

# Update for 33L Municipal Working Group Legislators

July 21, 2016

**Myron Kassaraba**  
**Belmont Representative to the**  
**Logan & Massport CAC's**  
**[logancac@belmont-ma.gov](mailto:logancac@belmont-ma.gov)**

**FOR PRESENTATION ONLY – NOT FOR DISTRIBUTION**

# Meeting Attendees

(alphabetical list)

First Name	Last Name	Role	Community
Andrea	Adams	Watertown Rep to Massport CAC	Watertown
Christine	Barber	State Representative	Medford, Somerville
Wade	Blackman	Staff, Congresswoman Clark	5th Congressional District
David	Bond	Staff, Congresswoman Clark	5th Congressional District
Bill	Deignan	Cambridge Rep to LCAC, MCAC	Cambridge
Dennis	Duff	Watertown Rep to LCAC	Watertown
Caitlin	Duffy	Staff, Rep. Jay Livingstone	Back Bay, Cambridge
Sean	Garballey	State Representative	Arlington
Jonathan	Hecht	State Representative	Cambridge, Watertown
Dan	Hurley	Staff, Rep. Paul Donato	Malden, Medford
Patricia	Jehlen	State Senator	Medford
Myron	Kassaraba	Belmont Rep to LCAC, MCAC	Belmont
Chris	Lange	Staff, Senator Warren	Massachusetts
Jon	Lenicheck	Staff, Congressman Capuano	7th Congressional District
Barbara	Miranda	Chief of Staff, Senator Brownsberger	Belmont, Watertown, Boston
Jordan	Neerhof	Staff, Re. Denise Provost	Somerville
Kelsey	Perkins	Staff, Congresswoman Clark	5th Congressional District
David	Rogers	State Representative	Arlington, Belmont
Jarred	Rose	Staff, Senator Pat Jehlen	Cambridge, Medford, Somerville, Winchester
Harvey	Steiner	Watertown Rep to LCAC	Watertown
Bill	White	Alderman at Large	City of Somerville
Wig	Zamore	Somerville Rep to LCAC, MCAC	Somerville

# Slides from Previous 33L Working Group Meeting

**Held in Belmont, October 25, 2015**

*Provided for context for new attendees*

# Objectives of 33L RNAV Municipal Working Group (from Oct. 2015 meeting)

- Gain a common understanding of the situation based on data and facts.
- Work as a coalition of communities most affected by 33L RNAV SID to demand assistance from Massport and an audience with the FAA.
- Work together to further enlist the support of our Legislators and Congressional delegation to put pressure on Massport and the FAA to be responsive.
- If deemed beneficial, provide shared funding to enlist experts or to commission a professional noise study.



# Our Communities & Residents Deserve an Audience with the FAA

(from Oct. 2015 33L Municipal Working Group meeting)

- We have been trying to engage with the FAA for 2 years on the concentration of noise that resulted from 33L RNAV SID
- We and our Legislators have been stonewalled and given the run-around (Post-implementation Review, go to the Logan CAC, now take it up with Massport)
- We want the FAA to sit down with the communities affected by 33L RNAV SID to explore alternatives and/or modifications to decrease the negative impact on a subset of our residents and return to a more fair distribution of flights.

# Where are we?

- In January, 2015 – a motion was made by Arlington, Belmont, Cambridge and Watertown to ask Massport and the FAA to re-examine 33L RNAV SID in light of massive increase in complaints and community feedback and to explore alternatives or modifications. The FAA responded that this issue needed to be sponsored by Massport for them to review the procedure.
- At our 33L Municipal Working Group Meeting in October of 2015 – the Municipalities elected not to invest in consulting resources or a noise study before trying to see what Massport was willing to do.
- Congressional delegation called meeting with FAA in Milton in December 2015 – 700 people showed up. **There has been no official response from the FAA to any of the issues brought up by residents and communities at that meeting.**
- Bill Deignan and Myron met with Massport in January 2016 – we were told that 33L RNAV was “part of a bigger RNAV initiative” and that it would likely be addressed by a broader program with the FAA.

# BLANS – Logan CAC

- Logan CAC, Jan 2015 official motion on 33L RNAV re-examination was deflected to the BLANS runway use plan. **Runway use has absolutely nothing to do with with RNAV flight paths.**
- BLANS Phase 3 – Runway Use Plan mired in debate and complexity – funding is running out on 9/30/16. May not yield anything that would be approved by a majority of CAC communities.
- BLANS will end by year-end. Future of Logan CAC uncertain.

# Massport CAC

- Held first official meeting in January 2016 – Officers Elected
- Have entered into 1 yr. Services Agreement with Massport for Administration
- Approx. 50% overlap with Logan CAC Communities and Representatives.
- Committees in the process of being established (Aviation Operations, Communications and Environmental)
- Lots and lots of work to do by a volunteer organization – will be looking to hire Executive Director in FY.'17.

# Terminal E Expansion

- The State Environmental Dept. requested that a full Environmental Assessment (EA) be conducted.
- A CD with the DRAFT EA was sent to CAC Members this week.
- The increase in international flights is expected to increase flight volume in the “shoulder hours” at Logan in the mid-afternoon and late evening. This will impact all communities.

# BWFS – Citizen Activities

- Group meets monthly. Online Google Group is active.
- <https://www.bostonwestfairskies.org/>
- Residents are angry and frustrated.
- May/June 2016 were bad because of unusual NW winds causing increased use of 33L for departures.
- Citizen noise survey effort planned but getting it organized is proving challenging (Wig's NEU interns/ David Waite – Belmont). See Appendix for methodology.

# Range of issues

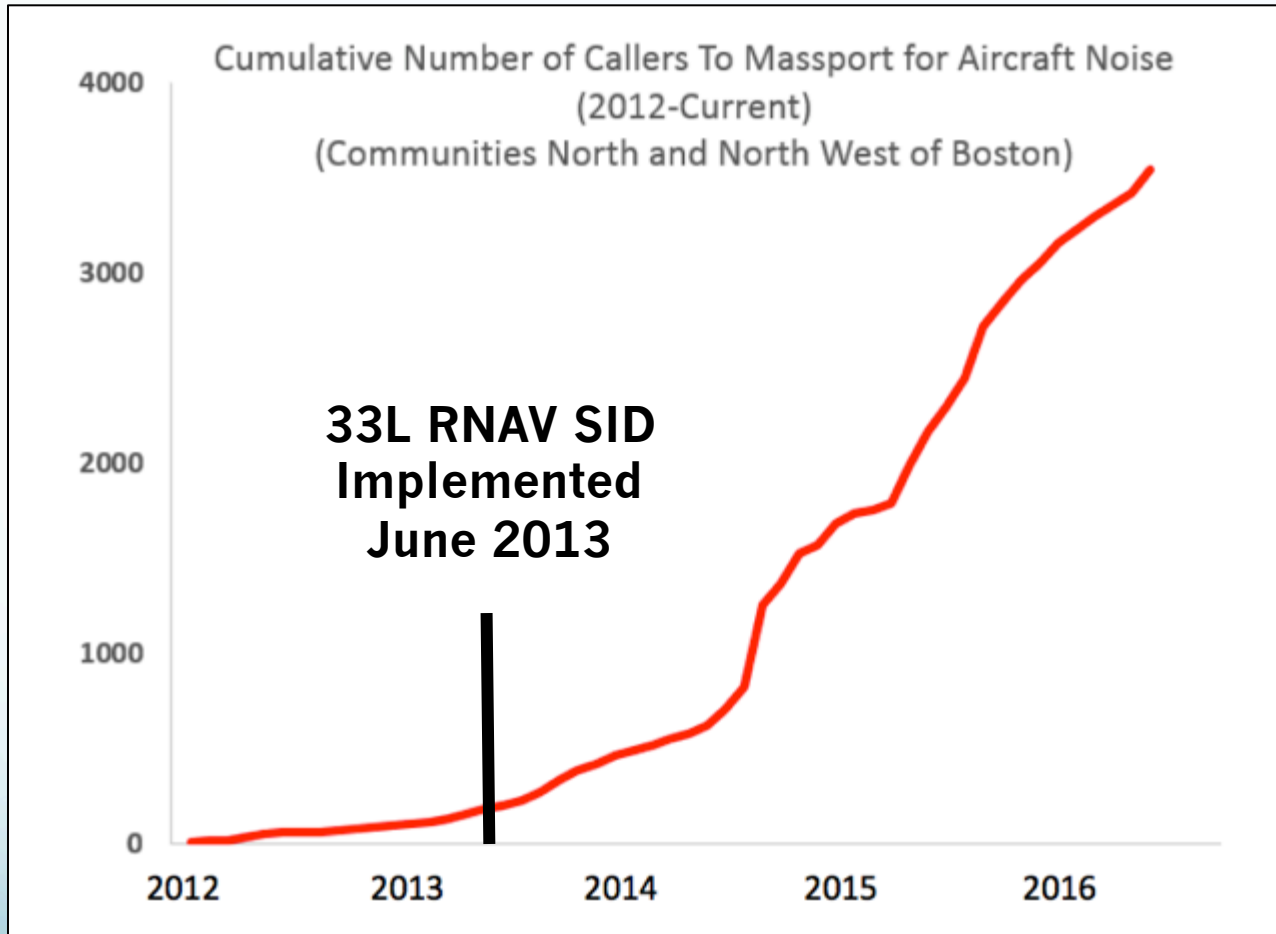
DAILY OPERATIONS	PROCEDURAL	SYSTEMIC
<p>“Flight 1234 was too low – thought it was going to crash into my house.”</p> <p>“I was woken up at 11.45 pm and then again at 5:30 am.”</p> <p>The MD80’s are really loud.</p>	<p>“Every time runway 33L RNAV is used for departures, my house shakes, I can’t sleep and it affects my quality of life.”</p>	<p>There are more and more flights now early in the morning and later at night.</p> <p>Airbus 300’s have a whine when they land.</p> <p>“My community has too many airplanes flying over it.”</p>
<p>Options:</p> <ul style="list-style-type: none"> <li>• Curfew</li> <li>• Penalties/fines</li> <li>• Runway Rotation</li> </ul>	<p>Options:</p> <ul style="list-style-type: none"> <li>• Higher altitudes</li> <li>• Faster clearance</li> <li>• Dispersion</li> <li>• Pre-RNAV procedure</li> </ul>	<p>Options:</p> <ul style="list-style-type: none"> <li>• Quieter aircraft</li> <li>• Vortex generators</li> <li>• Equitable distribution</li> </ul>

# \*\* Disclaimer \*\*

- Some of the data used in the analysis was provided by Massport, some was obtained from other sources and it is possible that there are some minor errors.
- The analysis has been done using volunteer resources. We are not aviation or noise experts.
- The analysis and calculations were done using best efforts with the time and tools available.



# Noise Complaints

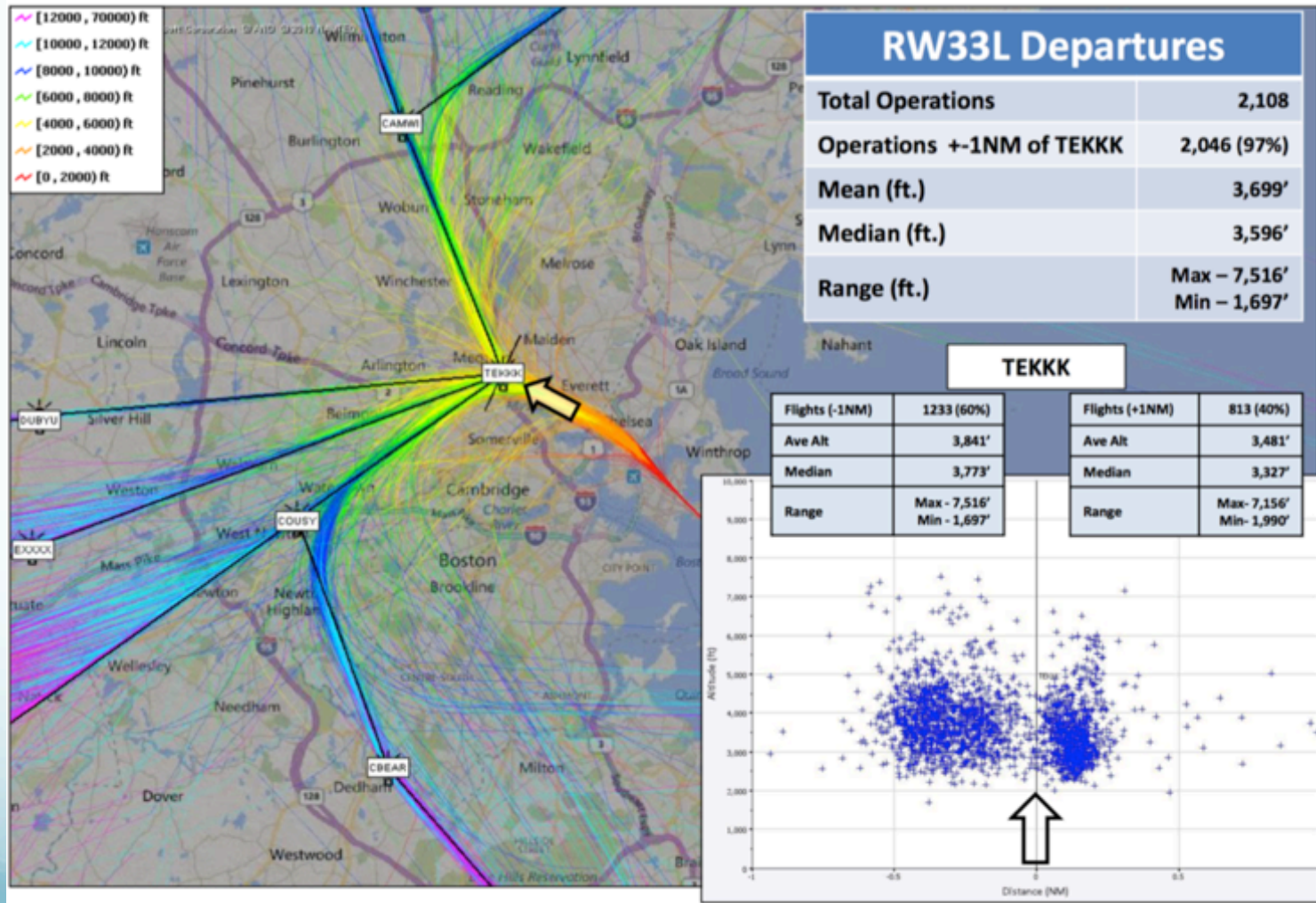


## Includes:

- Arlington
- Belmont
- Cambridge
- Medford
- Watertown
- Winchester

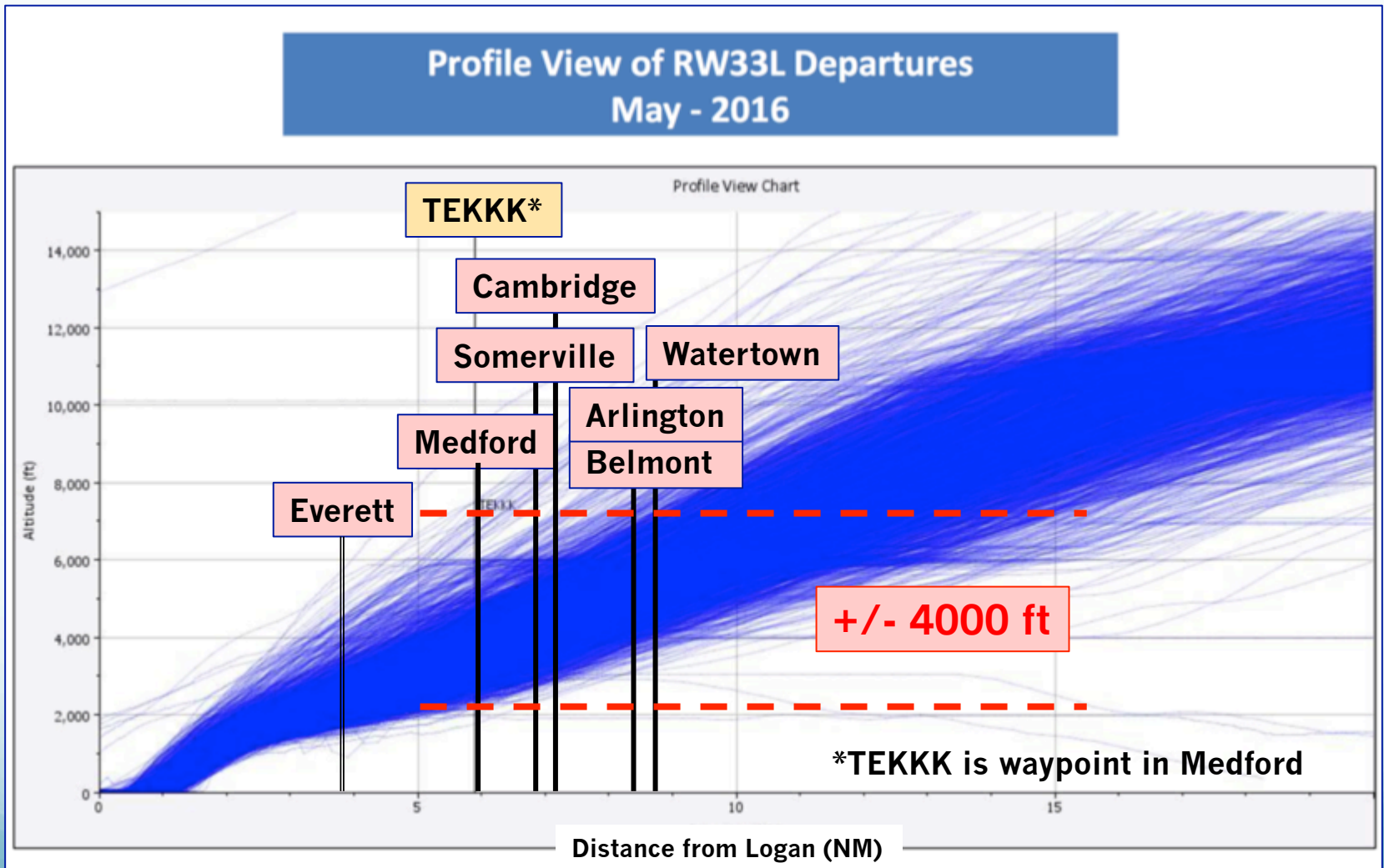
# Impact on our Cities/Towns is significant

Source: Massport Monthly Flight Track Reports, May 2016



# Wide range of altitudes – 33L departures

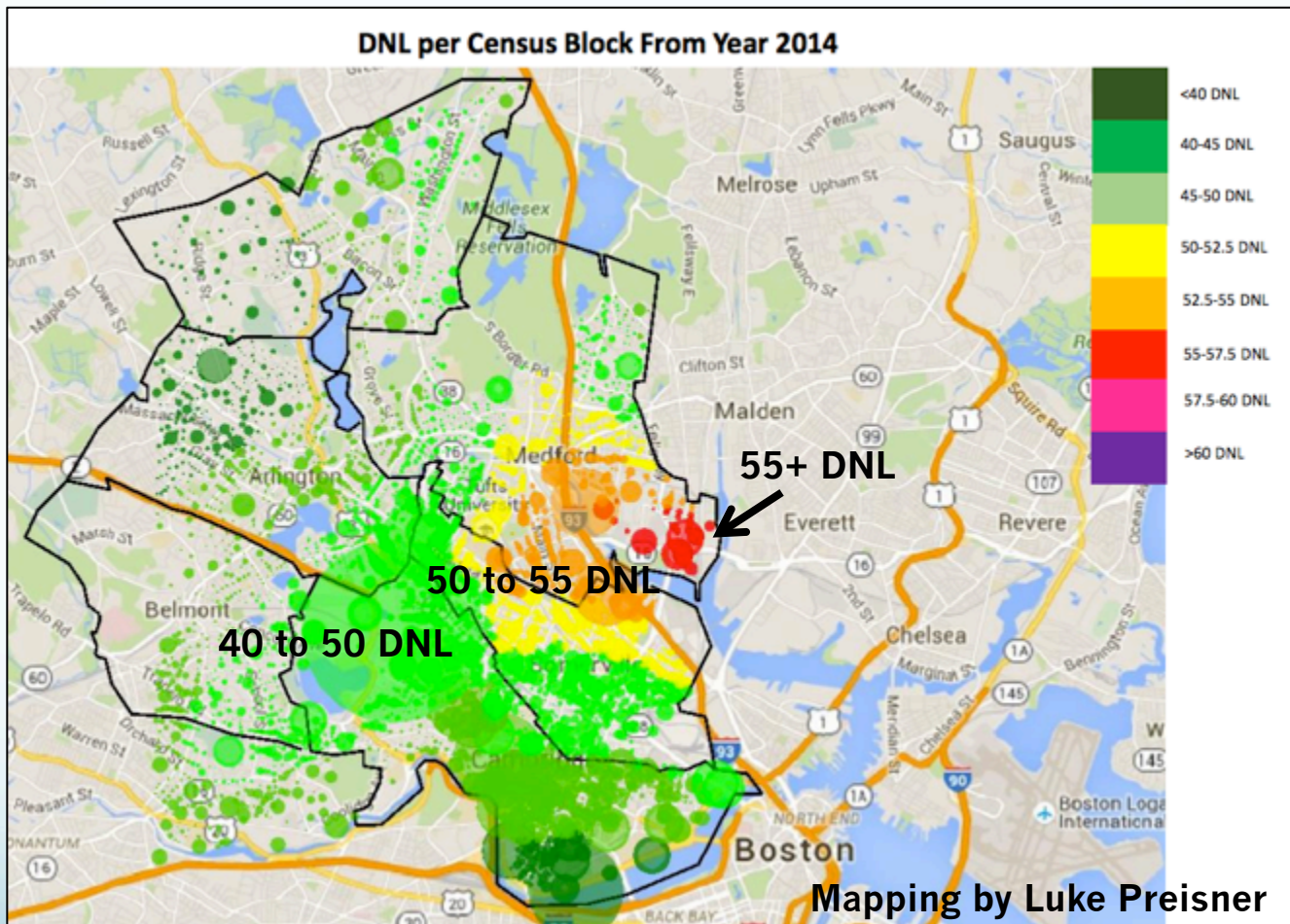
Source: Massport Monthly Flight Track Reports, May 2016





# Noise Impact

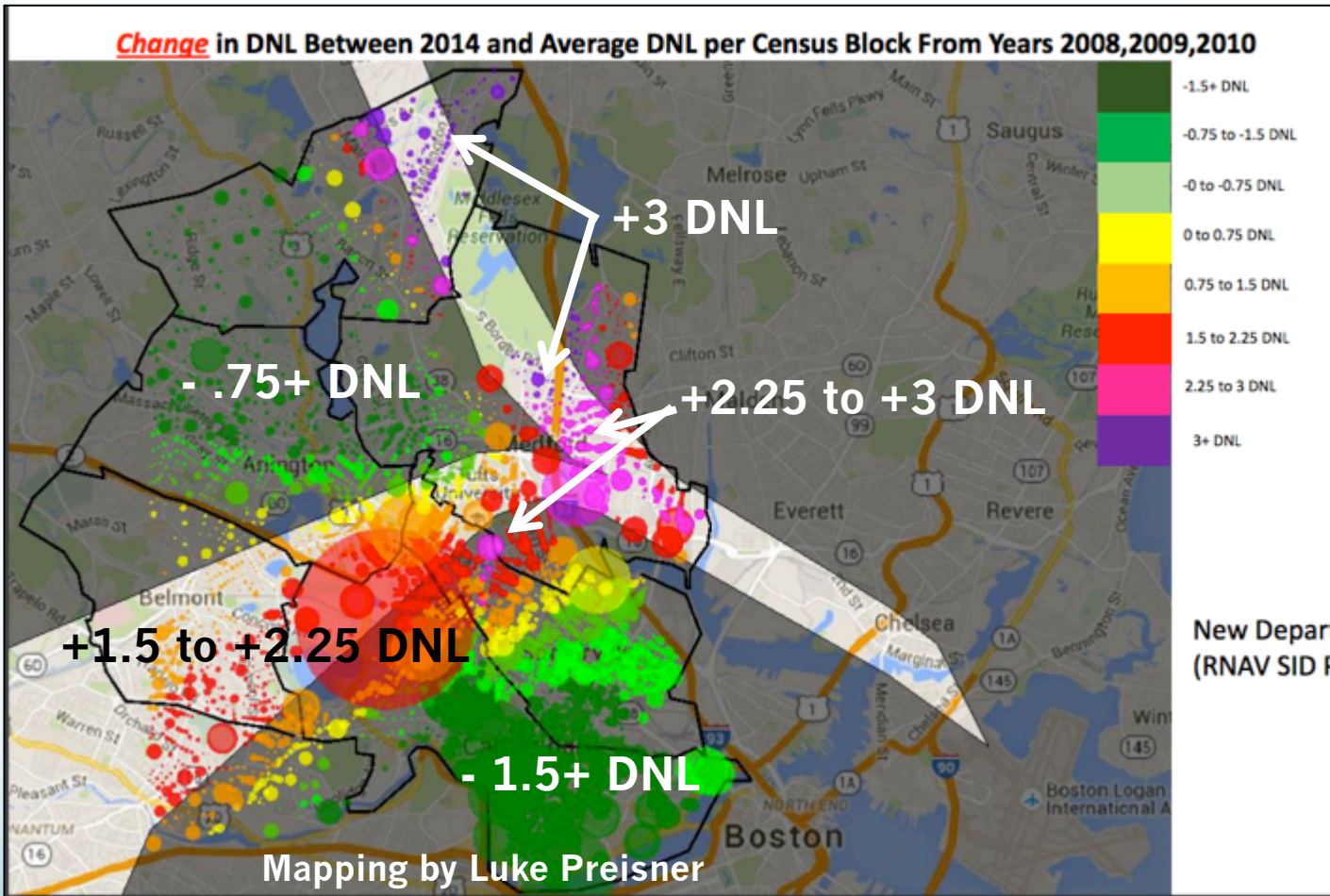
Source: Analysis of DNL data from Massport EDR



This analysis includes: Arlington, Belmont, Cambridge, Medford, Winchester, Watertown

# Change in DNL is significant

Source: Analysis of DNL data from Massport EDR

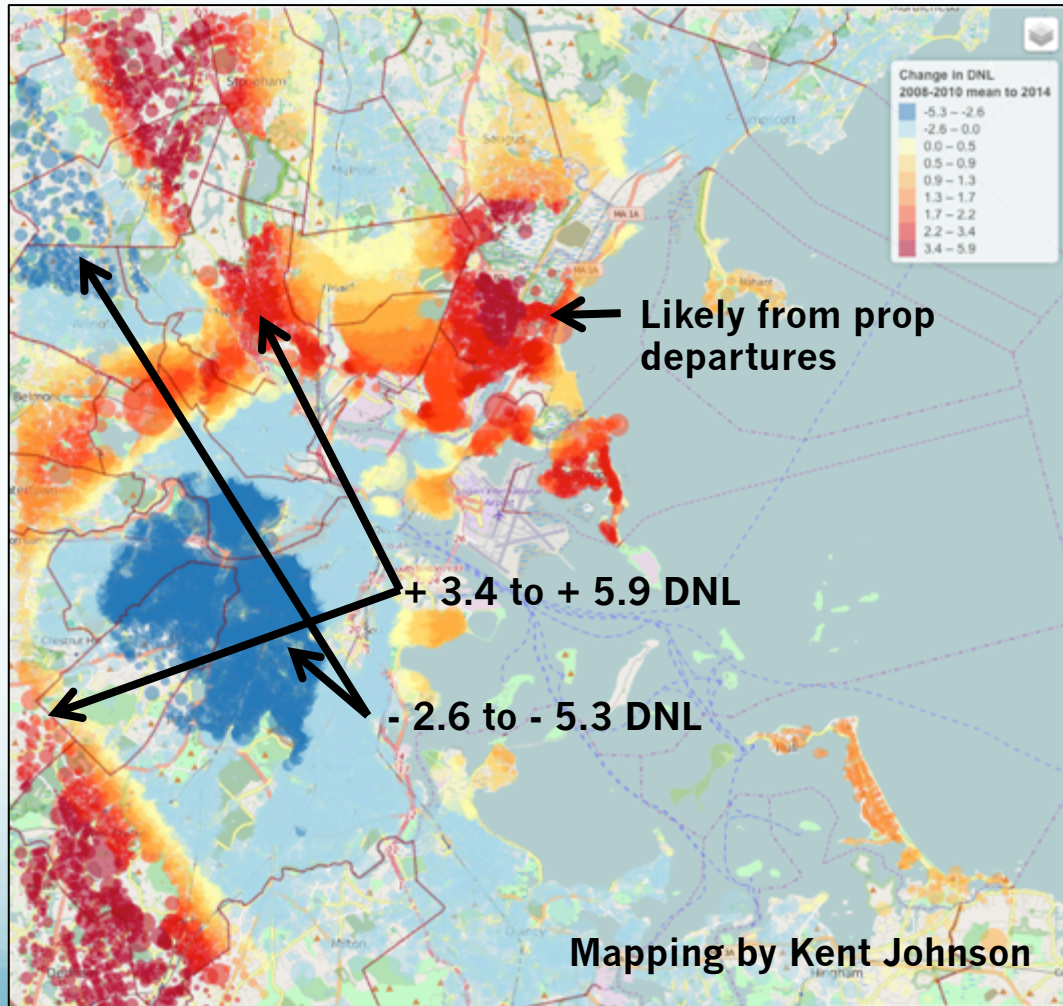


This analysis includes: Arlington, Belmont, Cambridge, Medford, Winchester, Watertown



# Noise Impact is significant

Source: Analysis of DNL data from Massport EDR



Work in progress -

Orange/Red =  
> 2 DNL increase

Blue = > 2 DNL decrease

# Impact to neighborhoods is uneven (winners and losers)

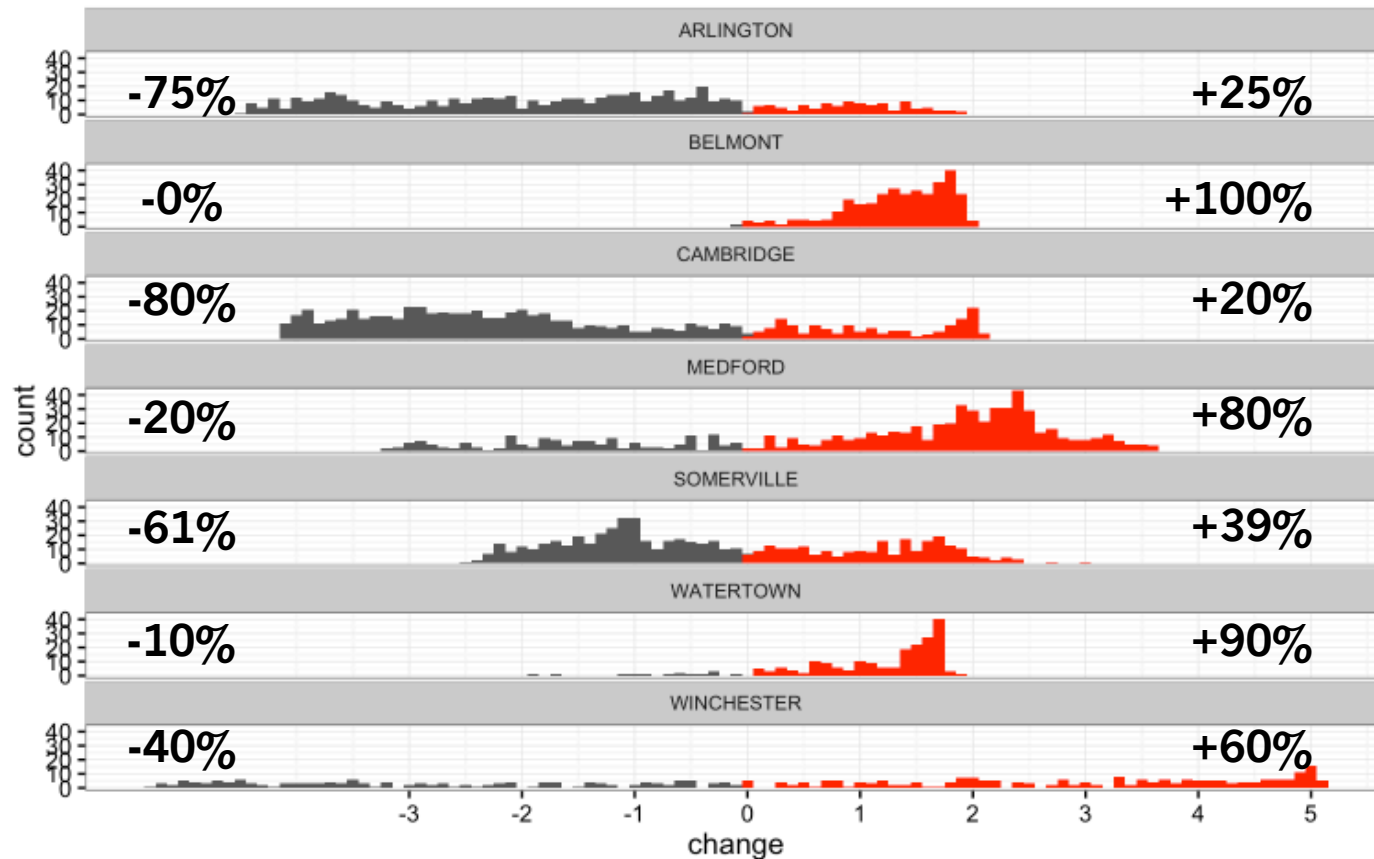
This chart looks at the difference in DNL by community between 2008-2010 (mean) and 2014.

Community	Change Type	Census Blocks	Population	% of Pop	Max Change
ARLINGTON	Decreased DNL	450	28803	75%	-4.5
ARLINGTON	Increased DNL	108	9366	25%	1.9
BELMONT	Decreased DNL	3	99	0%	-0.1
BELMONT	Increased DNL	316	19828	100%	2
CAMBRIDGE	Decreased DNL	565	79767	80%	-4.1
CAMBRIDGE	Increased DNL	163	20348	20%	2.1
MEDFORD	Decreased DNL	164	11269	20%	-3.2
MEDFORD	Increased DNL	501	43821	80%	3.6
SOMERVILLE	Decreased DNL	372	45182	61%	-2.5
SOMERVILLE	Increased DNL	234	28953	39%	3
WATERTOWN	Decreased DNL	14	1701	10%	-1.9
WATERTOWN	Increased DNL	192	15687	90%	1.9
WINCHESTER	Decreased DNL	145	8626	40%	-5.3
WINCHESTER	Increased DNL	211	12784	60%	5.1

Analysis by Kent Johnson

# Impact to neighborhoods is uneven (winners and losers)

The following histograms show the count of census blocks in each town by DNL increase or decrease.



Copyright 2016 Kent S Johnson



Visualization by Kent Johnson



# The Fallacy of Net Noise Reduction

The 33L RNAV SID Environmental Assessment claimed that the new procedure would provide a “net noise reduction” – see how that works in our seven communities.

Community	Change Type	Census Blocks	Population	% of Pop	Max
ARLINGTON	Decreased DNL	450	28,803	75%	-4.5
BELMONT	Decreased DNL	3	99	0%	-0.1
CAMBRIDGE	Decreased DNL	565	79,767	80%	-4.1
MEDFORD	Decreased DNL	164	11,269	20%	-3.2
SOMERVILLE	Decreased DNL	372	45,182	61%	-2.5
WATERTOWN	Decreased DNL	14	1,701	10%	-1.9
WINCHESTER	Decreased DNL	145	8,626	40%	-5.3
	Decreased DNL	1,713	175,447	54%	

ARLINGTON	Increased DNL	108	9,366	25%	1.9
BELMONT	Increased DNL	316	19,828	100%	2
CAMBRIDGE	Increased DNL	163	20,348	20%	2.1
MEDFORD	Increased DNL	501	43,821	80%	3.6
SOMERVILLE	Increased DNL	234	28,953	39%	3
WATERTOWN	Increased DNL	192	15,687	90%	1.9
WINCHESTER	Increased DNL	211	12,784	60%	5.1
	Increased DNL	1,725	150,787	46%	

Total Population	326,234
Pop with Decrease	(24,660) <span style="border: 1px solid black; padding: 2px;">-8%</span>

# We were encouraged....

- <https://www.facebook.com/RepMichaelCapuano/posts/989399117781204?fref=nf>



*"I had a great conversation yesterday with Massport Executive Director Tom Glynn about airplane noise. He told me that due to encouragement from the public, the Massachusetts Congressional delegation, and Massport, the FAA is finally considering using Logan to conduct various experiments at Logan Airport to minimize the impact of noise on the people living under flight paths – at the very least, they will try to "spread the pain" more equitably.*

*This is great news and I look forward to working with the FAA, Massport, the Citizens Advisory Committee, and all other interested parties to design, implement and test as many different proposals as possible until we find the best solution to this persistent problem for as many people as possible. I congratulate Tom Glynn, Massport, and the FAA for working with us and at least trying new approaches."*  
Rep. Capuano – Facebook, April 12, 2016

# Nothing is being done....

- **More than three years after the implementation of 33L RNAV SID – we have yet to have a substantive conversation with the FAA to explore alternatives or modifications to the procedure!**
- While in Baltimore and Charlotte and SF Bay Area.....

# RNAV – National issue with Local Impact

- Legislators and officials in Northern California dealing with RNAV issues at SFO formed the Select Committee on South Bay Arrivals and have held three public meetings.



12 person committee includes Mayors, City Councilmembers and Supervisors.

(<http://bit.ly/29FlcJe>)

FAA Regional Administrator Glen Martin has attended and spoken at all three public meetings.

*"While the vast majority of satellite-based procedures nationwide have been implemented seamlessly, we know that a few have generated controversy and we came here to be sensitive to the community's concerns and we work hard to address them when possible," said Glen Martin with the FAA.*

<http://www.ksbw.com/news/santa-cruz-county-residents-demand-flight-changes-from-faa/39733630>

<http://www.nbcbayarea.com/news/local/Hundreds-Turn-Out-to-Vent-About-Noisy-Airplanes-384971721.html>

# Some are getting action

The screenshot shows the top of a news article on The Baltimore Sun website. The page header includes the site name, a search bar, and navigation links. The main headline is "Howard officials, FAA work to address 'unacceptable' noise levels". Below the headline is a photograph of several commercial airplanes on a tarmac. To the right of the photo is an advertisement for Brightview Rolling Hills, a senior care facility. Below the photo is a short paragraph of text and a byline for reporter Fatimah Waseem. At the bottom of the article preview is a large first letter 'A' and the beginning of the article text.

THE BALTIMORE SUN

TUESDAY JUL 19, 2016

NEWS / Maryland / Howard County / Elkridge

## Howard officials, FAA work to address 'unacceptable' noise levels

Howard County officials said they are cautiously optimistic about the FAA's responses to increasing concerns about noise. (Kim Halston / Baltimore Sun)

By **Fatimah Waseem** - Contact Reporter  
Howard County Times

SHARE THIS "We're already behind the game."

JULY 19, 2016, 8:48 AM

**A**fter more than a year of back and forth, Howard County officials said they are working with the Federal Aviation Administration to address residents' concerns about increased noise from Baltimore/Washington International Thurgood

After more than a year of back and forth, Howard County officials said they are working with the Federal Aviation Administration to address residents' concerns about increased noise from Baltimore/Washington International Thurgood Marshall Airport.

The FAA plans to review possible plans for altitude changes and will jumpstart a formal review with community input on the increased noise. The FAA plans to meet with the Maryland Aviation Administration and Howard County representatives in mid-September to determine how to address the issue.

Source: <http://www.baltimoresun.com/news/maryland/howard/elkridge/ph-ho-cf-bwi-noise-follow-0721-20160719-story.html>



# FAA engaged post EA-FONSI



*The Charlotte Metroplex is currently in the Implementation Phase. The FAA issued a Finding of No Significant Impact and Record of Decision (FONSI-ROD) for the project on May 19, 2015. The FAA will continue to assess and monitor the environmental impact of this effort. Source: <http://bit.ly/29F3bu0>*

[https://www.faa.gov/nextgen/metroplex\\_public\\_engagement/media/CLT\\_Metroplex\\_Phase2\\_05192016.pdf](https://www.faa.gov/nextgen/metroplex_public_engagement/media/CLT_Metroplex_Phase2_05192016.pdf)

# Some are getting action

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POLITICS & GOVERNMENT JULY 14, 2016 2:17 PM

## FAA dispersing Charlotte Douglas departures to scatter jet noise

HIGHLIGHTS  
The city of Charlotte asked for change  
Residents who had avoided noise are now getting jets above them

Pre Metroplex Departures – South Flow

EXISTING JET RADAR TRACKS South Flow – East

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Here are flight paths at Charlotte Douglas before the FAA began dispersing planes in an effort to spread noise among more people. Most of the departures followed the dark blue band. Harrison, Steve - Federal Aviation Administration

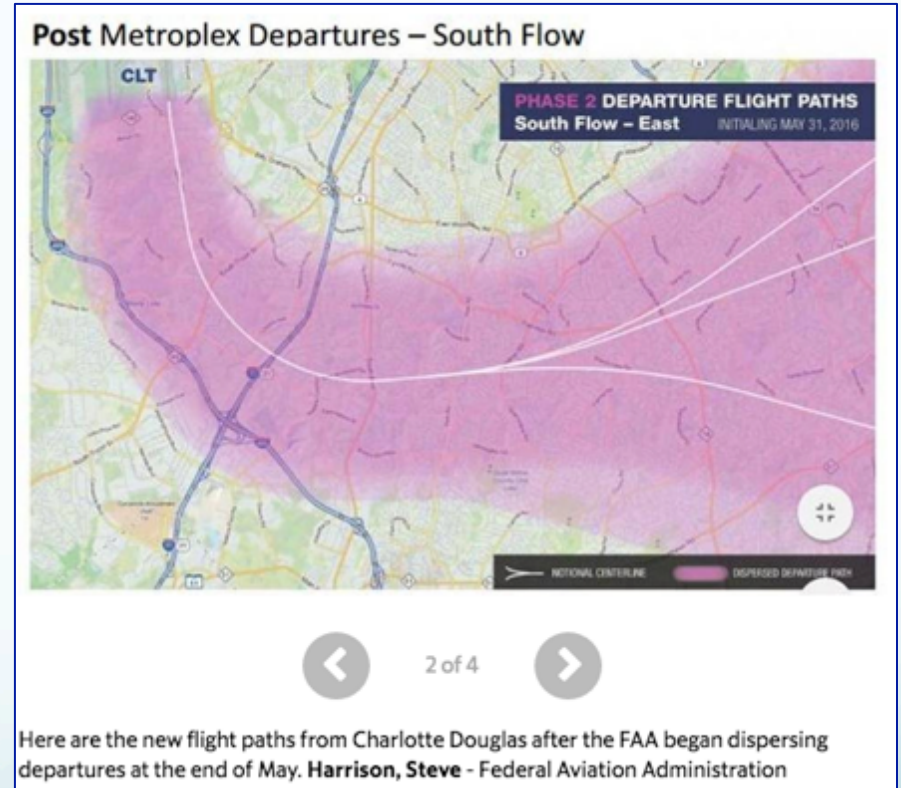
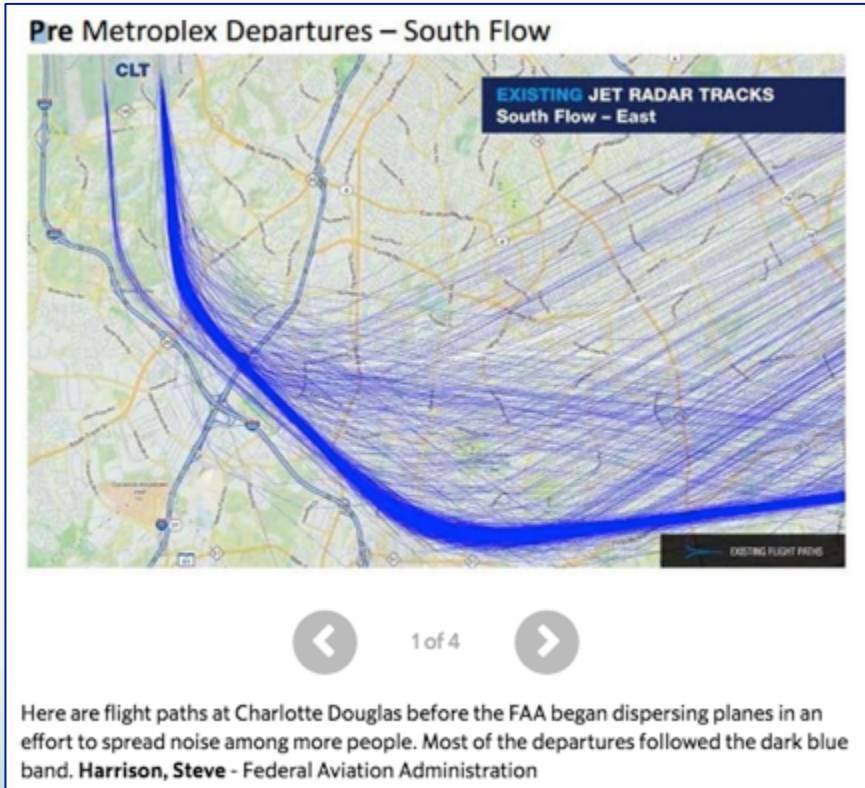
New RNAV flight paths were implemented at CLT in 2015.

The city of Charlotte asked the FAA to send the departures on different paths after takeoff. That means more people will be exposed to noise, but fewer people are impacted by it repeatedly.

“The city asked us to spread it out,” said Dennis Roberts, a regional administrator with the FAA.

Source: <http://www.charlotteobserver.com/news/politics-government/article89601182.html>

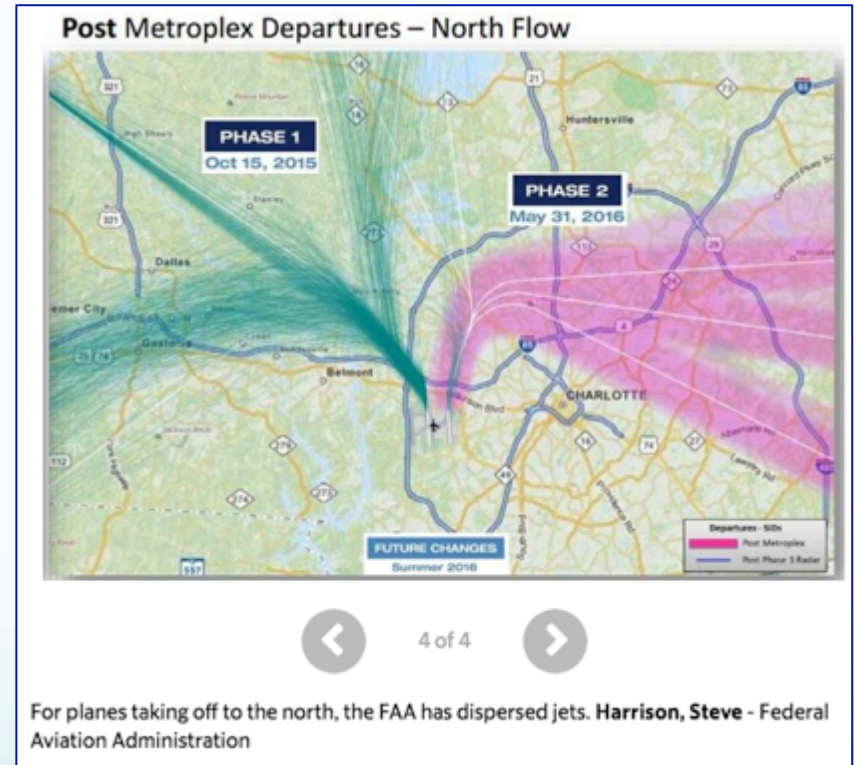
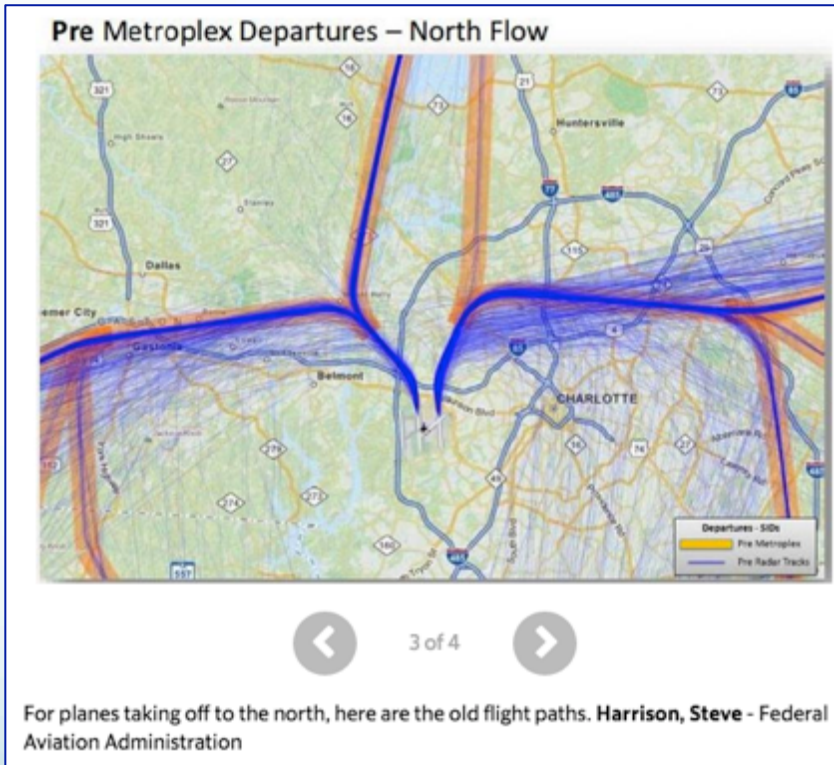
# Before/After Departures



Source: <http://www.charlotteobserver.com/news/politics-government/article89601182.html>



# Before/After Departures



Source: <http://www.charlotteobserver.com/news/politics-government/article89601182.html>

# And in Milton.....

**THE MILTON SCENE**  
WHERE MILTON NEIGHBORS MEET

Former Prosecutor  
Former School Committee Chair  
*The Right Choice to be Your Next Sl*

HOME NEWS CALENDAR LETTERS & OPINION EXPERTISE & RESOURCES HOMES & JOB LISTINGS COM

TRENDING JULY 14, 2016 | DO YOU HAVE RODENTS ON YOUR PROPERTY? HERE'S WHAT TO DO.

HOME NEWS

## Over 1000 Sign Milton Air Traffic Petition; Town Meets With FAA

TOPICS: Air Traffic Board Of Selectmen



*“The Milton Scene was pleased to learn that CAC Representative Cindy Christiansen and Milton ANAC (Airplane Noise Advisory Committee) Chair Andy Schmidt, along with Board of Selectmen Chairman, Katie Conlon, met on Friday, June 17 with FAA New England Regional Administrator Amy Corbett and FAA New England Deputy Regional Administrator Todd Friedenber*  
*g to discuss the negative effects of NextGen over Milton.”*

Source: <http://www.miltonscene.com/2016/06/over-1000-sign-milton-air-traffic-petition-town-meets-with-faa/>

# Positive Legislation proposed

- <http://capuano.house.gov/e-updates/eu2016-02-05.shtml>

The screenshot shows the website for Congressman Michael E. Capuano. At the top, there is a navigation bar with a language selector, a search box, and a header image of the congressman. Below the header is a sidebar with links to Home, Biography, Constituent Services, Media Center, Legislative Work, Schedules, Our District, Links, and Contact. The main content area features a large heading "E-UPDATES" and a sub-heading "An update from the office of the 7th Congressional District". The update is dated February 5, 2016, and is titled "Federal Aviation Administration". The text of the update begins with "I am happy to report we recorded a Wednesday the Transportation Cor (FAA) reauthorization bill. This is a policies and administration of the F Logan Airport on surrounding cities have long expressed concerns abo this and participated in a lengthy co". Below the text are social media sharing buttons for Facebook, Twitter, and YouTube, and a logo for the "APP CHALLENGE".

*"I cannot move Logan to another location but I can look for ways legislatively to address concerns that my constituents raise, particularly as the only Massachusetts member on the Transportation and Infrastructure Committee. I worked with the Republican majority on the committee to get a few items included in the FAA reauthorization bill." Feb. 5, 2016*

The first provision has to do with RNAV or "area navigational system" departure procedures. RNAV is being used by the FAA to narrowly direct airplanes over very specific flight paths. The unfortunate result of this is that some neighborhoods are experiencing an increase in flights over their homes. **My provision requires the FAA to consider "dispersing" flights to address noise concerns if the community and airport request it.** Dispersal is a navigational tool that air traffic controllers can use to send flights over a broader area if they find that too many flights are using a specific path at any given time. It cannot end the pain of too much airplane interference, but it can spread that pain out more fairly. I am in regular contact with Massport on a whole host of issues and have already spoken with them about dispersal. They have expressed their support of the concept where appropriate.

My second provision has to do with the way the FAA measures noise under flight paths. Currently, airports are required to offer various forms of mitigation to neighborhoods that experience noise levels above 65 DNL. DNL is an average noise level, measured over 24 hours, with higher weights given to noise in the overnight and early morning hours. **My provision requires the FAA to review noise exposure and its effects on communities around airports and report on whether the current 65 DNL standard should be updated or changed entirely.** The limit was first set in the 1970's. The science behind noise exposure has no doubt gotten more sophisticated since then, and the FAA should at least consider whether it should be updated.

The FAA reauthorization also contains a review of categorical exclusions. The FAA often applies a categorical exclusion to skip otherwise required environmental reviews when implementing RNAV procedures. **My provision requires the FAA to go back and review the categorical exclusions over the last few years to see if RNAV has had a significant effect on the human environment in communities impacted by the airport. If a negative impact is identified then the FAA must implement measures to mitigate that impact.**

# Long term initiatives

- <http://www.patriotledger.com/news/20160711/aircraft-noise-concerns-spur-lawmakers-to-request-scientific-research>

The screenshot shows the homepage of The Patriot Ledger. At the top, there is a navigation bar with links for HOME, NEWS, ELECTION, SPORTS, ENTERTAINMENT, LIFE, OPINION, OBITS, PETS, CLASSIFIEDS, JOBS, CARS, and HOMES. Below this is a secondary navigation bar with links for FEATURED, LEDGER LINKS, CONTACT, CALENDAR, SUBMIT YOUR NEWS, BLOGS, TV GUIDE, LOCAL PHOTOS, BIZ SERVICES, BUSINESS PROFILES, and EXPLORE. The main content area features a news article titled "Aircraft noise concerns spur lawmakers to request scientific research" by Chris Burrell. The article text states: "U.S. Rep. Steven Lynch, D-South Boston, and three other members of Congress are calling on the National Academy of Sciences to conduct a study about the health effects of air traffic noise and pollution on humans." To the right of the article is a sidebar with an advertisement for Allerton House Assisted Living Communities and a "FIND YOUR DREAM SHED" advertisement featuring images of sheds. At the bottom left of the article, there is a partial advertisement for Volusion, mentioning "75+ stunning templates".



# Some Good News

- [https://www.schumer.senate.gov/newsroom/press-releases/schumer-and-gillibrand-announce-legislation-to-reestablish-epa-office-of-noise-abatement\\_control-solely-dedicated-to-addressing-noise-pollution-like-airplane-noise](https://www.schumer.senate.gov/newsroom/press-releases/schumer-and-gillibrand-announce-legislation-to-reestablish-epa-office-of-noise-abatement_control-solely-dedicated-to-addressing-noise-pollution-like-airplane-noise)

**Charles E. SCHUMER**  
UNITED STATES SENATOR FOR NEW YORK

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07.15.16

## SCHUMER & GILLIBRAND ANNOUNCE LEGISLATION TO REESTABLISH "EPA OFFICE OF NOISE ABATEMENT & CONTROL" SOLELY DEDICATED TO ADDRESSING NOISE POLLUTION, LIKE AIRPLANE NOISE

*Current Bureaucratic Regs Give FAA Full Oversight of Airplane Noise Issues, But Senators Say EPA is Better Equipped to Handle Noise Concerns; EPA's Core Mission Aims to Protect Health & Environment*

*Schumer & Gillibrand Announce New Senate Legislation to Restore EPA's Oversight of Airplane Noise Issues, Which Senators Say Greatly Affect Residents' Quality of Life; Under Legislation, Sponsored by Rep. Meng in the House, EPA Experts Will Closely Examine Noise Measurement Methodologies, Health Impact Thresholds & Abatement Program Effectiveness*

*Schumer & Gillibrand: "Quiet Communities Act of 2016" Will Give EPA A Lead Role in Airplane Noise Abatement*

Today, U.S. Senators Charles E. Schumer and Kirsten Gillibrand introduced new legislation in the Senate that empowers the Environmental Protection Agency (EPA) to oversee airplane noise issues across the country, including airplane noise-plagued areas near JFK and LaGuardia airports. Currently, the Federal Aviation Administration (FAA) oversees airplane noise issues, however, Schumer and Gillibrand explained that the EPA is better fit to address these matters.

"Communities in the New York- metro area have long struggled with incessant airplane noise caused by the highly-trafficked skies above and it's time we set up an office dedicated to tackling this issue head on," said U.S. Senator Charles Schumer. "Airplane noise is a major quality of life issue and that's why it makes sense for the EPA to take the lead role in addressing these matters. This legislation will once again set up an Office of Noise Abatement and Control at the EPA

# Thoughts to Consider

- FAA Reauthorization has been pushed to 2017 – anything that makes it into legislation will take years to be implemented
- Why can the FAA seem to be able to engage in a dialog elsewhere and in some cases make changes to address procedural issues caused by RNAV but here we can't get a conversation about modifications or alternatives for a procedure implemented more than 3 years ago?
- Any health-related or noise metric studies are going to take years to yield usable findings.

# Options?

- We had previously discussed hiring an aviation consultant to evaluate our data and help propose alternatives. This is what Palo Alto did in the SF Bay Area. We tried Massport – they are not going to do this for us.
- Some communities are pushing for problematical RNAV procedures to be reversed – go back to the old flight paths – something to consider.
- Massport and the FAA gave hope that there would be an RNAV evaluation project at Logan – why has this taken so long and can we make sure 33L RNAV SID is a priority to be re-examined?

# Appendix

- Overview of BWFS Citizen Noise Survey effort.
- Slides from October 2015 33L Municipal Working Group Meeting.

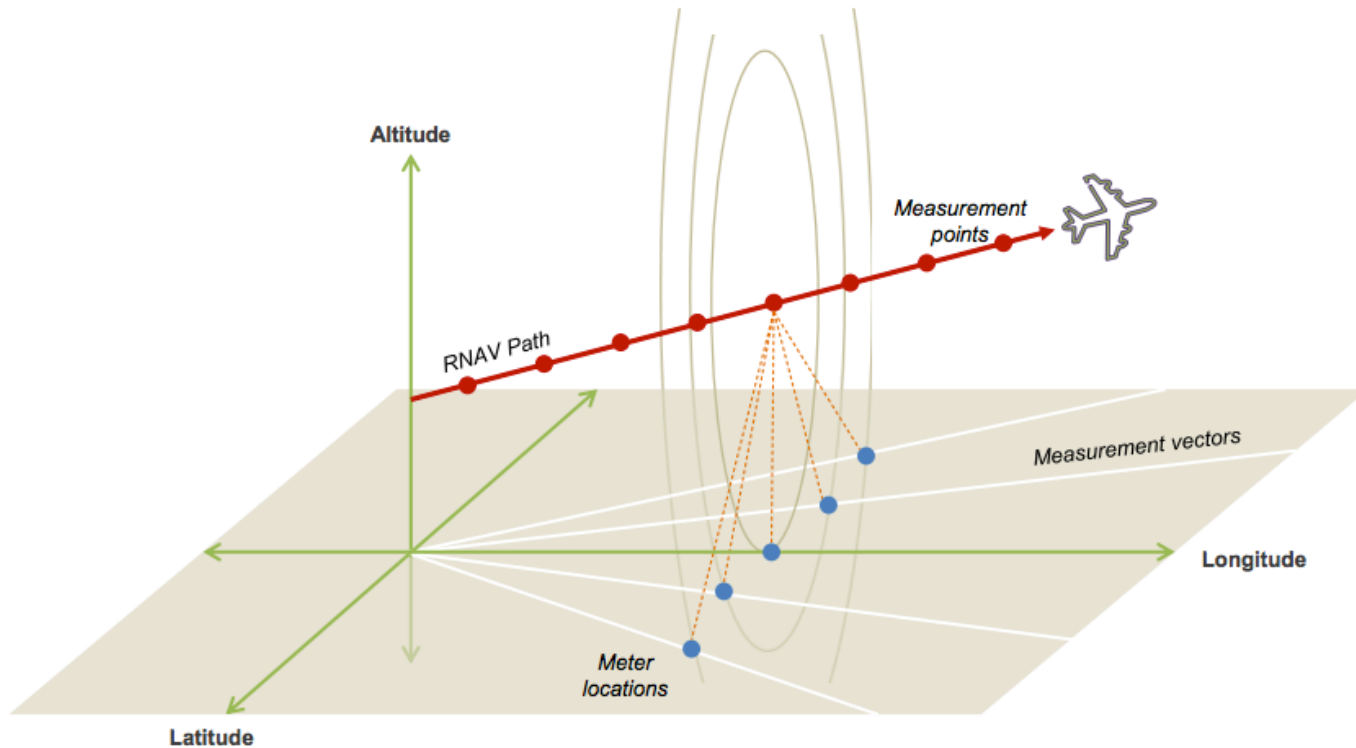


# Citizen Noise Survey

## Measurement Model

The proposed measurement approach involves recording noise levels at points along the RNAV path, each with several meter locations

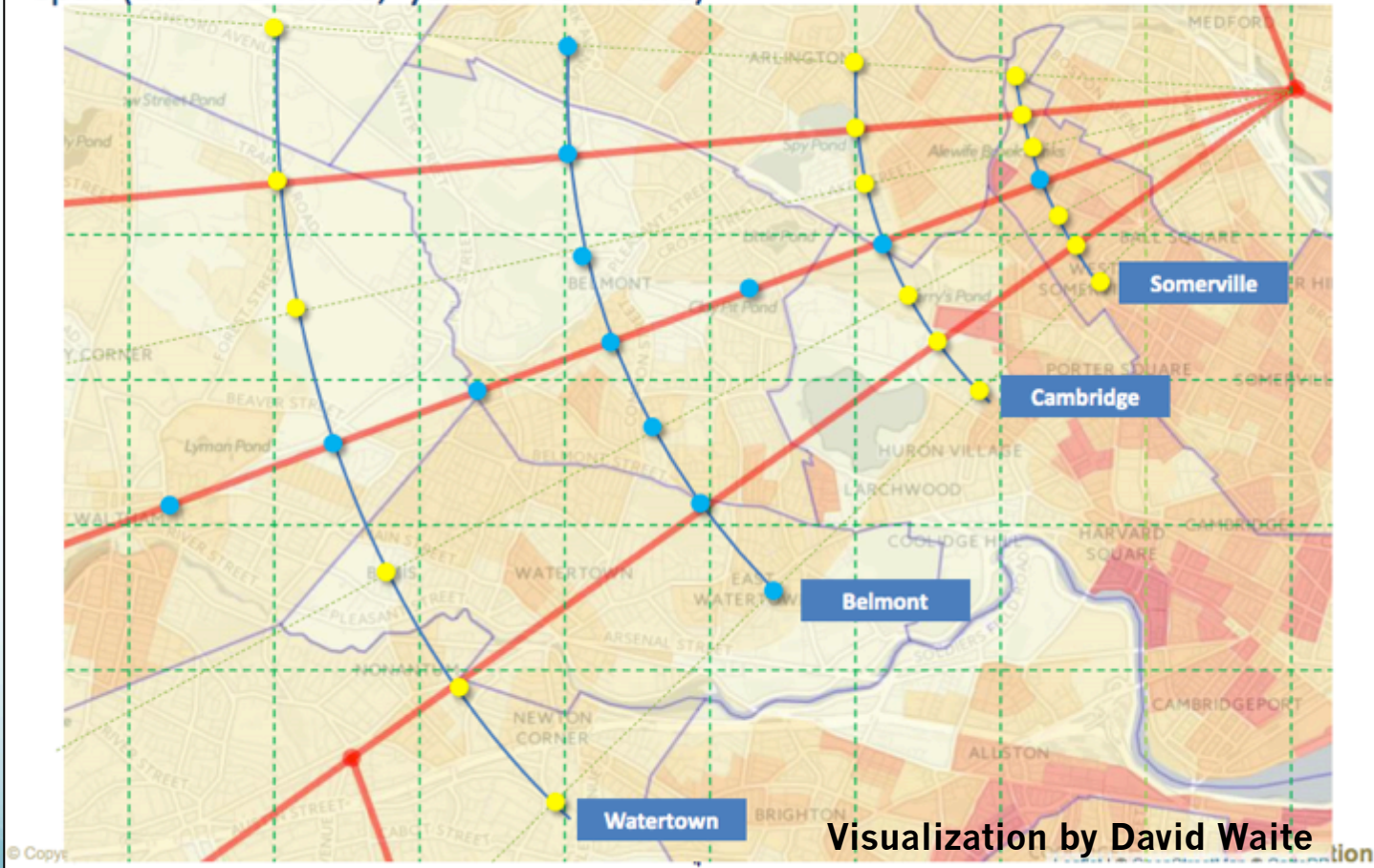
- We would like to generate enough data to model the impact of diversity and altitude on ground noise levels



# Citizen Noise Survey

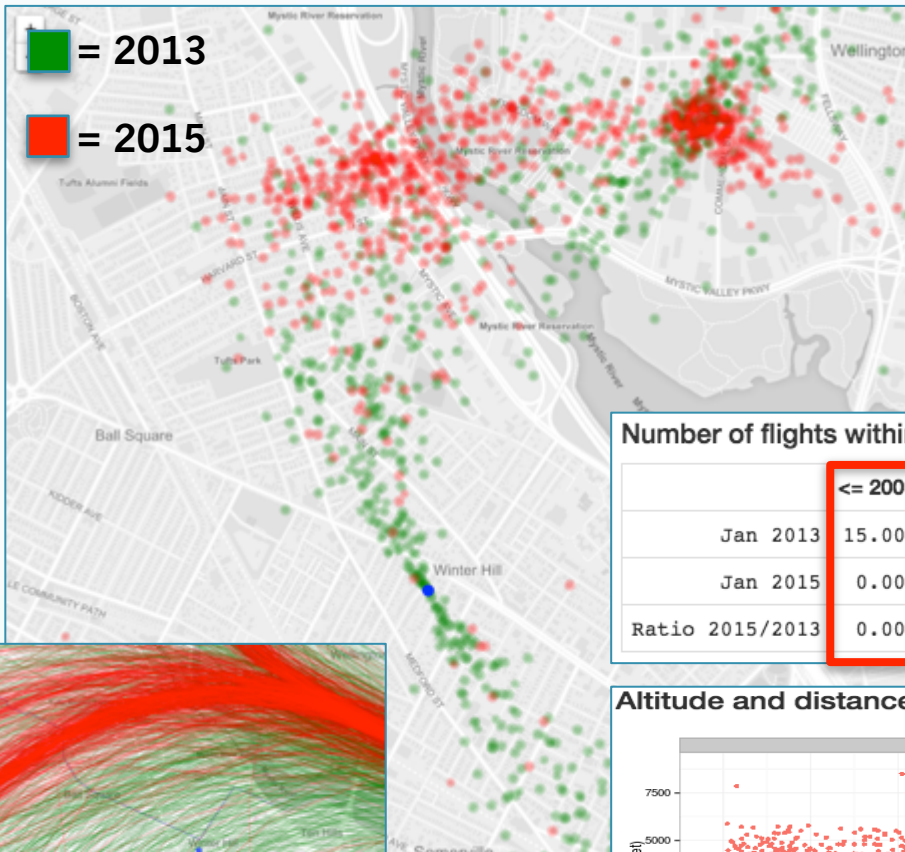
## Proposed Measurement Locations

We have defined 4 measurement arcs, each with 7 locations, and 1 longitudinal span (blue = 1<sup>st</sup> wave; yellow = 2<sup>nd</sup> wave)



# Some are winners

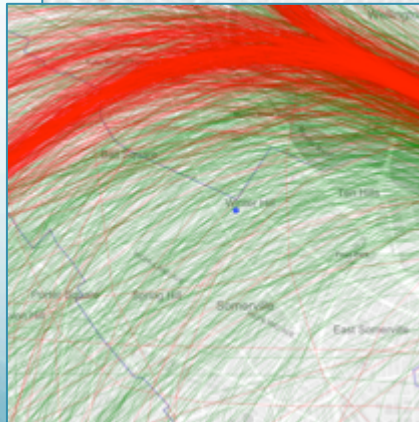
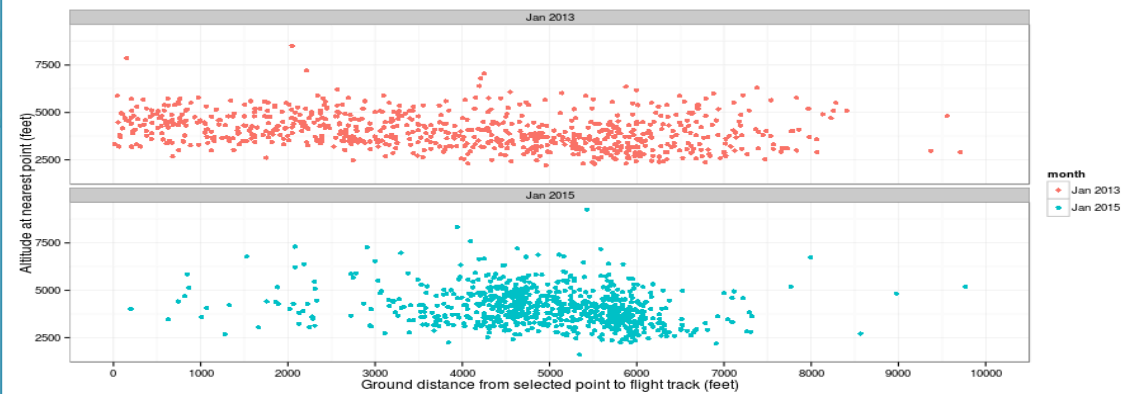
Winter Hill in Somerville went from 109 flights in 2013 w/in 1/2 mile to 9 in 2015 and from 15 to 0 directly overhead.



Number of flights within distance of selected point

	<= 200	<= 400	<= 600	<= 800	<= 1000	<= 1200	<= 1400	<= 1600	<= 1800	<= 2000
Jan 2013	15.00	36.00	60.00	75.00	95.00	109.00	123.00	141.00	164.00	182.00
Jan 2015	0.00	0.00	2.00	4.00	6.00	9.00	11.00	11.00	13.00	16.00
Ratio 2015/2013	0.00	0.00	0.03	0.05	0.06	0.08	0.09	0.08	0.08	0.09

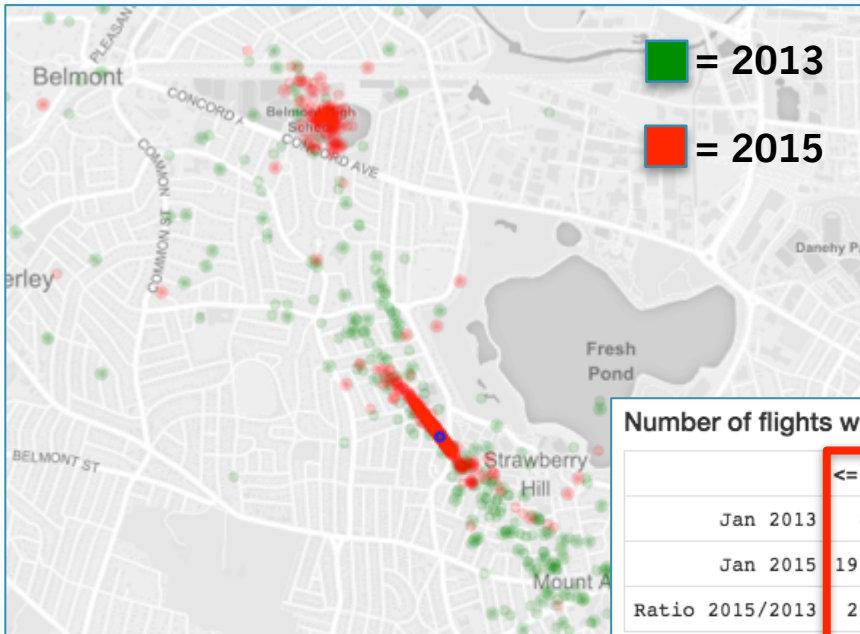
Altitude and distance at nearest point





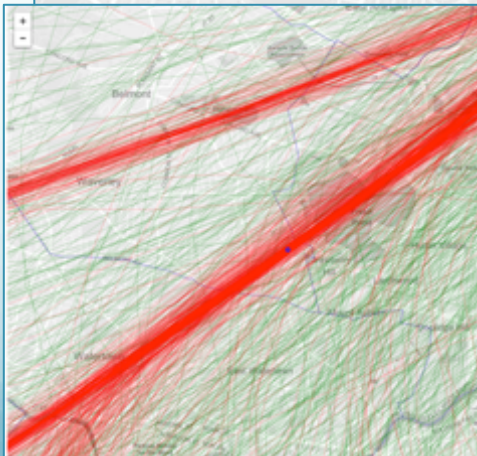
# Some are losers

Grove Street in Belmont went from 55 flights in 2013 w/in 1/4 mile to 330 in 2015 and from 8 to 193 directly overhead.

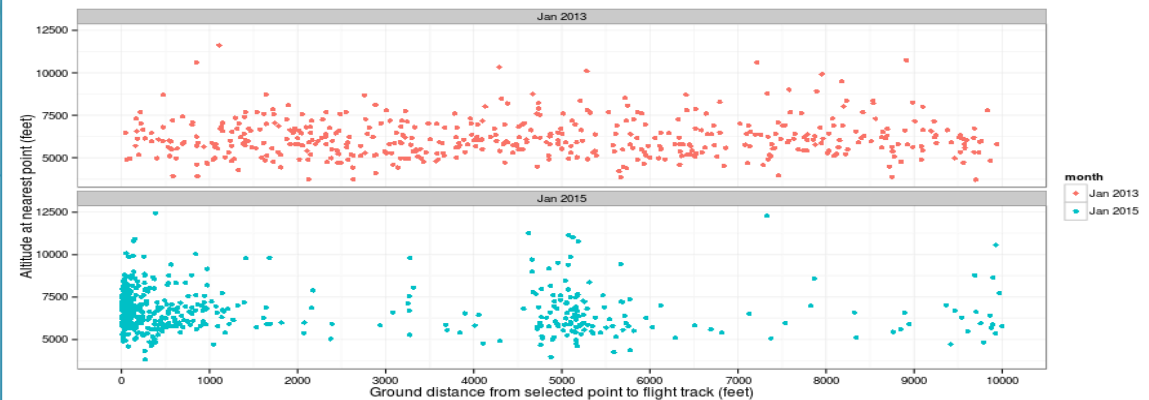


Number of flights within distance of selected point

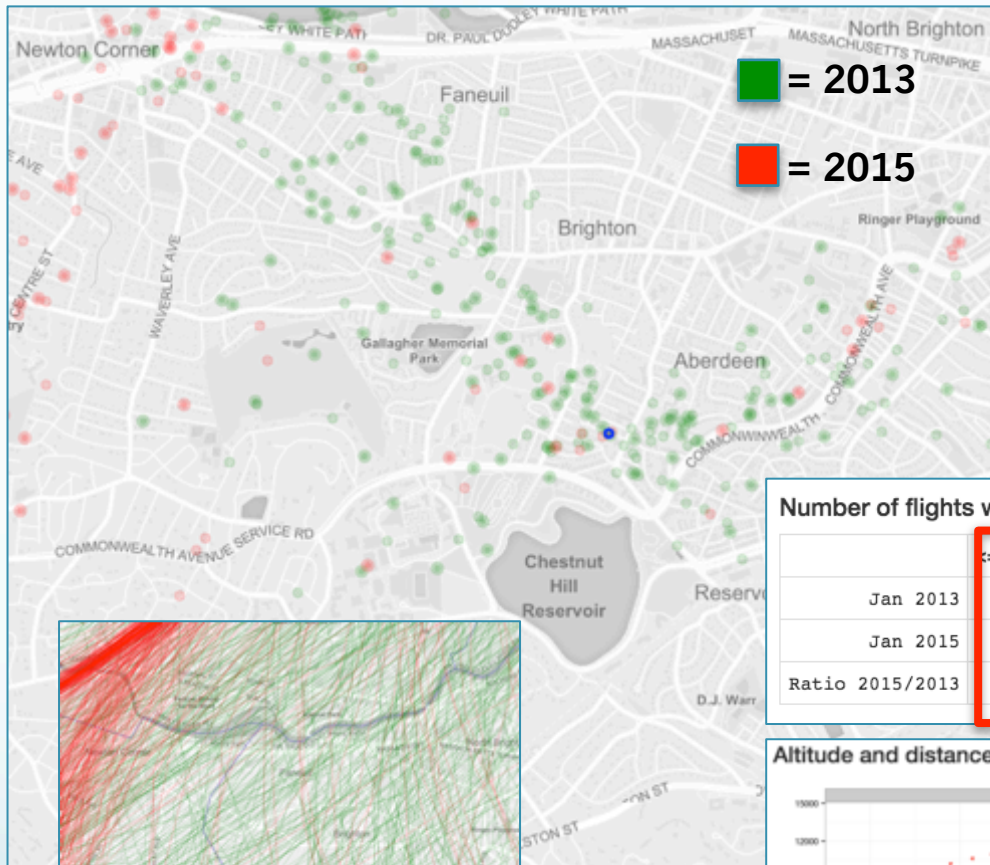
	<= 200	<= 400	<= 600	<= 800	<= 1000	<= 1200	<= 1400	<= 1600	<= 1800	<= 2000
Jan 2013	8.00	14.00	27.00	32.00	43.00	55.00	69.00	80.00	93.00	104.00
Jan 2015	193.00	245.00	278.00	300.00	320.00	330.00	336.00	338.00	343.00	344.00
Ratio 2015/2013	24.10	17.50	10.30	9.40	7.40	6.00	4.90	4.20	3.70	3.30



Altitude and distance at nearest point



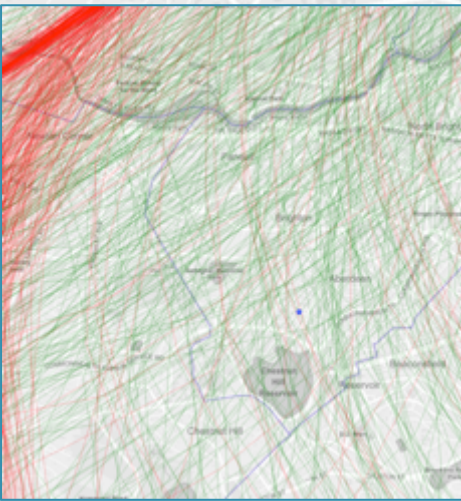
# Some are winners



Cleveland Circle in Brighton went from 73 flights in 2013 w/ in 1/2 mile to 10 in 2015 and from 3 to 2 directly overhead.

Number of flights within distance of selected point

	<= 200	<= 400	<= 600	<= 800	<= 1000	<= 1200	<= 1400	<= 1600	<= 1800	<= 2000
Jan 2013	3.00	7.00	13.00	23.00	35.00	47.00	59.00	62.00	65.00	73.00
Jan 2015	2.00	3.00	4.00	4.00	5.00	6.00	6.00	6.00	9.00	10.00
Ratio 2015/2013	0.67	0.25	0.31	0.17	0.14	0.13	0.10	0.10	0.14	0.14



Altitude and distance at nearest point

