

Sky Posse Palo Alto Information Packet on Aircraft Noise over Palo Alto

May 23, 2016

1. What changed?

- Gradual traffic migration to over Palo Alto from other places
- Sudden increase in concentrated traffic in 2015
- Traffic over Palo Alto has grown far faster than the rate of operations at SFO

2. What is the impact?

- Health, Children's learning, Productivity/Work, Quality of life, Property values
- Complaints distribution
- Survey results

3. What can be done?

- Noise distribution guidelines
- Solutions design guidelines
- Raising the Menlo target altitude or shifting SERFR to Big Sur are not viable solutions
- Select Committee

Appendices

- Appendix A: A short history of NextGen
- Appendix B: Report on Some Quantitative Measurements of Aircraft Overflight Noise in Palo Alto by Thomas C. Rindfleisch
- Appendix C: Myths dispelled and FAQs
- Appendix D: Populations of some cities in Santa Clara and Santa Cruz counties
- Appendix E: Sky Posse Palo Alto survey of residents, workers, students, and visitors of Palo Alto, East Palo Alto, and Stanford
- Appendix F: Survey comments from residents

We have prepared this information packet to share our data and analysis of the current aircraft noise situation in Palo Alto with a broad, non-technical audience. One must understand first the problem and how it came about before trying to solve it.

Palo Alto is a good case study of the situation because it is the “perfect storm”, according to the SFO Noise Abatement Office, due to the convergence of 3 arrival routes over the city and its proximity to the MENLO waypoint.

Sky Posse Palo Alto firmly believes that equitable solutions exist but must be designed by recognized aviation experts who have access to the appropriate resources, which include modeling tools. Therefore, we do not prescribe new arrival routes. Instead, we offer guidelines in terms of noise distribution and solutions designs, and we provide specific suggestions on solutions constraints or characteristics.

Our goal is to reduce the noise **for everyone** as much as possible and then fairly disperse what noise cannot be reduced.

We have the choice of doing it quickly or doing it right.

Let's do it right.

Sky Posse Palo Alto

1. What changed?

Over the last 10 years, traffic from the west (Oceanic arrivals) and the north (Pt Reyes arrivals) was moved to Palo Alto from San Mateo County. In addition, traffic from the south was shifted to the east and highly concentrated starting in March 2015.

The FAA has now merged 3 arrival routes (south, west, and north) over Palo Alto and the MENLO waypoint. Under this NextGen implementation:

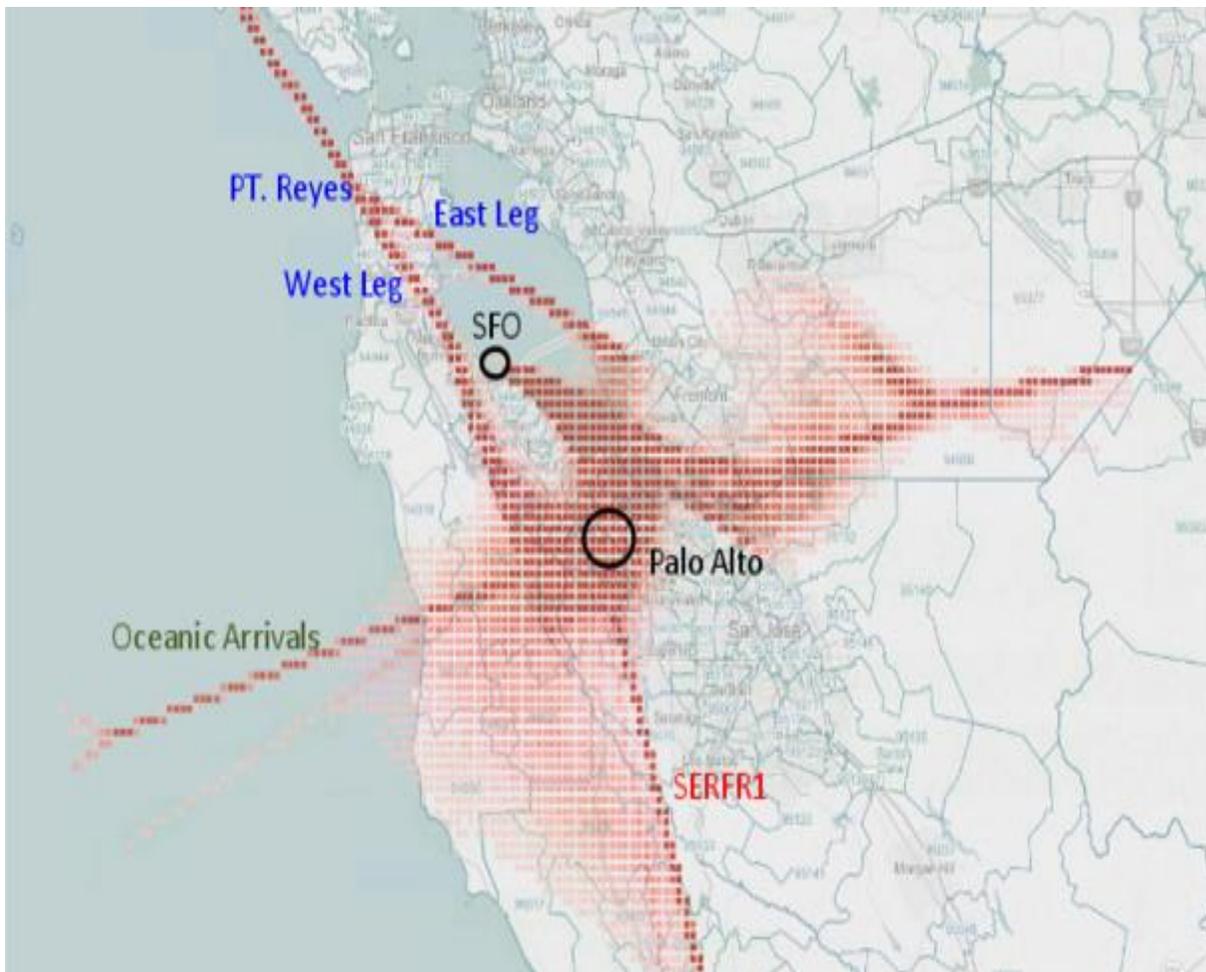
- Planes follow narrow corridors and must meet speed constraints along the way resulting in large-scale use of speed brakes and noisy accelerations over densely populated residential areas.
- Frequency and volume of air traffic have increased tremendously –planes are now routinely flying over the same neighborhoods 60 to 90 seconds apart, and many more planes are flying over the same area.
- Average altitudes are lower than in the past because of the extensive use of instrument-based approach with a MENLO target altitude of 4,000 ft

All these changes occurred while the number of SFO arrivals has remained relatively constant during the last 3 years.

In a nutshell, Palo Altans now live under a low-altitude giant aerial freeway used by planes at all hours of the day and night. Additionally, we are subjected to the toxic jet exhaust of roughly 100,000 planes per year, which are basically equivalent to hundreds of miles of freeway exhaust.

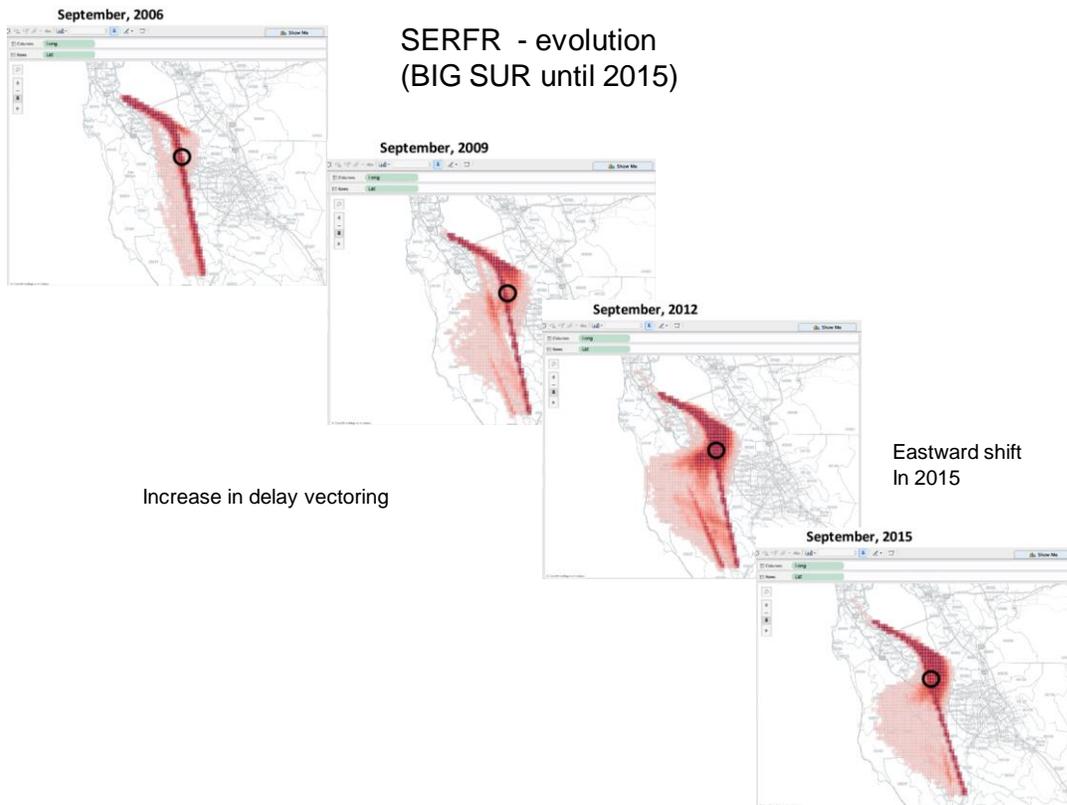
Supporting data:

- The map below shows the three arrival routes that converge over Palo Alto:
 - The SERFR route from the south is a pencil thin corridor with aircraft typically flying between 4,000 and 5,000 ft over Palo Alto before turning left for their final approach to SFO.
 - The Oceanic arrivals from the west also turn left over Palo Alto onto final approach.
 - The Pt Reyes flights from the north split into the west (over the Peninsula) and east (over the Bay) tracks. The west leg flights make a U-turn over Palo Alto. Over the past 10 years, this U-turn has gradually shifted from over San Mateo County to over Palo Alto. In addition, 70% of north arrivals are now using the west leg instead of the east leg that is over the Bay. A few years ago, the ratio was about 50% split between the two legs.



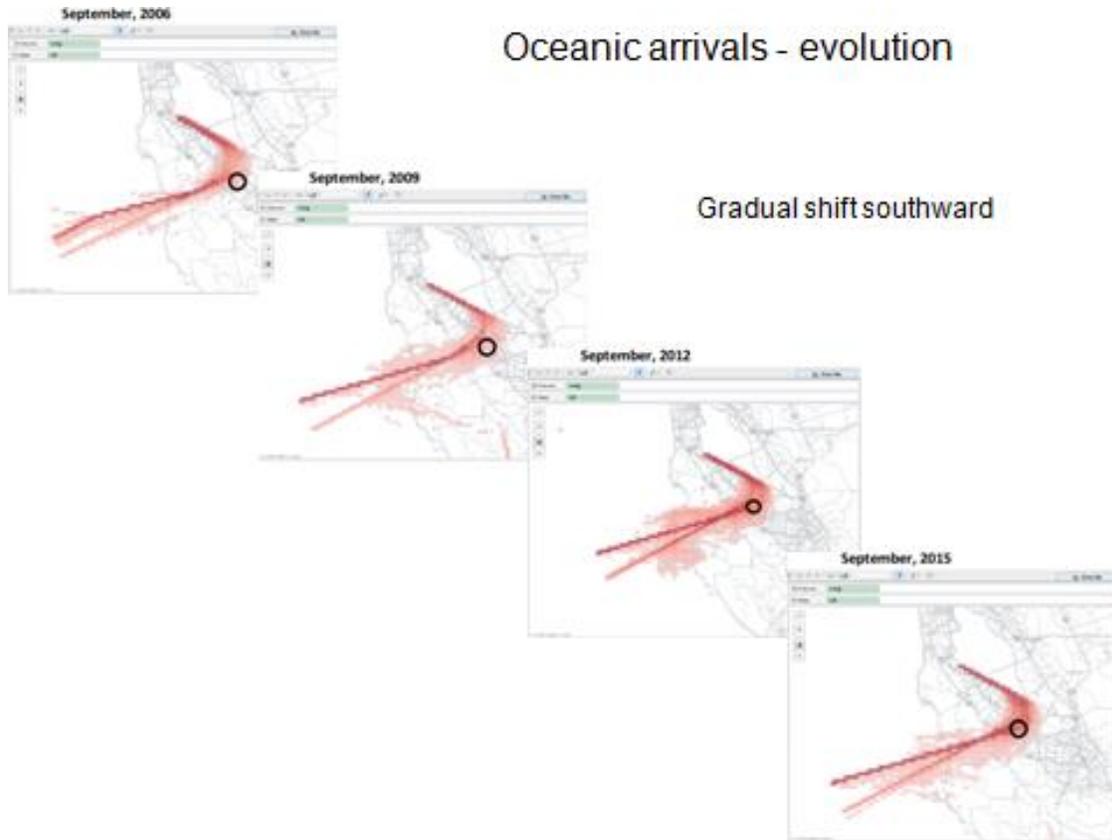
3 arrival routes (south/SERFR; west/Oceanic; north/Pt Reyes west leg) converge over Palo Alto

- The analysis of radar data reveals a long-term movement of air traffic to over Palo Alto over the last 10 years, compounded by a major shift in early 2015 due to NextGen. See appendix A for a short history of NextGen.

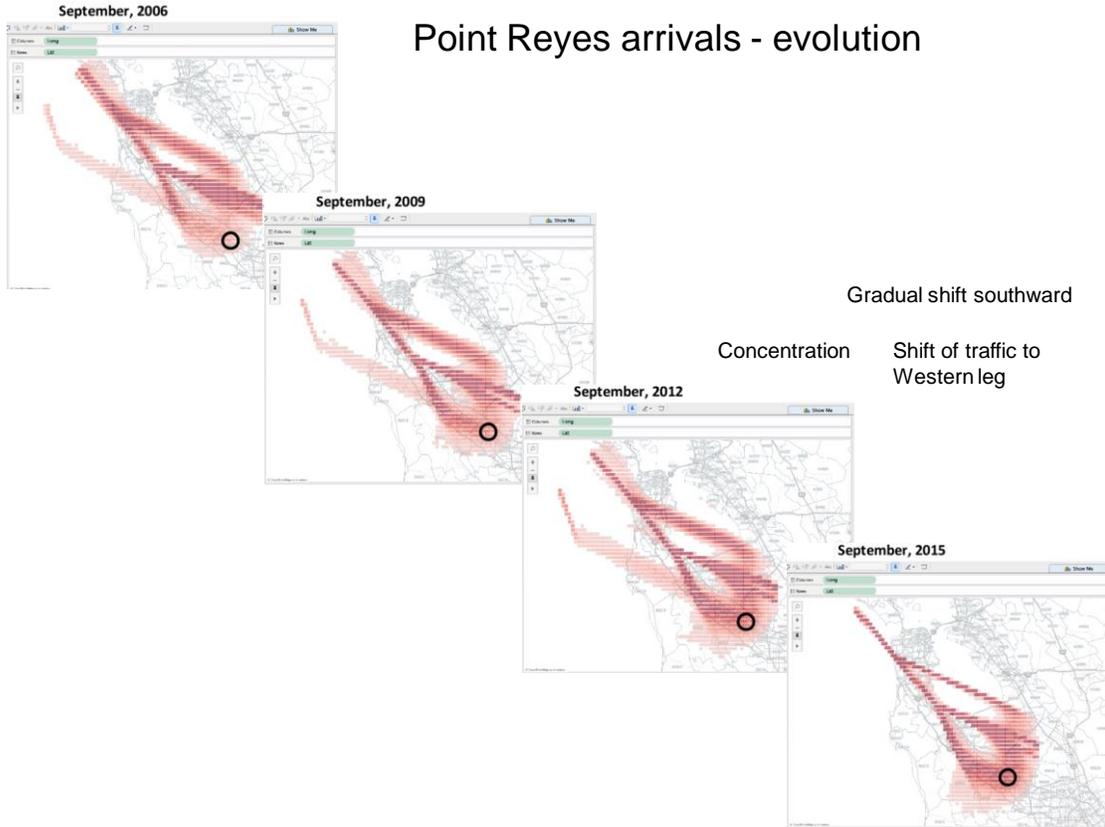


Oceanic arrivals - evolution

Gradual shift southward



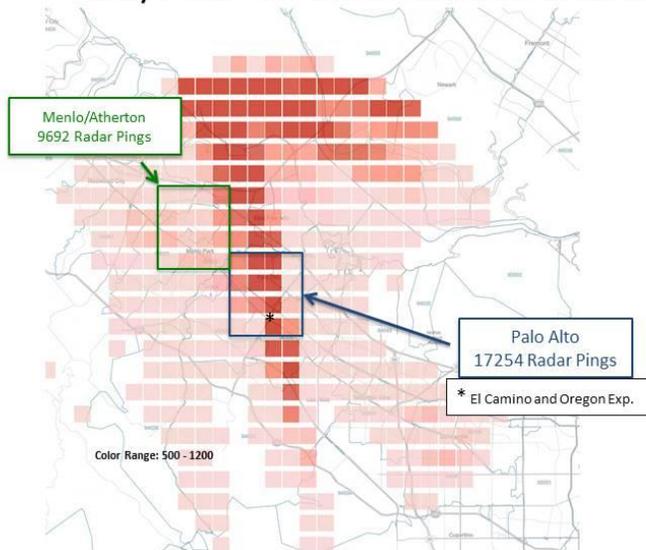
Point Reyes arrivals - evolution



- Analysis of radar data from May 2006 and May 2015 shows the shifts in low altitude aircraft traffic (3,000-6,000 ft) southeast towards Palo Alto.

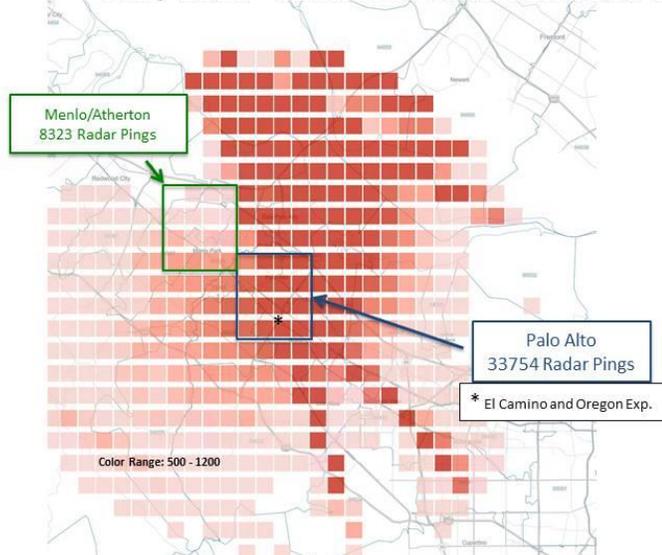
Radar Return Counts

May 2006 - All traffic between 3000 and 6000 feet

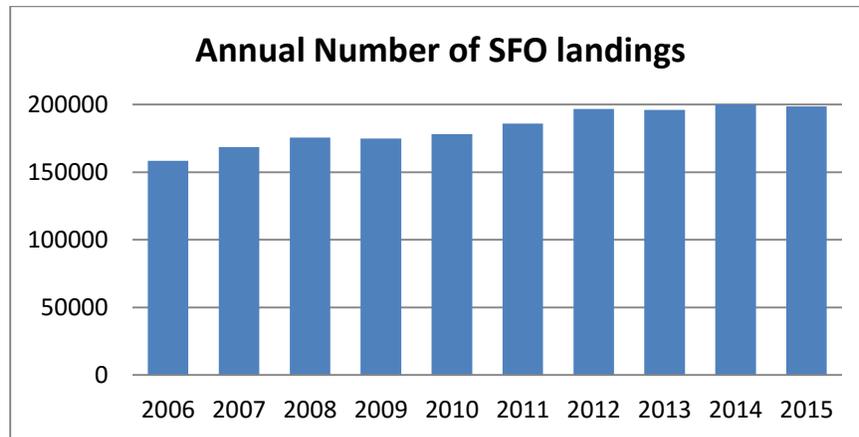


Radar Return Counts

May 2015 - All traffic between 3000 and 6000 feet



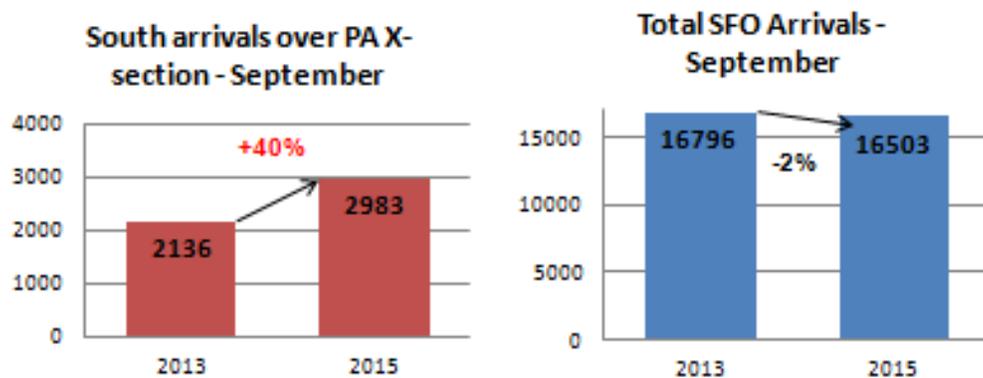
- The rate of SFO operations has remained relatively stable since 2012. **Therefore the issue of air traffic over Palo Alto cannot be explained by an increase in SFO arrivals.**



Source: SFO <http://www.flysfo.com/media/facts-statistics/air-traffic-statistics>

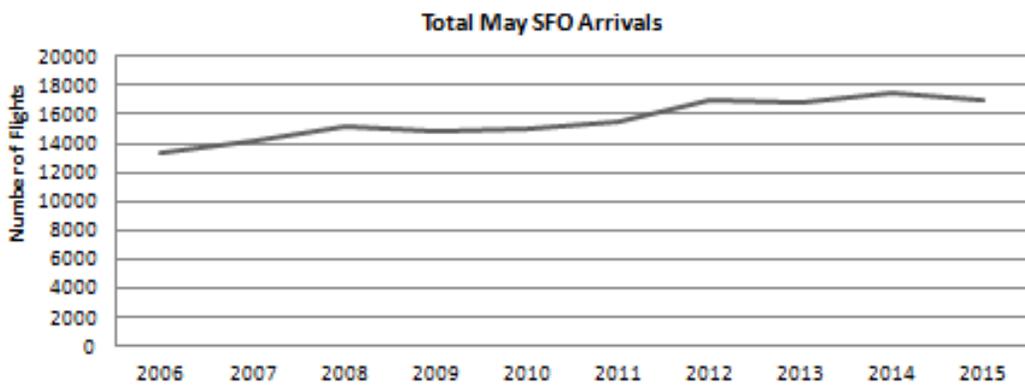
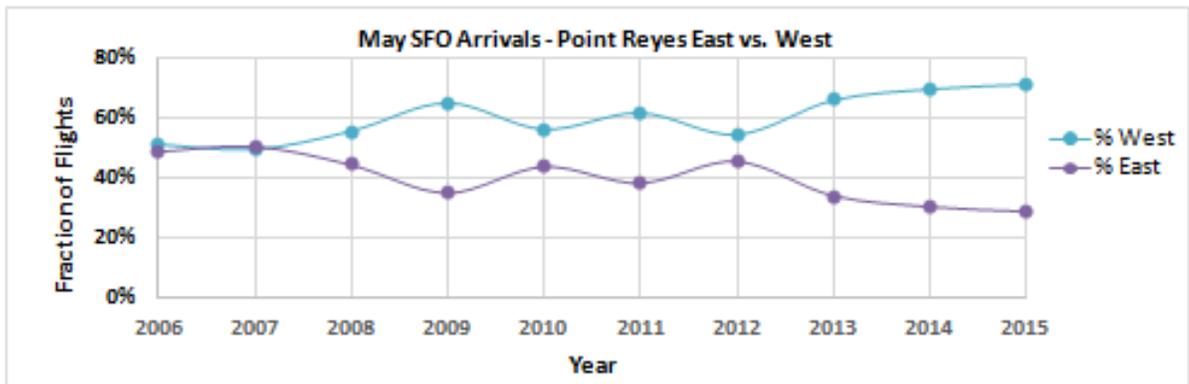
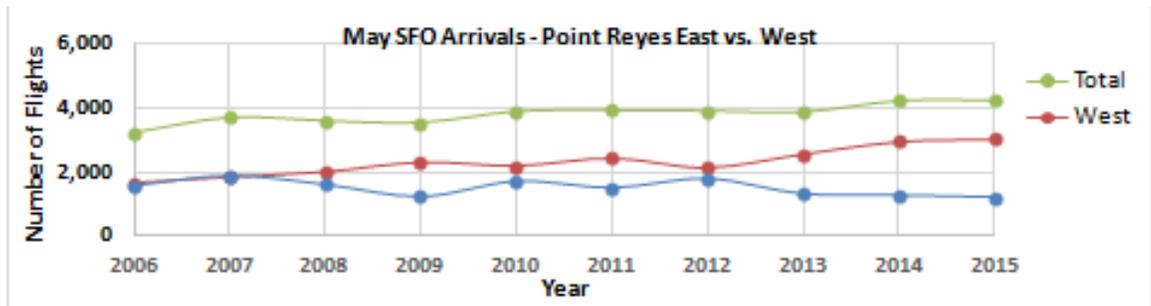
In contrast, Palo Alto overflights have increased continuously for over a decade without any stabilization. **Substantial changes occurred:**

- In the last 2 years alone, the number of low flights (3000-4000 feet) over Palo Alto increased by 65% while nearby communities to the north saw substantial reductions in low elevation air traffic.
- South arrivals over Palo Alto increased by 40% between Sep 2013 and Sep 2015 while total SFO arrivals decreased by 2% in that same time period.



Sources: SFO <http://www.flysfo.com/media/facts-statistics/air-traffic-statistics>; FAA flight data analysis.

- Years ago, and as recently as in 2012, Point Reyes arrivals were roughly equally split between the West (over Peninsula) and East (over Bay) legs. Now, over **70% of the traffic is using the West leg and making a U-turn over Palo Alto**. At the same time, SFO arrival traffic has remained relatively constant (in fact decreasing slightly in 2015).

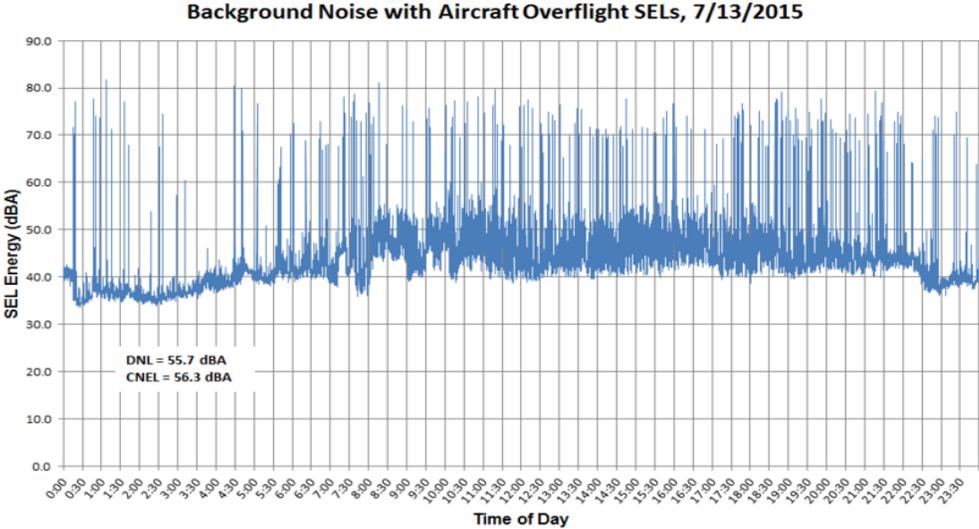


Sources: SFO <http://www.flysfo.com/media/facts-statistics/air-traffic-statistics>; FAA flight data analysis.

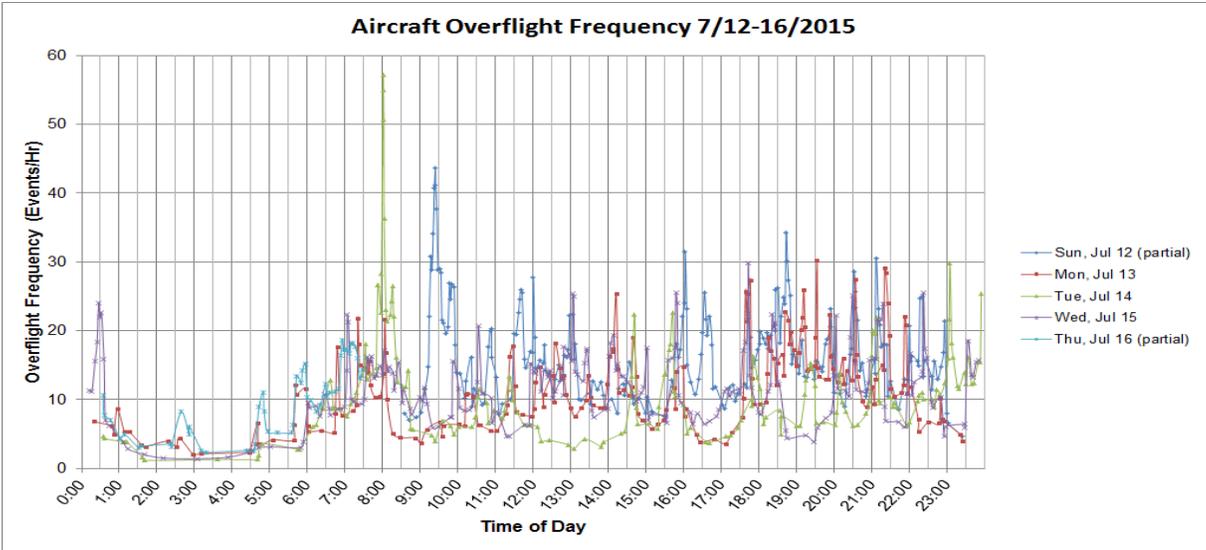
- Low altitude overflights are relentless, particularly during periods of SFO rush hour traffic. On a daily basis, Palo Alto residents experience up to 300 low altitude flights that are sequenced 60 to 120 seconds apart for extended periods of time. Such “bunching” occurs multiple times a day, from early morning to late at night.

Below are 2 graphs (courtesy of Thomas C. Rindfleisch) that illustrate the frequency of traffic at one Palo Alto location:

- The 1st graph shows noise recordings over 24 hours on July 13, 2015



- The 2nd graph displays the frequency of aircraft on 5 consecutive days.



See appendix B for more details on some noise measurements in Palo Alto. We also suggest reading some myths dispelled and FAQs in appendix C.

2. What is the impact?

Due to the repeated noise and emissions, a large volume of concentrated, low-flying aircraft have multiple impacts on people:

- **Health:**
 - Significant increase in the rate of cardiovascular diseases
 - Reduction in Rapid Eye Movement (REM) sleep (the restorative part of the sleep cycle) resulting in daytime fatigue
 - Air pollution: although the impact of concentrated jet traffic at low altitudes requires further studies, some research already exists:
 - Exhaust from airplane engines undergo photochemical changes under sunlight that result in carcinogenic aromatic hydrocarbons.
 - Aircraft emit ultrafine particles similar to the ones emitted by vehicles on freeways. Such particles are inhaled and appear to contribute heart and lung conditions such as asthma and the development of blocked arteries. A [recent study by the Keck School of Medicine of USC](#) found that communities downwind from LAX and as far away as 10 miles had higher levels of ultrafine particles than expected and equivalent to levels that would be created by hundreds of miles of freeway.
 - A repeated and large number of planes flying at low elevations in narrow corridors does not allow for a natural dispersion of toxic emissions and will result in concentrated chemical pollution for the populations below.
- **Children's learning:**
 - Aircraft noise exposure at school has been significantly associated with poorer recognition memory and conceptual recall memory as well as poorer reading comprehension and information recall memory.
- **Productivity / work**
 - Loss of sleep directly impacts people's productivity and ability to work.
 - Frequent aircraft noise creates repeated disruptions and annoyances, which disrupt people's ability to concentrate.

- **Quality of life**
 - People can no longer live as they did previously because of constant interruptions. They can no longer enjoy normal activities, indoors or outdoors. The noise is occasionally loud enough to interfere with conversation.
- **Property values**
 - Per California law, owners must disclose any neighborhood noise when selling their property. Failure to do so causes liability exposure.
 - Excess noise reduces property values. House near busy streets, let alone freeways, command lower selling or rental values.

Reference materials on impacts are available in the Science and Health section of the Library tab of the Sky Posse Palo Alto website www.skypossepaloalto.org.

Complaints distribution

Since their start in March 2015, changes in the SFO arrival routes have generated an unprecedented increase in the number of complaints. **In the week of April 27-May 3, 2016, there were 74,806 complaints on stop.jetnoise.net. This weekly number translates into about 300,000 complaints/month and close to 4 million complaints/year.**

One must keep in mind, however, that only a small percentage of the people affected by aircraft noise complain. Many people do not know how and where to complain, or are dealing with more urgent issues such as taking care of their family or earning some income. Many are also tired of complaining for a year or more without seeing any results.

Despite the fact that a minority of people complains, SFO has been overwhelmed by the number of complaints and is about 6 months behind in processing complaint data. However, we can use stop.jetnoise.net data, which are compiled daily, as a good proxy to understand which communities are affected.

Complaints reveal that many communities are now affected by excessive aircraft noise, but Palo Alto and Los Altos are more affected than others.

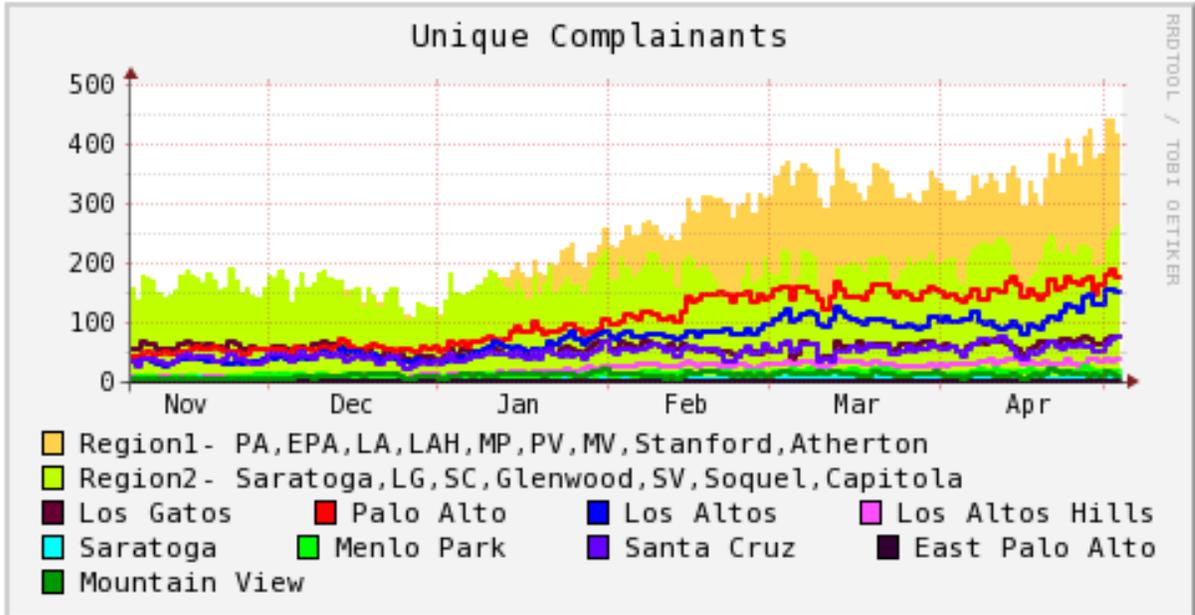
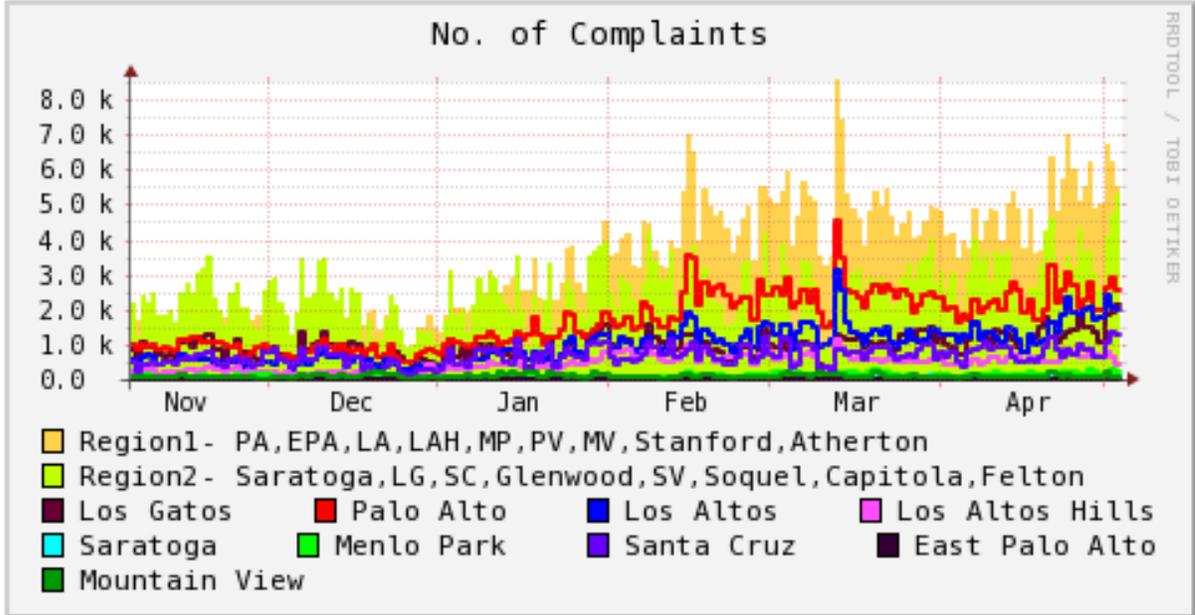
Below is a summary of the number of complaints and unique complainants since November 1, 2015 captured by stop.jetnoise.net. The graphs show data for individual cities with the largest number of complaints and complainants but also aggregate data into 2 regions:

- Region 1 close to the Bay encompasses Palo Alto, East Palo Alto, Los Altos, Los Altos Hills, Menlo Park, Mountain View, Stanford, and Atherton
- Region 2 close to the Santa Cruz mountains and encompasses Saratoga, Los Gatos, Santa Cruz, Glenwood, Scotts Valley, Soquel, Capitola, and Felton

As shown in the graphs below, the largest number of complaints and complainants come from Region 1 and from Palo Alto, with Los Altos following close behind. These data should not be a surprise given that 3 arrival routes now converge over Palo Alto, which is the largest city with a high population density and is very close to the Menlo waypoint. (See appendix D for populations of some cities in Santa Clara and Santa Cruz counties).

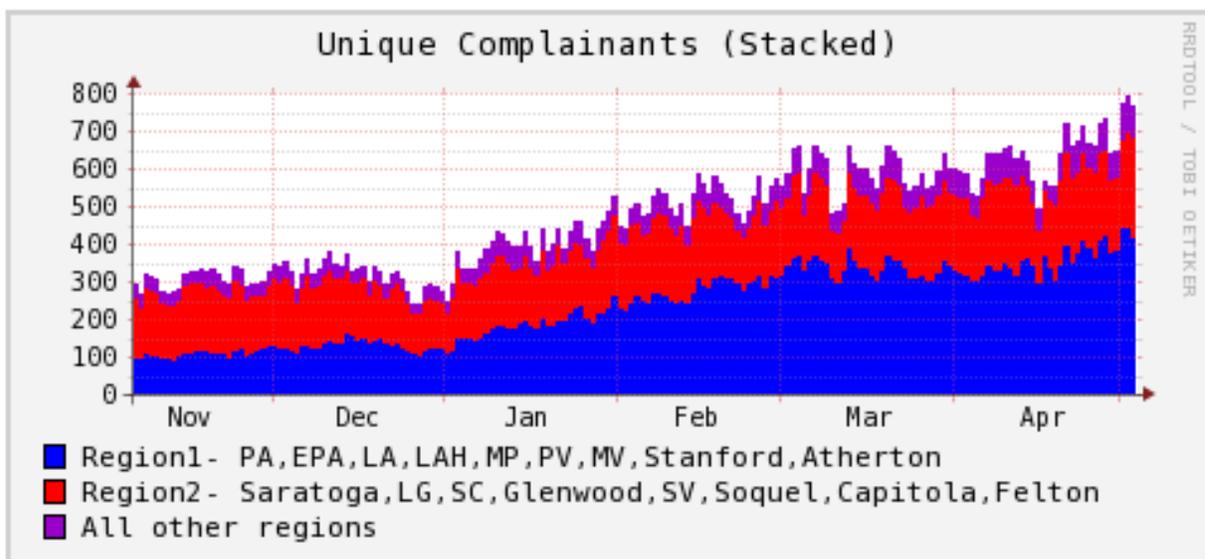
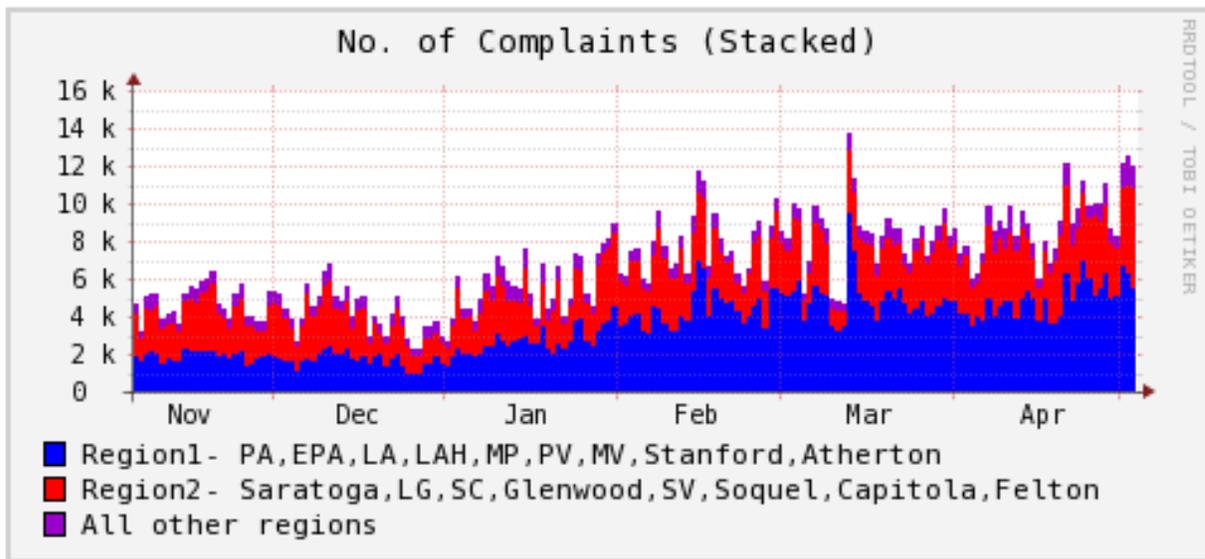
Number of complaints and unique complainants over the last 180 days
per city and per region

Regular View



Number of complaints and unique complainants over the last 180 days
per region only

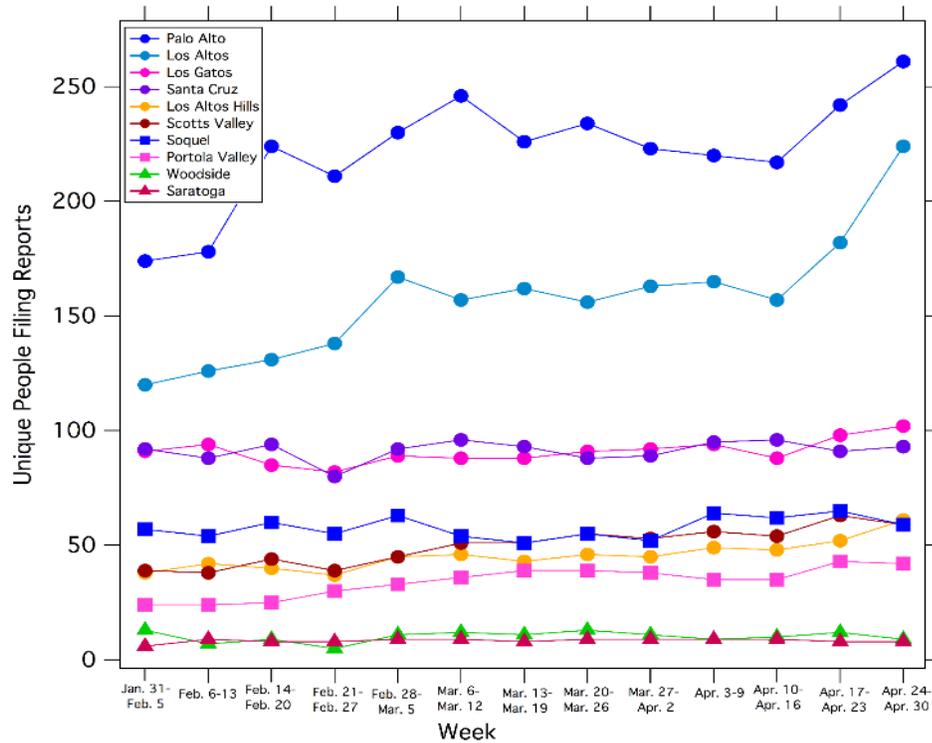
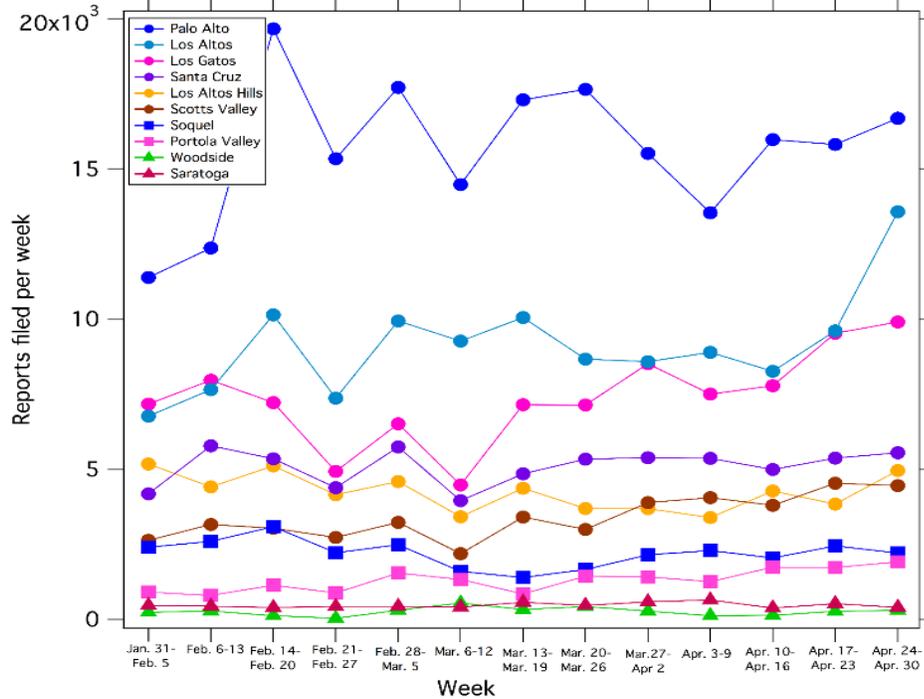
Stacked View



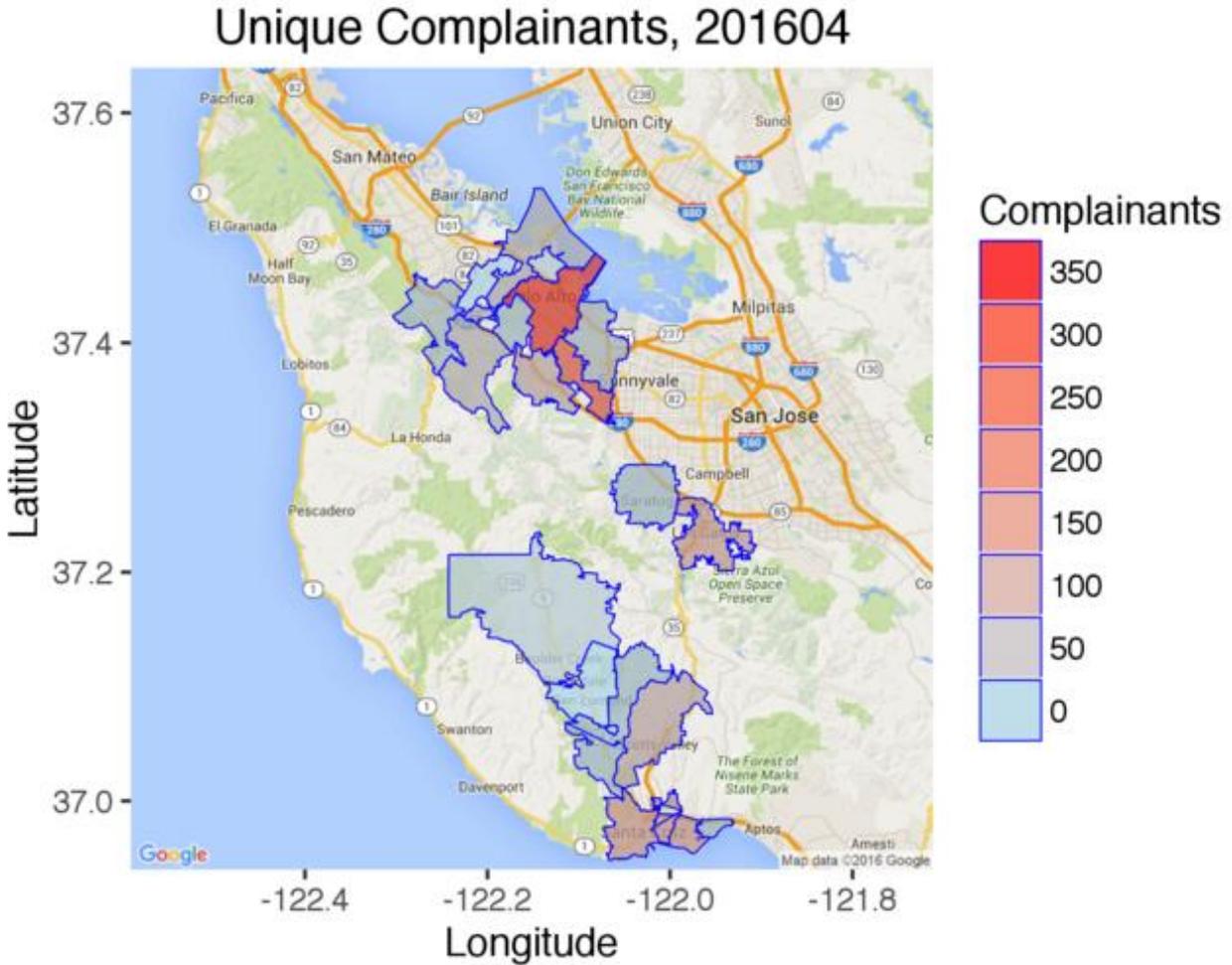
PA: Palo Alto	EPA: East Palo Alto	MV: Mountain View	LA: Los Altos	LAH: Los Altos Hills
MP: Menlo Park	PV: Portola Valley	SC: Santa Cruz	LG: Los Gatos	SV: Scotts Valley

Below is a weekly view for the last 3 months or so. Again, more people in Palo Alto and Los Altos were consistently filing more noise reports.

Weekly complaints in stop.jetnoise.net Jan 31 – Apr 30, 2016

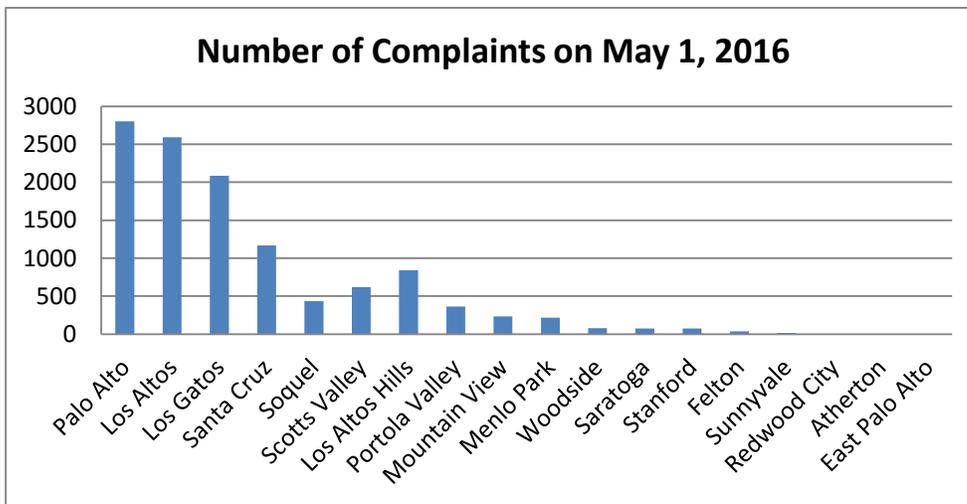
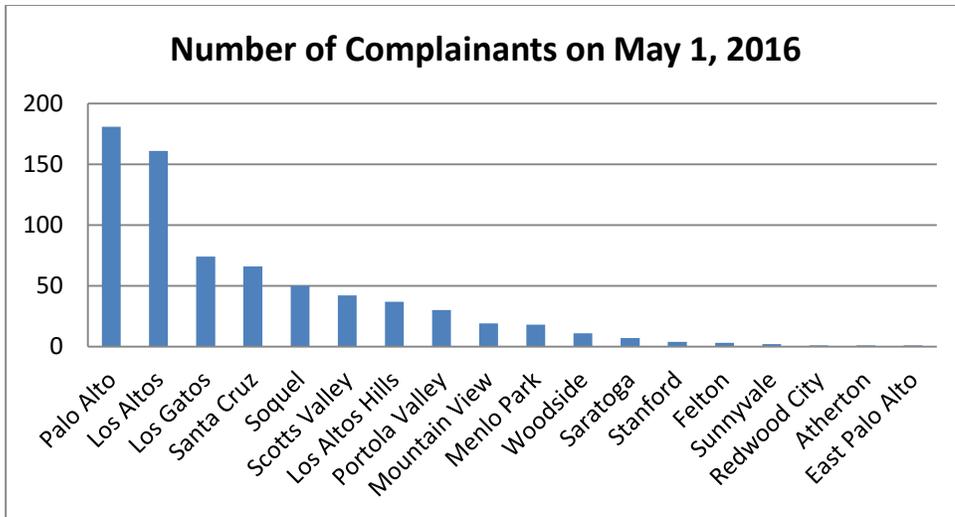


A drill down for April 2016 complainants using stop.jetnoise.net shows again the severity of the problem for Palo Alto and Los Altos.

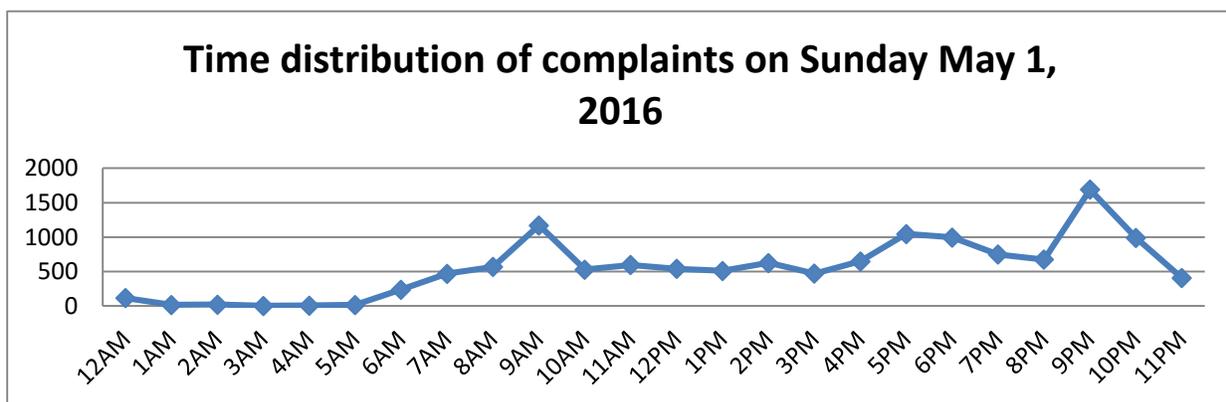


Finally, a daily analysis of stop.jetnoise.net data on May 1, 2016 shows again the impact on Palo Alto and Los Altos.

May 1 was a record day for stop.jetnoise.net: 800 people across the Bay area filed 13,088 complaints on that day. 88.5% of the people who complained that day were from the cities listed in the graphs below. Palo Alto and Los Altos were again the top 2 cities for both complaints and complainants.



A sobering observation is that complaints on May 1 (across the whole Bay Area) happened even late at night: there were 406 complaints between 11PM and midnight and 115 complaints between midnight and 1 AM. The lowest number was 2 complaints in the middle of the night. This was a warm evening.



Survey results

Sky Posse Palo Alto ran a survey for 11 days in mid February to better understand the negative impact of commercial aircraft noise on residents, workers, students, and visitors of Palo Alto, East Palo Alto, and Stanford. We received 599 responses and 1,600 comments. Given that responses were from some groups of people like households, the survey responses represent about 1,000 people.

Here is a brief summary of the results (see appendix E for more details on the survey and the results, including a sample of the comments received):

- 90% of the respondents have had their lives impacted in a major or significant way
- The top 3 concerns were: noise/interruptions (96%), health/stress (83%), and property values (78%)
- The top 5 impacted “activities” were:
 - Sleep (86%)
 - Outdoor activities (86%)
 - Overall quality of life (86%)
 - Concentration (reading, writing, classroom) (76%)
 - Conversation (face-to-face, phone) (72%)
- 98% of the respondents were affected by noise and 94% were affected by the frequency of the planes (e.g. planes sequenced every 2 or 3 minutes for long periods of time) –90% of the people experienced that frequency more than once a day
- Respondents were disturbed at all hours of the day and night
 - 77% between 7AM and 7PM
 - 68% between 5AM and 7AM OR between 10PM and midnight
 - 54% between midnight and 5AM
- All Palo Alto neighborhoods were affected. Homes, businesses/workplaces (including hospitals), schools, places of worship, libraries, and parks were affected.

These 1,000 voices represented people of all ages who lived, worked (some from home), went to school (to study or teach), or visited our area. These people told us that they can’t fall asleep or are awakened multiple times a night. They can’t concentrate and they worry about being fired because they are so tired. They feel stressed and fear for their health. They are afraid of the

jet-induced air pollution. They are concerned about the impact on their children. They are anxious about planes crashing. They no longer go outdoors anymore or open their windows. They don't want to run air conditioners. They have insulated homes with double-pane windows but they still hear the planes. Some wish they were deaf. They can't carry on conversations, including when they are on the phone with clients. They no longer want to entertain guests. They worry about property values.

These people cannot get away from the noise though some stated that they are moving out or are considering moving out. They don't understand what happened. Some have lived in the same place for decades thinking that they would retire in the home they love.

3. What can be done?

Solving this complex problem will require an ongoing, iterative process that should rely on technical expertise and resources. Such process could serve as a model for other cities plagued by aircraft noise.

- Problems of this complexity require a continuous quality improvement process. The chance of getting it right the first time is nil.
- Developing equitable solutions that take advantage of NextGen technology cannot be accomplished without the appropriate technical expertise and resources, including aeronautics engineers and representatives from the airline industry and the FAA.

Sky Posse Palo Alto does not consider itself qualified to design specific routes - this must be done by aviation experts who have access to the right resources, including modeling tools. We offer, however, **guiding principles for noise distribution and solutions design**, including some **specific suggestions on solutions constraints or characteristics**.

Our overall goal is for the FAA to reduce noise pollution as much as possible for all residents and distribute the remainder as equitably as possible.

Noise distribution guiding principles

- **Noise should be reduced to the greatest extent possible for the most people**
 - Arrival routes should remain at the highest possible altitudes over residential areas
 - Routes should be planned to take advantage of the full extent of the Bay. We encourage routing over uninhabited and industrial areas.
 - Angles of descent should be as steep as feasible. An angle of 4.5 degrees, such as the one tested in Hannover Germany ([see short video](#) of the “whisper approach”), would permit higher altitudes over land.
 - Descents below 10,000 feet should occur over the Bay or unpopulated areas.
 - Nighttime arrivals (for cargo or passenger planes) should never occur over residential areas.
- **Residual noise should be distributed over a large area**
 - Noise that cannot be eliminated should be distributed in an equitable fashion among communities so that everyone who benefits from the airport bears a share of the noise cost.
 - Narrow flight corridors at altitudes below 10,000 feet over residential areas are unacceptable. While predictable, such corridors are implicitly unfair and harmful to the residents living underneath them. The FAA can use the accuracy of the GPS technology to distribute flight tracks. But this would require the FAA to move away from their current thinking of concentrating low altitude arrival routes over densely populated areas.

Solution design guiding principles and characteristics

- Consider the whole NorCal Metroplex airspace and all airports (not just SFO) to maximize the FAA's ability to use all airspace to design routes that will reduce noise overall or distribute any remainder noise equitably.
- Take advantage of the Bay to the fullest extent possible
- Enter the space above the Bay from the Southeast at the highest practical altitudes to use the maximum length of the Bay (this approach has been used in the past)
- Create one or more waypoints over the Bay or unpopulated area east of San Jose and as far South from SFO as possible to maximize flight altitudes.
- Do not create a single convergence point such as MENLO. Institute instead fanned or herringbone or trident¹ flight paths for arrivals that cannot take the South Bay approach in order to spread out the residual noise. There is no reason why multiple arrival routes must converge towards the same virtual GPS waypoint. Multiple sets of GPS coordinates could be used to disperse arrival traffic.
- Re-balance Point Reyes arrivals to the East leg as it was in the past
- Do not concentrate flights over populated areas unless the distance between the ground and aircraft altitude is at least 10,000 ft. Building giant low-altitude freeways over established communities is not acceptable. These sacrificial noise corridors such as the ones over Palo Alto create tremendous harm to the populations living underneath.
- Sequence planes on the ground and over the ocean or unpopulated areas, but not over residential communities
- Increase the angle of descent to the greatest degree possible during the majority of the approach (this "whisper approach" at 4.5° is being tried in Hannover, Germany²)
- Evaluate proposed solutions based on existing technologies, not the promise of future technologies. The FAA has failed to deliver Continuous Descent or Optimized Profile Descent technologies below 10,000 ft. As a result, we now have the inverse of a quiet descent at idle: planes fly quietly at high altitudes, but the noisy part of the descent, which occurred at much higher altitudes in the past, now happens close to the ground.

¹ http://www.airservicesaustralia.com/wp-content/uploads/FINAL_High-and-wide.pdf

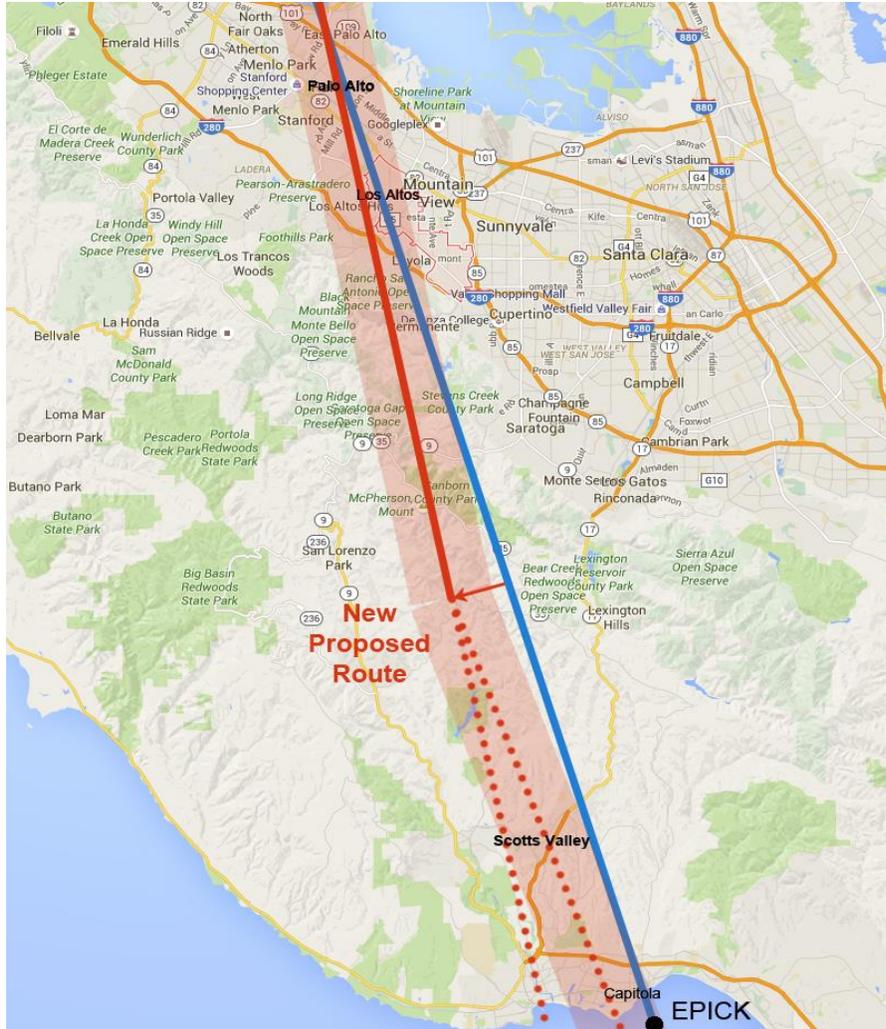
² <http://en.hannover-airport.tv/video.html?v=8B>

Raising the MENLO target altitude or shifting SERFR to Big Sur are not solutions

We do not believe that raising MENLO by 1,000 ft (or even a few thousand feet) or shifting SERFR to Big Sur are viable solutions for Palo Alto or nearby cities because these changes:

- **Fail to address the large increase in the number of flights over Palo Alto (or adjacent cities)**
 - Although the number of SFO landings has not changed significantly in recent years, aircraft traffic over Palo Alto has increased significantly, in particular for arrivals from the south and north. As discussed earlier,
 - South arrivals over Palo Alto increased by 40% between Sep 2013 and Sep 2015
 - West leg traffic of Point Reyes arrivals from the North doubled between May 2006 and May 2015
- **Fail to take into account the frequency of Palo Alto overflights.**
 - On a daily basis, Palo Alto residents experience low altitude flights that are sometimes sequenced 60 to 120 seconds apart for extended periods of time. Such “bunching” occurs multiple times a day, from early morning to late at night.
 - Simply increasing the MENLO target altitude by a few thousand feet will not address the flight frequency or bunching problem.
- **Fail to address the concentration issue caused by the convergence of 3 routes over Palo Alto and will not reduce the level of noise for residents**
 - Planes often make noisy speed adjustments over Palo Alto because the airspace is too crowded to permit regular use of the less noisy Continuous Descent Arrival or Approach (CDA) in which planes descend at idle speed.
 - The net result of the 2015 implementation of NextGen, including the SERFR2 arrivals, is that planes now descend at shallow angles but with speed constraints/changes at key waypoints along the way.
 - Altitude restrictions do not work. There is already a wide variation in actual altitudes of flights over MENLO today.
 - Noise will become worse as traffic over Palo Alto and Los Altos is likely to increase over time because planes are expected to be sequenced more effectively thus reducing the level of vectoring between SERFR and MENLO.

As shown in the map below, shifting SERFR (blue line) back to Big Sur (red line) will shift noise from some residents in the Santa Cruz mountains to other residents in other parts of the Santa Cruz mountains as well as the many residents of Santa Cruz City. In addition, the proposed change will provide absolutely no relief for the many residents of cities such as Los Altos or Palo Alto given that the ground tracks are almost overlapping in these locations.



Blue line: SERFR ground track. Red Line: Big Sur Track.
Reddish area: noise shadow under new proposed route.

Select Committee

We do not know how the Select Committee plans to operate but would like to emphasize the following:

- Representation and decisions should be based on measured impact, not political boundaries.
- Technical expertise, independent of any airport, will be critical to review and discuss FAA recommendations. The lack of an independent technical council will limit the Select Committee's ability to vet options and alternatives that might be better solutions than those proposed by the FAA or SFO.
- Actual noise measurements must be taken and published.

*FAA NEXTGEN AND THE 2012
TO 2015 “OPTIMIZATION OF
METROPLEX AIRSPACE”*

Short Version – See Full Version for Review of CatEx2
and the Role of the RTCA

Mark Shull
Palo Alto, CA
January 30, 2016
Ver. 1.0

Table of Contents for This Short Version

I. Introduction	4
II. Metroplex Redesign – NextGen’s “Plan B” or “NowGen”	5
III. RTCA Task Force 5 and the NextGen Mid-Term Implementation Report.....	6
IV. FAA Modernization and Reform Act of 2012 – Congress micromanages the FAA	9
IV. Nextgen Advisory Committee (NAC) sets NextGen mid-term priorities – reduced separation, metroplex airspace redesign and incentives	13
V. The Greener Skies Pilot and the NorCal ‘Optimization of Airspace for the Metroplex’ (OAPM) Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) Processes	19
VI. OAPM Public Comment Process – Sudden, Quick and Done	24
VII. Summary – We are Worse Off and Actual Modernization Will be Even Harder Going Forward.....	28

Table of Contents for Full Version

I.	Metroplex Redesign – NextGen’s “Plan B” or “NowGen”	5
II.	RTCA Task Force 5 and the NextGen Mid-Term Implementation Report.....	6
IV.	FAA Modernization and Reform Act of 2012 – Congress micromanages the FAA	9
III.	Nextgen Advisory Committee (NAC) sets NextGen mid-term priorities – reduced separation, metroplex airspace redesign and incentives	13
IV.	The RTCA CatEx2 Task Force is Created.....	Error! Bookmark not defined.
V.	FAA Selects the NIRS Noise Model, ignoring its March 2012 Order to Use AEDT	Error! Bookmark not defined.
VI.	The RTCA Catex2 Task Force Constructs the Correct Regulatory Interpretation of the 2012 Legislation for the FAA	Error! Bookmark not defined.
VII.	Sacrificial Noise Corridors Enable the “Net Noise Reduction” Measurement Technique	Error! Bookmark not defined.
VIII.	The Greener Skies Pilot and the NorCal ‘Optimization of Airspace for the Metroplex’ (OAPM) Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) Processes	19
IX.	OAPM Public Comment Process – Sudden, Quick and Done	24
X.	Summary – We are Worse Off and Actual Modernization Will be Even Harder Going Forward.....	28

I. Introduction

In March 2015, Palo Alto experienced a dramatic increase in aircraft noise. The flights were more frequent, lower and louder. Like many communities around the country, we were part of a fast-track FAA program, the redesign the San Francisco Bay Area airspace.

According to the FAA, this “Optimization of Airspace and Procedures in the Metroplex” (OAPM) was part of “NextGen,” the FAA’s effort to modernize management of the U.S. air transportation system. The purported goals for metroplex airspace redesign were to improve efficiency and safety, reduce fuel consumption and decrease environmental impacts, including noise. In the end, however, this program was mostly about increasing airport capacity by reducing separation between planes for arrivals and departures and by creating “simpler” (i.e., straighter) arrivals and departure paths. This has increased noise on the ground dramatically, well beyond what volumes alone would suggest. Some of the goals, like concern for the environment, appear to be mostly program packaging for public consumption, and have not been born out in NextGen performance metrics nor do they comport with general airline industry environmental policy.¹

Many have experienced NextGen in their skies and know its effect on their well being. The intention of this document is to provide a factual history of how all this happened, from the perspective of those individuals on the ground² and from the perspective of taxpayers who are paying over one billion per year,³ or \$49 billion in total, for NextGen (via airline ticket fees and federal income taxes.⁴)

¹ U.S. airlines, led by its primary lobbying organization, Airlines for America (A4A) successfully excluded air travel from the Paris Climate agreement, and used their influence to pass the European Union Emission Trading Scheme Prohibition Act of 2011, forbidding U.S. airlines from participating in the EU’s Emissions Trading System. Nancy Young, A4A’s vice president for environmental affairs, and a participant in defining NextGen’s noise standards, has led a multi-year effort against any and all carbon regimes, with the one exception of reducing carbon emissions by making arrivals and departures from crowded metroplex airports as direct, straight and low as possible. See “Your Biggest Carbon Sin May be Air Travel,” New York Times, Elizabeth Rosenthal, Jan. 26, 2013; and “Emissions in the EU: US Vilifies Carbon-Trading Scheme for Airlines,” Spiegel Online International, July 28, 2011.

² The FAA includes airlines, airports, aviation equipment and service providers, the general aviation industry, pilots (private and commercial), air traffic controllers, aviation related unions, and other government agencies (such as DOD, NASA and DHS) as official “stakeholders” in the NextGen program and in its NextGen planning meetings and considerations, but does not include individuals, in spite of the dramatic effect this program has had on tens of thousands across the country.

³ Testimony of Michael Huerta, (then) Acting Administrator, FAA, Hearing on “A Review of and Update on the Management of FAA,” Hearing before the Subcommittee on Aviation, September 2, 2012, p. 27.

⁴ NextGen: A Review of the RTCA Mid-Term Implementation Task Force Report, Hearing before the Subcommittee on Aviation, Oct. 28, 2009, p. 19.

II. Metroplex Redesign – NextGen’s “Plan B” or “NowGen”

The FAA and others have expended considerable resources to communicate and market their grand vision for NextGen as “a comprehensive program to modernize U.S. airspace.” However, what we and many others are experiencing is not this NextGen. Instead, what we are experiencing is a Plan B, the “Mid-term”⁵ re-start of NextGen. This **Plan B restart, or “NowGen,”** as one Government Accountability Office (GAO) report⁶ described it, **was created by the airline industry for the FAA and focused almost entirely on a fast-track program to open metroplex airspace.**

The original NextGen program – the comprehensive modernization of airspace management – was initiated by executive order in 2000, and funded in 2003 as part of Vision 100 – Century of Aviation Reauthorization Act.⁷ Over the next decade, the program missed one deadline after another⁸ and continuously exceeded budgets by a wide margin.⁹

By 2009, the airlines and their lobbies, including Airlines for America (A4A) and the RTCA,¹⁰ had had enough. They complained to Congress and the administration that NextGen had reached the “Mid Term” of its life, had cost them money, but had not benefited them or met their business needs. (The Air Transport industry spends about \$72m per year in reportable

⁵ The NextGen “Mid-Term” period is generally 2013 to 2018, with the Initial Term being 2003 to 2013 and Maturity Term being 2019 to 2025, or later.

⁶ “NextGen Air Transportation System, Issues Associated with MidTerm Implementation”, Dr. Gerald Dillingham, General Accountability Office, March 25, 2009, p. 10; and “NextGen: A Review of the RTCA Mid-Term Task Force Report,” Hearing before the Subcommittee on Aviation, Oct. 28, 2009, pp. 11-12.

⁷ Public Law 108-176, Dec. 12, 2003 “Authorized FAA to create the performance-based Air Traffic Organization to administer and improve FAA’s management of air traffic control. This included the creation of the Joint Planning and Development Office (JPDO) housed within the FAA, to plan for and to transition to NextGen – envisioned as a move from largely ground-based radars to precision satellite-based navigation and including digital, networked communications, an integrated weather system; layered, adaptive security, and more.”

⁸ The NextGen Tech Center in Atlantic City NJ has repeatedly failed to deliver field-ready NextGen systems, but it is defended preemptively in hearings as a “force multiplier” by Congressman Frank LoBiondo, chair of the House Subcommittee on Aviation, who also represents Atlantic City. See “NextGen: A Review of the RTCA Mid-Term Implementation Task Force, Subcommittee on Aviation”, House Committee on Transportation and Infrastructure, Nov. 28, 2009, p. 23.

⁹ The FAA’s original budget estimate for NextGen from 2002 to 2025 was about \$40 billions; updated estimates for this program are up to \$150 billion. See Addressing Underlying Causes for NextGen Delays Will Require Sustained FAA Leadership and Action, Office of Inspector General, Audit Report, AV-2014-031 February 25, 2014, p. 9

¹⁰ RTCA is the Radio Technical Commission for Aeronautics, and was established in 1935 to coordinate airline technical and operating standards. In Task Force 5, the RTCA moved beyond coordinating technical standards to coordinating the economic benefits they expected to receive from NextGen, including incentives, under that auspices of “policy coordination.”

money on lobbying.¹¹⁾ With Congressional backing¹²⁾, the airlines, simultaneously campaigning on the side to have air traffic control (ATC) privatized,^{13 & 14)} played hardball, and won a charter from the FAA in January 2009 to develop their own Mid-Term plan for NextGen. They quickly assembled a team - Task Force 5 (TF5) – under the auspices of the RTCA, and produced a plan in 9 months.

III. RTCA Task Force 5 and the NextGen Mid-Term Implementation Report

This RTCA Task Force 5 plan dispensed with the FAA’s grand vision of air space modernization.¹⁵⁾ Instead, it focused on initiatives that could be implemented quickly, would provide immediate benefits to the airlines, and used existing technologies.¹⁶⁾ The RTCA exists to enable the airlines to collaborate on joint technical studies and to set technical standards, but Task Force 5 went beyond this and included “for the first time, financial expertise,”¹⁷⁾ and the

¹¹⁾ Source: Air Transport, Industry Profile: Summary: 2015, OpenSecrets.Org at <https://www.opensecrets.org/lobby/indusclient.php?id=M01>

¹²⁾ In a 2009 Congressional hearing, Mr. Costello, the chair of the House Subcommittee on Aviation complimented Hank Krakowski, FAA COO, and Peggy Gilligan, FAA Associate Administrator, for commissioning the RTCA, stating “they did exactly the right thing, what all the stakeholders [airlines] and what we wanted them to do.” NextGen: A Review of the RTCA Mid-Term Implementation Task Force, Sub Committee on Aviation, House Committee on Transportation and Infrastructure, Nov. 29, 2009, p. 1. (of actual hearing)

¹³⁾ While asserting that they were not calling for FAA Administrator Huerta’s or Chief NextGen Officer Bolton’s resignation (as they had for previous FAA leaders), the AFA Congressional testimony continues to focus on privatization: “**Our work to date leads us to believe that a commercialized, non-profit type governance structure would deliver the greatest benefits for a reformed ATC entity**”. Air Traffic Reform (ATC) Solutions, Statement of Douglas Parker, U.S. House of Representatives Committee on Transportation and Infrastructure, Subcommittee on Aviation, March 24, 2015. This is not an idle threat, Canada privatized its air traffic control service successfully in 1996.

¹⁴⁾ “FAA Reauthorization: Issues in Modernizing and Operating the Nation’s Airspace”, Testimony of John Engler, President, Business Roundtable, Transportation and Infrastructure Committee, Nov. 18, 2014.

¹⁵⁾ In an important exchange between Congressman Corbel in a 2009 Aviation Sub Committee hearing on the RTCA Task Force NextGen recommendations, the Department of Transportation’s Inspector General, Scoval, testified that, “**the Task force recommendation don’t speak to the longer NextGen vision**”. This is followed by a question by Congressman Corbel to RTCA president Jenny in which he asks, “**Since [the TF5 report] focuses on maximizing capabilities from existing equipage, the recommendations are not really about NextGen**”? Ms Jenny replies that it isn’t new infrastructure that matters, “what you need to go do to get the benefit is implement new procedures, train pilots and controllers, **possibly change the way airspace is designed**’. NextGen: A Review of the RTCA Mid-Term Implementation Task Force, Subcommittee on Aviation, Committee on Transportation and Infrastructure, Nov. 28, 2009, p. 22.

¹⁶⁾ See e.g., “Summary of Subject Matter”, Hearing on “NextGen: Review of the RTCA Mid-Term Implementation Task Force Report,” Subcommittee on Aviation Staff, Subcommittee on Aviation, House Committee on Transportation and Infrastructure, Oct. 29, 2000, p. 7.

¹⁷⁾ Testimony of Margaret Jenny, RTCA president and co-chair of Task Force 5, NextGen: A Review...Nov. 2009, p. 6; Testimony of Dr. Agam. Shiha, MITRE Corporation, NextGen: A Review of the RTCA Mid-

direct participation of airline CFOs as gatekeepers to determine what programs would provide the most immediate financial benefits to the airlines.¹⁸

With Congress blessing this new hard-nosed business approach – one effusive Congressman on the Aviation Subcommittee calling it “BestGen”¹⁹ – the airlines were very specific in demanding what they wanted, a program they initially called the “metroplex initiative.”²⁰

Their primary demands were: 1) to land more planes per hour at metroplex airports by reducing in-tail, runway, wake and other separation standards, 2) to gain simpler and more direct ingress and egress routes via metroplex airspace redesign²¹, and 3) to be given incentives, in the form of subsidies to buy the navigation “equipment” to enable reduced separation in crowded metroplex airspace.²²

Term Implementation Task Force, Hearing before the Subcommittee on Aviation, Committee on Transportation and Infrastructure, Oct. 28, 2009, p. 12.

¹⁸ Summary of Subject Matter, NextGen: A Review of the RTCA Mid-Term Implementation Task Force Report, Hearing before the Subcommittee on Aviation, Committee on Transportation and Infrastructure, Oct. 28, 2009, p. ix.

¹⁹ NextGen: A Review of the RTCA Mid-Term Implementation Task Force Report, Hearing before the Subcommittee on Aviation of the Committee on Transportation and Infrastructure, House of Representatives, Oct. 28, 2009. P. 28.

²⁰ Memorandum from Thomas E. Petri, Chairman, Hearing on “A Review of and Update on the Management of FAA,” Subcommittee on Aviation, Sept. 2, 2012, p. 4.

²¹ During a Nov. 2009 hearing on NextGen, former Congressman Jim Oberstar asked James May, president of the Air Transport Association, “What parts of NextGen are going to be the most valuable to commercial aviation? Continuous glide paths, for example, climb out procedures, not having to do the step down?” Mr. May responded, “[I]f we are going to have positive benefits...its going to have to start with New York airspace redesign.” He then added parenthetically, the “best way to way to jumpstart this process is to fund the equipment for all aircraft”. Source: NextGen: A Review of the RTCA Mid-Term Implementation Task Force Report”, Subcommittee on Aviation Staff, Subcommittee on Aviation, House Committee on Transportation and Infrastructure, Oct. 27, 2009, p. 49.

²² While the airlines requested and received financial incentives, almost all of the commercial fleet already included ADS-B, about the only new equipment required to implement the TF5 initiatives. “ITT Awarded FAA Contract for Air-Traffic Control System”, Del Quentin Wilber, Washington Post, Aug. 31, 2007.

In subsequent Congressional testimony, Margaret Jenny, the president of the RTCA and co-chair of TF5, listed the Task Force’s “four critical overarching recommendations:”²³

- “Eliminate current separation buffers,
- Streamline operations approval processes [i.e., expedite environmental and other approvals,]
- Incentivize equipage, and
- Use the RTCA mechanism to plan and implement NextGen going forward.”²⁴

It is important to note that the TF5 recommendations did not include acceleration of NextGen’s “foundational” systems, ones that would actually modernize U.S. airspace management, but focused on “mature” technologies at specific “high-benefit locations” (metroplexes) that could be implemented quickly via “tiger teams.”²⁵ In other words, the industry wanted to fast-track new metroplex access procedures, without deploying the advanced systems the FAA had envisioned to enable noise dampening capabilities like continuous descent at idle to the runway. (The FAA continues to sell NextGen as including “quiet descents at flight idle” to touchdown, but these capabilities were not delivered in the rushed metroplex redesigns.)

TF5’s plan to increase airport throughput mostly involved the recategorization (or “ReCats”) of FAA safety “minima” such as wake turbulence separation; bad weather separation; low visibility/ceiling separation; closely spaced, parallel, independent and dependent runway separation; in-tail, vertical and horizontal separation; etc. – not new technologies.²⁶ **The**

²³ Testimony of Jenny Margaret, President, RTCA Inc., NextGen: A Review of the RTCA Mid-Term Implementation Task Force Report, Hearing before the Subcommittee on Aviation of the Committee on Transportation and Infrastructure, House of Representatives, Oct. 28, 2009, p. 7.

²⁴ Ibid.

²⁵ Testimony of Dr. Agam. Shiha, MITRE Corporation, NextGen: A Review of the RTCA Mid-Term Implementation Task Force, Subcommittee on Aviation, Committee on Transportation and Infrastructure, Nov. 28, 2009, pp. 12 - 14.

²⁶ “NextGen Integration Working Group Final Report, Approved by the NextGen Advisory Committee October 2014,” RTCA, Oct 2014. p. 14 and p. 18. Benefits from these “ReCats” are described in the RTCA’s NextGen Integration Working Group Final Report in 2104 at p. 15: “**The Multiple Runway Operations and Separation Management** capabilities recommended in this report will provide benefits **via increased arrival and/or departure capacity** and throughput, particularly during less than visual approach weather conditions, and will establish new standards for future parallel runway construction. This will lead to reduced delays, more flight opportunities and better reliability and predictability for the traveling public. These procedures will also reduce cancellations by allowing the airport to maintain visual approach capacity in marginal and poor weather conditions. //Additionally, **the increased capacity available with Wake Recategorization**, which is usable regardless of weather conditions, may enable air carriers to provide additional service to the traveling and shipping public without a degradation of service quality and will provide air traffic controllers with an additional separation tool. //This potential capacity is unrealized today due to legacy separation standards that do not consider advancements in navigation and surveillance, or the improved understanding of wake turbulence transport and decay. These more conservative standards have been used to maintain the target levels of safety and to mitigate collision and wake encounter risk. **The MRO and Separation**

metroplex changes did not introduce new safety, it compensated for the reductions in separation margins – the purported efficiency gains – by making the procedures straighter, lower and simpler.

Increasing aircraft density in metro airspace around the country was going to be painful no matter what. The FAA's planned (but did not deliver) a suit of systems and procedures equivalent to painless dentistry. With TF5, the airlines took over and pared the systems necessary to the absolute minimum needed to increase metroplex density, or in the dentistry analogy, they proceeded with just the drill.

Senior members of the Aviation Subcommittee went out of their way to endorse these no-nonsense CEO and CFO²⁷ recommendations, and told FAA senior management, in no uncertain terms, to get behind this new reality²⁸.

IV. FAA Modernization and Reform Act of 2012 – Congress micromanages the FAA

The RTCA TF5 recommendations were then incorporated almost verbatim into the the **FAA Modernization and Reform Act (FMRA) of 2012**, under Title II – NextGen Air Transportation system and Air Traffic Control Modernization²⁹. The Act was strikingly detailed in its instructions to the FAA. Below are some of the main points of the act:

Management capabilities discussed in this report will provide operational benefits to the NAS without requiring additional aircraft equipage and with minimal cost to FAA when compared to other large NextGen programs.//Additionally, several of the **recommendations will support simultaneous parallel operations at runway spacing's that do not require High Update Rate surveillance.** This will allow FAA to decommission or relocate these facilities to airports where there will be incremental benefits. **These reductions in separation**, in combination with other future Air Traffic Control (ATC) equipment upgrades (TAMR), which include high resolution monitors with alert algorithms such as FMA[Final Monitor Aid – See OIG Jan. 25, 2008 report on integration and cost problems with FMA], will make new airports eligible for higher capacity configurations with existing runway layouts, or in the future with reduced land acquisition requirements. **Note, however, that advanced equipage or decision support tools are not a requirement to realize operational efficiencies associated with these operational improvements.** Lastly, as noted above, reduced separation standards for parallel operations will minimize the cost of future runway and taxiway infrastructure improvements at airports around the country.

²⁷ Summary of Subject Matter, Hearing on "NextGen: A Review of the RTCA Mid-Term Implementation Task Force Report", Subcommittee on Aviation Staff, Subcommittee on Aviation, House Committee on Transportation and Infrastructure, Oct. 27, 2009, p. ix.

²⁸ Statements by Mr. Costello, chairman of the House Subcommittee on Aviation to senior FAA administrators, NextGen: A Review of the RTCA Mid-Term Implementation Task Force Report, Hearing before the Subcommittee on Aviation of the Committee on Transportation and Infrastructure, House of Representatives, Oct. 28, 2009, pp. 29 and 63.

²⁹ Title II – NextGen Air Transportation System and Air Traffic Control Modernization, Public Law 112-95, H.R. 658, FAA Modernization and Reform Act of 2012, Jan. 3, 2012.

§203 and §208 –Named and detailed two new FAA leadership positions to run NextGen, down to their GSA levels and compensation (the Assistant Administrator for NextGen at the time soon resigned,³⁰ and was replaced by Michael Whitaker, an airline executive, who was given the more senior position of FAA Deputy Director and Chief NextGen Officer³¹),

§209 – Set out detailed meeting and reporting requirements for the “NextGen Air Transportation Senior Policy Committee,”

§211 – Required aircraft to be equipped with ADS-B capability in “capacity constrained airspace” and “capacity constrained airports” by 2020³² (while directing the metro redesigns to proceed immediately),

§213 – **Mandated the implementation of new airspace procedures** (essentially arrivals and departure routes requested by industry) **at 35 metro airports**, including the following specifics:

(a)(1) Instructed the FAA to publish a report, within 6 months, in consultation with industry (but not citizen groups) defining “procedures to be developed, certified, and published and the air traffic control operational changes to maximize the fuel efficiency **and airspace capacity at each of the 35 metroplex airport**,

(a)(1)(A) Instructed the FAA to “**avoid overlays of existing procedures**” in developing the new procedures. (In many cases, these “overlay” procedures were existing noise abatement routes developed to reduce aircraft noise and emissions on the ground.) And, required that “the Administrator shall clearly identify ... **the reason why such an overlay was used**, “if the FAA believed that an existing “overlay route” should be used, (thus initiating a massive program of noise shifting in communities across the US.)

(a)(1)(C)(II) Required the FAA to create a plan for “**expedited environmental review procedures and processes for timely environmental**

³⁰ Meeting Summary of “FAA Report” by Administrator Michael Huerta, NextGen Advisory Committee Meeting, Feb. 27, 2013, p. 3.

³¹ Victoria Cox was (a career government official) replaced her deputy, Pam Whitney, who became Acting Assistant Administrator for NextGen. Administrator Huerta then recruited and hired the two new senior leaders as specified in the legislation, first Michael Whitaker, a 20-year airline industry executive (United Airlines and TWA), as Deputy Administrator of the FAA, in June 2013 and, Major General Edward Bolton, a career air force officer with a background in managing large air force missile and space programs, as Assistant Administrator for NextGen, in September 2013.

³² As discussed later in this paper, the industry has since worked to slow roll and water down this equipage requirement.

approval of area navigation [RNAV] and required performance [RNP] that offer significant improvements as determined by baseline and performance metrics” for each metroplex, to meet the following schedule:

(a)(2) Required the FAA shall certify, publish and **implement [rush] the new procedures” at 30% of the 35 metroplex airports in 18 months, 60% in 36 months and 100% by June 30, 2015,**

(c)(1) and (c)(2) The new procedures were “presumed to be covered by a **category exclusion,**³³ ”but the procedures must specifically “ **result in measurable reductions in fuel consumption, carbon dioxide emissions and noise, on a per flight basis, as compared to aircraft operations that follow existing flight rule procedures in the same airspace”...**”in the determination of the Administrator”,

(d) The FAA shall submit a plan for its DataComm system within one year, (a critical system that is still not in place, and whose absence requires simple, straight and noise routings to compensate),

(e)((1)(B) The FAA shall investigate “**the feasibility of reducing aircraft separation standards**” and if these are feasible, “**shall include in the NextGen Implementation Plan a timetable for implementation of such reduced standards**”,

(f) The FAA shall “authorize the use of “qualified third parties” to develop, test and maintain flight procedures, (as the FAA relies heavily on airlines to test – and approve – procedures.)

§ 214 Required the FAA to implement specific key performance metrics and to implement a “process for holding the Administration accountable for meeting or exceeding the metrics baselines” for:

(a)(1) Arrival and departure rates per hour (e.g., getting more planes in and out of airports via reduced separation),

(a)(2) Average gate-to-gate times (i.e., does NextGen reduced overall flight times)],

(a)(3) Fuel burned between key city pairs, (an efficiency and fuel metric that does not seem to be improving),

³³ A Categorical Exclusion is defined by § 1508.1 of Title 10, CFR, under chapter 3 of FAA Order 1050.1E.

- (a)(5) Average distance between city pairs,
- (a)(7) Continuous climb and descent),

- (a)(9) Flown vs filed flight times,³⁴

- (a)(10) Plans to reduce fuel and emissions (but not noise),

- (a)(11) The FAA's unit cost for providing air traffic control (which relates to the airlines lobbying group's (AFA's) push to privatize air traffic control), and

- (a)(12) Runway safety related to risks from reduced separation.

§ 281 Congress found, as a matter of law, that airspace redesign, “will play a critical near-term role in enhancing capacity, reducing delays, transitioning to more flexible routing, and ultimately save money in fuel costs for airlines”. (These have yet to be born out, according to the metrics Congress required the FAA to track and publish.)

§ 221 Congress authorized the FAA to **establish an “avionics equipage incentive program” to provide subsidies and federal loan guarantees to airlines** for any equipment the Secretary deems “in the interest of achieving NextGen capabilities”.

§ 225 Congress ordered the FAA “to submit to Congress [within 180 days] a report on the strategy of the Administrator for implementing, on an accelerated basis, the NextGen operational capabilities produced by the Greener Skies [Over Seattle] project, as recommended in the final report of the RTCA NextGen Mid-Term Implementation Task Force that was issued on September 9, 2009.”

As a result of the legislation, the FAA formally chartered the RTCA NextGen Advisory Group (NAC), the successor to Task Force 5, to provide direction and leadership for the 35 metroplex redesigns.³⁵ The NAC, chaired by a different airline CEO every two years,³⁶ moved

³⁴ This is an important metric, but these are airline requested metrics, and this one is a way to for the airlines to force the FAA to give them the procedures they want. This relates to noise because on of the airline's criticisms of the FAA is that it assigns them longer procedures simply to appease local communities who are complaining about noise.

³⁵ According to David Barger, CEO of Jet Blue and Chairman of the NextGen Advisory Committee in 2011 and 2012 the FAA “tasking” consisted of the seeking industry direction on: “equipage incentives, Metroplex further definition and roll out are prioritization, performance metrics.”. Source: Testimony of David Barger, “A Review of and Update on the Management of FAA,” Hearing before the Subcommittee on Aviation, September 2, 2012, p. 40.

³⁶ The current NAC chairman is the CEO of Delta Airlines, with the two previous NAC chair positions held by the CEO's of Alaska Airlines and JetBlue Airlines.

quickly to de-emphasize NextGen’s long-term efforts to modernize and upgrade technology, and focused squarely on opening metro airspace. These efforts are well documented in the RTCA NextGen Advisory Committee minutes starting in Oct. of 2012.

As an FAA chartered group, the NextGen Advisory Committee and TF5 were required to be open to the public and to publish minutes³⁷, however, the first six meetings NAC and all TF5 meetings do not seem to be available on the RTCA or FAA web sites or via Internet search (including caching services.) The RTCA’s Mid-Term Final Report, which is the basis for the 2012 law, also is not readily available to the public, except from RTCA for a substantial fee or, according to WorldCat, at Embry-Riddle Aeronautical University in Daytona Beach Florida. The first public minutes from RTCA NextGen Advisory Committee meetings available online appear to be from its Oct. 12th, 2012 Orlando Florida meeting – meeting number seven. Subsequent meetings include a reading of the federal requirement that such meetings are required be open to the public³⁸. (They are announced to the public several weeks in advance in the Federal Register and up to a year in advance to RTCA members.)

IV. Nextgen Advisory Committee (NAC) sets NextGen mid-term priorities – reduced separation, metroplex airspace redesign and incentives

The NextGen Advisory Committee was made up of a “cross section of aviation industry execs” (pictured below in 2012) and was co-chaired that year by Dave Barger, CEO of JetBlue, and Michael Huerta, Acting FAA Administrator. The Committee included an “environmental representative,” but the disparity between the industry representatives being extremely senior C-level executives,³⁹ and the lone environmental representative being a mayor of the Village of Arlington Heights, IL, is striking.⁴⁰ She was later replaced by a Aurora Colorado airport noise

³⁷ The Federal Advisory Committee Act (FACA) of 1972, Public Law 92–463, 6 October 1972, governs the conduct of federal advisory committees, and provides for open meetings, chartering, public involvement, and reporting.

³⁸ The Feb. 7th 2013 NextGen Advisory Committee Meeting included a slide (slide 4) that noted that “In Accordance with the Federal Advisory Committee Act, this Advisory Committee is OPEN TO THE PUBLIC”, and that notice of the meetings are published in the Federal Register.

³⁹ The full committee was made up of six airline CEOs, one airline VP, the presidents of key divisions of Lockheed and Raytheon, a VP from Boeing, the president of Airbus Pro Sky, senior officials from the Port Authority of New York and DFW, the presidents of the three major air traffic controller unions, the president of the RTCA, the five most senior FAA officials, a major general and Arlene Mulder, the mayor of the Village of Arlington Heights Illinois, a physical education teacher during the day,

⁴⁰ Mayor Mulder resigned in 2015, amid complaints from other communities near O’Hare Airport that she was too “chummy” with the FAA and that the new airport flight patterns had shifted away from Arlington Heights to other communities as a result of NextGen redesigns. She defended her relationship to the airport as justified given the high number of people in her community that work at O’Hare. “Sometimes Beleaguered Noise Commission Chair Won’t Seek Re-election”, Chicago Sun Times, January 9, 2015, also at <http://chicago.suntimes.com/politics/7/71/278103/ohare-noise-commission-chairman-resigns-amid-complaints>

officer, and his associates⁴¹ (under the auspices of N.O.I.S.E.⁴²) These environmental representatives appear to have voted with industry on all matters,⁴³ and there is no record of any presentations, discussions or objections by them related to noise or the environment



RTCA NextGen Advisory Committee (NAC)

The “aviation industry executives” that made up the NAC made clear from that start that they wanted one thing, increased metro access – specifically reduced separation and simple direct routes. Moreover, they did not want to wait for or invest in what they viewed as FAA blue sky systems, including those designed to make increased metro access more tolerable on the

⁴¹ The two other N.O.I.S.E. participants were members of the NextGen CatEx Task Group. They are officers of N.O.I.S.E., as well as lobbyists on FAA matters. N.O.I.S.E. represents cities with airports. TF5 and the NextGen Advisory Council has not included any representatives that do not have direct economic interests in aircraft noise.

⁴² The first member update on NOISE’s involvement with the NextGen Advisory Committee appears to be summary slides from the Feb. 26, 2015 meeting, followed by a six slide presentation on Nov. 4th 2015 with a slide entitled “N.O.I.S.E. NAC Involvement”. The four points on the slide were:
//December, 2012: N.O.I.S.E. staff joined the **NAC CATEX 2 Task Group** asked to provide recommendations to the full NAC to provide to the FAA on how to interpret ambiguous environmental review language in the 2012 FAA Reauthorization Bill.// January, 2014: N.O.I.S.E staff joined the **PBN Blueprint task group** asked to provide recommendations to the full NAC to provide to the FAA on best practices for technical and non-technical implementation of Performance Based Navigation (PBN?RNAV).//November, 2014: N.O.I.S.E. President becomes environmental (community) representative on NAC.//2015-2016: NAC meets twice a year and NAC subcommittees meets monthly in Washington, which N.O.I.S.E. staff attends. Beyond these, and an excellent March 8th 2015 presentation to N.O.I.S.E. about NextGen, entitled “NEXT GENERATION Noise Metrics Considerations,” by Ambrose Clay, a Councilman from College Park, GA, there are no detailed minutes, summaries or presentations by N.O.I.S.E. to its members or to the public on its web site, in spite of its self-described significant involvement.

⁴³ Recommendations for Implementing Categorical Exclusion Contained in FAA Modernization Act of 1022, Slide 53, Attachment 2 – Presentations for Committee, Meeting Summary, RTCA NextGen Advisory Committee Meeting, June 12, 2013

ground.⁴⁴ As commercial entities, some of this “benefits now” focus is understandable, like wanting to increase airport capacity by reducing separation. But, having knocked the FAA back on its heels via the 2012 legislation, the airlines grabbed not only what they needed – reduced separation – but also what they didn’t really need, and what has caused so much harm to communities around the county – absolute direct routes, with significant noise consequences.

In preparation for this expected increase in noise, the **RTCA NextGen Advisory Committee prepared a sixty-page game plan on how to deal with the public’s reaction, with one of its first recommendations being, “[I]n addition to engaging communities who will be impacted, residents or communities who will benefit should also be engaged.”**⁴⁵ In other words, set one community against its neighbor. (The chair of this Task Group was later awarded a White House metal for this work by the FAA.⁴⁶)

The airline-CEO-chaired NextGen Advisory Committee (NAC) remade the NextGen program, taking a troubled and idealistic airspace modernization program, and replacing it with a steely-eyed, no-holds-barred metroplex airspace land grab. Although the FAA officials were members of the NextGen Advisory Committee, they were no match for the political cloud wielded by the increasingly consolidated airline industry. It is clear from NAC records that industry drove this next (“Mid-Term”) phase of NextGen and its laser focus on a brute-force, low-tech,⁴⁷ redesign of metro airspace.

Chairman Barger’s opening remarks in the first recorded NextGen Advisory Committee meeting post the 2012 legislation described his view of the value of this new approach to the governance of NextGen.⁴⁸

⁴⁴ Slide presented to RTCA NextGen Advisory Committee by Bill Ayer, CEO of Alaska Air Group and NAC Chair at their June 4, 2013 meeting.

⁴⁵ “Blueprint for Success to Implementing Performance Based Navigation”, Report of the NextGen Advisory Committee in Response to a Tasking from The Federal Aviation Administration, Oct. 2014, p.9.

⁴⁶ The co-chair of the “Blueprint for Success” task group, Jim Critch, EVP of Operations at DFW Airport, was awarded the “White House Champion of Change Award in Transportation Technology Solutions”, by the FAA in 2013 for his support of NextGen. See Administrator Michael Huerta’s “FAA Report”, NextGen Advisory Committee, June 4, 2013.

⁴⁷ The redesign was as low-tech as possible, with dramatically fewer systems and capabilities than the FAA had envisioned, and was done in ways that were as cheap as possible for the airlines.

⁴⁸ Slide from RTCA NextGen Advisory Committee Meeting, Orlando Florida, Oct. 11, 2012.

The Value of the NAC (cont.)

Results In

- Delivering near-term benefits using existing equipage
- Continuous improvement in planning and execution of each new procedure and capability
- Increased confidence by stakeholders in FAA's processes
- Solid business cases for future investments to gain new benefits

11

NAC Chair Opening Remarks

This first (recorded) NextGen Advisory Committee (NAC) meeting (October 2012), focused primarily on structuring the government incentives Congress had just legislated for them, and on the NextGen operational metrics they wanted to see to ensure their demands for reduced separation and metro access were being acted on by the FAA.⁴⁹

The airline insisted on “financial” and other incentives to in order to “agree” to the “beneficial” metroplex redesigns they insisted be the new focus of Nextgen in the 2012 legislation. Congress responded by authorizing these “incentives” including government backed loans, in spite of GAO reports that showed that 67% of the domestic commercial fleet already had RNAV capability by 2011.⁵⁰ (FAA congressional testimony in 2008 put this number at 87% of commercial aircraft.)⁵¹ The airlines got the new straight in metroplex approaches they wanted, then double dipped for incentives to fly them as well.

Not ones to leave the well, in 2014, Airlines for America (A4A) further demanded, on behalf of certain air operators, that they be allowed to fly the “incentive” routes without investing in any RPN equipage using a technique called “Track-to-Fix,”⁵² and then in 2015,

⁴⁹ Ibid.

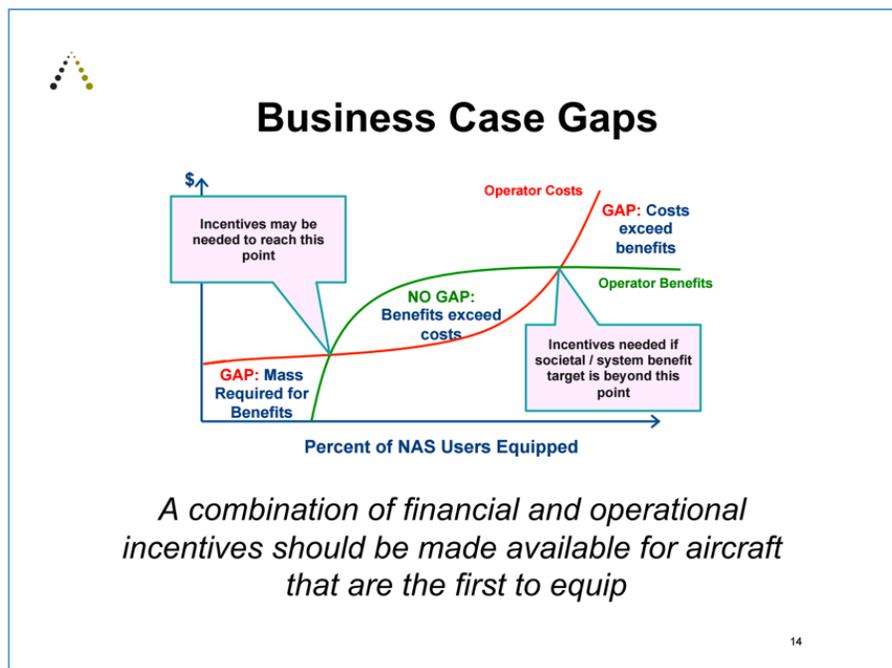
⁵⁰ Testimony of Calvin Scovel, Inspector General, US DOT, NextGen: A Review of the RTCA Mid-Term Implementation Task Force, Subcommittee on Aviation, Committee on Transportation and Infrastructure, Nov. 28, 2009 p. 24.

⁵¹ Statement of Victoria Cox, Vice President for NextGen and Operations Planning, FAA, House Committee on Science and Technology, Sept. 9, 2008, p. 2.

⁵² NextGen Priorities Joint Implementation Plan, Executive Report to Congress, Federal Aviation Administration, Nov. 2014, p. 13.

petitioned the FAA successfully⁵³ for an extension to the 2020 deadline to install ADS-B equipage in transport aircraft, arguing that 8 years was not enough lead time.

The airline industry's insistence on a dramatic and immediate increases in metroplex aircraft density and throughput, with existing equipage and training, required simple straight in routes to maintain safety. These procedure designs accepted any amount of noise for even the smallest efficiency,⁵⁴ with people on the ground paying the cost as a direct subsidy to the airlines. These efficiencies only designs exploded noise in city after city across the U.S. As Chairman Barger's introductory slides below make clear, noise and environmental impact were not even considerations, much less priorities.



NAC Chair Opening Remarks
NextGen Mid-term Priorities

⁵³ Fact Sheet: Exemption No. 12555, FAA Flight Technologies and Procedures Division, AFS-400, Regulatory Docket Number FAA-2015-0971.

⁵⁴ The airlines argue the straight in routes save the environment, but the environmental savings are minimal and do not count the larger offsetting environmental cost of noise and emissions close to the ground. Environmental groups have a long list of potential environmental improvements airlines can make. Straightening final procedures over populated areas is not one of them.



NAC High Level Metrics Suite

Performance Area	NextGen High-Level Outcome Metric	Where Measured
Flight Safety	Change in Airborne/Ground Separation Alert Rate	NAS-Wide
Operational Efficiency	Mean Aircraft Operation Time	Key City Pairs
Fuel Efficiency	Fuel Efficiency Normalized by Weight and Distance	Key City Pairs
ATC Cost Efficiency	ATC Cost per IFR hour	NAS-Wide
Metroplex Capacity	Metroplex Peak Allowable Throughput	OAPM Metroplexes
Metroplex Access	Metroplex Achieved Utilization	OAPM Metroplexes

18

NAC Chair Opening Remarks
NextGen Mid-Term Priorities

V. The Greener Skies Pilot and the NorCal ‘Optimization of Airspace for the Metroplex’ (OAPM) Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) Processes

The prototype for the 35 metroplex airspace redesigns was a program initiated by Alaska Airlines, called Greener Skies Over Seattle. Its purpose was to increase the number of landings possible at Seattle SeaTac airport, by making approaches simpler and more direct, thereby enabling reduced separation requirements, including during bad weather. Its Environmental Assessment (EA) included an early version of the “net noise reduction method,”⁵⁵ and followed the FAA’s constrained “action” vs “no action” approach, to quickly reach a “Finding of No Significant Impact and Record of Decision (FONSI/ROD)”.⁵⁶ This FONSI was signed by Elizabeth Ray, Vice President, FAA Mission Support Services in 2012, and was held up by the RTCA and industry as the type of “simple” and “efficient” environment assessment wanted for all metroplex redesigns.

Greener Skies began in 2009 when Alaska Air, Boeing and the FAA, “initiated a plan to investigate new Performance Based Navigation (PBN) procedures for SEA that would...allow aircraft operators to fly optimal descent paths.”⁵⁷ These were supposed to enable certified aircrews to, “fly shorter routes to the runways than they are able to do at present, and to do so with less pilot-controller interaction and at lower throttle settings”.⁵⁸

The latter – lower throttle settings - was supposed to reduce “environmental impact during approaches to land”.⁵⁹ This is one of the FAA’s biggest Pinocchio’s. For an optimized descent to be quiet from the ground, the descent needs to be at flight idle all the way to the runway. Optimized Profile Descents at idle stop at the beginning of the Standard Terminal Arrival (STAR) procedure. So the quiet part of the descent is at altitude, and the noisy part is near the ground. But, to the FAA, its quiet, at least on average. (Tailored Arrivals do descend at idle to final, but they are highly custom – Pacific Arrivals only – and rare.)

The **Greener Skies EA demonstrated one of the FAA’s most powerful and easy to abuse regulatory tools, its Action/No Action analysis.** The FAA first proposes an Action without considering any alternatives, no matter how obvious or advantageous they might be.⁶⁰ Then, it

⁵⁵ 2007, p. 5.

⁵⁶ Final Environmental Assessment for Greener Skies Over Seattle; Proposed Arrival Procedures to Seattle-Tacoma International Airport, Department of Transportation, Federal Aviation Administration, Oct. 31, 2012

⁵⁷ Ibid, p. 3.

⁵⁸ Ibid, p. 3.

⁵⁹ Ibid. p. 3.

⁶⁰ This is justified by FAA Order 1050, 1E, Chapter 4, §405(d) which states that there “is no requirement for a specific number or range of alternatives to be included in an EA” found in Final Environmental Assessment for Greener Skies Over Seattle, p. 5.

compares this Action to a No Action alternative. The most powerful part of this tool is that the FAA is free to define the impacts of both the Action and No Action any way it wants.

The manipulative power of this Action/No Action approach can be seen in how the FAA reached a finding of “no significant impact” in its Environmental Assessment for the “Northern California Optimization of Airspace and Procedures.”⁶¹ It analyzed “the potential environmental impacts from the proposed “Action” – the creation of new routes that would be more direct, lower and support an increased number of planes – and the “No Action” alternative (do nothing) for 2014 and 2019 forecast conditions. The EA concluded that “the Proposed Action would not result in a significant noise impact” over doing nothing.”⁶² This is how they got there.

First, the **FAA defined the Proposed Action in a way that, “no additional growth in operations is anticipated”**.^{63 & 64} According to the NorCal EA and FONSI, “the proposed action does not include development or construction of facilities, such as runways or terminal expansions, that would be necessary to accommodate an increase in aviation activity, therefore, no additional growth in operations is anticipated.”⁶⁵ In other words, the “Action,” by FAA’s definition, would require physical on-the-ground construction to be treated as causing traffic growth. New procedures, designed specifically to increase the number of flights by reducing separation cause “no additional growth”.

While asserting that the “Action” does not include the “construction of facilities”, the FAA boasted on its web site about completing “ADS-B ground stations” on Nov. 10th, 2011⁶⁶, to enable the new NextGen RNAV approach routes (which require ADS-B) went live in March of 2012.

Having zeroed out the growth effect of the proposed “Action,” the FAA then assumed that the “No Action” alternative would include a large scale growth in traffic. By all accounts, SFO is completely capacity-constrained, and should have had zero or near zero growth capacity under the “No Action” alternative. As far back as 2000, the the Bay Area Metropolitan Transportation Commission determined that, “SFO operates at ‘full runway system capacity’,”⁶⁷

⁶¹ Finding of No Significant Impact (FONSI) and Record of Decision (ROD) For the Northern California Optimization of Airspace and Procedures in the Metroplex (NorCal OAPM), July 2015, p. 5.

⁶² EA for NorCal OAPM and FONSI, p. 5-3

⁶³ EA for NorCal OAPM and FONSI, p. 5-3.

⁶⁴ Apparently, if the FAA does not build a physical facility, they can assert that they have not enabled growth for the purposes of environmental reviews. That a significant number of ground ADS-X facilities were installed to enable the PBN procedures did not count as new facilities on the ground. This is similar to the Greener Skies finding that the new approaches did not affect protected natural habitat because they did not involve a physical change on the ground – assuming one ignores related runway improvement projects.

⁶⁵ EA for NorCal OAPM and FONSI, p. 5-3.

⁶⁶ See “ADS-B General” at,

<http://www.faa.gov/nextgen/programs/adsb/coveragemap/media/Advisory-Terminal.pdf> and “ADS-B Coverage Map, Operational” at <http://www.faa.gov/nextgen/programs/adsb/general/>

⁶⁷ Regional Airport System Plan, Update 2000 Final Report (Revised to Include Final Airport Capacity and Delay Results 2001), Metropolitan Transportation Commission, 2001, p. 8.

In 2001, SFO commissioned a study (that looks like the NorCal metroplex redesign) “to evaluate the prospects for air traffic management technology, airspace allocation, and aircraft navigation, control or communications technology that could increase the capacity of SFO,”⁶⁸ because the airport had maxed out its physical capacity. However, the FAA ignored SFO’s well documented physical traffic growth constraints, and used a non-physical calculation to support the fiction traffic would grow significantly if nothing were done.

The source of this fictional growth capacity number under the “No Action” alternative was an FAA document called the Terminal Area Forecast (TAF)⁶⁹. The TAF forecasts potential demand for an airport based on economic growth, airline requests, an unmanaged public input portal and the FAA’s own internal analysis. It has no relationship to the physical capacity of the airport to increase traffic.

The “Forecast Method” section of the TAF makes this clear, that it does not represent an airport’s actual capacity to grow as is. It states:⁷⁰

*The TAF assumes a demand driven forecast for aviation services based upon local and national economic conditions as well as conditions within the aviation industry. **In other words, an airport’s forecast is developed independent of the ability of the airport or the air traffic control system to furnish the capacity to meet the demand**”.*

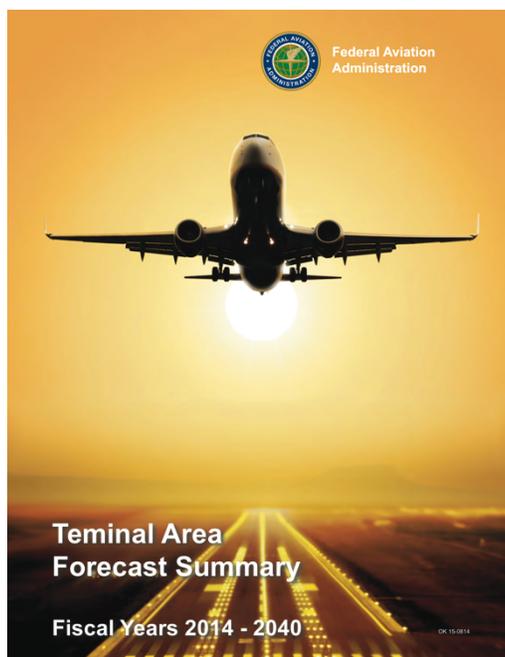
Moreover, “The TAF model allows users to create their own forecast scenarios.”⁷¹ **The TAF is a made up number.**

⁶⁸ “Potential Future Contribution of Air Traffic Management Technology to the Capacity of San Francisco International Airport, Report of the Independent Technology Panel, Prepared for San Francisco International Airport and San Francisco Bay Conservation and Development Commission, Cotton and Foggia, Cotton Aviation Enterprises, Inc., April 2001, p. 44.

⁶⁹ NorCal OAPM, EA p5-4.

⁷⁰ Terminal Area Forecast Summary, Fiscal Years 2013 – 2040, Federal Aviation Administration publication OK 14-0723, p. 3.

⁷¹ Ibid.



The FAA assumed that SFO traffic would double⁷² if they did nothing, not because the airport has any capacity to grow, but simply by projecting that “demand” for air travel would double.

In the same vein, the NorCal EA made short work of the Environmental Justice considerations required by law.⁷³ These enhanced protections require the FAA EAs to consider the *environmental justice* impacts on minority and low income communities to determine whether they would be subject to a disproportionately high and adverse impact. Environmental Justice communities are based on census tracts, and certain communities such as East Palo Alto or the Bell Haven neighborhood of Menlo Park would likely qualify. Under the proposed “Action”, East Palo Alto and Bell Haven were at ground zero, directly under the convergence of three approaches at a maximum altitude of 4,000 feet (the Menlo Waypoint), that would account for 65% or more of all traffic landing at SFO.

The NorCal EA skirted the requirement to give East Palo Alto and Bell Haven special consideration by simply rolling up the East Palo Alto and Bell Haven census blocks with all other

⁷² The TAF for SFO estimates that demand for air travel will grow by a factor of 1.93 between 2012 and 2040. Terminal Area Forecast Summary, p. 9.

⁷³ FAA Executive Order 12898 and DOT Order 5610.2 (cited in FAA Order 1050.1.E) require the FAA to provide meaningful public involvement and consideration for minority and low income populations.

census blocks in their respective counties, Santa Clara and San Mateo, to determine that, in fact, no low income or minority environmental justice communities exist in the study area.⁷⁴

The EA also requires special consideration for specific “impact categories” such as Coastal Resources, Wetlands and Wild and Scenic Rivers. In the Greener Skies EA, the FAA determined that these special impact categories do not apply because the new arrivals procedures “does not entail any ground based development”⁷⁵. However, the overall project also included expanding runways and installing ADS-B towers – “physical developments” –but by treating these as separate unrelated projects for EA purposes, the FAA was able to claim they didn’t need to consider Coastal Resource impacts because their project involved “in the air” changes only.

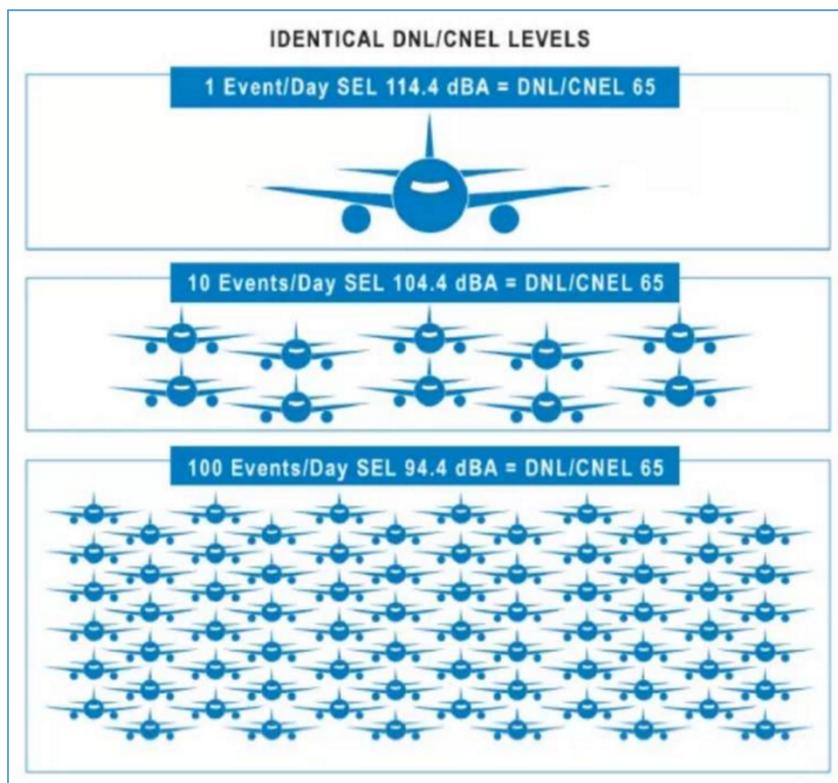
Finally, the FAA also cites its 1970’s era Day/Night Level to assert that the new procedures “would not result in a significant noise impact, i.e., an increase of 1.5 dB or more at Day-Night Average Sound Level (DNL) of 65 dB or more, at any noise sensitive receptor”. That the FAA still uses this 1974 much-criticized standard is a travesty that was enabled by the Reagan Administration’s defunding of the EPA Noise Office in 1980. The EPA has had no staff, funding or ability to update aircraft noise standards since this defunding. Because Congress doesn’t fund the EPA to regulate aircraft noise, but has not repealed the law designating the EPA to regulate it, the 1974 DNL noise model, fossilized as it is, continues to be the FAA’s “Twilight Zone” standard for noise.⁷⁶

⁷⁴ NorCal OAPM EA, p. 4-24.

⁷⁵ Final Environmental Assessment for Greener Skies Over Seattle: Proposed Arrival Procedures to Seattle-Tacoma International Airport, Volume 1 – Main Document, United States Department of Transportation, Federal Aviation Administration, Renton Washington, Oct. 31, 2012, p. 8.

⁷⁶ To make matters work, the FAA also applies original DNL model in a watered down fashion, such that major noise events – that are well know to be both physically and psychologically harmful – are averaged out over a 24-hour period into nothingness. But, just in case, it further refines its rules to require a 1.5 dB increase over the maximum 65 dB, a 40% power gain.

The graphic below depicts how meaningless the FAA's DNL noise model is. All three panels represent the exact same noise levels by FAA standards.⁷⁷



VI. OAPM Public Comment Process – Sudden, Quick and Done

In preparing for the NextGen environmental reviews, the FAA requested White House approval in late 2011 to deviate from the FAA's past NEPA environmental review processes for Instrument Landing Systems, and to implement a "re-engineered" process to conduct PBN environmental reviews for NextGen operations such as RNAV (Area Navigation), STARs (Standard Terminal Arrivals), SIDs (Standard Instrument Departures) and RNP (Required Navigation Performance.)⁷⁸ **One of the Agency's primary justifications for these changes to NEPA review processes was increased public transparency:**

⁷⁷ <https://www.facebook.com/QuieterSkiesTaskForce/>

⁷⁸ Nomination Received by Council on Environmental Quality, Executive Office of the President for: CEQ NEPA Pilot Project Program, Project Title: Environmental Process Re-engineering for Instrument

*The transparency of agency decision making will be improved for this re-engineered environmental process because the proposed online system will allow persons with access to the system to follow their requests through the system to the final environmental decisions and documentation. Also, because the internal FAA and external customers will be involved in the design and testing of the system, they will have direct access to the decision making logic that will be programmed into the system. **Additionally, the online system could be linked to other FAA systems that would allow the public access to environmental projects and documents.***

It is not clear exactly what the proposed re-engineered procedures were or if they were approved by White House staff. In the end, the 35 Environmental Assessments were done in near secrecy, quickly and in a cookie-cutter fashion. They were sprung on communities with minimal notice, and only one or two months to realize they existed, understand them and file objections. In almost all cases, the objections were overruled and the FAA quickly issued prompt Findings of No Significant Impact (FONSI).

In the case of the NorCal OAPM EA, **the FAA sent “Early Notification” letters to 41 “Federal Organizations,” 55 “State Organizations,” 6 “Regional Organizations,” 29 “County Organizations,” 18 “Tribal Organizations”, and no cities.**⁷⁹ The public was notified later via a notice in the Federal Register, and two obscure newspaper notices in the San Francisco Chronicle and San Jose Mercury News.

For those “organizations” lucky enough to receive notice, the FAA’s form letter discounted the potential impact of the NorCal OPAM as follows:⁸⁰ **“The project may involve changes in aircraft flight paths and/or altitudes in certain areas, but would not require any ground disturbance or increase the number of air operations within the Northern California Metroplex airspace area.”**

Almost half way into the one-month period allowed for public comment, the City of Palo Alto found out about the proposed changes, and took what action it could. Based on the FAA’s letter, the city manager notified the city council that, “the proposed action does not require an increase in the number of aircraft operations or involve additional aircraft landings”.⁸¹ However, in an “abundance of caution,” the city drafted an EA Comment letter to the FAA asking for

Flight Procedures, Submitted by: Donna Warren, Environmental Programs, Mission Support Services, Air Traffic Organization, FAA, June 9th, 2011

⁷⁹ “Mailing List for Early Notification Letters on 12-4-2012”, Appendix A: Agency Coordination, Public Involvement and List of Receiving Parties, NorCal OAPM EA, Final, July 2014.

⁸⁰ Environmental Assessment Northern California Optimization of Airspace and Procedures in the Metroplex Early Notification Letter, Air Traffic Organization, Western Service Center, Dec. 4, 2012 found in Appendix A: Agency, Public Involvement, and List of Receiving Parties, NorCal OAPM EA, Final, July 2014.

⁸¹ Discussion and Direction to City Manager Regarding City of Palo Alto Response to the FAA Draft Environmental Assessment (EA) Regarding the Northern California Optimization of Airspace and Procedures in the Metroplex (NorCal OAPM), City Council Staff Report, April 29, 2014.

clarifying details, such as the altitudes of flights, confirm that it is not moving noise from one community to another, and pointing out that the city learned of the changes, not in a letter from the FAA, but third-hand.⁸² The mayor reiterated this request for “critically-needed information” in a letter to Anthony Foxx, the then Secretary of Transportation, and pointed out that the “purpose of the EA is not well served” if this information is “last-minute”, and the “written comment period” is only 30 days, only a few weeks from when the city actually received notification.⁸³

The FAA’s answers to the city’s questions were as follows:

- **What altitudes** will be flown over the city? – The response provided no data, but directed the city to “Topical Response 3,” entitled “Altitudes Accounted for in the Noise Analysis”.⁸⁴ This ‘Response’ simply listed all of the sections in a separate “Aircraft Noise Technical Report,”⁸⁵ prepared by ATAC Corporation for the EA, with an asterisk next to three sections, but no data. These three sections in the ATAC report, sections 4.2, 3.2.7 and 3.1, simply explained FAA noise measurement policy, but again provided no data. (The ATAC report did list an “Exhibit 3,” in its Table of Contents entitled “NorCal Population Centroids,”⁸⁶ which presumably includes noise data for communities affected, but this exhibit was not attached.⁸⁷)
- Does this **move noise**? – The response was that it does not move noise because the changes involve “no significant noise impacts”.⁸⁸ (Its not clear how the “Net Noise Reduction” model works if this is true, as there would not be an increase and a reduction in noise to compare.)
- Why was the **city not notified**? – The response was that notice was provided in the Federal Register, and in notices published in the San Francisco Chronicle and San Jose Mercury News, newspapers 50 miles from Palo Alto.⁸⁹ (Focused Internet searches,

⁸² Letter entitled “EA Comment Letter from the City of Palo Alto” (to the FAA), April 24, 2014.

⁸³ Letter entitled “Northern California Optimization of Airspace and Procedures in the Metroplex Environmental Assessment” from Nancy Shepard, Mayor, City of Palo Alto, to Anthony Foxx, Secretary of Transportation, April 10, 2014.

⁸⁴ Response 77-01, Responses to Comments on the Draft EA, Appendix F, NorCal OAPM EA, Final, July 2014, p. 116.

⁸⁵ Aircraft Noise Technical Report, prepared by ATAC Corporation, Technical Reports, Aug. 7, 2014 (revised), from NorCal OAPM EA, Final, July 2014.

⁸⁶ Aircraft Noise Technical Report, prepared by ATAC Corporation, Technical Reports, Aug. 7, 2014 (revised), Exhibit 3, “NorCal Population Centroids”, p. 3-37.

⁸⁷ See NorCal OAPM EA web page at

http://www.metroplexenvironmental.com/norcal_metroplex/norcal_docs.html

⁸⁸ Response 77-03, Responses to Comments on the Draft EA, Appendix F, NorCal OAPM EA, Final, July 2014, p. 116.

⁸⁹ Response 77-04, Responses to Comments on the Draft EA, Appendix F, NorCal OAPM EA, Final, July 2014, p. 116.

including those using the two newspaper search tools did not produce copies of these newspaper “notices” to the public or affected cities.)

The FAA notice process was designed to minimize turnout. It provided the minimum of notice provided by law, an extremely short review process and the notices themselves were deceptive. The FAA letter’s reassuring assertions that, “the propose action does not require any ground disturbance or increase in the number of aircraft operations”⁹⁰ were a false flag, hiding one of the FAA’s most powerful deceptions. That is, in the FAA’s world, so long as it can claim it is not doing construction on the ground, it can double, triple or quadruple flights and still claim that there is no increase in aircraft operations.

In reviewing the NextGen Mid-Term Metroplex implementation, it appears that the FAA simply asserts whatever data, tests and reality achieves its goals, with no consistency, rigor, independent oversight, audit, review or concern for the public. Far from its claims to the White House that its expedited EA process would increase transparency, the FAA proceeded with extreme secrecy and misdirection. Its thirty-five metroplex redesigns have been community and FAA public relations disasters. The FAA has achieved little, and made many enemies.

⁹⁰ Public Notice: FAA Northern California Optimization of Airspace and Procedures in the Metroplex (NorCal OAPM) Draft Environmental Assessment (EA) Document Release, available at http://www.metroplexenvironmental.com/docs/norcal_metroplex/NorCal%20OAPM%20Public%20EA%20Notification%20Announcement%20for%20mailing.pdf .

Its flagship Greener Skies Over Seattle is a mess. The program has generated significant community opposition and activism, the airlines are flying dense but simple, and thereby noisy, RNAV procedures, and none on the nine advanced (and expensive) RNP procedures (which, if used correctly, could help reduce noise) are in use.⁹¹

RNP AR with RF Leg Usage

June 2015 RNP AR USAGE

Procedure Name	Days Published In Database	Total Candidates	Total Executed	Percent Executed
R34LZ	30	1047	2	0.2%
R16RZ	30	1651	10	0.6%
R16CR	30	29	0	0.0%
R34CZ	30	9	0	0.0%
R16CZ	30	9	0	0.0%
R16CL	30	11	0	0.0%

Airline Utilization of Available RNP Routes at SeaTac

VII. Summary – We are Worse Off and Actual Modernization Will be Even Harder Going Forward

NextGen started out as the FAA’s program to modernize the management of U.S. airspace, and to maintain (recover) U.S. leadership in air traffic management. The program attempted everything and accomplished almost nothing.

Foreign programs such as the SESAR system in the EU have been much more successful. The reason was knowable, SESAR focused on integrating diverse partners first (much like the Internet model) and allowed for local differences, while NextGen “tend[ed] to be closely tied to government in a hierarchical framework,”⁹² enforced one size fits all designs and was massively more ambitious.

Its 2004, the initial Next Generation Air Traffic Management System Integrated Plan listed six expansive goals, starting with “Retain U.S. Leadership in Global Aviation” and ending with

⁹¹ See PBN utilization dashboard at: <http://www.faa.gov/nextgen/pbn/dashboard/#>

⁹² Ibid., p. 5.

“Safety, National Defense, Capacity, Environment and Secure the Nation.”⁹³ In May of 2015, the National Academies’ National Research Council (NRC) published scathing report that essentially declared the FAA’s \$40 billion dollar program, unrecognizable. A Washington Post summary of the report listed the six key NRC findings starting with, “The original vision for NextGen is not what is being implemented today” and ending with “NextGen has become a misnomer”.⁹⁴

The industry driven “Mid-Term” corrections have not make NextGen better. **The airlines and A4A continue to criticize NextGen, but the Mid-Term Plan – NowGen – is their plan.** The FAA bent over backwards to do exactly as the airlines wished. And, what the airlines pushed for was short-term, benefits-now CFO type thinking. They wanted every bit of the high density metroplex access that NextGen originally promised, but they wanted it on the cheap – cheap to them, expensive to citizens living the the metroplex.

The airlines won everything they wanted – reduced separation to increase flights per hour, straight-in arrival paths, early-turn departure paths, no time curfews, and 1970s era factory-floor noise standards – all on bargain basement terms. They gained the right to increase aircraft densities within metroplexes, while investing in only the most minimal level of navigation, training and safety systems necessary to operate at densities without a high risk of crashing. Because of these shortcuts, noise (and low level emissions) exploded, dramatically and predictably.

In September 2011, the NAC’s Airspace and Procedures Group reported on findings from early NextGen implementations at airports like Houston and Denver, prior to the major redesign program authorized by the 2012 legislation. It cautioned that:⁹⁵

[A]t the various locations in NAS [National Air Space] where it [new RNAV procedures] ha[ve] been implemented, there have been mixed results...A repeatable departure track may be both a benefit and a drawback: the benefit lies in the capacity and efficiency gains the procedure may produce; and the drawback is the fact that in some locations the repeatable flight track has resulted in noise complaints.

The airlines and the FAA knew early on that the (crudeness of the) redesigns would create significant noise problems. They did not care.

In speaking to the House Committee on Transportation and Infrastructure in November 2014, John Engler, President of the Business Roundtable roundly criticized the FAA’s backwardness and inability to deliver the future. He contrasted the FAA lethargy with private

⁹³ Comparison of the SESAR and NextGen Concepts of Operation, NCOIC Aviation IPT, May, 2008

⁹⁴ “Scathing report: FAA isn’t delivering what was promised in \$40 billion project”, The Washington Post, Transportation Section, Ashley Halsey III, May 1, 2015.

⁹⁵ Recommendations for Enhancing Operations in Specific Regional Airspace, A Report of the NextGen Advisory Committee in Response to Tasking from the Federal Aviation Administration, Approved by the NAC, Sept. 29, 2011, p. 3.

industry's ability to get things done, citing airline led projects like the (Alaska Airlines initiated) Seattle Greener Skies to create "shorter and more precise landing paths". He argued that more programs like this, "will reduce noise exposure around airports, which makes it easier to add runway capacity."

To the Business Roundtable and Airlines for America (A4A), the fast-track NextGen metroplex redesigns are an example of how quickly and well private industry can move, and why Air Traffic Control should be privatized. **As inefficient as the FAA may be, if the Mid-Term Metroplex redesigns were private industry's audition to operate part of the national airspace infrastructure, they failed miserably.** Yet, that is now exactly what the airlines have proposed and have been able to include in the current FAA reauthorization process before Congress.⁹⁶

The metroplex redesigns have greatly harmed communities around the country, and poisoned any chance that industry or the FAA will be given the opportunity to actually modernize the US air transport management infrastructure, which is now sorely behind others in the world.

⁹⁶ See H.R. 4441, the Aviation, Innovation, Reform and Reauthorization of 2016, A bill to transfer operation of air traffic services currently provided by the Federal Aviation Administration to a separate not-for-profit corporate entity, to reauthorize and streamline programs of the Federal Aviation Administration, and for other purposes.

Report on Some Quantitative Measurements of Aircraft Overflight Noise in Palo Alto

Discussions have been underway for some time about intrusive aircraft overflight noise levels in Palo Alto and other communities under the new re-routing instituted by the FAA NextGen program. This report is to begin to provide quantitative information about the character of the noise resulting from those decisions, the impact it is having on our community, and some recommendations for how to move forward.

Introduction

Some time ago I wrote about recordings I made in June illustrating subjectively the interference of aircraft overflight noises with TV watching at our house (see [this link](#)). Such subjective examples do not have much credibility with the FAA, SFO, etc. when objecting to noise levels, even though a survey (also summarized at the above link) indicates that over 70% of residents find the newly increased noise from aircraft overflights to be extremely intrusive and disruptive.

To better quantitate the aircraft noise we are exposed to, I began working on noise monitoring in July. I bought a Reed SD-4023 Sound Level Meter/Datalogger to start collecting our own data, so that we might compare that with noise monitoring data the FAA and SFO may begin collecting in Palo Alto sometime in August. This is a report on the quantitative results I have obtained to date, which I believe support the subjective impressions of very persistent and intrusive overflight noise levels from low-flying aircraft in our community since late last winter.

I believe the preliminary data I describe below is accurate and revealing. It is highly suggestive that the changes in noise levels over Palo Alto from NextGen exceed the thresholds set by the FAA for a finding of objectionable noise, and we would like to see this new regime reconsidered through an open, frank, and earnest discussion about how we might take advantage of the bay area's unique geography and access routes to minimize the noise over any populated areas. Our intention is not to push the noise to another community but, rather, to find a rerouting of the traffic that is a suitable compromise between safety, noise impact, and efficiency. We believe that there are alternatives to the re-routing (including the bay or other more lightly populated areas such as the regional open space properties) that would be a better solution for everyone.

The need to objectively understand the extent and nature of the noise effects Palo Alto has come to experience is an important step toward these goals. This requires more comprehensive noise surveys and analyses that we hope the FAA will undertake (but which the citizens could tackle as a kind of crowd-sourced study if the FAA does not). If the early results presented here hold, then the FAA should take appropriate action.

My studies should be seen as a work in progress in several respects:

- (1) My sound measurements were taken over a limited period of time so far (July 12-16, 2015) and must be extended over time to more thoroughly characterize the temporal (daily, weekly, monthly, seasonal, and long-term trend) aspects of aircraft noise in our community.
- (2) The measurements were taken from a single residential location (my home) and must be broadened to reflect the noise characteristics throughout the community.
- (3) Finally, much of what I have done is to develop a feasible methodology to measure and analyze physical noise data from various perspectives to better characterize the impact aircraft noises are having on our community under NextGen routing. The computer programs and tools I have built are prototypes and need to be polished for more routine production use.

(Note: this subject is fairly technical so I will try to explain what I did in intuitive terms first, and include at the end some more technical detail for those interested.)

Raw Data

The Reed meter measures sound energy falling on its microphone, taking samples every 2 seconds with a sensitivity curve simulating the frequency response of the human ear. These measurements are time stamped and written to a small SD card whose contents can be uploaded to a computer and analyzed in Excel or other data analysis programs. The recorded intensity values are expressed in decibels (dBA), a logarithmic scale commonly used for sound level measurements as compared to the faintest audible sound. (A logarithmic intensity scale is used because the dynamic range of sounds is so large – see [this link](#) for more detail on sound measurements).

As a first step, I logged data for 5 days starting at 8:22 AM on Sunday, July 12 in my back yard (31 Tevis Place, Palo Alto, CA 94301), and running continuously until 7:38 AM on Thursday, 7/16. I then organized the records by day (0:00 AM - 23:59 PM; i.e., 43,200 records per day) for analysis. A typical set of raw measurements for Monday, July 13 is shown in Figure 1.

You can see that the data include a noisy ambient background ranging from about 38 dBA at night to about 50 dBA during the day. A number of narrow vertical spikes are superimposed on this background corresponding mostly to aircraft overflights, but also including other localized ambient noise events. Recall that a measurement is taken every 2 seconds, so individual spikes are not resolved on the plot at the scale shown in Figure 1. They can be seen more clearly in Figure 2, which shows a small portion (7:30 - 8:30 AM) of the record in Figure 1, blown up on the horizontal (time) axis.

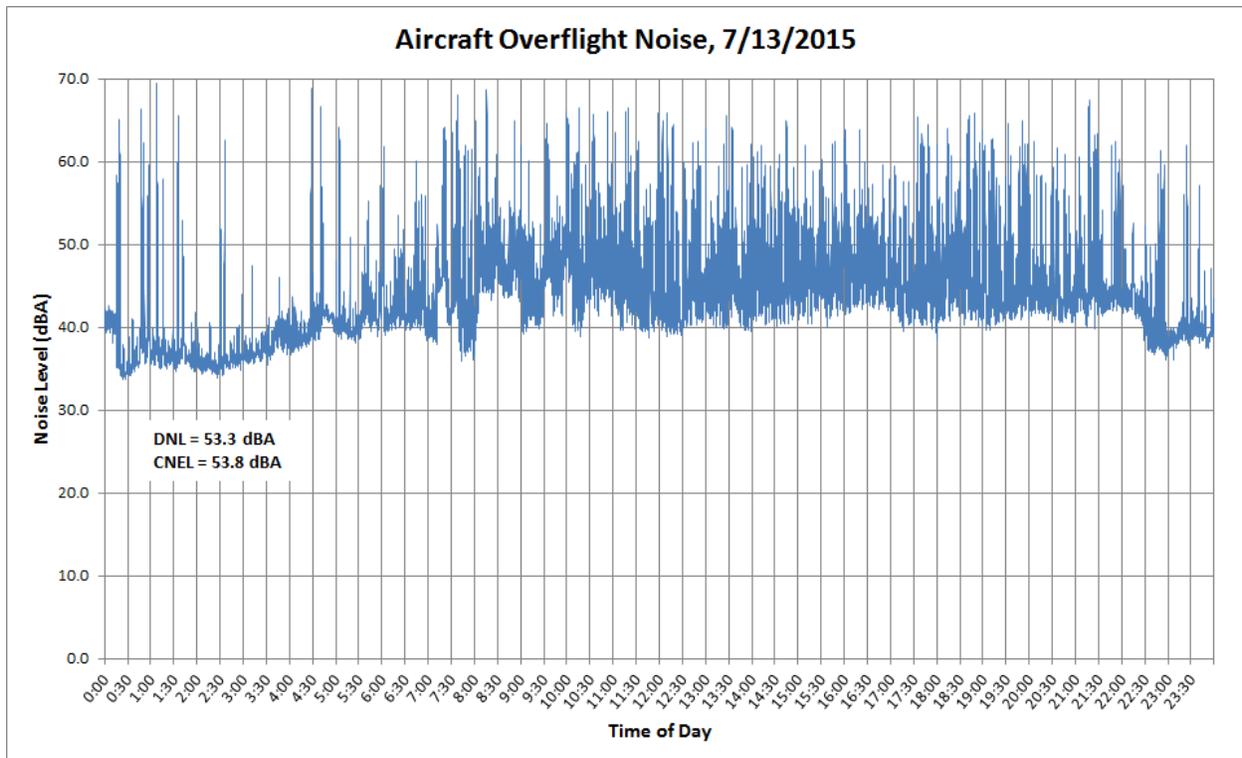


Figure 1. Raw data from Reed sound meter for July 13, 2015.

In Figure 2 you can clearly see the background (between about 40 and 50 dBA) and the 11 peaks corresponding to aircraft overflights that occurred in this one-hour period. This background comes from the ambient neighborhood noise and the peaks are either sharp noises (like an object falling, a yell, etc.— look at the narrow peaks just before 7:36 and 7:52 marked with red arrows) or low-altitude airplane overflights seen as the wider peaks (around 1-1:30 minutes in duration).

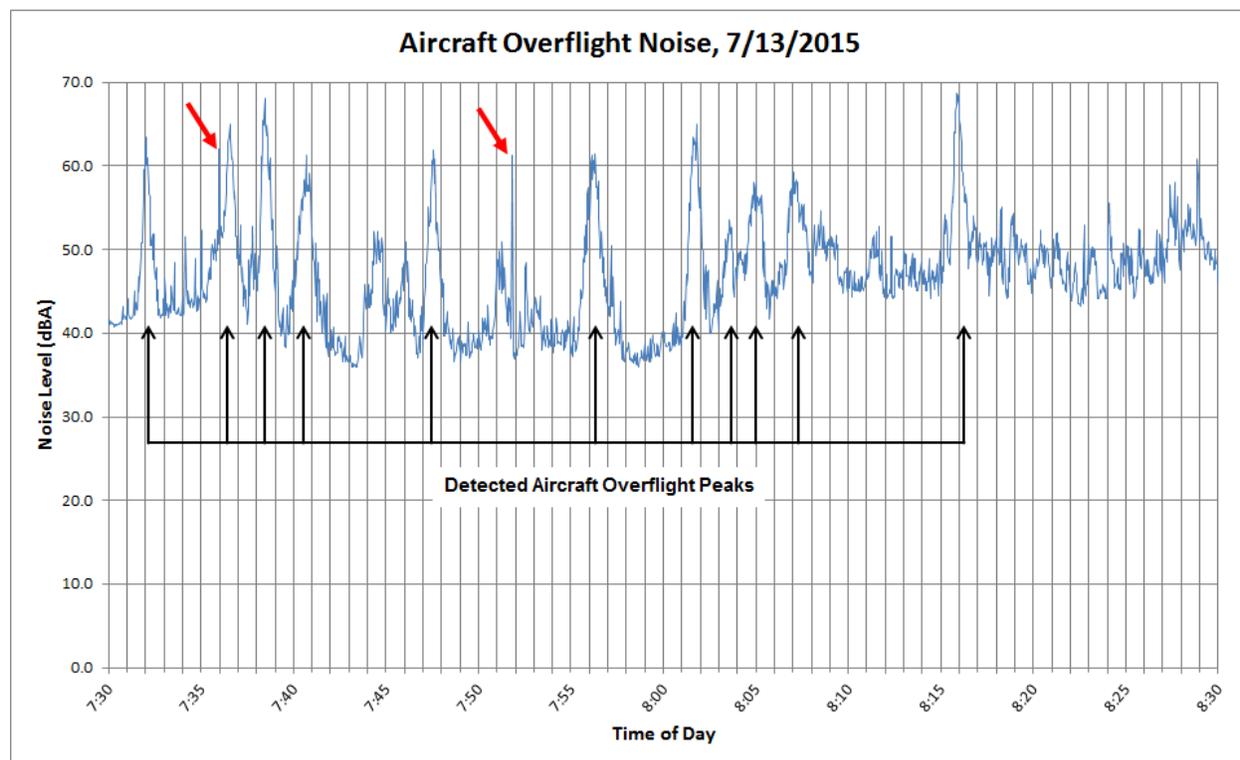


Figure 2. Expanded view of the interval 7:30 8:30 AM from Figure 1.

Data Analyses

In addition to simply plotting these data as above, we can do various calculations of interesting noise measures. For example:

The FAA **Day-Night Average Sound Level (DNL)** — is a single number, the day-long average of a sound intensity record shown such as shown in Figure 1 (the average is done in linear intensity space and then converted back to dBA units). The DNL supposedly represents an assessment of the impact of aircraft noise, and "accounts for increased human sensitivity to noise at night by applying a 10 dB penalty to nighttime events (during the 10:00 PM to 7:00 AM time period). The DNL value for Figure 1 is 53.3 dBA.

The **California Community Noise Equivalent Level (CNEL)** — CNEL is a variant of the DNL developed in California, which includes an extra 5-decibel penalty on noise during the 7:00 PM to 10:00 PM evening time period, as well as the 10-decibel penalty on noise during the 10:00 PM to 7:00 AM time period. The CNEL is again a single number that purports to represent the impact of aircraft noise. The CNEL value for Figure 1 is 53.8 dBA.

The problems with the DNL and CNEL measures are well-known in that these overall average noise measures do not account for the disruption of localized intense and often recurring sounds during daily activities. The best noise metric(s) to accurately quantify the impacts of aircraft noise on human health, learning, annoyance, speech disruption, sleep disturbance, etc.,

particularly in situations where communities were previously unaffected by aircraft noise, have yet to be determined. Although the FAA is pursuing some research efforts in this area, they are not progressing at a rapid pace and governments in Europe have taken the lead. These traditional measures are nevertheless the criteria the FAA uses to judge impact of aircraft noise and unless the DNL/CNEL is greater than 65 dBA, they are not obligated to do any mitigation.

For a person under the flight path of low-flying aircraft, what matters most is not the average noise over a 24-hour period, but rather, for common activities, the extent to which one's concentration on a task at hand is broken by aircraft noise. This means that we need to worry in some detail about when, how much, how long, and how often we are exposed to aircraft sounds in our analyses.

To do this, we have to isolate each aircraft overflight peak and measure some more directly relevant parameters: such as how big each peak is, how long it lasts, and how close it follows on to similar events around the same time. I spent a fair amount of time writing, testing, and tuning a computer program to analyze the raw data to identify and extract each peak corresponding to an overflight event. This is a fairly complicated program in that it has to find the upper bound of the dynamically varying ambient background noise to establish a threshold to detect bigger aircraft noise peaks. It also has to make sure that candidate overflight peaks are neither too short nor too long. Once a peak is found that matches these criteria, its location in time, its maximum height, and its overall size (total sound energy under the peak) are calculated. (See further details near the end of this message.)

DNL & CNEL Values with and without Aircraft Noise

One of the simplest things we can do is estimate the values of DNL and CNEL with and without aircraft noise. This is relatively easy once we have identified the locations and extents of aircraft noise peaks. Using a spreadsheet program (like Excel), we can replace each peak with the average ambient background noise level seen near the peak, and recalculate DNL and CNEL values. Table 1 shows the result of doing this for each of the 24-hour sound records in the 5-day recording I made.

Effect of Overflight Noise on DNL and CNEL Estimates	With Overflight Noise		W/O Overflight Noise		Change Adding Overflights	
	DNL (dBA)	CNEL (dBA)	DNL (dBA)	CNEL (dBA)	Δ DNL (dBA)	Δ CNEL (dBA)
Mon, 7/13 (Full day)	53.3	53.8	48.3	48.7	+5.0	+5.1
Tue, 7/14 (Full day)	54.4	54.7	48.3	48.7	+6.1	+6.0
Wed, 7/15 (Full day)	55.0	55.5	49.8	50.4	+5.2	+5.1

Table 1. Effects of presence/absence of aircraft noise on DNL/CNEL

As can be seen, the presence of overflights in the data adds approximately 5-6 dBA to the FAA measures, corresponding to a factor of 3.5-4 increase in average intensity of the sound. Now clearly Palo Alto has always had a certain level of noise from aircraft in the past, so it might be argued that these differences in DNL and CNEL measures could be a bit of an overestimate. On the other hand we have visually scanned all of the daily noise records at high time-axis resolution to be sure the extracted peaks are reasonably overflight events. There were a few small dubious peaks that slipped through, but more often, there were peaks that were most likely overflights that were below the conservative detection threshold level. This means we are

including in the background some of the smaller amplitude overflight noise (probably from aircraft that did not come close to flying directly over my house).

As a result, we believe the table above shows a fairly accurate estimate of the significant changes brought on by the recent realignment of aircraft flight paths with the new NextGen system. One of the qualities that Palo Alto has enjoyed as a community is that it has always been a relatively quiet place to live. The NextGen changes have affected that profoundly.

Sound Exposure Level (SEL) Calculations

Another calculation we can do is to replace each recorded overflight peak with a simulated peak that is a composite metric that represents both the intensity of the sound and its duration. This measure is called a *Sound Exposure Level (SEL)* and it represents the total acoustic energy transmitted to the listener during the overflight event. Mathematically, an SEL is the intensity of a constant sound that would, in one second, generate the same acoustic energy as the actual time-varying noise event. For sound from aircraft overflights, each of which typically lasts 30 seconds to a minute or more, the SEL represents a better metric to use in assessing noise levels from overflight events, although it does not capture the effects of the repetitiveness of successive overflights nor the duration of an episode of high traffic.

Figure 3 shows the record for Monday, July 13, with the recorded overflight peaks converted to SELs. You can see that the peaks are now uniformly narrow (1 second wide) and have amplitudes of around 70 - 80 dBA, corresponding to the integrated sound energy delivered by the whole recorded peak. The heights of the SEL peaks may more closely represent the impact of individual events, but the DNL and CNEL statistics are only changed moderately. When computed over the SEL chart in Figure 3, the DNL(SEL) statistic is 55.7 dBA (instead of 53.3) and CNEL(SEL) is 56.3 dBA (instead of 53.8). We believe that the use of the SEL measure still falls short of capturing the local repetitiveness and duration effects of vexing aircraft noise.

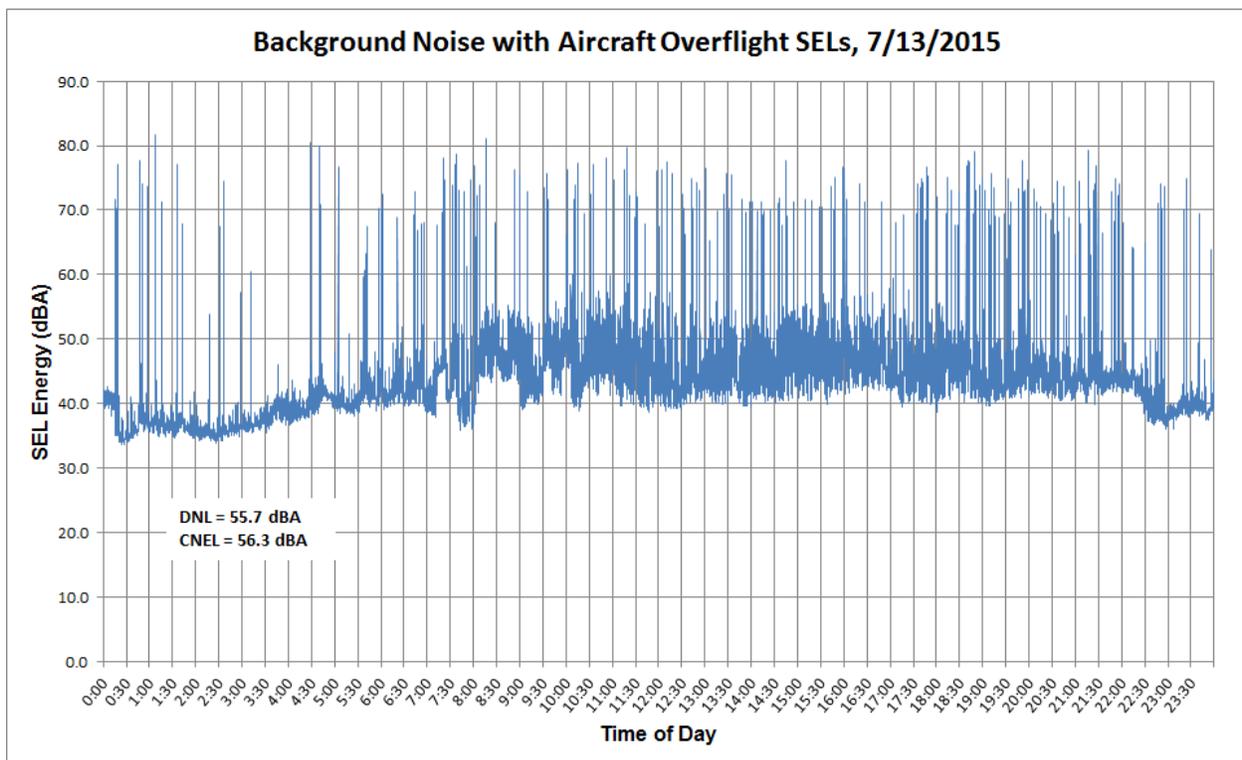


Figure 3. SEL representation of aircraft noise peak magnitudes for July 13.

Overall Magnitude of Aircraft Overflight Disruptions

There are a number of metrics that have been studied to try to capture various aspects of the impact of overflight noises (see these links, [link-1](#) and [link-2](#), for a discussion):

- Time Above a Specified Level (TA)
- Time Above Ambient Level (TALA)
- Time Audible (TAUD)
- Number-of-events Above a Specified Level (NA)

These can be computed over various time intervals, such as high-traffic and low-traffic times of the day. These each suffer from being single figures of (de)merit though that leave out other dimensions of the noise context (e.g., maximum amplitude and the distribution of amplitudes are ignored in the TA and NA series, and the duration of events is ignored in the NA measure).

In the following, we explore some multi-parametric ways to characterize the magnitude of repetitive aircraft overflight noise intrusions from our data set. One approach is to calculate histograms of raw peak heights and SEL amplitudes to show the distribution of aircraft noise intensities we are exposed to. Having the peaks now isolated and measured makes this easy to do with a spreadsheet program like Excel. Rather than doing this analysis just for Monday, July 13, we summarize the data from all 5 days during which data were recorded. Figure 4 shows the overall histogram for raw peak heights and Figure 5 shows the histogram for SEL heights (a total of 866 peaks are included in the histograms).

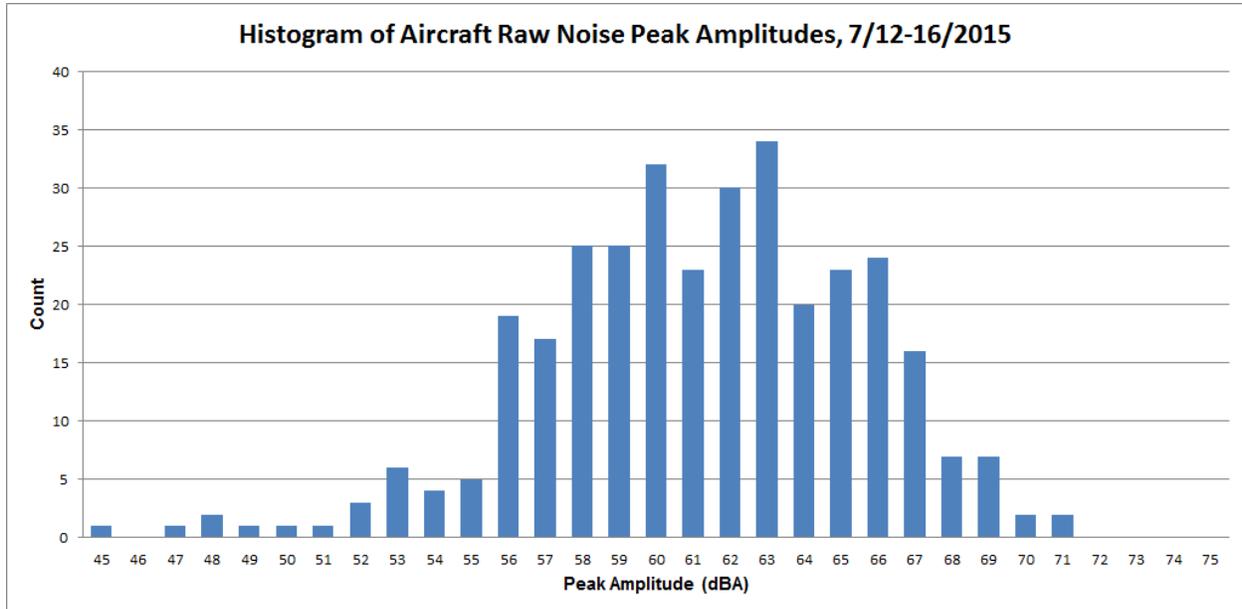


Figure 4. Distribution of raw aircraft overflight event intensities for July 12-16.

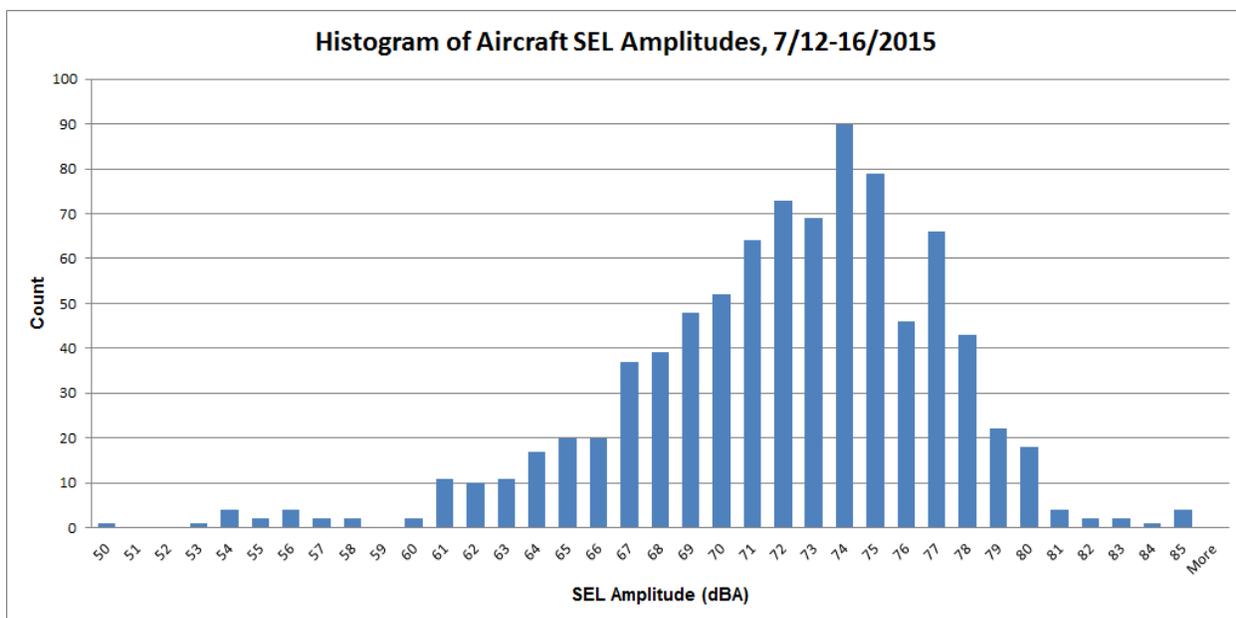


Figure 5. Distribution of aircraft overflight event SELs for July 12-16.

The mode of the distribution of raw peak heights is about 62 dBA with a half width variation of about +/- 8 dBA. The mode of the distribution of SEL heights is about 74 dBA with a half width variation of about +/- 9 dBA. These noise levels, especially at the higher end of the distributions, represent a significant disruption to daily activities. This way of presenting the data clearly leaves out the detailed time dimension of overflight events, although the histogram counts and the time interval covered in the histogram gives a measure of how often especially intense events happen. Such disruptions are immediately felt events *when* they happen, and are not an assessment done at the end of the day when you might imagine tallying your overall noise experience (DNL or CNEL) for the day. What matters if a conversation or other activity is interrupted because of disruptive overflight noise is that in that moment the effect is felt and evaluated.

The Frequent and Incessant Nature of Overflight Disruptions

From these same tabulations of overflight peak parameters, we can calculate other measures of the repetitive nature of these events. One measure is the frequency of overflight events based on the time between successive peaks. In order to have a more stable measure, we smooth out peak-to-peak time interval variations by measuring the mean time intervals separating successive running groups of 5 adjacent overflight peaks. The admittedly rather cluttered graphs of Figure 6 show smoothed diurnal event frequencies for each of the 5 days during which data were recorded.

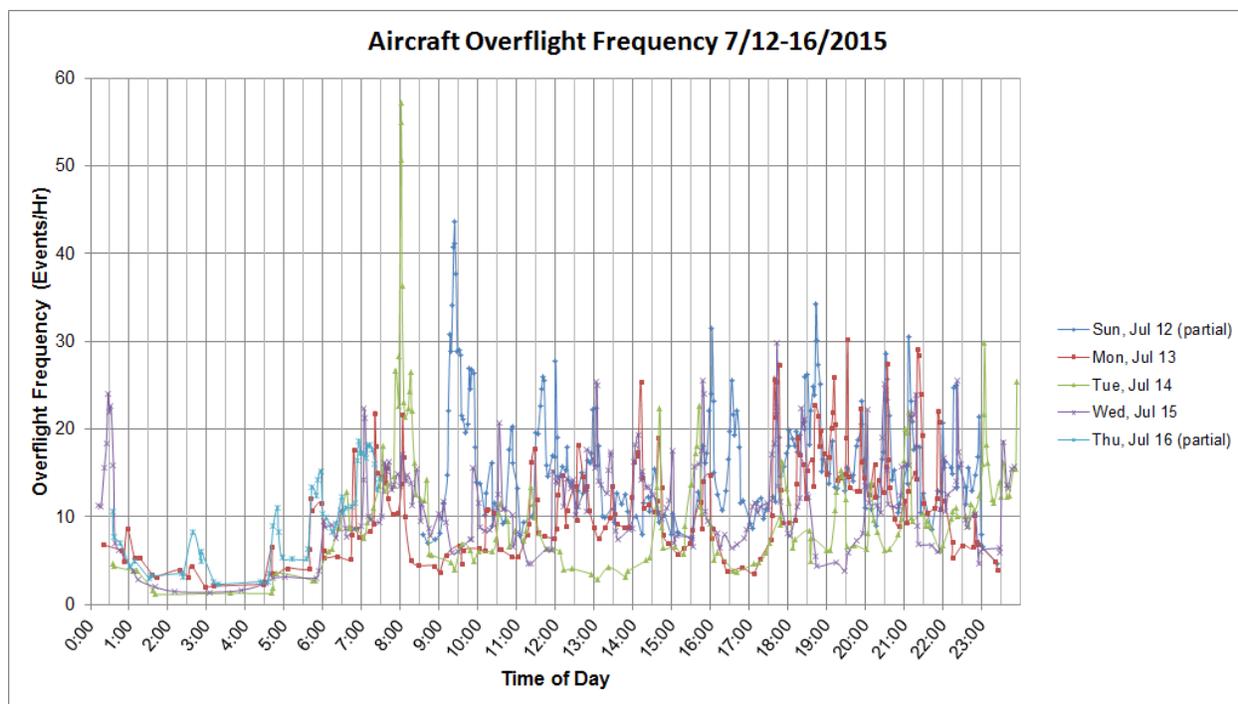


Figure 6. Overflight event frequencies for successive peaks as a function of time of day.

In its current form in Figure 6, this chart ignores event amplitude information, although one could imagine adding another dimension to the chart showing graphs for varying amplitude thresholds. A take-home message from this plot is that there seems to be no obviously consistent pattern of overflights from day to day. One should expect some natural schedule and statistical variability, as well as variations from day to day due to interactions among the airports in the metroplex (SFO/OAK/SJC) where the configuration of one airport can affect the traffic patterns of the others. Nevertheless, some general features can be seen in the frequency patterns in Figure 6, as better illustrated in the *histogram* of event frequencies shown in Figure 7 (846 overflight frequency measurements are tabulated in this histogram). These features include:

- (a) traffic decreases (but does not disappear!) during the middle-of-the-night hours. In fact there are highly intrusive flight events just after midnight, until around 4:00 AM. Then, beginning around 4:30 AM, overflight frequencies start increasing toward the waking hours of the new day;
- (b) flight traffic starts to increase noticeably at around 5:00 - 6:00 AM with big early morning peaks until about 10:30 AM;
- (c) there are bursts of traffic throughout the mid-day and afternoon; and
- (d) traffic again increases significantly from around 5:00 PM to 11:00 PM or midnight.

During the main part of the waking day, we see consistent traffic at a rate of around 10 - 12 overflights per hour (one every 5-6 minutes!). These frequencies increase during some times of the day to 20-25 flights per hour (one flight every 3 minutes!).

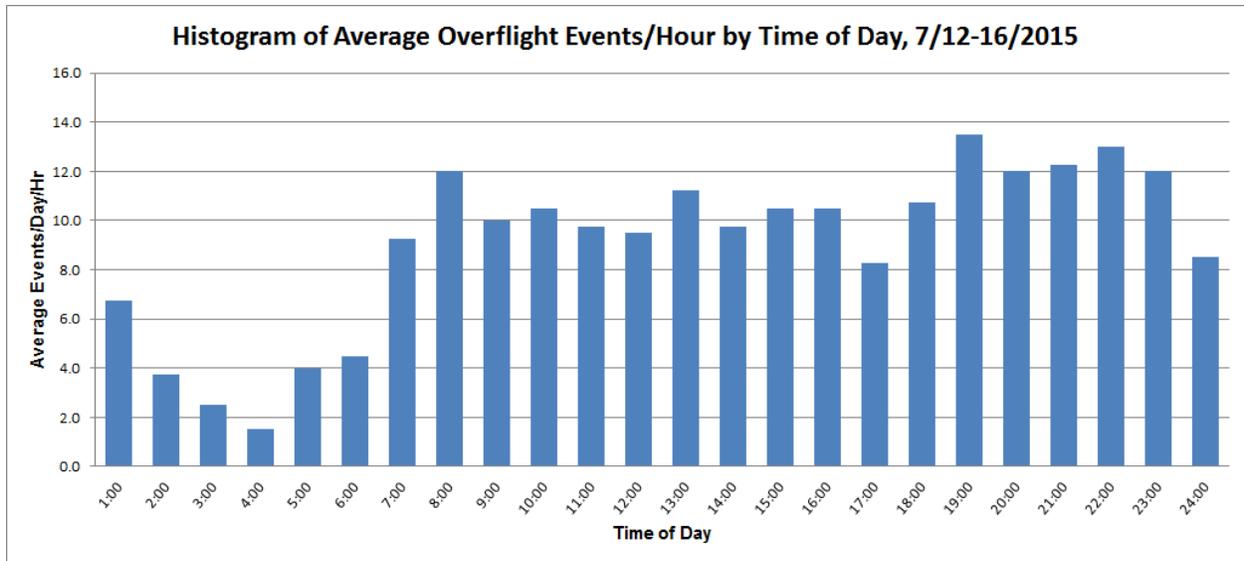


Figure 7. Histogram of overflight events as a function of time of day. Note that events in a given hourly bin do not necessary come in succession at that hour on a given day.

Another way to illustrate the statistics of overflight event frequencies is to compute a histogram of the frequency measurements themselves as derived from Figure 6. This histogram is shown in Figure 8 (again, 846 overflight frequency measurements are included in this histogram).

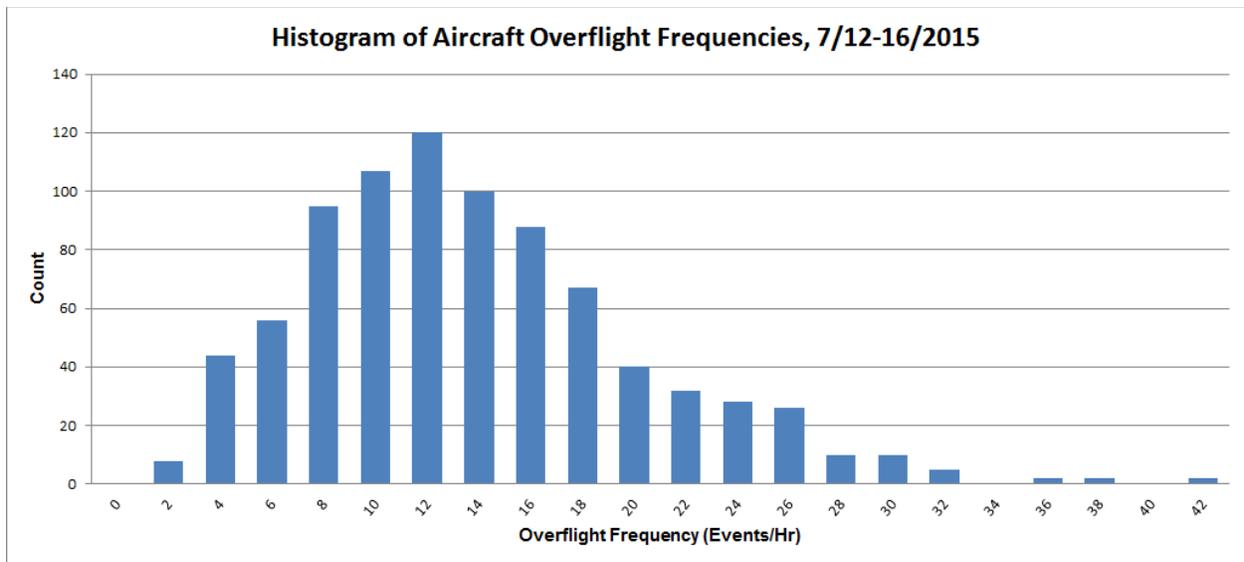


Figure 8. Histogram of frequencies for successive overflight events.

Clearly the mode of the distribution is at 12 events per hour (one every 5 minutes), but the distribution has a long tail so that on a significant number of occasions we have up to 30 events per hour (one every 2 minutes). These high rates happen during the busiest times for flight traffic which interfere significantly with resident morning and evening hour activities. Remember, these overflight frequencies measure the average time intervals between 5 successive peaks, not instantaneous frequencies. Thus, they represent sustained repetitive noise patterns that are especially annoying at the higher frequencies.

Conclusion

The bottom line, whether or not aircraft noise disturbs you, is that these data support the claims by residents that aircraft overflights have become very loud and occur frequently and repetitively during the day and night. In particular, the data shown in Table 1 (comparing DNL values with and without overflight noise peaks) suggest that in re-routing the flight paths around SFO/OAK/SJC, the FAA may have violated their own rules (less than 5 dBA increases in areas with ambient DNL levels in the 45-60 dBA range). This observation, and the search for better metrics to assess noise impacts on residents, argue strongly for reconsideration of the decisions leading to the current NextGen traffic patterns. I believe these reconsiderations should include:

- (a) a more detailed and comprehensive survey of noise in the Palo Alto area as a function of geography and time, with an eye toward comparisons with other impacted communities since any solution is largely a zero-sum game,
- (b) an examination of alternative flight re-routes that are higher in altitude and take place primarily over the bay to minimize noise exposure, and
- (c) an examination of improved approaches to ensure that the noise that does remain over populated areas is not concentrated over a few unfortunate communities.

In the meantime, I and my colleagues will continue to collect and analyze data to see how stable over time and geography these analyses are.

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Acknowledgement

It is a pleasure to acknowledge Juan Jose Alonso, Professor of Aeronautics and Astronautics at Stanford University, for a number of very helpful conversations to critique and refine the work described here.

More Technical Details

In my measurements, the Reed sound level monitor unit was set to use A-profile weighting, slow response, and 2 second sampling to conform to FAA measurement guidelines. I used the vendor calibration unit (SC-05) and a foam wind shield (SB-01). The vendor specifications for the unit are as follows:

Specifications:

Measuring Range: 30 to 130dB

Resolution: 0.1dB

Accuracy: 31.5Hz \pm 3.5 dB, 63 Hz \pm 2.5 dB, 125 Hz \pm 2.0 dB,

250 Hz \pm 1.9 dB, 500 Hz \pm 1.9 dB, 1 kHz \pm 1.4 dB, 2 kHz \pm

2.6 dB, 4 kHz \pm 3.6 dB, 8 kHz \pm 5.6 dB

Frequency Weighting: A: Human Ear Listening; C: FLAT Response

Time Weighting: Fast: 200ms; Slow: 500ms

Frequency Range: 31.5 to 8,000Hz

Auto Sampling Time: 1, 2, 5, 10, 30, 60, 120, 300, 600, 1800, 3600 seconds

Microphone: Electric Condenser Microphone

Memory Card: SD memory card, 1 GB to 16 GB

Data Output: USB/RS232 PC computer interface

AC Output: 0.5 Vrms corresponding to each range step

Output Impedance: 600 Ω

Power Supply: 6 x 1.5V UM3/AA batteries

Dimensions: Meter: 245 x 68 x 45mm; Microphone: 12.7mm dia.

Weight: 489g (1.08 lb)

The device appears to be accurate and stable for the purposes of this study, good to +/- a couple of dBA. I also checked the degree to which the wind shield might affect measured values without wind present and found it to be negligible.

Our neighborhood is very quiet and I believe that most of the sharp peaks (at least those with widths typically around 20-60 seconds, such as illustrated in Figures 2 and 10 below) correspond to aircraft overflights. I have checked quite a few random peaks with the playback feature of *Flightradar24* to verify this, but have not done so for all because I don't have access to the radar database to do that programmatically (doing it by hand is too tedious)

The most important features of my data analysis computer program are (a) being able to measure an appropriate upper bound for background ambient noise levels as a function of time of day, and (b) detecting aircraft overflight sound peaks that rise above this dynamic threshold while filtering out peaks that are too narrow or too wide for a typical overflight. All calculations are done using linear scale sound intensity values rather than decibel values. Starting with a nominal background estimate, I measure the background mean and variance using simple exponential weighting functions to track changes with time. If $y(t)$ is the signal level at time t , then the new weighted average value, $v(t)$, is:

$$v(t) = y(t) + f * v(t-1)$$

where f is a weighting constant less than 1. The closer f is to 1, the longer the "memory" of the weighting.

"v" is not updated during the analysis of a possible peak. The upper bound I use for the background threshold at time t is the background mean at t plus 3.5 times the square root of the variance at t (standard deviation). This is quite a stringent criterion for detection meaning that we only find large peaks.

Noting that the peaks of louder aircraft events stay above threshold longer than quieter overflights, I adjust the upper width threshold for detecting valid aircraft peaks proportional to the square root of the log of the peak maximum (as if the peak had a Gaussian shape). If several overflights take place within an interval less than that of a single aircraft transit, their sound level peaks may get merged and counted as one event rather than several.

To illustrate the results of this procedure, Figure 9 below shows the computed background mean (green) and the peak detection threshold (red) for the day-long record on July 13, and Figure 10 shows these values for the sub-period, 7:30 - 8:30 AM, with higher resolution.

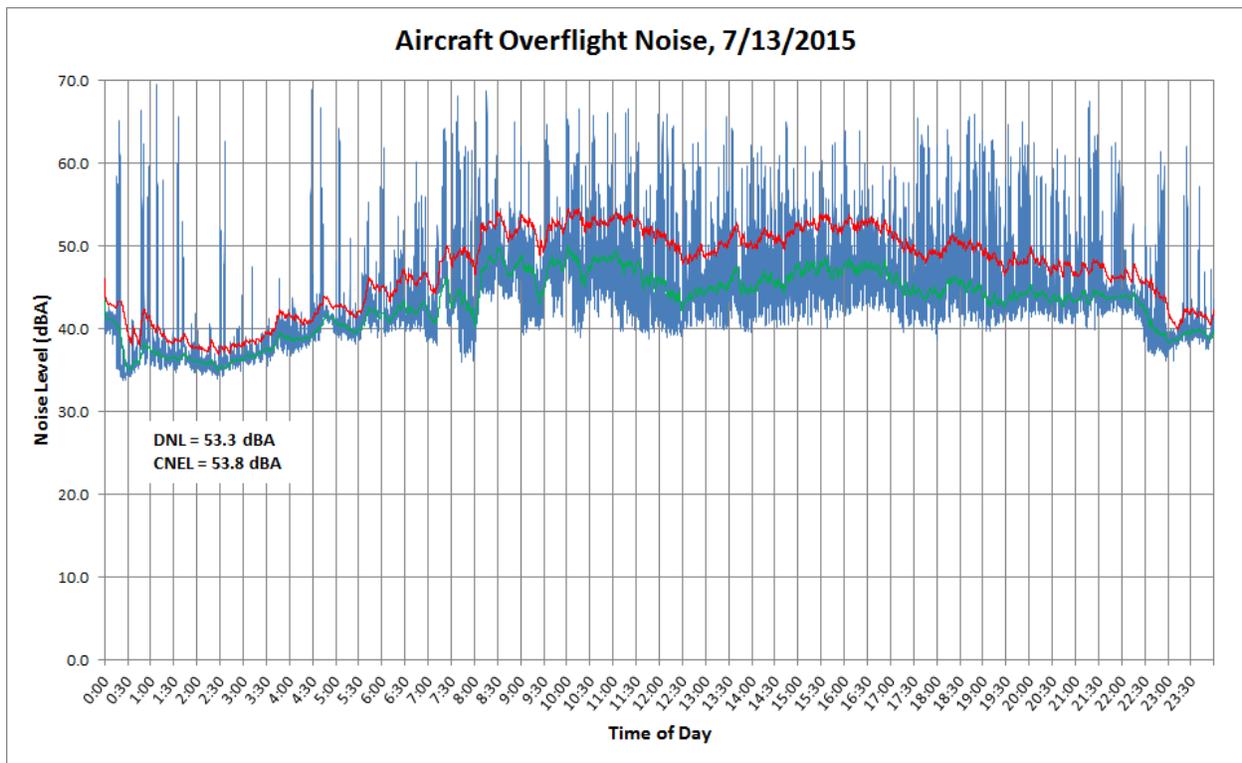


Figure 9. Raw data from Reed sound meter for July 13, 2015 showing the estimated mean background (green) and the associated peak detection threshold (red).

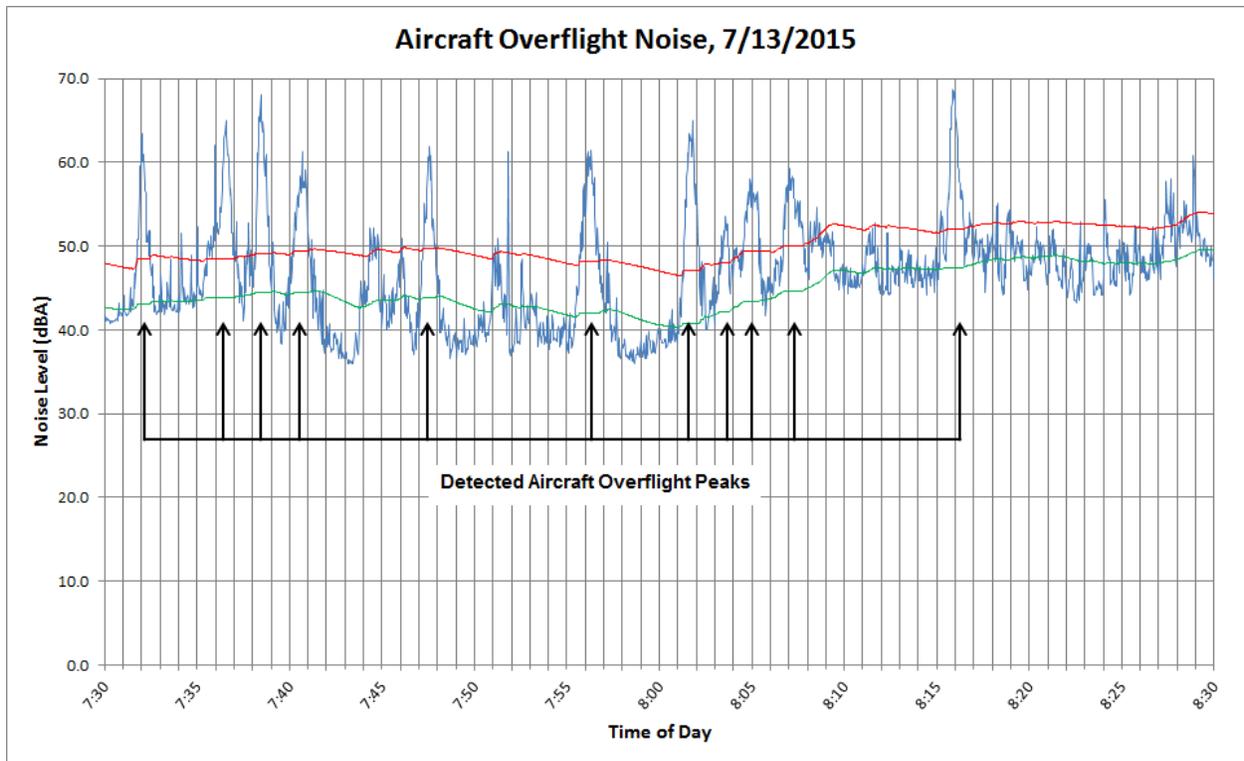


Figure 10. Expanded view of the interval 7:30 8:30 AM from Figure 9.

As can be seen, this peak detection algorithm is conservative in calculating SELs in that it ignores peaks that are near the background noise level and it does not include the wings of peaks extending below the threshold.

APPENDIX C

MYTHS DISPELLED

#1 Air traffic has increased; there are just more planes.

Air traffic has indeed increased over the last ten years, but recent SFO arrival air traffic has not changed (per SFO data, the number of arrivals in 2013 and 2015 is about the same). One cannot blame the tremendous and recent aircraft noise increase over Palo Alto and nearby communities on more planes landing at SFO. On the other hand, arrival patterns have been changed. Planes are now flying at much lower altitudes and are concentrated over narrow corridors. In addition, arrival traffic has been moved over Palo Alto and nearby communities (for instance, the majority of traffic arriving from the North is now flying over the mid-peninsula; most of that traffic was previously flying over the Eastern part of the Bay).

#2 Nothing has changed –airplanes have always been flying over Palo Alto.

Things did change. In the past, aircraft were indeed flying over Palo Alto and neighboring communities but they were at much higher altitudes and were dispersed over a much larger area. In contrast, aircraft are now concentrated in narrow corridors and fly at much lower altitudes. In establishing new airport approaches and altitude levels, the FAA basically built a super highway over long-established neighborhoods. As a result, many communities (such as East Menlo Park, East Palo Alto, Palo Alto, and Los Altos to name a few) are living under a “sacrificial” noise corridor where residents experience over 200 flights a day. This number includes late night and early morning flights that create unhealthy sleep conditions for all (children, adolescents, adults, and elderly).

#3 Planes are less noisy than before and will hopefully continue to get quieter every year.

New airplanes are indeed less noisy than much older models, but according to some experts the promise of a truly quiet aircraft is decades away. However, what matters most to the human ear are the altitude of the aircraft and the rate of acceleration or deceleration. Aircraft noise roughly doubles with every 1,000 ft reduction in altitude. Few people are disturbed by planes at 10,000 ft or above unless they are in full throttle mode due to take off. But SFO-bound airplanes are now routinely making their turns over our communities at altitudes ranging from 3,500 ft to 5,000 ft and deploying noisy speed breaks because the NextGen routes jam aircraft into narrow corridors that create congestion at SFO.

#4 Sky Posse Palo Alto hates airplanes and airports.

We don't. We love responsible airlines and have great respect for airport personnel and the hardworking folks at the chronically underfunded FAA. We rely on airports to travel to many destinations for personal or professional reasons. Like many Silicon Valley residents, we also embrace technology, including GPS technology. On the other hand, we want new aviation technologies to be implemented in a thoughtful way that does not hurt people who are living and working on the ground.

#5 There is nothing anyone can do and the situation is hopeless.

No! Speak up –every voice counts. One very good way to speak up is to file a noise complaint using stop.jetnoise.net. Report noise at least once a day to keep the planes away! In addition, contact your City Council, County Supervisor, and Congressional Representative to tell them to make our public health a priority. See the [Sky Posse Advocacy page](#).

#6 Sky Posse Palo Alto is trying to dump the noise onto other communities.

Absolutely false! Sky Posse Palo Alto does not want any residential community to be in the situation that many communities (not just Palo Alto) are now facing. It is not a zero sum game: planes could be sequenced over the Ocean instead of flying noisy circles over our towns as they wait to be guided into SFO. Planes could fly much higher over residential communities and start their descent over the Bay (as opposed to over residences). The further away from SFO the planes enter the Bay, the higher they can fly, which makes it less noisy for all. Taking advantage of the Ocean and the Bay may add a few miles to the routes but the small additional cost in fuel or travel time seems to be a reasonable trade-off given the relief it would provide to hundreds of thousands of residents every day and night. Concentrated noise and air pollution threaten our public health, which should be a priority for our government, not greater profits for airlines.

#7 The FAA changed the routes for safety reasons.

No. Safety records for SFO and SJC have always been excellent. The FAA has created a lot of public relations spin around the NextGen program, but the implementation in our area has not lived up to their promises of an improved air transportation system. There are real public health impacts created by NextGen's concentrated noise corridors. For example, noise complaints into SFO have gone up astronomically (e.g. 3000%) since March 2015. The FAA made changes to accommodate requests from the airlines to reduce travel time and increase airspace capacity to handle future increases in air traffic. We also know that safety is always the top consideration for the FAA and has been factored into the new flight patterns. However, our neighbors in Santa Cruz are rightly very concerned that the new NextGen route over their homes and schools sometimes causes jets to swerve into airspace where only small aircraft are supposed to fly.

#8 Palo Alto residents like to complain about everything.

Palo Alto residents rightly pay attention to many important things, both locally and globally. Even though they did not move, many residents, schools, and businesses in Palo Alto and nearby are now living under airplane super highways with aircraft flying at low altitudes, sometimes as often as every 2 minutes or less. Tremendous noise was moved to these communities. Aircraft noise is a public health issue that deserves attention because it affects everyone who lives, studies, or works under the growing canopy of air transportation noise. Across the United States, communities affected by NextGen (Chicago, New York, Boston, Minneapolis, San Diego, Los Angeles) are asserting their rights to a quieter and cleaner environment.

FREQUENTLY ASKED QUESTIONS

1. Why are more loud jet aircraft flying over our communities?

There are actually two main reasons why jet traffic has increased dramatically over our communities.

1. Over the past decade SFO arrival routes gradually migrated South resulting in the current concentration of large jets from Asia, Europe and the North turning over Palo Alto.

- The aircraft are sometimes so low you can read the markings on their tails.
- Note that Palo Alto City leaders were never allowed to participate in the SFO Roundtable noise abatement forum that involves communities in reviewing SFO route changes. In addition, no environmental impact assessment of the changes was ever done.

2. In March of 2015 the FAA implemented new NextGen procedures, which included an SFO southern arrival route that caused new noise for communities as far away as Santa Cruz and greatly amplified Palo Alto's already noisy soundscape.

- As part of its NextGen program to modernize the airspace to accommodate future air traffic and respond to repeated demands from the airlines to shorten travel time, the FAA re-designed the approach routes to SFO and SJC. Existing and perfectly safe arrival routes that dispersed noise more effectively have been eliminated and traffic over the remaining routes must now follow a precision navigation system. In the past, aircraft followed an approximation of the published route. But now aircraft fly much lower than before and are concentrated in narrow corridors.
- Well-established communities (such as Palo Alto), located far away from SFO, are now subjected to as many as 300 low altitude flights every 24 hours (some as late at 1:30 am and as early as 4:30 am). That's over 100,000 flights a year!
- The new approach routes are not always the shortest ones: therefore the FAA's argument for saving fuel or travel time is not always valid. But even if the new routes were shorter, should the FAA and airlines make the lives of hundreds of thousands of people miserable to reduce the travel distance of an airplane by 2 or 3 miles and the time to the gate by 60 seconds or less?

2. How could our noise environment change so radically without a proper environmental review?

Before implementing NextGen in the Northern California Metroplex the FAA did an internal environmental review using old noise-modeling technology. No **actual** noise measurements have ever been taken in our community by the FAA. They concluded that the new NextGen routes and procedures would have "no significant impact" on our community and therefore no further environmental review was necessary. One problem with their analysis is that the noise harm averaging measures they used are based on standards that were developed in the 1970s, and even then these standards were questioned. It is in the FAA's and air transportation industry's interests to maintain these antiquated noise harm standards as it enables them to increase capacity at airports without realistic environmental reviews and to create routes that abandon existing noise abatement routes in favor of ones that concentrate aircraft AND NOISE into narrow corridors.

3. Who is affected by the changes?

Many communities (East Menlo Park, Menlo Park, East Palo Alto, Palo Alto, Los Altos, Los Altos Hills, Los Gatos, Saratoga, Portola Valley, Woodside, parts of Santa Cruz County, etc.) are affected by the new arrival patterns. But East Menlo Park, East Palo Alto, and Palo Alto are probably the most affected areas because 3 of the 4 SFO arrival routes now converge over these communities at low altitudes. There is a virtual rendez-vous point (called the Menlo waypoint) with a target altitude of 4,000 ft above the intersection of Willow Road and Highway 101. In practice, planes adjust their speed and altitude right before reaching the Menlo waypoint (by the way, many planes routinely go below the 4,000 ft target altitude) thus creating a huge noise impact on the communities below.

Palo Alto also gets two kinds of SJC flights: morning departing flights on their way to Hawaii (planes take off over the Bay and make a sharp turn to the West over Palo Alto or Mountain View) and arriving flights when the prevailing winds reverse directions. In this situation, SJC goes into “reverse-flow”, which means that planes approach SJC from the North. When SJC is in “reverse flow” mode, SJC-bound planes fly as low as 1,800 feet over Rinconada Park in Palo Alto.

4. Who controls where aircraft fly? Who decides on changes?

The FAA designs and approves the routes, and controls whatever changes need to be made. The FAA is aware of the current noise problem and is in the process of evaluating possible remedies for both arrivals and departures into and out of both SFO and SJC. The FAA analyses and recommendations for SFO arrivals will be reviewed by [Select Committee](#), which is composed of 12 elected officials representing 3 Congressional districts (Anna Eshoo, Sam Farr, Jackie Speier).

5. Why should I pay attention if I am not bothered by the noise?

Aircraft noise and air pollution have multiple negative impacts: health, children learning, productivity and work, quality of life, and property values. You may not be directly affected today by aircraft noise but others (children, neighbors, guests) may be. Your health may be affected due to air pollution: a [recent study](#) by the Keck School of Medicine of USC found that communities downwind from LAX and as far away as 10 miles had higher levels of ultrafine particles than could be created by freeway traffic over hundreds of miles.

The air pollution impacts for this concentrated jet traffic at low altitudes have not been adequately studied. Exhaust from airplane engines undergo chemical changes under sunlight that result in carcinogenic aromatic hydrocarbons. Aircraft emit ultrafine particles (similar to the ones emitted by vehicles on freeways) that can easily be inhaled thus contributing to heart and lung conditions such as asthma and the development of blocked arteries. A repeated and large number of planes flying at low elevations in narrow corridors does not allow for a natural dispersion of toxic emissions and will result in concentrated chemical pollution (interestingly enough, several long-term residents of our affected communities have now noticed some recent “scum” in their yards).

Per California law, one must disclose any neighborhood noise. A failure to do so exposes the seller to potential lawsuits. Aircraft noise is public knowledge and local realtors are fully aware of the problem. But forget about laws: why would someone pay premium \$ to live under a “highway in the sky”, a term used by the FAA to describe their NextGen implementation? We all know that houses near busy streets, let alone freeways, have a much lower value. Why would this not apply to highways in the sky?

You should therefore be concerned even if you are not directly affected by aircraft noise today. Think about the clean air you should be breathing. Think about your property values. Think about the fact that it will get worse because air traffic is projected to increase. Think about what could happen when the FAA decides to tweak their low elevation routes to accommodate increased traffic: who chooses to live underneath a “highway in the sky”?

6. Can the problem be solved?

Yes. Remember first that this massive noise problem is relatively recent. For decades, SFO planes have been landing and taking off safely (the Asiana Air crash that occurred in July 2013 had nothing to do with the SFO arrival route). Second, it is **not** a zero sum game: one can eliminate the impact of noise at ground level by forcing planes to fly much higher over residential communities and start their descent over water (as opposed to over residences) and by instituting nighttime protocols that respect sleep. Then, whatever residual noise may remain should be spread over a large area by dispersing the flights.

Taking advantage of the Bay may add a few miles to the new routes (the further away from SFO the planes enter the Bay, the higher they can fly) but the additional fuel or time costs are a small price to pay for reducing the impact on hundreds of thousands of residents who are affected every day and night.

7. Why are there flights at night?

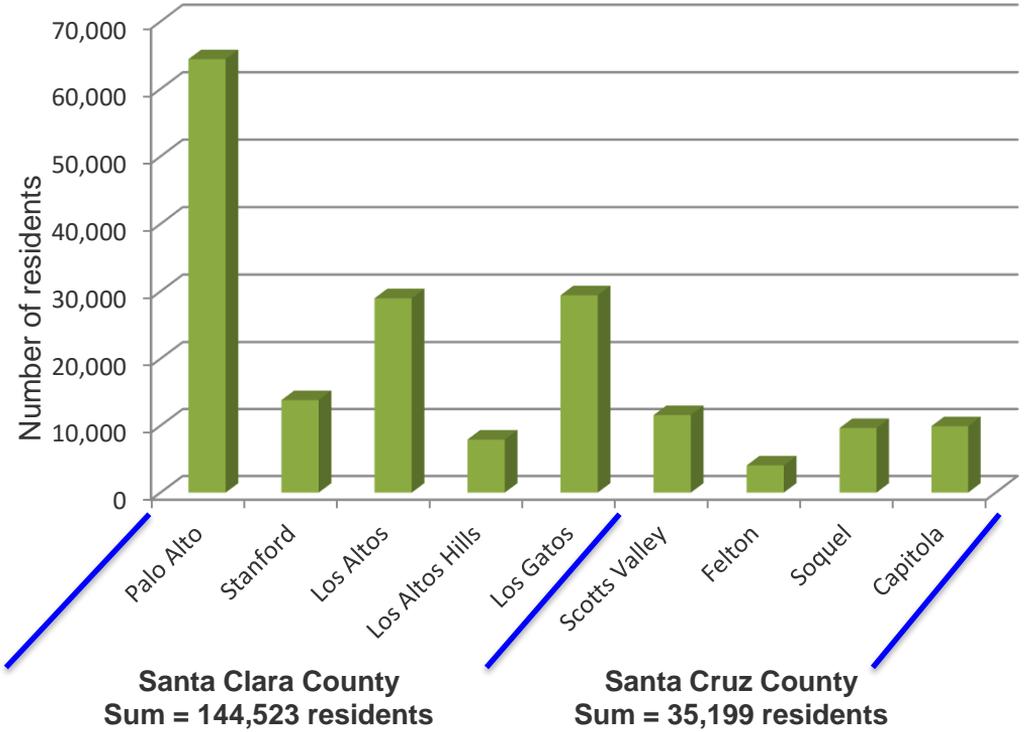
Existing aviation “open skies” law prohibits SFO from enacting curfews and airline restrictions. Passenger planes can land at any airport 24 hours a day as long as it is safe to do so (airlines decide their schedule). Cargo planes from overseas or the U.S. also routinely land at SFO in the middle of the night. Unfortunately, night flights follow the new low altitude arrival routes even though there is almost no air traffic over the Bay at that time. This **can** change with cooperation from the FAA and the airlines.

8. Why should I complain and how?

Complaining to airports is essential as it is the only public record we have that indicates noise harm. Noise complaints are like noise monitors but they are better because they show the human impact. A noise complaint represents a human perception of the noise: similar to a level of pain, each person perceives noise differently but knows very well how quiet their environment was before the FAA made changes. A noise monitor is only an instrument. It collects noise data but it cannot tell the level of pain inflicted on the people. Furthermore, we will never have thousands of noise monitors implemented on the ground. Therefore, report noise complaints through stop.jetnoise.net because you are the best monitor that we will ever have. Do it at least once a day to keep the planes away.

APPENDIX D

Populations of some cities in Santa Clara and Santa Cruz counties



Source: 2010 census data

- Not all cities in each county are displayed.
- Employees or visitors are not represented.
- Stanford does not take into account student population (~7,000 undergraduates, ~ 9,000 graduate students)
- Medical facilities are not represented
 - **Stanford Hospital** (1,500 physicians; 1,000 interns and students; 1,000,000 ambulatory visits in 2014)
 - **Lucille Packard Hospital** (1,286 medical staff; 3,455 employees; 979 volunteers)
 - **Palo Alto Medical Foundation** (5,350 employees; 1,173 physicians; 2,558,490 patient visits in 2012)
 - VA Hospital in Palo Alto

Voices from Palo Alto, East Palo Alto, and Stanford on impact of commercial aircraft

Sky Posse Palo Alto <http://www.skypossepaloalto.org/>

March 1, 2016

Context

Sky Posse wanted to better understand the **negative impact of commercial aircraft** on our communities and ran a survey for 11 days starting Feb 11, 2016 (survey questions in Appendix B).

For manageability purposes, the survey was **limited to residents, workers, students, and visitors of Palo Alto, East Palo Alto, and Stanford** (referred to as **“Palo Alto”** in the survey).

657 total responses were received but only 599 responses have been used (e.g. all respondents who answered at least the 2nd question of the survey).

The **599 responses represent about 1,000 people** (475 individuals, 125 groups –95% were households).

- 90% live in “Palo Alto”
- 35% work in “Palo Alto”
- 33% meet / conduct activities in “Palo Alto”
- 15% frequently visit “Palo Alto”
- 13% run / manage a business in “Palo Alto”
- 12% attend / teach school in “Palo Alto”

Over 1,600 comments (see sample comments in appendix A).

The **vast majority** of respondents (567 respondents; 93%) **noticed an increase in the number of aircraft** over “Palo Alto” areas. 74% (484 respondents) noticed the change within the last year or so.

The **vast majority** (529 respondents; 90%) have had their **lives impacted in a major or significant way**. Respondents identified the **following top 3 concerns**:

- **#1 Noise/interruptions** (575 respondents; 96%)
- **#2 Health/stress** (497 respondents; 83%)
- **#3 Property values** (467 respondents; 78%)

The **top 5 impacted “activities”** are:

- **Sleep** (489 respondents; 86%)
- **Outdoor activities** (489 respondents; 86%)
- **Overall quality of life** (489 respondents; 86%)
- **Concentration** (reading, writing, classroom) (432 respondents; 76%)
- **Conversation** (face-to-face, phone) (410 respondents; 72%)

Virtually all respondents are **affected by** the **noise** (558 respondents; 98%) and **many** of them (535 respondents; 94%) are **also affected by** the **frequency of occurrence**⁽¹⁾

Most of them (529 respondents; 90%) **experience aircraft concentration**⁽¹⁾ **more than once a day**. 58% (327 respondents) experience it several times a day.

The **vast majority** (509 respondents; 90%) are **disturbed every day or almost every day** of the week. 70% (396 respondents) are disturbed every single day.

Respondents are **disturbed at all hours of the day and at night**:

- 435 respondents (77%) are disturbed between 7am and 7pm
- 384 respondents (68%) are disturbed between 5am and 7am OR between 10pm and midnight
- 305 respondents (54%) are disturbed between midnight and 5am

(1) Frequency of occurrence or aircraft concentration means many planes every 2 or 3 minutes

The **vast majority** of respondents (507 respondents; 90%) are **disturbed in their homes or gardens. 69%** (388 respondents) are also disturbed **in other outdoor places**. In addition, respondents are disturbed at:

- Other indoor places (158 respondents; 28%)
- Work (152 respondents; 27%)
- School (107 respondents; 19%)
- Place of worship (62 respondents; 11%)

The problem is pervasive:

- All Palo Alto neighborhoods are affected
- East Palo Alto is affected
- Stanford is affected

and affects more than homes: **it affects businesses/workplaces** (including hospitals), **schools, places of worship, libraries, and parks.**

1,000 voices from residents, constituents, neighbors, old and young.

They live, work (some from home), go to school (study or teach), or visit the area.

They can't fall asleep or are awakened multiple times a night.

They can't concentrate and they worry about being fired because they are so tired.

They feel stressed and fear for their health. They are afraid of the chemicals falling down. They are concerned about the impact on their children.

They are anxious about planes crashing.

They don't go outdoors anymore. They no longer open their windows. They have insulated homes with double-pane windows. They don't want to run air conditioners. Some wish they were deaf.

They can't carry on conversations, including when they are on the phone with clients.

They no longer want to entertain guests.

They worry about property values. Who wants to live under a runway?

Even their dogs are affected.

They cannot get away from the noise.

They don't understand what happened. Some have lived in the same place for decades. They thought that they would retire in the home they love but their dream is now shattered.

They are desperate. They have no peace. Some are moving out or considering leaving.

They are crying for help but they don't feel heard or that anyone cares.

Conclusion

These are the voices of about 1,000 people.

More than 100,000 people reside in Palo Alto, East Palo Alto, and Stanford (per 2010 census data, 106,367 individuals live in these 3 communities). This number **does not include employees, visitors, or students**:

- About 7,000 Stanford undergraduate students.
- About 9,000 Stanford graduate students.
- About 1,500 physicians and 1,000 interns and students at Stanford Hospital. 1,000,000 ambulatory visits in 2014.
- 1,286 medical staff, 3,455 employees, 979 volunteers at Lucille Packard Hospital
- 5,350 employees and 1,173 physicians at Palo Alto Medical Foundation. 2,558,490 patient visits in 2012.

From flight data (and some survey comments), we also know that **nearby towns**, which were not included in the survey, are **similarly affected** (Menlo Park, Atherton, Los Altos, etc.).

Appendix B – Survey questions

Welcome to this Sky Posse Palo Alto survey on the impacts of commercial aircraft.

A few notes before we get started:

* this survey applies only to people who live, work, or study in Palo Alto, East Palo Alto, or Stanford or visit these locations frequently. The survey uses the term "Palo Alto", which includes these three locations.

* you can respond as an individual or on behalf of one group of people (if you want to respond on behalf of multiple groups, you will need to submit multiple surveys).

* aircraft refers to large commercial aircraft flying to or from SFO, SJC, or OAK

* unless otherwise specified, questions should be answered for the period covering the last 12 months.

* 1. Have you noticed an increase in the number of aircraft over "Palo Alto" areas?

Yes, especially
within the last year or so

Yes, within the last few years
(not just last year)

No

* 2. Are you concerned by any of the following aircraft impacts? Please provide an answer for each item.

	Yes	No	I am not sure
Noise / interruptions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Chemical emissions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Health / stress	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Safety concerns	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Children's education / learning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Property values	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Visual distraction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other concerns (please describe in text box below)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please describe other concerns you may have or add comments on your previous answers.

You can answer this survey as an individual or on behalf of one group of people (such as a head of household, a teacher, a coach, a business owner or manager, etc.).

The questions will be the same but your answers may be different depending on who you represent.

* 3. Are you filling out this survey on behalf of one group?

Yes

No (just myself)

Appendix B – Survey questions

* 4. Who and how many people (including you) will be represented in this survey? Select only one row because you can only represent one group at a time in the survey.

	2 - 4 people	5 - 14 people	15 - 49 people	50 - 99 people	100 - 499 people	500 people or more
Household	<input type="radio"/>					
Co-workers	<input type="radio"/>					
Employees and customers	<input type="radio"/>					
School members (students, staff, or teachers)	<input type="radio"/>					
Church members	<input type="radio"/>					
Neighbors	<input type="radio"/>					
Other group (please describe in text box below)	<input type="radio"/>					

Please provide a brief description of the "Other group" in the text box below.

* 5. What is your (your group's) relationship to "Palo Alto"? Select all that apply.

- live in "Palo Alto"
- work in "Palo Alto"
- run / manage a business in "Palo Alto"
- attend or teach school in "Palo Alto"
- meet or conduct activities in "Palo Alto"
- frequently visit "Palo Alto"

* 6. What level of impact have aircraft had on your (your group's) life in general?

Major impact	Significant impact	Minor impact	Negligible or no impact
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Comments (optional):

Impact

Appendix B – Survey questions

* 7. Which of your (your group's) activities have been impacted by aircraft? Select all that apply.

- Sleep
- Concentration (reading, writing, classroom)
- Productivity (paid or unpaid work, including studying)
- Customer experience or satisfaction
- Outdoor activities (gardening, walking, biking, running, playing sports, eating, etc.)
- Conversation (face-to-face, phone)
- Meetings / presentations
- Entertainment (TV, movies, music, theatre, etc.)
- Overall quality of life
- Other activity(ies): please describe in the text box below

* 8. Are you or members of your group particularly sensitive to noise?

Yes

No

If you select Yes, please specify the reasons that make you or members of your group particularly sensitive (age, illness, specific condition, etc.)

* 9. What disturbs you (your group) about aircraft? Select all that apply.

- Noise level
- Frequency of occurrence (e.g. planes every few minutes, many planes every day, etc.)
- Other (please specify in the text box below)

* 10. How often do aircraft disturb you (your group)? Select all that apply.

Every day of the week Almost every day of the week Every weekend A few days per week A few days per month It varies a lot
There is nothing typical

Frequency

Comments (optional):

Appendix B – Survey questions

* 11. In a typical 24-hour period, when are you (your group) disturbed by aircraft? Select all that apply.

- In early morning hours (from 5 am to 7 am)
- During the day (from 7 am to 7 pm)
- In the evening (from 7 pm to 10 pm)
- In the late evening (from 10 pm to midnight)
- At night (from midnight to 5 am)

* 12. In a typical 24-hour period, how many aircraft disturb you (your group)?

1 - 9 aircraft 10 - 24 aircraft 25 - 49 aircraft 50 - 99 aircraft 100 or more aircraft

Comments (optional):

* 13. Have you (your group) experienced "rush-hour" air traffic (e.g. many aircraft spaced 2 or 3 minutes apart)?

Yes, several times a day Yes, once or twice a day No

Comments (optional):

* 14. Please select the places where aircraft disturb you (your group). Select all that apply.

- Inside home
- Yard / garden
- Workplace / Business location
- School
- Place of worship
- Other indoor places I(we) visit (e.g. libraries, restaurant, shops)
- Other outdoor places I(we) visit (e.g. parks, walking, outdoor eating, farmer's markets)

If you select other places (indoor or outdoor), please provide a brief description in the text box below.

15. Please specify the name of your (your group's) workplace/business, school, or place of worship if you selected such places in the previous question. Otherwise, skip the question.

Appendix B – Survey questions

* 16. Please specify the zip code of each place where you (your group) are disturbed by aircraft.

	Home	Yard / garden	Workplace / Bus. location	School	Place of worship	Other indoor places	Other outdoor places
94301 Palo Alto	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
94303 East Palo Alto	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
94303 Palo Alto	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
94304 Palo Alto	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
94305 Stanford	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
94306 Palo Alto	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I don't know	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments (optional):

* 17. Please specify the neighborhood of each place where you (your group) are disturbed by aircraft.

If you do not know the neighborhood name, please indicate a landmark (such as a school or park) or major cross-streets nearby.

Home	<input type="text"/>
Yard / garden	<input type="text"/>
Workplace / Bus. location	<input type="text"/>
School	<input type="text"/>
Place of worship	<input type="text"/>
Other indoor places	<input type="text"/>
Other outdoor places	<input type="text"/>

Home stretch! Just a few more questions before we wrap it up.

Please answer the rest of this survey as an individual, even if you answered prior questions on behalf of one group.

* 18. In the last 12 months, have you complained about aircraft noise?

Yes	<input type="radio"/>	No	<input type="radio"/>
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Comments (optional):

Appendix B – Survey questions

* 19. Please explain why you have not complained. Select all that apply.

- I don't believe that my complaints will change anything
- It is too difficult to complain
- I am too busy, I don't have time
- I am afraid that my complaints will affect my property value
- I don't want to provide an email or password because I don't trust the website
- I want to tune out the noise
- I don't need to complain because other people are already doing that
- I don't know how to complain
- Other reasons: please describe any other reasons in the text box below.

* 20. Please select the main reason why you do not complain.

* 21. Would you like some help to install <https://stop.jetnoise.net> on your phone or computer to file noise complaints?

Yes

No

If you select yes, please provide a contact email address in the text box below.

* 22. How do you complain? Please provide an answer for each row.

	Many times a day	A few times a day	Once a day	A few times a week	A few times in last 12 months	Once in last 12 months	Used in the past but not anymore	Not used
I use stop.jetnoise.net	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
I use spacefrog.herokuapp.com	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
I call SFO	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
I email / web report to SFO	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
I contact City officials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
I contact my Congressional Representative	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				
I use other methods (please specify in text box below)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				

Please describe briefly any other methods you may use and how often you use them, or feel free to add other comments.

Appendix B – Survey questions

* 23. Have you filled out Anna Eshoo's noise abatement survey?

<https://eshoo.house.gov/constituent-services/airplane-noise-in-the-18th-congressional-district/>

Yes

No

OK, let's wrap it up.

* 24. Do you know of Sky Posse Palo Alto (<http://www.skypossepaloalto.org/>)?

Yes, I am already on the mailing list

Yes, and I would like to add my name to the mailing list

No. Please add my name to the mailing list

No, and I do not want to be added to the mailing list

Comments (optional):

* 25. Please provide your email address.

26. Do you have any other comments, questions, suggestions, or concerns?

Done!

Thank you very much for filling out this Sky Posse Palo Alto survey. We value your input.

Appendix F – Sample comments from survey respondents

I have not slept through the night in over a year due to the noise.

Noise "pollution" is so constant that makes us more irritable and stressed. Sometimes cannot even hear each other, much less birds or oncoming cars , etc.

The noise wake my children's up during night, therefore during the day time my children get tire and can not concentrate at school. Pleases stop fly over Palo Alto sky.

I no longer can sleep at night -- planes fly over as late as 1:17 a.m. and then begin again hours later ~ 4:36 a.m. This is insane!

My profession requires intense and uninterrupted intellectual concentration extending over long time periods. I also need extended periods of quiet and rest in-between projects. In both respects my work is suffering severely.

Loss of sleep, this in turn leads to lack of energy to focus on work and study during daytime. This is one vicious cycle!

Jet fuel (burned residual exhaust spray) skum on my car (within 1 day of washing). From 5 am to 1 am (20 hrs) more than 125 planes fly over (or nearly so) my house. This is proof of the chemical hazard.

When I use the phone in the back yard often the person on the other end will ask me if I am at the airport.

Perception by visitors/tourists/prospective employees and residents of the attractiveness of our city as a pleasant place to visit, work or reside.

This is related to health / stress -- I fear the constant harassment by aircraft overhead is turning me into a miserable, sleep-deprived person who makes poor decisions and endangers others while driving.

The unrelenting loud, low jets overhead interrupt my work at Stanford every 2-3 minutes throughout the work day. I live on Stanford campus and the noise

pollution is a constant stress during the night when sleeping as well as a constant irritation when working outside on weekends and evenings.

Noise during church gathering -- distracted and cannot concentrate.

the noise makes its very hard to work from home, to sleep, to relax have a conversation or entertain in the backyard, to watch tv with the windows open, to do anything with the windows open, to sleep, did i mention to sleep.

I'm concerned about safety on many levels: emissions, noise, buildings shaking, and even increased risks of a plane crashing in a residential neighborhood.

The incessant late-night, early morning flights are severely messing up our sleep patterns and hence our general health and well-being. They may even jeopardize my partner's continued employment because he's not sleeping through the night and his performance is suffering. It's messing up our relationship, too.

we can no longer use our patio for either evening dinners or for get-togethers with friends and neighbors. The incessant loud aircraft during late afternoons and evenings renders our patio not useable; we can't sustain conversations and everyone is distracted by the incredible noise level.

Negatively affects sleep, leisure, air quality, peace and quiet, ability to concentrate in the home environment be for working at home or doing homework

I haven't had a decent night's sleep in months. I thought I would never leave Palo Alto, but will consider moving if the disruptive noise pollution doesn't stop

The noise is simply too constant and too loud to enjoy our outdoor space. In short, we have become prisoners in our home due to the increased and incessant air traffic overhead.

Our childrens' naps are disturbed. Our pets' naps are disturbed. They are scared of the noise.

I now close all my windows and use air con at night. I'm still being woken at night and it takes me awhile to go back to sleep. I am frequently tired at work and on weekends.

As an older couple, we had hoped for a peaceful life in our last few years but this abomination has prevented that from happening.

We are sincerely thinking of relocating, due to the constant noise, the pollution & health hazard posed by these aircraft flying frequently low & loud over our house & neighborhood.

Every time a large plane comes in over my house, it makes me fearful.

Wake up by the airplane noise during sleep -- especially bad for children growth/health Kids complaining that noise is so loud that in school they have to stop teaching till the plane flies over. -- bad for children education. Cannot go outside to do yard work or play with kids -- really bad for living style, and kids don't go out to exercise anymore. Instead, they just play video game.

Visitors are surprised at the noise.

Even inside (with double-pane windows) the live is extremely impacted.

It sometimes feels like we live under a freeway offramp.

My BP has increased, stress level increased and am constantly woken up. I can't get anymore than 3 hrs sleep at a time

Affecting the health of our family horribly. Wake up to noise of aircraft engines, rattling of Windows. It is scary and disturbing to adults and children in household. Lack of sleep and stressed caused by the severe increase in flight frequency is affecting our health as well as performance at school and work.

I have lived in Palo Alto in the same house for 20 years. I paid very close attention to the surrounding noise level of my house before deciding to buy it. I would never have thought to take into account SFO or SJC flights in my assessment. Until now, who would?

I cannot work, let alone relax, in my own home any longer -- the disturbance from aircraft overhead is so stressful and so unrelenting, it has turned my once peaceful haven of a home into a place of misery.

makes me anxious, especially when falling asleep.

There is nothing that is NOT affected.

The noise is often louder than trains passing by 350 feet away.

Some of our family members and friends have PTSD from military service and this noise and proximity really bothers them. I go to bed early for work reasons and the early evening flights wake me up.

I've already spent nearly \$500 on noise reducing curtains for my daughter's room, and have 3 more rooms to go. She can't concentrate, and study in her own room, without being disturbed by the jet noise.

Memorial services

Graduations. Each speaker at the middle and high school graduations had to pause multiple times.

exercising out doors - the planes interrupt my workout and conversations.

Our church, fccpa.org, at Embarcadero and Louis Road, meets out-of-doors during the month of August. A smaller group meets weekly to meditate in the memorial garden, weather permitting. The noise of aircraft overhead is disruptive and unwanted.

I was swimming in the Stanford pool this week and heard one flight after another overhead. This totally disrupted the relaxation I seek to enjoy from this exercise.

Some of my work includes recording live music and voice...I never know when I will need to re-record because of aircraft background...this was NEVER the case before two years ago. Also, we live near the Stanford Dish open space, which is no longer a pleasant place to walk much of the time.

nursing my baby at night

It is very difficult to meditate when it sounds like jets are dive-bombing my house.

We had a friend visiting us from Reno who used to live in the Bay Area asked us after a hour at being at our house: "What is the deal with all these planes flying over our house". Please note I did not mention this to her it was unsolicited statement.

I am a parent and worry about the health and safety of my family. I am a business owner and would like to speak with my customers without feeling like I'm next to an int'l airport.

I have Attention Deficit Disorder and am easily distracted by unusual sensory input like loud noise.

It's embarrassing to have house guests... They can't believe these jets are permitted to fly directly over an established neighborhood.

We moved to Palo Alto from San Francisco because it was a quiet suburb and spent our life savings to buy a house here.

My parents have insomnia problem; they already have hard time falling asleep. When they get awoken by the airplane noise, they pretty much just stay awake for the whole night. This has been horrible for their health!

Psychological: anticipation of the next loud low airplane is anxiety producing.

It is like being punched again and again and again. I am convinced that this daily abuse is impacting my health.

The large aircraft often fly extremely low. This creates a huge noise in the house, shakes the house, rattles the windows. It is as if the large aircraft are about to land right nearby. This has had a terrible impact on our peace of mind and the enjoyment of our home and neighborhood.

Droning, whining sound as the aircraft descends sounds like something is falling from the sky. It is actually frightening to hear when you are half asleep.

I'm also concerned about emissions (especially since I have a young child) and the possibility of a crash

Why so many planes over such a small area? Why not route the planes over the bay? Why not have the jets fly in a higher altitudes over Palo Alto then descend more steeply near the airport? Orange county has done that for years.

There is no end. The only relieve is major fog at the airport which causes cancellations and delays.

24/7, 365 days / yr roughly 300 flights per day = 109,500 flights per year

Once in a while (maybe once or twice a month), there is a rare break when no jet is flying low and loud over my house for a few hours. When this happens, I suddenly realized how life was before this botched NextGen implementation. I had that life for 19 years.

I would expect this sort of thing to happen in Russia or China, not here. Many of our neighbors are at a breaking point as their peaceful and quiet retirement has been halted abruptly - what can we do to change this now?

Every day, all day...

The maximum aircraft disturbances have been 168 when my spouse was home all day. I am not home all day but regularly report more that 50 disturbances a day, 7 days per week.

Impossible to count. I would need to spend my entire day counting.

My measurements show anywhere from 300-400 overflight events per day.

It is continuous during much of the day - another 747 is now overhead - and I have to earn a living, not count airlines. You may as well ask residents in Tennessee to count gallons of sludge contaminating their rivers. Aircraft coming into SFO are a toxic river of acoustic waves: unregulated, unaccountable and managed by a city not subject to these sounds. That's democracy?

Why are there planes above Palo Alto at 3-4 am? What causes this air traffic?

This is the worst - there is no escaping the noise.

I have recorded overhead flights passing as often as 1 minute apart for as long as an hour

This happens every day – there are at least a couple of periods of time where multiple aircraft are stacked up... sometimes as short as 60 seconds apart. Other times 90 seconds or 120 seconds. It's a constant barrage of noise. One after the other.

We have also purchased a home in another part of California, as we have chosen not to live with this unacceptable intrusion in the future. We expect to move in the next year, after we fix up the home we have purchased.

We are extremely upset and thinking of moving out of Palo Alto. Our life quality has gone down and we can no longer enjoy the outdoors. There should be some type of law, that stops an organization like the FAA from doing this without involvement of the community.

Sleep, meals, conversations, work at home and time spent in the garden are no longer enjoyable. My husband has lived at this address for over 30 years. We are sincerely thinking of relocating, due to the constant noise, the pollution & health hazard posed by these aircraft flying frequently low & loud over our house & neighborhood. The FAA has recklessly turned our peaceful residential neighborhood into an airport approach with no regard for the resident's quality of life or health.

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I really really really would love to SENSE a change in the skies sooner rather than later. I now take vacations that are driven by one attribute --- the assurance of quiet.

THE CONTINUOUS AIRPLANE NOISE / PRESENCE CHANGE THE WAY PALO ALTO AND LIFE IN PALO ALTO IS PERCEIVED BY PEOPLE LIVING, WORKING OR VISITING THE TOWN

If you need some way to describe the emotion created by excessive noise, it is very similar to "road rage"

Please, bring this plane noise under control. Even my dog is awakened by the planes at night.

If I had bought a home near a major airport, I would expect this noise and the attendant problems. This has been a mostly quiet area until the change that has taken place. I understand it is called nextgen. I vote for lastgen or perhaps pastgen or the way it was prior to this gen.

I had planned on retiring in my house in Barron Park. If the flight path is not changed, I will have to move. I chose where I live considering noise issues - the FAA decided to put a super highway for jets directly over my head without notifying me. I don't understand why the flight path can't be spread out over a larger area like it was before. I also don't understand why there aren't curfews for flights so that late night flights don't wake people up. The new flight path has had a huge negative impact on my life - it needs to change!

I've traveled to cities in Canada where landing after a certain hour was forbidden by law. It would be cool if we could limit the hours during which SFO and other Bay Area airports operate. Also, it's obvious but maybe not, that airplanes should slow down over the PACIFIC or the BAY, not over people's homes.

I don't understand why planes can't be routed on a variety of paths, to keep the disturbance from being continuous in any one place.

I don't understand why the jets don't land and take off at a steeper descent or ascent like they do at John Wayne airport in Newport Beach. The jets do that to spare the people below.

Why aren't the planes flying over the bay where there aren't any homes and schools?

Modernizing the airspace does not mean that you have to sacrifice thousands of people along the way. Technology should be used to serve the people, not to hurt them.

I do not understand why air traffic control cannot spread the spacing of planes so their flight paths vary either a few miles north or south when they fly over the Palo Alto area.

Raise the elevations, regulate the speed to eliminate the whiny noise, spread the wealth in terms of where the airplanes comes across the peninsula and whatever methodology of which I am unaware.

My biggest concern is that SFO will change the night traffic and ignore the daytime traffic.

If they don't change the pattern then we should take legal action promptly.

You should add SJC to your list of airports where to report airplane noise. SJC planes fly above Midtown at about 2,000 feet, and A320s or B737s, and the occasional MDs are VERY loud at 2,000 feet.

It certainly feels as though our chimney is now a beacon on the route for planes arriving at SFO. We've lived here for 20+ years and never had so much disturbance. It's absolutely unfair to route all the planes in one narrow path without any notice about what it would do to our property values. We now have the equivalent of a superhighway directly overhead.

I am disappointed and concerned that the number of aircraft and noise levels are depreciating my property value and more importantly, taking away the quality of life I used to have when I purchased my home in 1993.

Is anyone monitoring the chemicals coming from this constant stream of airplanes that fall to the ground or pollute the air around our homes?

I hope something can be done before the warm weather begins. I would hate to have to close all my windows and consider putting in an environmentally unfriendly air conditioner just so that I can sleep at night.