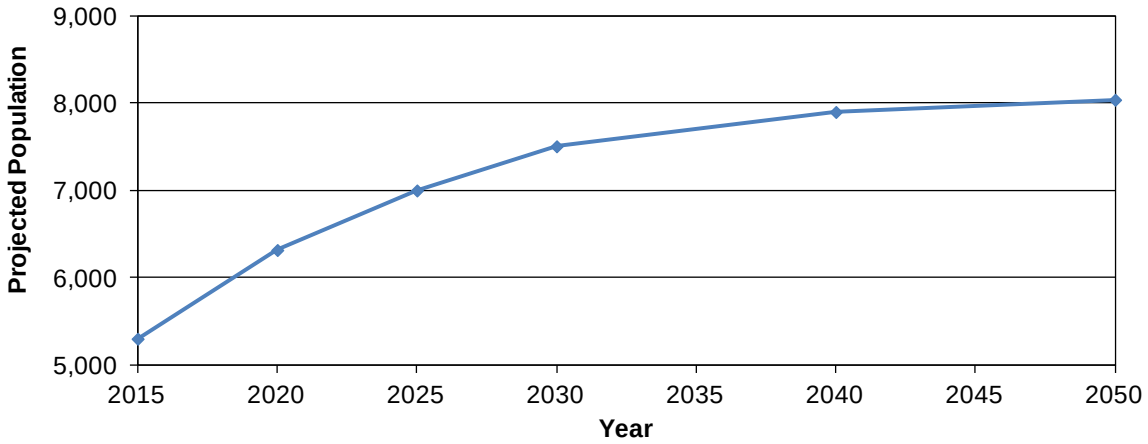

Figure 3-9 – Projected Population of Barrow, 2015–2050
Source: TransCanada and ExxonMobil (2011) and Northern Economics, Inc. analysis

Factors Affecting the Forecast

Two primary drivers of the forecast are activities associated with oil and gas development and a growing tourism sector. Of the two, oil and gas activity shows substantial opportunity for economic growth in Barrow and elsewhere in the NSB, while tourism appears to be stable. Each of these drivers is discussed below.

Economic and Demographic Effects of Anticipated Oil and Gas Development

While most of the oil and gas industry activity on the North Slope to date has been limited to where the existing oil field units/facilities are located—Prudhoe Bay, Kuparuk, and Alpine—certain industry activities such as stakeholder engagement, permitting, planning, and baseline studies take place in Barrow. Barrow serves as the regional hub for the North Slope communities and is also the administrative center for the NSB. There are state and federal agencies based in Barrow, as well as a number of businesses that provide support services to oil field operations. An increase in oil and gas activity in the NSB would also result in an increase in the level of economic activity in Barrow.

It is anticipated that oil and gas development would lead to workforce training opportunities, local jobs, and increased community investment, as well as tax revenue for the NSB, which creates significant employment multiplier effects in the region. Along with these economic changes would be social and demographic changes that would occur in local communities over the next two decades.

Figure 3-10 shows the different oil and gas activities occurring on the North Slope as of December 2012. See also Figure 2-1 for locations of Chukchi Sea offshore leases.

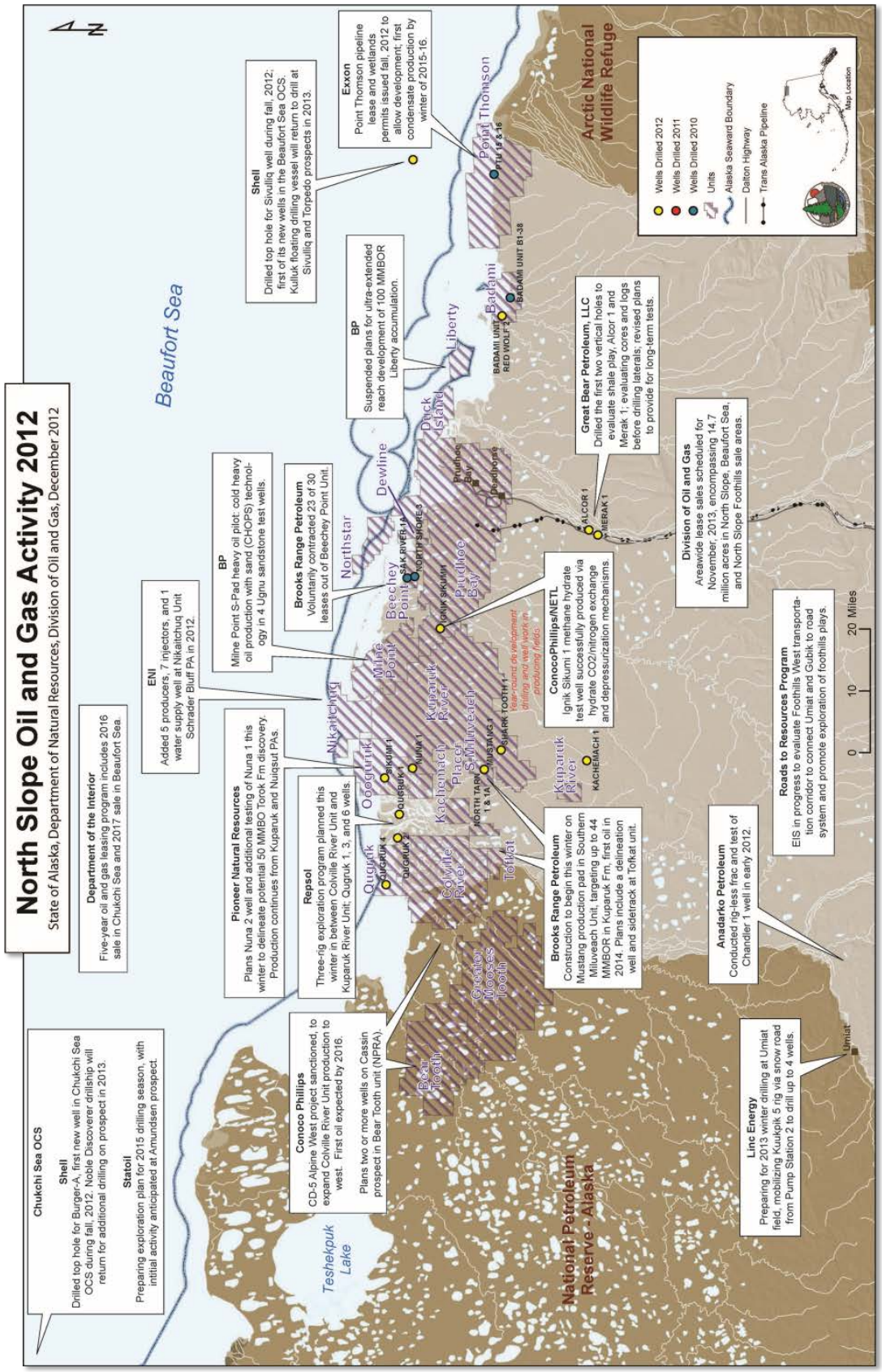

Figure 3-10 – North Slope Oil and Gas Activity 2012
Source: ADNR (2012)

Current on-shore and nearshore activities include:

- ConocoPhillips's CD-5 project, which is expected to start producing oil by 2016
- ENI's additional well work on the Nikaitchuq unit
- BP's heavy oil project on Milne Point
- Exxon's permitting activities for the Point Thomson development to allow development and production by winter of 2015-2016
- Pioneer Natural Resources' continued production from Kuparuk and Nuiqsut and additional testing and drilling (Nuna) to delineate a potential 50 million-barrel oil discovery
- Brooks Range Petroleum's Mustang project that is planned to begin construction winter 2012-2013, with first oil expected in 2014
- Repsol's three-rig exploration program planned this winter
- Great Bear Petroleum, LLC's drilling activities (oil from shale)
- Linc Energy's preparation for 2013 winter drilling at the Umiat field involving mobilization of a rig via ice road from Pump Station 2 to drill up to 4 wells
- Anadarko's fracking and testing at Chandler prospect

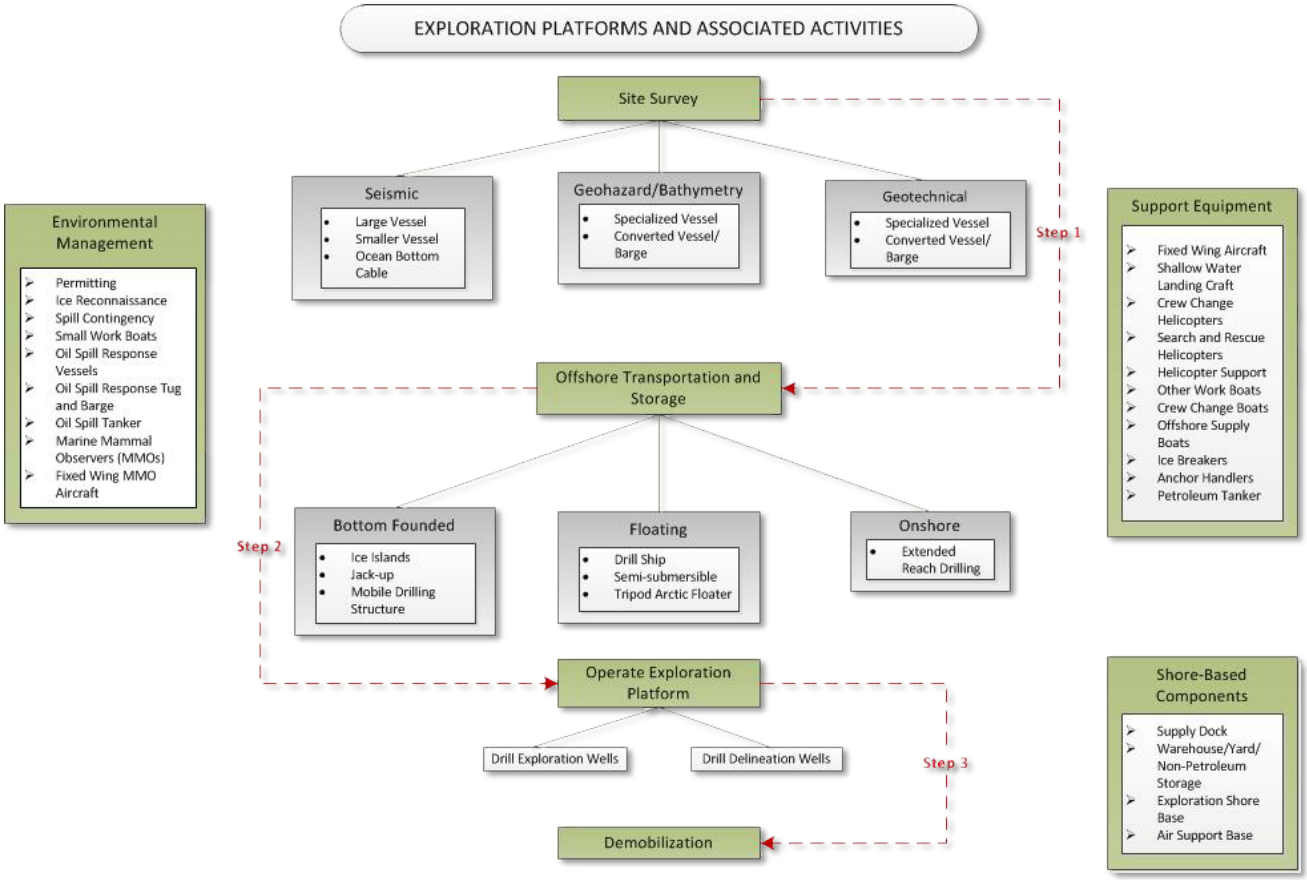

Figure 3-11 – Exploration Activities Associated with Oil and Gas Development in the OCS

Source: Northern Economics, Inc.

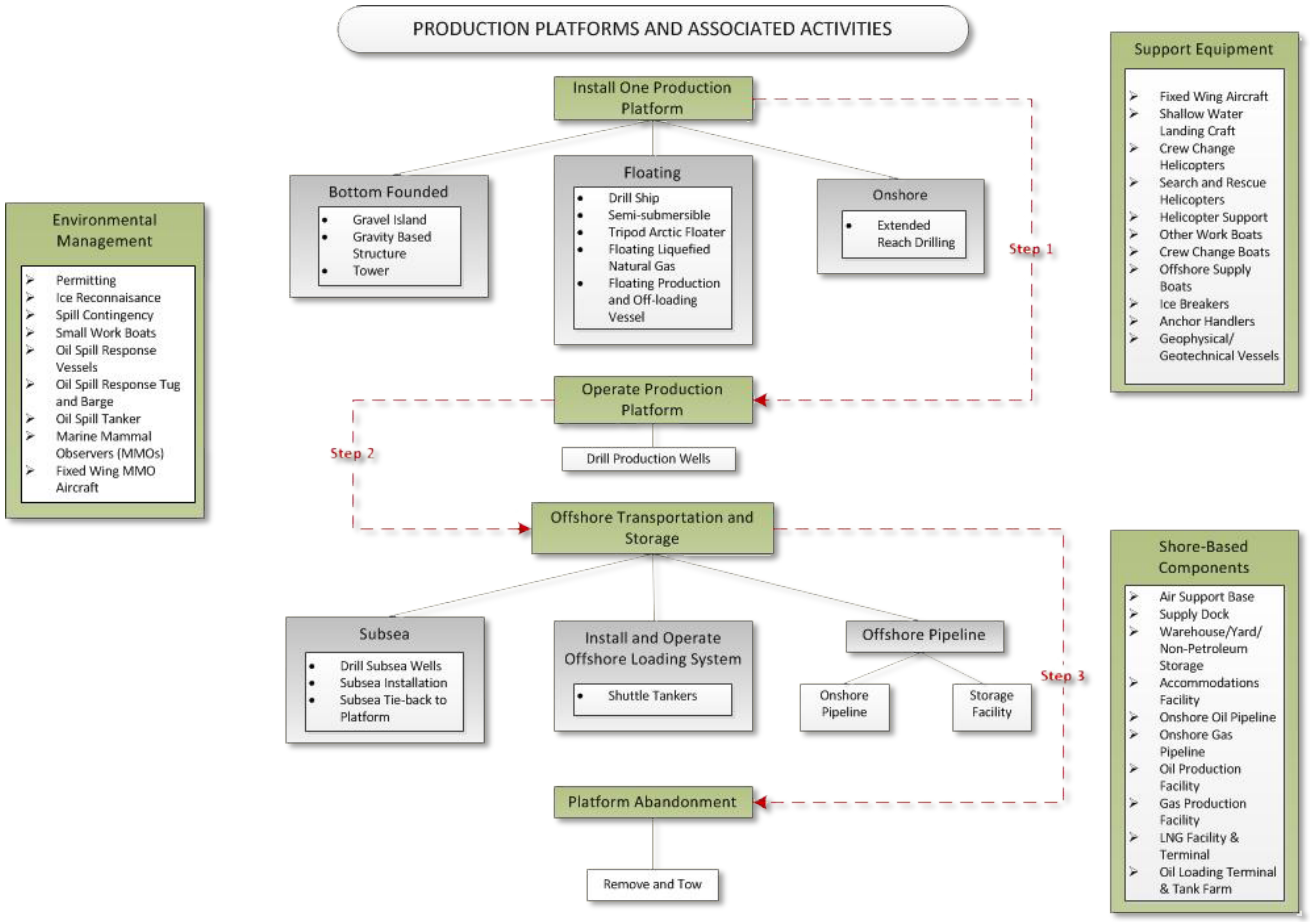

Figure 3-12 – Production Activities Associated with Oil and Gas Development in the OCS

Source: Northern Economics, Inc.

With respect to oil and gas activities in the Outer Continental Shelf (OCS), consisting of the Beaufort and Chukchi Seas, Shell has already started exploratory drilling in its Sivulliq and Burger prospects. Shell has recently announced suspension of drilling activities in 2013, but it is expected to continue exploration activities in the near future. Statoil has started stakeholder consultations and baseline studies in preparation for exploration for its Amundsen project. Exploratory drilling is planned for the year 2015. ConocoPhillips has also started planning for exploration activities for its Devil's Paw prospect in the Chukchi Sea. The companies' exploration plans indicate a shorebase for air transportation will be located at the Deadhorse Airport. However, search and rescue aircraft (helicopter) will be stationed in Barrow in support of the drilling operations. Beyond the exploration phase, subsequent development and production activities in the OCS would require significant manpower resources and infrastructure. Figure 3-11 and Figure 3-12 are graphic representations of the nature of exploration and production activities associated with oil and gas development in the Beaufort and Chukchi OCS.

In addition, the U.S. Coast Guard officially began aviation operations in Barrow. The USCG program, called Arctic Shield 2012, is the largest deployment in the region to date and will allow 24-hour search and rescue. The Coast Guard sent two MH-60 Jayhawk helicopters with support teams to Barrow to reduce response time to incidents in the Chukchi and Beaufort Seas. From July to October 2012, the

Coast Guard had two teams working from a rented hangar at the Wiley Post-Will Rogers Memorial Airport in Barrow. The crew followed the same rotation used by North Slope oil workers, with 2 to 3 weeks at the location at a time. The aviation and the communications detachment included a total of 26 people (*Alaska Journal of Commerce*, July 2012).

This future industrial development is expected to reverse the declining trend in the region's population. Figure 3-13 shows the historical population in the community of Barrow from 2000 to 2011. In the future, the community is expected to see in-migration from former residents and from neighboring communities who moved to larger communities to seek employment opportunities.

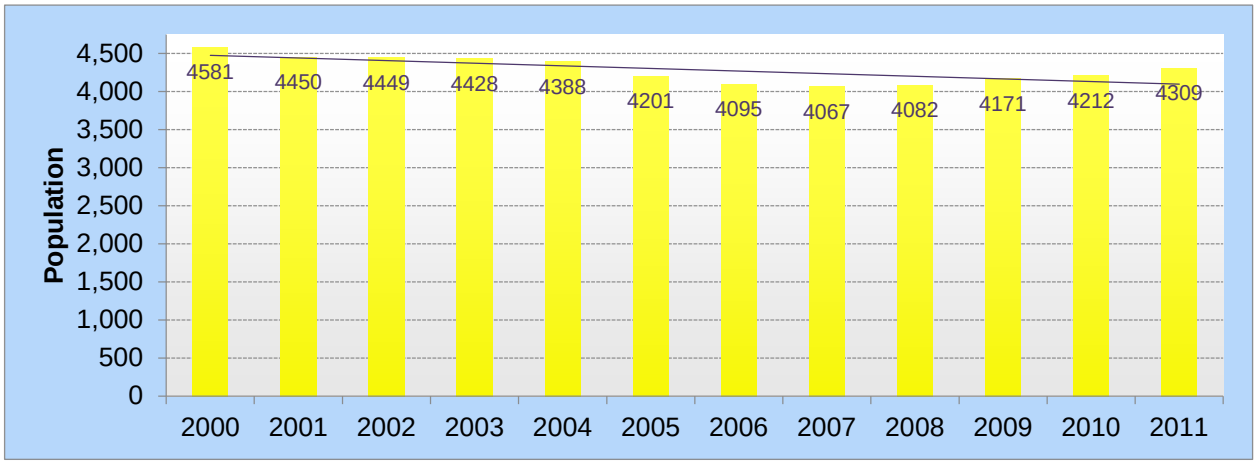

Figure 3-13 – Population in Barrow, 2000-2011
Source: ADOL&WD (2013b) and Northern Economics, Inc. analysis

The projected increase in employment and population is based on a structural economic forecasting and policy analysis model that integrates input-output, computable general equilibrium, econometric and economic geography methodologies. The model is dynamic, incorporating economic responses to wage, price, and other economic and demographic factors, on forecasts and simulations generated on an annual basis through the year 2050. Projected employment and population changes in Barrow are primarily attributed to the reasonably foreseeable future oil and gas activities in the North Slope. The model assumptions resulted from an information collection process aimed at deriving a reasonably foreseeable portrait of the economic future for Alaska. The assumptions reflect the combined information from published reports, project proponents, and statements from industry and government representatives.

Economic and Demographic Effects of Anticipated Tourism Growth

Northern Economics interviewed three tour companies that provide Barrow trips. Major attractions for tourism are Point Barrow (the northernmost point of the United States and a place where tourists can touch the Arctic Ocean), wildlife viewing, the whale harvest, and the Iñupiat Heritage Center. While all three operators said that their businesses are doing well post-recession, only one indicated that there was a strong upward trend in business.

One of the attractions for a trip to Barrow is the Iñupiat Heritage Center. Northern Economics contacted staff at the center to learn about trends and to gather visitation information that serves as a proxy for tourism activity. Visitor numbers for the last 10 years are shown in Table 3-13. While the center has had a fairly consistent number of visitors each year, there are no strong trends suggesting growth in either Tundra Tours or general traffic.

Table 3-13 – Iñupiat Heritage Center Visitor Numbers, 2003–2012

Source: Glenn (2013)

Year	Number of Visitors		
	Tundra Tours	General Public	Total
2003	—	14,875	**14,875**
2004	—	17,183	**17,183**
2005	—	21,456	**21,456**
2006	3,654	13,698	**17,352**
2007	2,431	15,476	**17,907**
2008	2,321	11,118	**13,439**
2009	1,565	16,700	**18,265**
2010	1,764	16,077	**17,841**
2011	1,745	17,445	**19,190**
2012	1,926	13,241	**15,167**

3.4.2 Forecast Method

Passenger enplanements, aircraft operations, and cargo shipments are not directly correlated with the population trends of Barrow or the NSB. Consequently, forecasting future aviation activity at Barrow Airport is not simply a matter of applying a growth rate based solely on population growth. Instead, a realistic forecast must consider other factors such as oil exploration, economic growth, tourism, State spending, and other factors. The following three scenarios outline the methods for forecasting aviation activity for Barrow Airport.

Low Growth Scenario

The low growth scenario represents a situation in which oil and gas exploration is minimal or non-existent. Oil prices remain steady or decline due to weak world economies and exploration in the region is stagnant. Likewise, USCG presence at Barrow is minimal and no base of operations is developed. Barrow population growth continues at historic levels.

The population of Barrow has grown at a compound annual rate of approximately 0.50% over the past 20 years. With no oil exploration in the region it is reasonable to expect that aviation demand will not continue to increase at the recently observed rates. Therefore, this rate (0.50%) was chosen to represent the aviation demand growth under the low growth scenario, and was applied to passenger enplanements, cargo, and operations. Factors contributing to the low growth scenario include:

- Aircraft operations related to oil exploration (charter flights for crew changes, helicopter support, USCG monitoring, etc.) cease

- Stagnant oil prices mean NSB and State revenues remain flat or decrease, thereby reducing capital expenditures and government travel
- USCG presence returns to pre-exploration levels

Medium Growth Scenario

The medium growth scenario considers continued oil and gas exploration activities similar to those undertaken in 2012. Consequently, the USCG maintains an active presence in the region and begins development of a base of operations at BRW. The population of Barrow continues to grow at recent levels, reflecting an influx of people seeking employment.

A mid-level growth rate of 1.7% was selected to represent the medium growth scenario. This rate reflects the U.S. Department of Energy's baseline forecast of crude oil prices through 2040 and is very close to the recent annual growth rate of the Barrow population (1.65%), the average U.S. Gross Domestic Product (GDP) over the past decade (1.9%), and the average growth rate of enplanements (2.02%) and Barrow-bound cargo (1.7%) for the last 10 years—a period of increasing oil prices and exploration. We believe this is a reasonable growth rate because:

- Aviation activity remains correlated with oil exploration
  - Crew changes and support capabilities (e.g., search-and-rescue)
  - Development of support infrastructure (personnel housing, warehouses, etc.)
- Moderate growth in oil prices allows Borough and State spending on capital projects, as well as government-related travel to the region
- USCG presence continues at 2012 levels

High Growth Scenario

The high growth scenario is based on increased offshore oil exploration, new Barrow-based onshore oil and gas exploration (NPR-A), continued USCG presence, and growth in the tourism sector. This scenario assumes world economies show strong recovery and North Slope oil prices rise.

To forecast the growth under this scenario, we chose a growth rate of 3.0%. This is based on the forecast U.S. GDP growth rate of 3%. As domestic GDP grows, demand for oil typically follows (US Energy Information Administration, 2013). Domestic, as well as global demand for oil will likely result in increased oil exploration and production activity across Alaska's North Slope. The increased activity will lead to increased demand for air travel as workers are transported to the region.

The high growth scenario considers:

- Increasing oil and gas exploration in the Chukchi Sea
- New onshore oil and gas exploration in the western NPR-A
- USCG presence in Barrow and development of facilities
- Accelerated private development of support facilities such as warehouses and crew housing that requires freight shipments via air, additional construction personnel, etc.
- Increasing North Slope oil prices and subsequent increases in NSB revenues
- Increasing Barrow population

3.5 Steps 5 & 6 – Apply Forecast Methods, Evaluate Results, and Summarize

This section applies the three growth scenarios discussed above to develop air traffic forecasts for passenger enplanements, cargo, and aircraft operations for Barrow Airport for the next 20 years.

Figure 3-14 shows the historical and forecast passenger enplanements for Barrow Airport. The low, medium, and high growth scenarios are presented, as well as the TAF (for comparison per FAA guidance, *Forecasting Aviation Activity by Airport*).

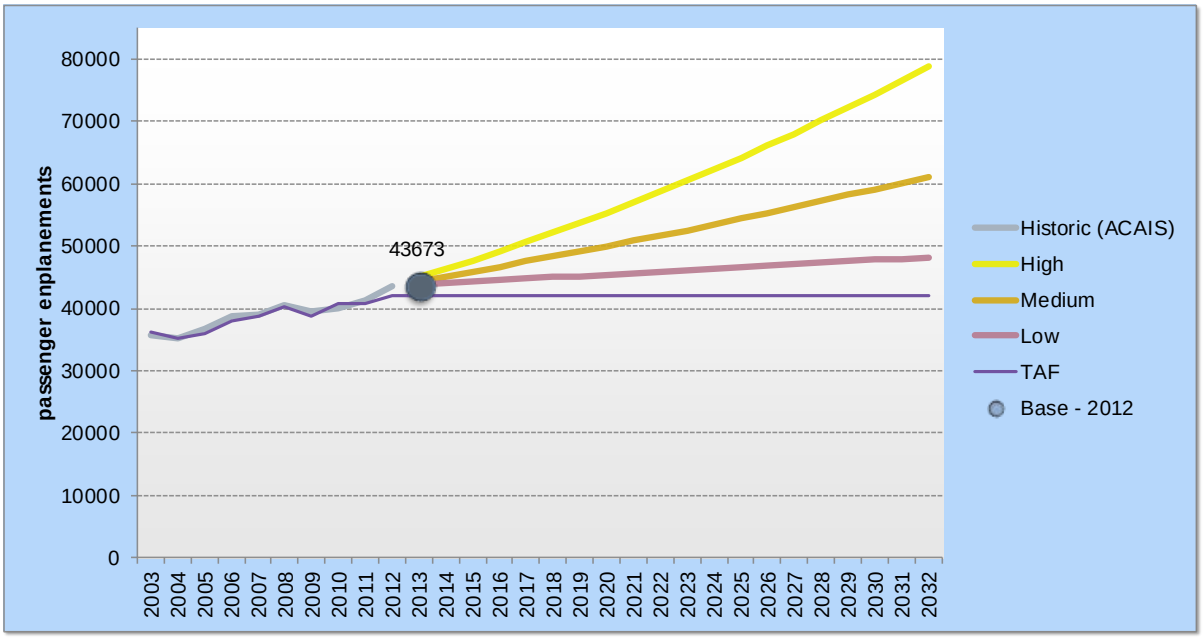

Figure 3-14 – Historic and Forecast Passenger Enplanements

Figure 3-15 shows historic and forecast cargo volumes (enplaned and deplaned) for Barrow Airport. Cargo includes freight and mail. Showing cargo volumes prior to 2003 would be misleading because the changes to the Rural Air Service Improvement Act in 2002 changed the reporting requirements for freight and mail.

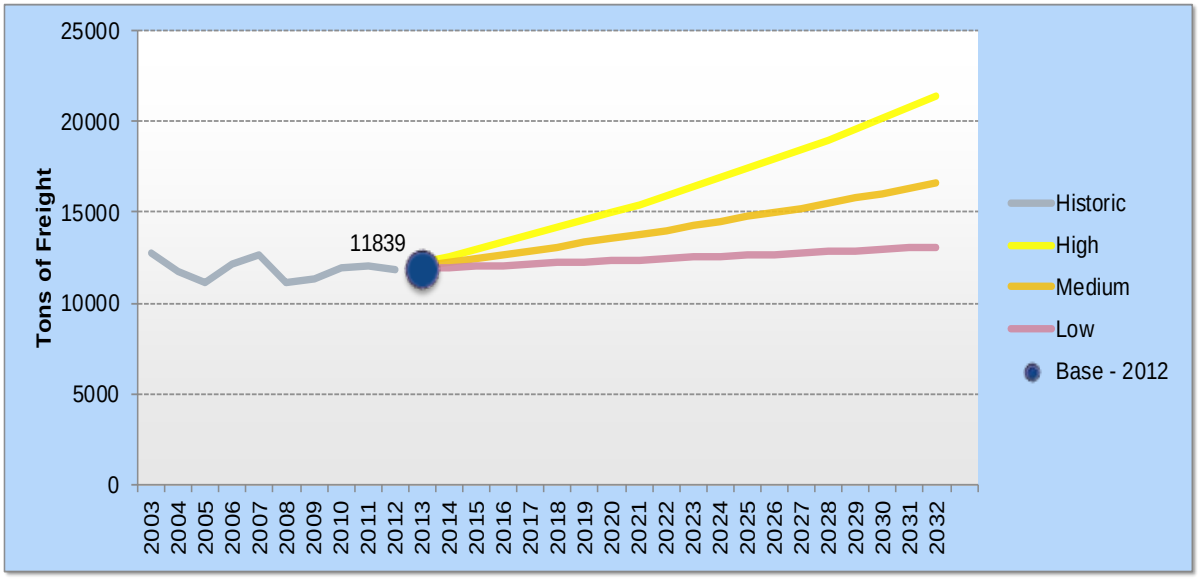

Figure 3-15 – Historic and Forecast Cargo Volumes

Figure 3-16 shows the high, medium, and low forecasts of aircraft operations, as well as the Terminal Area Forecast. The TAF is not updated for BRW and does not reflect actual conditions.

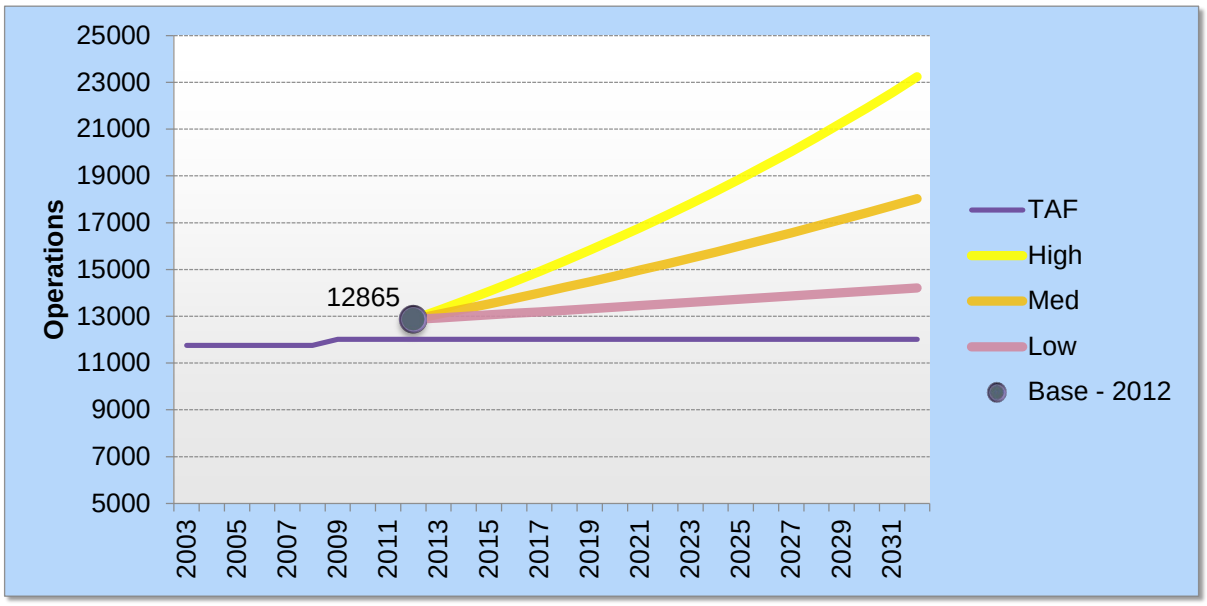

Figure 3-16 – Aircraft Operations Forecast and Historic TAF Operations

3.6 Step 7 – Compare Airport Planning Forecast Results with TAF

Table 3-14 compares the updated air traffic forecast for Barrow Airport (using the medium scenario growth rate of 1.7%) to the FAA TAF. As mentioned previously, the TAF for BRW is not updated frequently and does not reflect actual conditions at the airport.

Table 3-14 – TAF/Airport Planning Forecast Comparison

	Year	Airport Forecast (AF)	TAF	AF/TAF % Difference
Enplanements				
Passenger Enplanements	2012	43,673	42,077	4%
	2017	47,514	42,077	13%
	2022	51,692	42,077	23%
	2032	61,183	42,077	45%
Operations				
Commercial Operations	2012	6,965	7,460	(7%)
	2017	7,577	7,460	2%
	2022	8,243	7,460	10%
	2032	9,758	7,460	31%
Military Operations	2012	500	50	900%
	2017	544	50	988%
	2022	592	50	1084%
	2032	700	50	1300%
GA Operations (local + itinerant)	2012	5,400	4,500	20%
	2017	5,875	4,500	31%
	2022	6,391	4,500	42%
	2032	7,565	4,500	68%
Total Operations	**2012**	**12,865**	**12,010**	**7%**
	2017	**13,996**	**12,010**	**17%**
	2022	**15,227**	**12,010**	**27%**
	2032	**18,023**	**12,010**	**50%**

3.7 Step 8 – Obtain FAA Approval

FAA AC 150/5070-6B provides guidance on airport master plans. The chapter on aviation forecasts concludes that forecasts must be:

- Realistic
- Based on the latest available data
- Reflect the current conditions at the airport
- Supported by information in the study
- Provide an adequate justification for the airport planning and development

FAA AC 150/5070-7, *The Airport System Planning Process*, recommends that aviation forecasters use their professional judgment in determining what is reasonable. PDC believes that this forecast represents a realistic outlook of aviation demand at Barrow Airport.

The FAA approved this forecast on August 29, 2013 (see Appendix A for approval email).

Table 3-15 – Barrow Airport Forecasts and Growth Rates

	Base Year: 2012					Average Annual Compound Growth Rates			
	Base Year	Base +1 Year	Base +5 Years	Base +10 Years	Base +15 Years	Base to +1	Base to +5	Base to +10	Base to +15
Passenger Enplanements									
Air Carrier	32,530	33,083	35,391	38,503	41,889	1.7	1.7	1.7	1.7
Commuter	11,143	11,332	12,123	13,189	14,349	1.7	1.7	1.7	1.7
Total Enplanements	**43,673**	**44,415**	**47,514**	**51,692**	**56,238**	**1.7**	**1.7**	**1.7**	**1.7**
Operations									
Itinerant									
Commercial									
Air Carrier	*1,908*	*1,940*	*2,076*	*2,258*	*2,457*	*1.7*	*1.7*	*1.7*	*1.7*
Commuter/Air Taxi	*4,473*	*4,549*	*4,866*	*5,294*	*5,760*	*1.7*	*1.7*	*1.7*	*1.7*
All-Cargo Carriers	*584*	*594*	*635*	*691*	*752*	*1.7*	*1.7*	*1.7*	*1.7*
Total Commercial	6,965	7,083	7,577	8,243	8,969	1.7	1.7	1.7	1.7
General Aviation	2,000	2,034	2,176	2,367	2,575	1.7	1.7	1.7	1.7
Military	500	509	544	592	644	1.7	1.7	1.7	1.7
Local									
General Aviation	3,400	3,458	3,699	4,024	4,378	1.7	1.7	1.7	1.7
Military	—	—	—	—	—				
Total Operations	**12,865**	**13,084**	**13,996**	**15,226**	**16,566**	**1.7**	**1.7**	**1.7**	**1.7**
Based Aircraft									
Single Engine (Non-Jet)	4	4	4	5	5	0%	0%	25%	0%
Multi Engine (Non-Jet)	2	2	2	2	3	0%	0%	0%	50%
Jet Engine	1	1	1	1	1	0%	0%	0%	0%
Helicopter	2	2	2	2	3	0%	0%	0%	50%
Other	—	—	—	—	—	—	—	—	—
Total Based Aircraft	**9**	**9**	**9**	**10**	**12**	**0%**	**0%**	**11%**	**20%**

3.8 References

Alaska Department of Labor & Workforce Development (ADOL&WD). 2013a. Alaska Population Projections 2010 to 2035, by Borough/Census Area. Available at http://laborstats.alaska.gov/pop/projected/data/BCAProjections.xls. Accessed January 29, 2013.

Alaska Department of Labor & Workforce Development (ADOL&WD). 2013b. Population Estimates, Population 2010-2012. Available at http://laborstats.alaska.gov/pop/estimates/data/TotalPopulationBCA.xls. Accessed January 29, 2013.

Alaska Department of Natural Resources (ADNR). 2012. North Slope Oil and Gas Activity 2012. Available at http://dog.dnr.alaska.gov/GIS/Data/ActivityMaps/NorthSlope/North_Slope_Oil_and_Gas_Activity_Map_20121206.pdf. December 6, 2012.

Explore Tours. 2013. Personal communication with Northern Economics, Inc. February 18, 2013.

Glenn, Patuk. Iñupiat Heritage Center. 2013. Visitor numbers, 2003–2012. Spreadsheet provided by e-mail. February 28, 2013.

Iñupiat Heritage Center. 2013. Personal communication with Northern Economics, Inc. February 18, 2013.

Northern Alaska Tour Company. 2013. Personal communication with Northern Economics, Inc. February 18, 2013.

TransCanada and ExxonMobil. 2011. Alaska Pipeline Project Draft Resource Report 5 – Rev 0, Socioeconomics. FERC Docket No. PF09-11-000. USAG-UR-SGREG-000008. Available via the Office of the Federal Coordinator for Alaska Natural Gas Transportation Projects website at http://www.arcticgas.gov/sites/default/files/documents/app-draft-resource-report-5.pdf. Accessed March 26, 2013. December 2011.

Tundra Tours. 2013. Personal communication with Northern Economics, Inc. February 18, 2013.