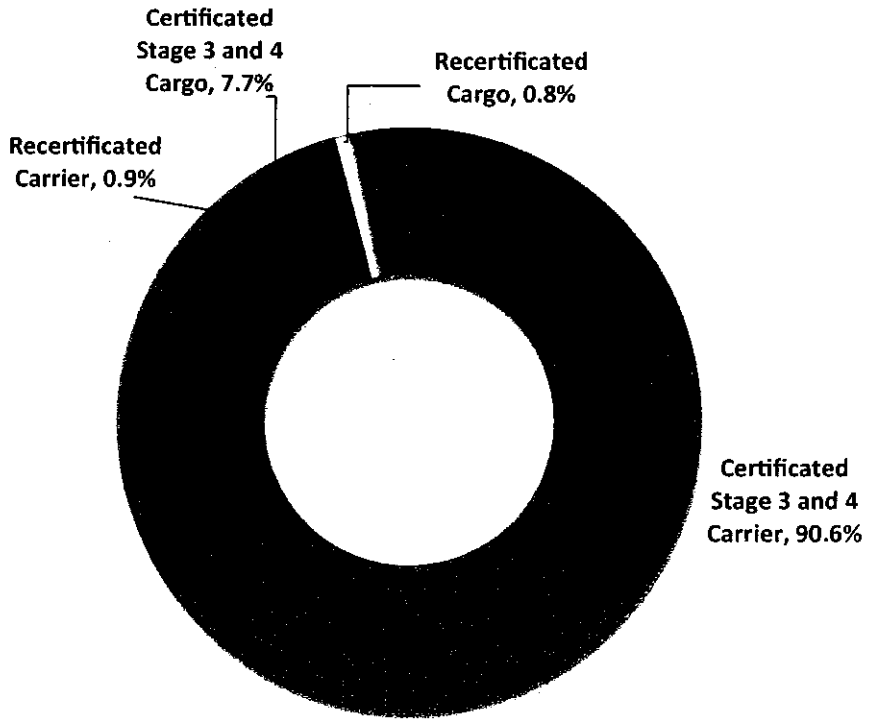
Figure 6-3 Commercial Nighttime Jet Operations Part 36 Stage Breakdown (2009)



Notes: Full Stage 3 refers to originally manufactured Stage 3, which do not meet Stage 4 requirements.
Stage 4 refers to originally manufactured Stage 4 and Stage 3 which meet Stage 4 requirements.
Stage 2 Day and Night operations contribute less than 0.5 percent of operations.
Noise calculations include the 10 dB nighttime penalty.

Runway Use

Logan Airport's runways are shown in Figure 6-4. Runway use refers to the frequency with which aircraft utilize each of these runways during the course of the year, as dictated or permitted by availability, wind, weather, aircraft performance, demand, and air traffic control conditions. Runway 15R-33L and Runway 4R-22L are Logan Airport's longest runways; each is just over 10,000 feet in length. Runway 15R-33L is the preferred runway at night, with arrivals to Runway 33L and departures from Runway 15R, thus keeping flights over Boston Harbor. Runway 22R is used primarily for departures, and Runway 22L is used primarily for arrivals. Runway 9 is used for departures, and Runways 15R, 27, and 33L are used for both arrivals and departures. Runway 14-32 is unidirectional; there are no arrivals to Runway 14 and no departures from Runway 32. Additionally, Runway 14-32 can be used only during northwest wind conditions when winds are 10 knots or greater. Under certain northwest wind conditions, Runway 14-32 provides the FAA with a second arrival runway, thereby reducing delays at the Airport.

Table 6-4 Summary of Annual Jet Aircraft Runway Use[1]

	Runway									
	4L	4R	9	14[2]	15R	22L	22R	27	32[2]	33L
2004										
Departures	0%	5%	34%	NA	10%	4%	24%	18%	-	6%
Arrivals	6%	34%	0%	-	1%	12%	0%	24%	NA	23%
2005										
Departures	0%	5%	36%	NA	7%	1%	31%	13%	-	7%
Arrivals	8%	33%	0%	-	1%	11%	0%	29%	NA	17%
2006										
Departures	0%	4%	33%	<0.1%	3%	1%	40%	13%	-	6%
Arrivals	7%	29%	0%	-	1%	14%	0%	33%	0.2%	16%
2007										
Departures	0%	5%	31%	<0.1%	4%	1%	33%	7%	-	19%
Arrivals	5%	31%	0%	-	1%	15%	0%	36%	2%	11%
2008										
Departures	0%	6%	33%	<0.1%	3%	<0.1%	36%	6%	-	16%
Arrivals	6%	30%	0%	-	2%	17%	0%	33%	2%	11%
2009										
Departures	0%	7%	32%	0%	3%	2%	34%	6%	0%	16%
Arrivals	7%	31%	0%	0%	3%	17%	0%	30%	1%	11%

Source: Massport Noise Office and HMMH 2010.

Notes: The data reflect actual percentages of jet aircraft operations on each runway end. They should not be confused with effective runway use which is used by the Preferential Runway Advisory System (PRAS) to derive recommendations for use of a particular runway.
Jet aircraft are not able to use Runway 15L or 33R due to its length of only 2,557 feet.
Values may not add to 100 percent due to rounding.

1 Data for years prior to 2004 is available in *Appendix H, Noise Abatement.*

2 Runway 14-32 opened in late November, 2006. (Runway 14-32 is unidirectional with no arrivals to Runway 14 and no departures from Runway 32).

NA Runway was not available.

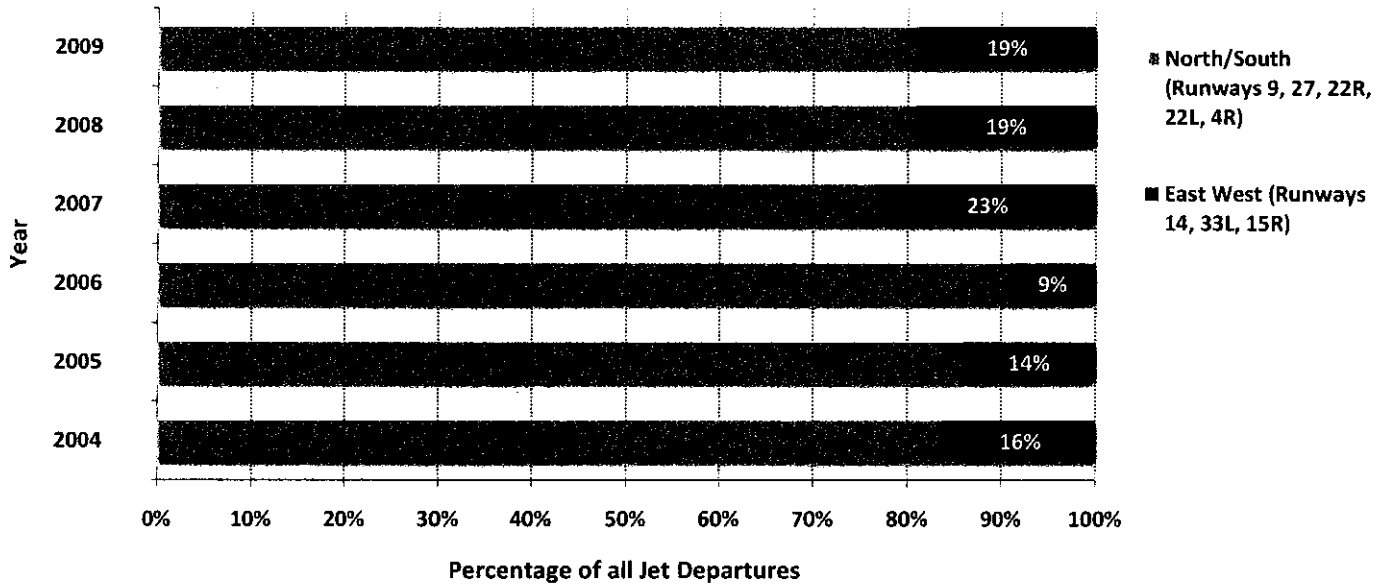
Preferential Runway Advisory System

Developed in 1982 and enhanced in 1990 and subsequent years, the Preferential Runway Advisory System (PRAS) is a set of short-term and long-term runway use goals that includes the use of a computer program that recommends to FAA air traffic controllers, runway configurations that will meet weather and demand requirements and provide an equitable distribution of the Airport's noise impacts on surrounding communities. The two primary objectives of the PRAS goals are to distribute noise in on an annual basis, and to provide short-term relief from continuous operations over the same neighborhoods at the ends of the runways.

PRAS Compliance

Under the PRAS, each runway end has a specific annual utilization goal, defined separately for departures and arrivals. The goals are defined in terms of effective usage, which applies a factor of 10 to nighttime (10:00 PM to

Figure 6-5 Jet Departures by Operating Direction



Runway use conditions in 2009 were as follows:

- Overall the Airport continued to be characterized by a north-south operating flow in 2009. Jet aircraft departures operated in this flow 81 percent of the time as shown in Figure 6-5.
- Combined arrivals to Runways 4L and 4R increased by 1 percent to 38 percent in use of both Runways 4L and 4R in 2009 compared to 2008. Departures from Runway 4R increased by 1 percent from 2008.
- Arrivals to Runway 22L remained at 17 percent in 2009. Departures on Runway 22L remained at 36 percent. Runway 22R arrivals decreased by 2 percent over 2008, with a corresponding 2 percent increase on Runway 22L. Runway 22R remained consistently the most used departure runway at Logan Airport. The new multilateration flight tracking system processes the parallel runway assignments better than the previous system, making the noise analysis more accurate.
- Departures on Runway 27 remained at 6 percent in 2009, and departures on Runway 9 decreased to 32 percent in 2009. Arrivals to Runway 27 decreased from 33 percent in 2008 to 30 percent in 2009 compared to 2008. During 2009, Runway 9-27 had extended weekend closings for resurfacing.
- Departures on Runway 33L remained at 16 percent in 2009, and departures on Runway 15R remained at 3 percent in 2009. Arrivals to Runway 15R increased from 2 percent in 2008 to 3 percent in 2009. Arrivals to Runway 33L remained the same at 11 percent compared to 2008. The departure use of Runways 33L and 27 are shown in Figure 6-6.

Table 6-4 Summary of Annual Jet Aircraft Runway Use[1]

	Runway									
	4L	4R	9	14[2]	15R	22L	22R	27	32[2]	33L
2004										
Departures	0%	5%	34%	NA	10%	4%	24%	18%	-	6%
Arrivals	6%	34%	0%	-	1%	12%	0%	24%	NA	23%
2005										
Departures	0%	5%	36%	NA	7%	1%	31%	13%	-	7%
Arrivals	8%	33%	0%	-	1%	11%	0%	29%	NA	17%
2006										
Departures	0%	4%	33%	<0.1%	3%	1%	40%	13%	-	6%
Arrivals	7%	29%	0%	-	1%	14%	0%	33%	0.2%	16%
2007										
Departures	0%	5%	31%	<0.1%	4%	1%	33%	7%	-	19%
Arrivals	5%	31%	0%	-	1%	15%	0%	36%	2%	11%
2008										
Departures	0%	6%	33%	<0.1%	3%	<0.1%	36%	6%	-	16%
Arrivals	6%	30%	0%	-	2%	17%	0%	33%	2%	11%
2009										
Departures	0%	7%	32%	0%	3%	2%	34%	6%	0%	16%
Arrivals	7%	31%	0%	0%	3%	17%	0%	30%	1%	11%

Source: Massport Noise Office and HMMH 2010.

Notes: The data reflect actual percentages of jet aircraft operations on each runway end. They should not be confused with effective runway use which is used by the Preferential Runway Advisory System (PRAS) to derive recommendations for use of a particular runway.
Jet aircraft are not able to use Runway 15L or 33R due to its length of only 2,557 feet.
Values may not add to 100 percent due to rounding.

1 Data for years prior to 2004 is available in *Appendix H, Noise Abatement.*

2 Runway 14-32 opened in late November, 2006. (Runway 14-32 is unidirectional with no arrivals to Runway 14 and no departures from Runway 32).

NA Runway was not available.

Preferential Runway Advisory System

Developed in 1982 and enhanced in 1990 and subsequent years, the Preferential Runway Advisory System (PRAS) is a set of short-term and long-term runway use goals that includes the use of a computer program that recommends to FAA air traffic controllers, runway configurations that will meet weather and demand requirements and provide an equitable distribution of the Airport's noise impacts on surrounding communities. The two primary objectives of the PRAS goals are to distribute noise in on an annual basis, and to provide short-term relief from continuous operations over the same neighborhoods at the ends of the runways.

PRAS Compliance

Under the PRAS, each runway end has a specific annual utilization goal, defined separately for departures and arrivals. The goals are defined in terms of effective usage, which applies a factor of 10 to nighttime (10:00 PM to

RealProfiles™ was used to develop a profile for each flight track departing from and arriving to each runway end to ensure that the altitude profiles represented as accurately as possible the aircraft's performance during arrival or departure. This use of special profiles improves the accuracy of each aircraft's modeled altitude over surrounding communities.

For the *2009 EDR*, 332,027 flight tracks were modeled to calculate the noise levels surrounding Logan Airport. Figures 6-7 through 6-12 provide a representative sample of flight tracks used with RealContours™ to develop the 2009 contours.[9] The figures show arrivals and departures separately for each of three aircraft categories: air carrier jets, regional jets, and non-jets.

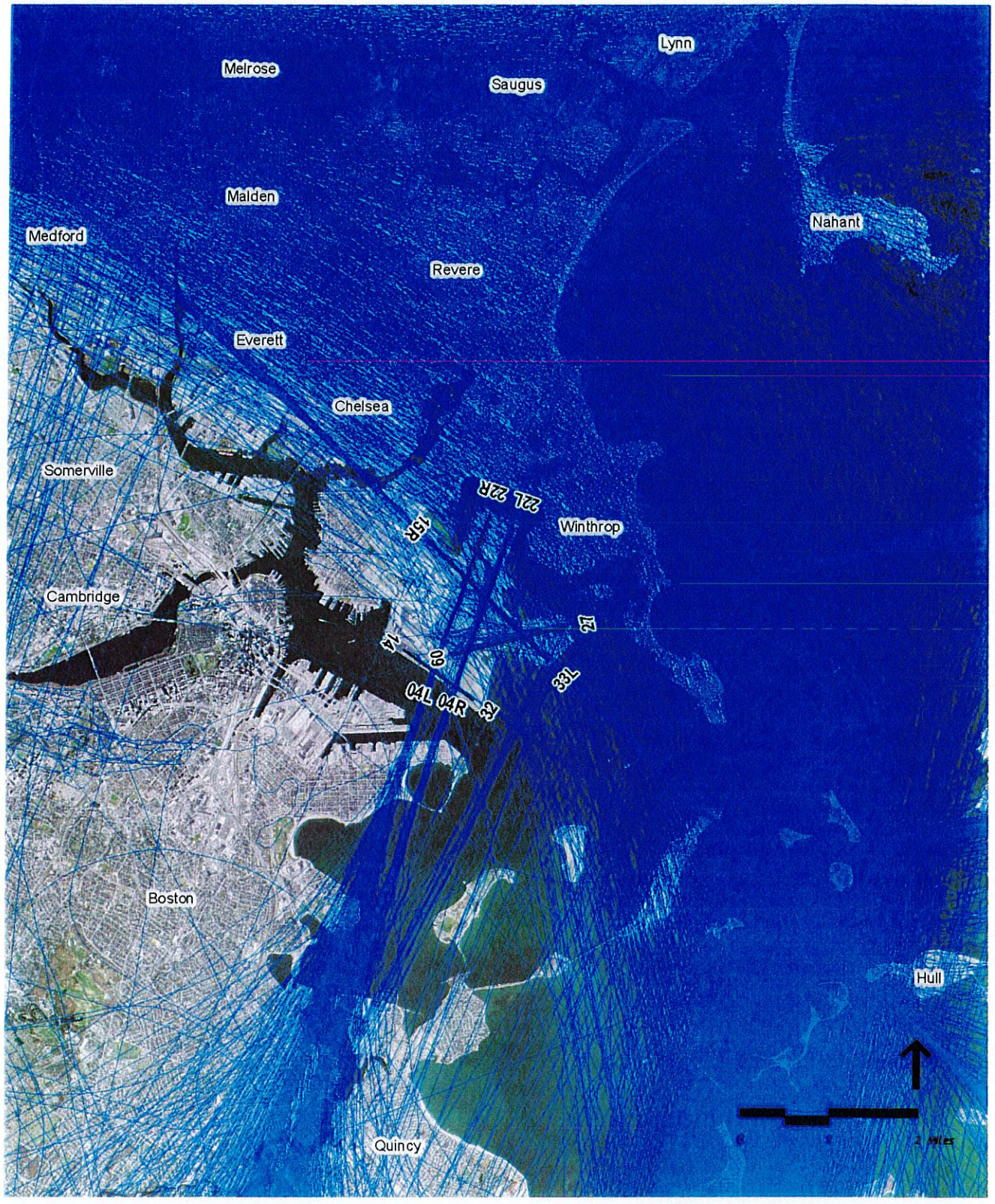
- Figure 6-7 displays air carrier jet departures following the recommended departure routes. The Runway 27 WYLYY Seven RNAV[10] departure procedure is evident in this graphic as the departures from Runway 27 do not show the dispersion that is seen at the other runways.
- Figure 6-8 displays air carrier jet arrivals. This graphic displays the east downwind configuration which the air carrier arrivals utilize to line up on final approach to the runways thus avoiding populated areas to the west of the Airport.
- Figure 6-9 displays the regional jet departures following the recommended departure routes with flights remaining north of the Hull peninsula and passing over the Nahant Causeway.
- Figure 6-10 displays the regional jet arrivals which utilize both east and west sides of the Airport for arrivals. Arrivals to Runway 32 are also displayed on this graphic.
- Figure 6-11 displays the non-jet departures which tend to turn early off the runways and do not follow the jet departure routes. Non-jet departures from Runways 4L, 22R, 33L, and 27 are allowed to turn over populated areas whereas the jet aircraft are not. This also keeps the non-jet aircraft out of the jet departure paths allowing for efficient jet departures.
- Figure 6-12 displays the non-jet arrivals and includes the harbor route for non-jet aircraft arriving to Runway 4L. The graphic also displays the non-jet arrivals to Runways 22R and 33R in addition to the runways which also accommodate jets.

Meteorological Data

The INM has several settings that reflect aircraft performance profiles and sound propagation based on meteorological data. Meteorological settings include average temperature, barometric pressure, and relative humidity at the Airport. Massport obtained weather data for 2009 from the National Climatic Data Center (NCDC). Average daily values for each of the settings were used in the development of the 2009 noise conditions. The average conditions for each day allowed the modeling system used by Massport to develop performance profiles based on each days conditions and allowed the INM model to use each day's conditions to affect the propagation of noise. This is an improvement over previous years (prior to 2008) which only used the annual average value to model these conditions.

9 Runway use from each month was developed and compared to the annual runway use information. October 2009 provided the closest match to annual results.

10 Area Navigation (RNAV) - RNAV enables aircraft to fly on any desired flight path within the coverage of ground- or spaced-based navigation aids, or within the limits of the capability of aircraft self-contained systems, or a combination of both capabilities.

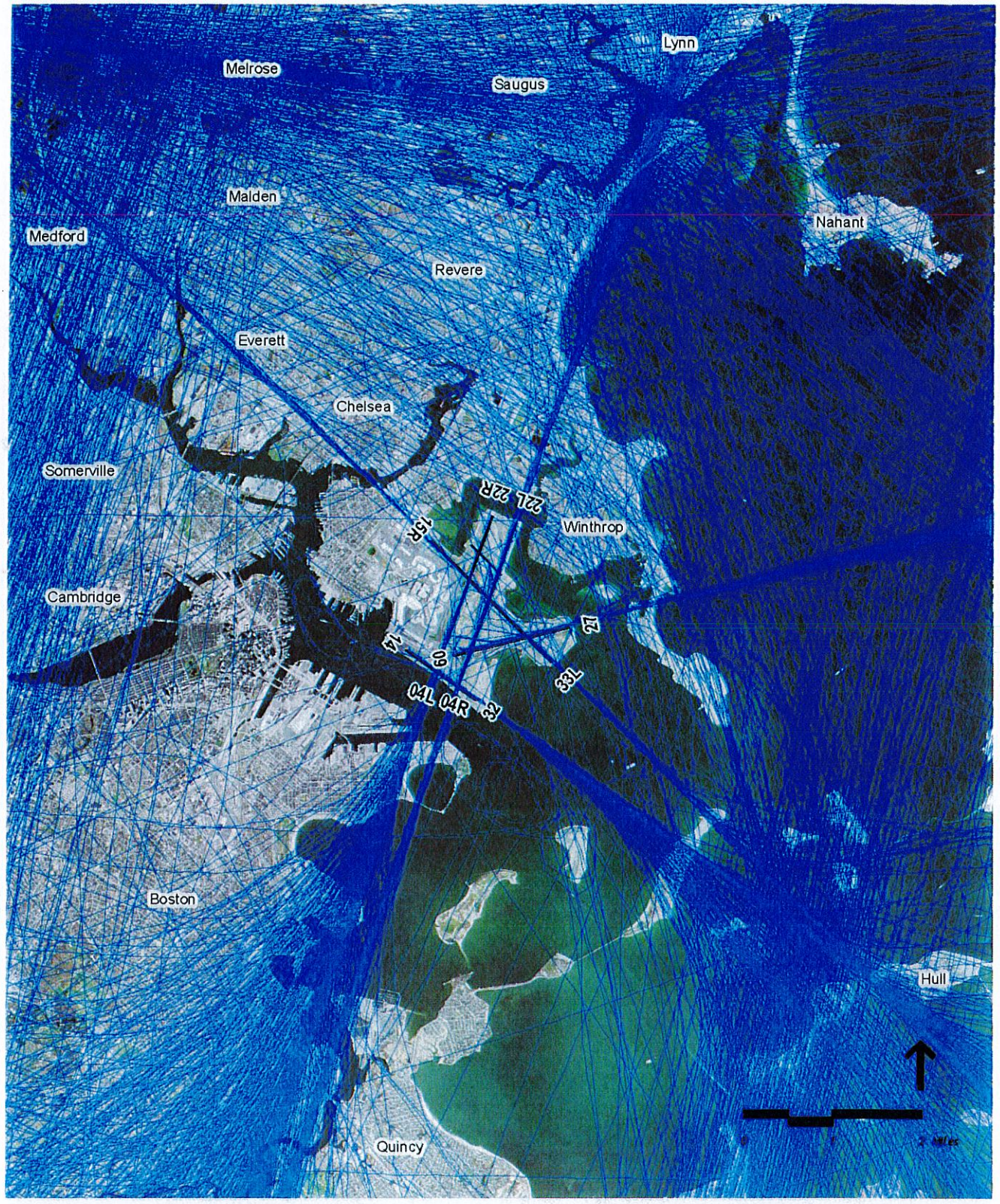


Source: Massport NOMS/ERA Multi-Lat, Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs

RealContours™ Air Carrier Arrival Tracks (October 2009)

Figure 6-8

Arrival Flight Tracks

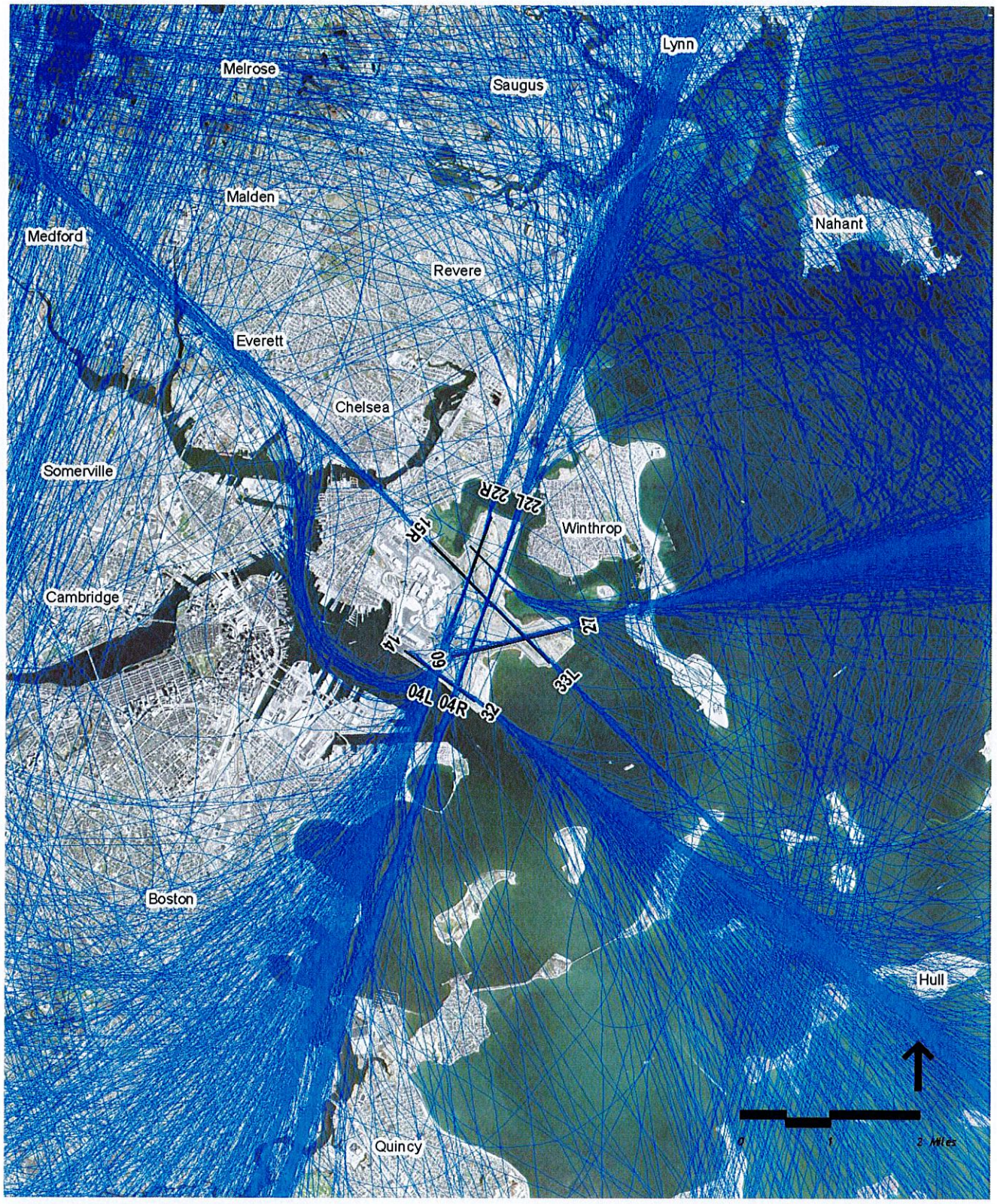


Source: Massport NOMS/ERA Multi-Lat, Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs

RealContours™ Regional Jet Arrival Tracks (October 2009)

Figure 6-10

Arrival Flight Tracks



Source: Massport NOMS/ERA Multi-Lat, Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs

RealContours™ Non-Jet Arrival Tracks (October 2009)

Figure 6-12

Arrival Flight Tracks