



Federal Aviation  
Administration

# Airport Environmental & Noise

Presented to: REDAC Subcommittee on Airports

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# Airport Environmental & Noise

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## ***Research Co-Sponsored by:***

- **FAA Office of Airports, Planning and Programming**
  - Planning and Environmental Division (APP-400)
- **FAA Office of Environment and Energy**
  - Noise Division (AEE-100)

## **Airport Environmental Research Purpose:**

*Explore ways to improve the performance of airports in reducing their environmental impacts while responding to community needs for transportation services.*

## **Noise Research Purpose:**

*To gain a better understanding of how aviation noise is perceived by communities around airports. Research guides national aviation noise policy, assists in determinations of community noise impacts, land-use guidelines and sound insulation programs.*

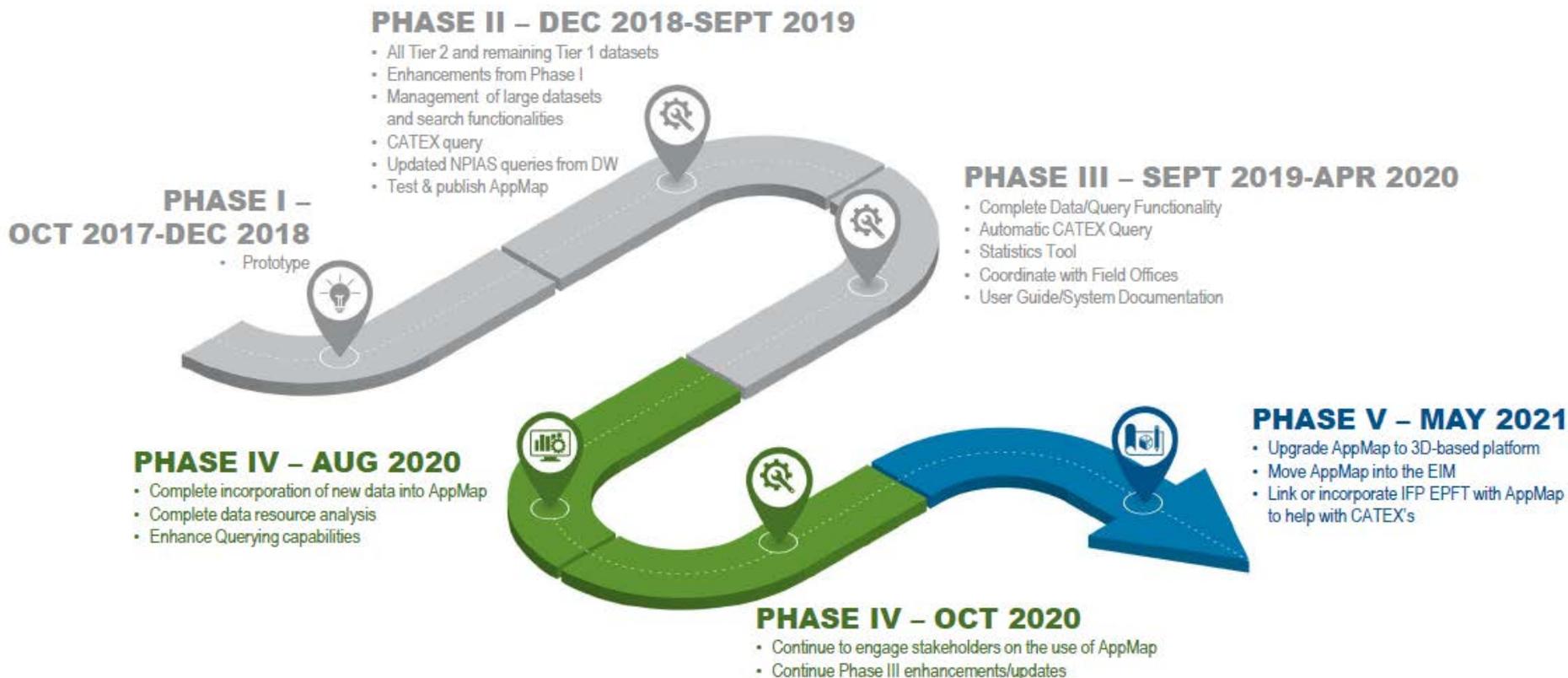
# Airport Environmental & Noise Current Projects

Environmental	Noise
Geospatial Environmental Map Tool (AppMap)	National Noise Annoyance Survey (NES)
Future Climate Scenarios for Runway Length	National Sleep Disturbance Survey
	Noise Level Reduction – Innovative Test Methods
	Noise Abatement Charting
FY21 Budget Allocation	
<b>\$320k</b>	<b>\$1.9M</b>

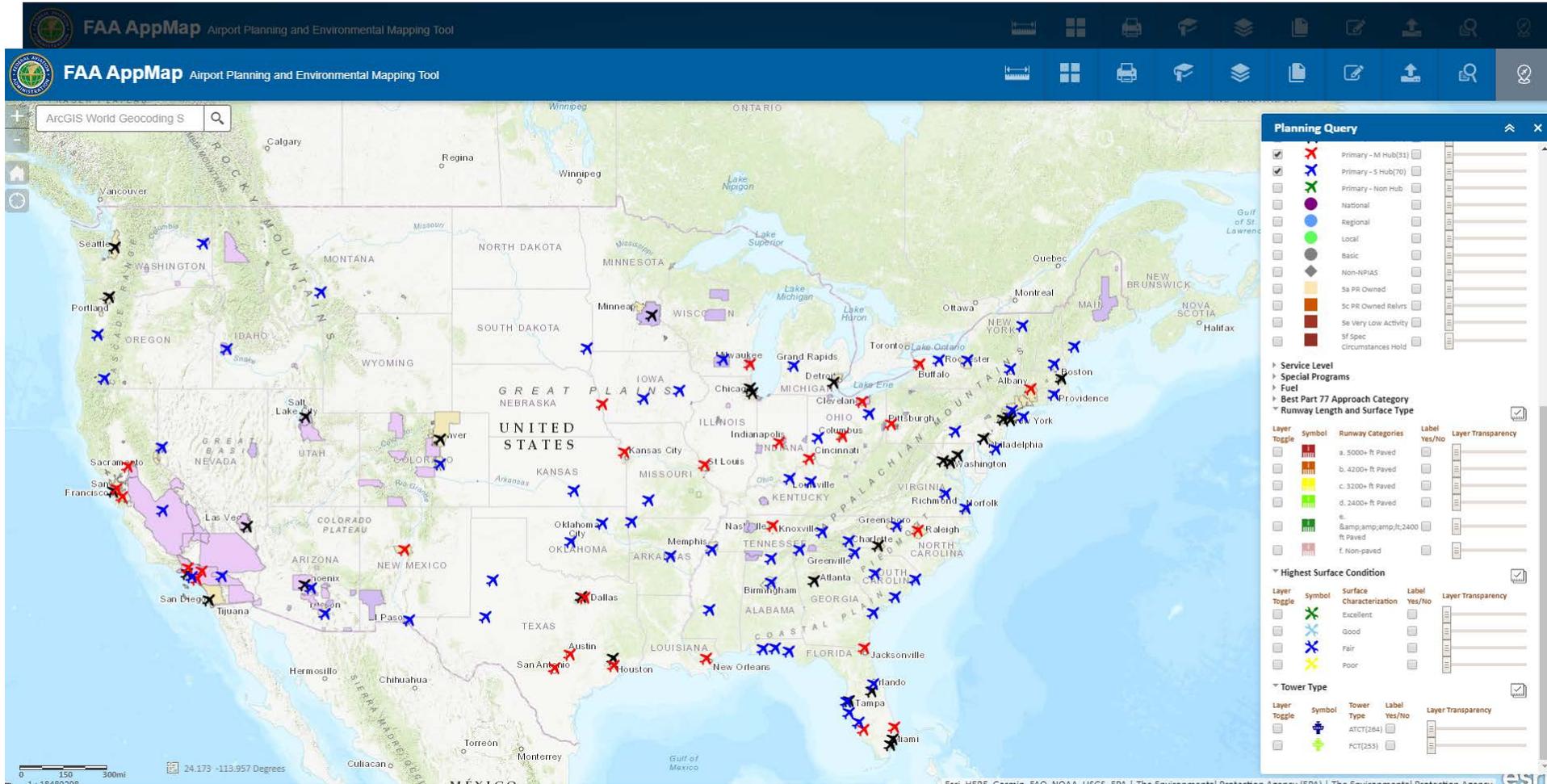


# FAA AppMap

Centralized geospatial mapping tool to improve internal workflow, streamline planning/environmental process and support NEPA reviews.



# FAA AppMap <http://appmap.faa.gov>





# FAA AppMap

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## Phase 4 – Upcoming tasks

- New Data
- Automatic Updates
- Enhance querying capabilities
- Stakeholder Engagement
- Enhance User Interface
- Gap Analysis to transition from NASR Data Warehouse to AppMap
- Publish AppMap

# Airport Environmental Research

# Future Climate Scenarios for Runway Length

- FAA evaluates runway length needs for civil airports using Advisory Circular (AC 150/5325-4B), which contains the runway length requirements for airplanes for a range of weights, **runway conditions**, **temperatures**, and airport elevation
- Future environmental changes in precipitation patterns (wet or dry) and average high temperatures might **effect key inputs** that were used to evaluate runway length
- A thorough understanding of future climate trends and **their effect on aircraft performance** are needed with an update to the AC's methodology



U.S. Department  
of Transportation  
Federal Aviation  
Administration

## Advisory Circular

**Subject:** RUNWAY LENGTH  
REQUIREMENTS FOR AIRPORT DESIGN

**Date:** 7/1/2005  
**Initiated by:** AAS-100

**AC No:** 150/5325-4B  
**Change:**

1. **PURPOSE.** This Advisory Circular (AC) provides guidelines for airport designers and planners to determine recommended runway lengths for new runways or extensions to existing runways.
2. **CANCELLATION.** This AC cancels AC 150/5325-4A.
3. **APPLICATION.** The standards and guidelines contained in this AC are recommended by the Federal Aviation Administration strictly for use in the design of civil airports. The guidelines, the airplane performance data curves and tables, and the referenced airplane manufacturer manuals *are not to be used* as a substitute for flight planning calculations as required by airplane operating rules. For airport projects receiving Federal funding, the use of this AC is mandatory.

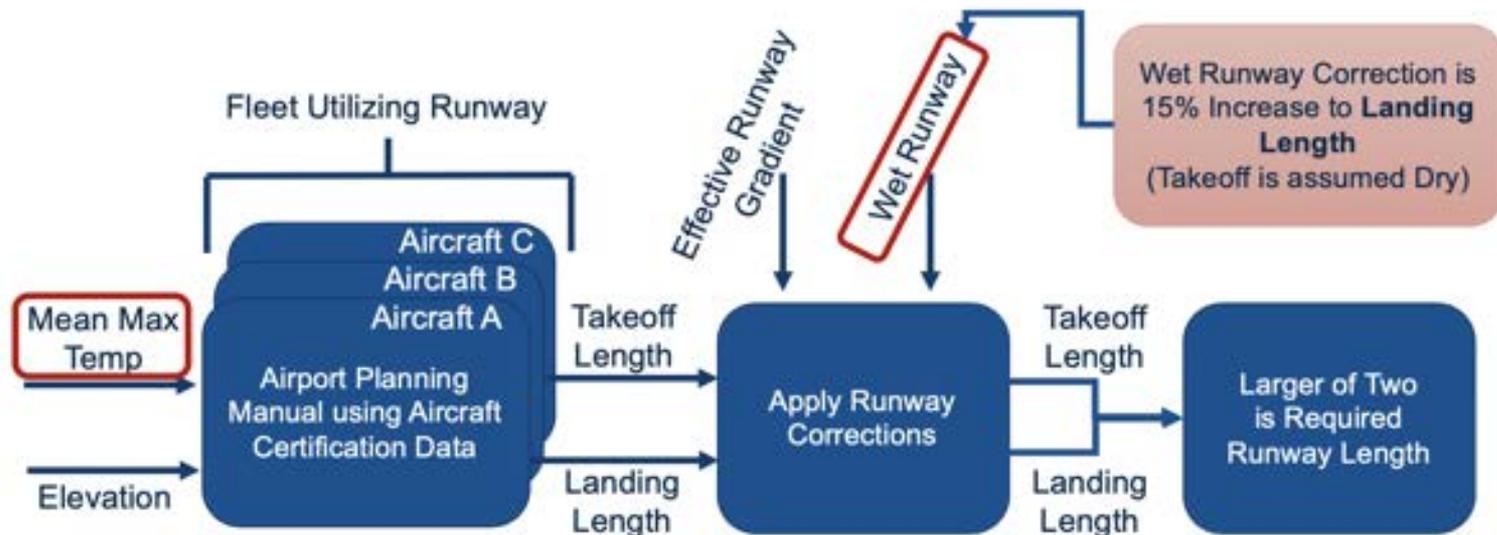
David L. Bennett  
Director, Office of Airport Safety and Standards



# Airport Environmental Research

## Future Climate Scenarios for Runway Length

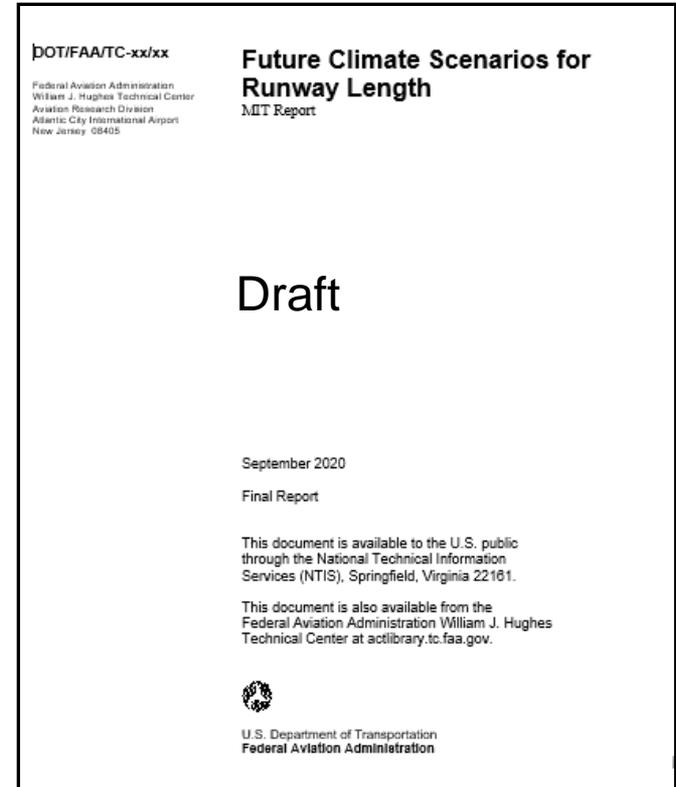
### Advisory Circular Runway Length Analysis Procedure



# Airport Environmental Research

## Future Climate Scenarios for Runway Length

- Reviewed National Climate Assessment's Climate Resilience Toolkit
- Historical data analyzed
- Adjustment to AC was tested with case studies for 30 busiest airports





# National Sleep Disturbance Study

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## *Effects of Aircraft Noise on Individuals and Communities Health and Human Impacts Research*

- 25,000 eligibility mailings
- 400 participants
- 5 nights, collection of noise and electrocardiography data

### Preparation for Data Collection

- Finalizing study protocol
- Staff training routine
- Data equipment acquisition
- OMB package re-submitted to BTS, ready for submission to DOT



# National Sleep Disturbance Study

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## Will a decrease in traffic (related to COVID-19) affect this study?

- 2018 noise data used for initial study design.
- Re-ran power calculations artificially reducing traffic by 20% - 80% to observe how our precision of exposure response function would be affected.
  - If traffic down 20%, minimally affected
  - If traffic down 40%, 50 more subjects
  - If traffic down 50%, 100 more subjects
  - If more than 50%, wait until traffic is back up
- At this time, it is not anticipated the initial study design will need to change

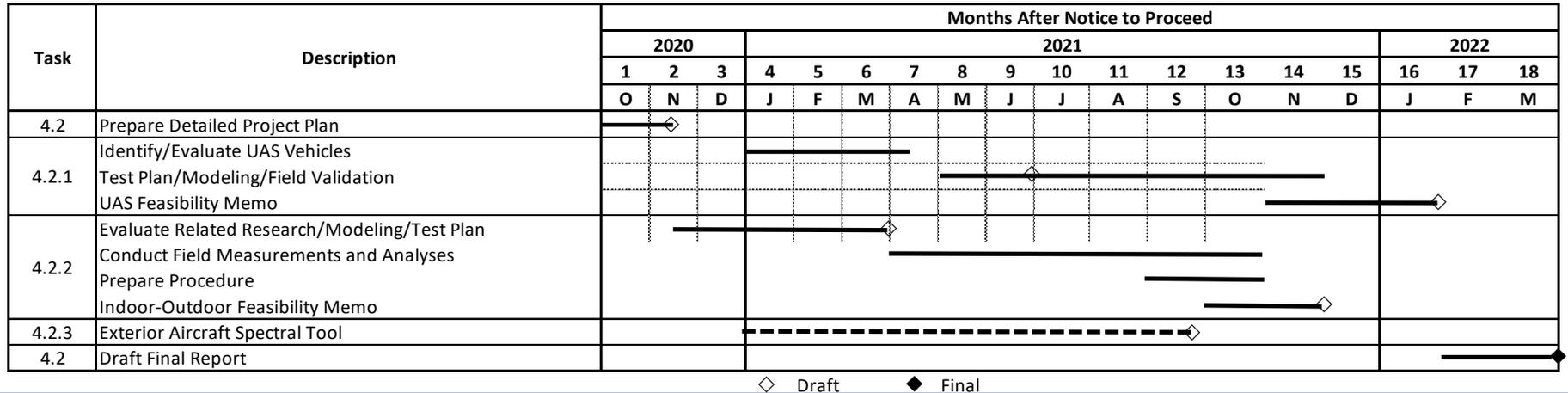
# Noise Level Reduction Measurement

## Objectives:

1. Investigate the feasibility of using a UAS-based loudspeaker for NLR measurement
2. Investigate the feasibility and application of an indoor-outdoor method for NLR measurement
3. Develop a software tool to calculate representative exterior aircraft spectra specific to an individual airport and adjacent community

## Research Team:

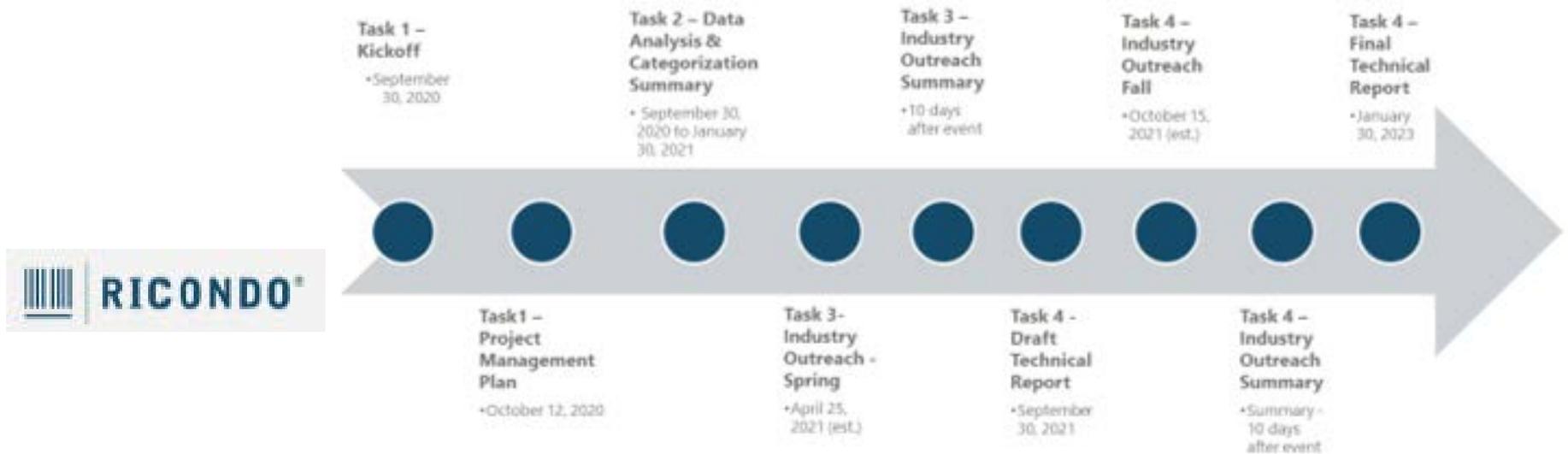
HMMH; Ben Sharp; Utah State University



# Noise Abatement Charting

## Objectives:

1. Develop best practice recommendations for charting airport noise abatement procedures in the Chart Supplement.
2. Develop standard nomenclature and taxonomy for describing noise abatement procedures for the pilot and operator community.



# Noise Abatement Charting

## Examples of Non-Standard Terminology:

- *NS ABTMT procedures are in effect at all times; Continuous noise ordinance in effect; Noise abatement procedures in effect, ctc arpt manager 218–287–1400*
- *Noise abatement procedures in effect, recommend acft remain east/west of City of Merced at alt above 1,500´ MSL. Departing tfc Rwy 12 no left turns over city until reaching 3,000´ MSL. Avoid right turns which will position acft over city (Clear)*
- *All acft use recommended departures Rwy 05 left turn 360° stay W of interstate to 1500´, Rwy 23 rgt turn hdg 255° as soon as practicable after passing rwy end to 1500´ avoid residential areas, overfly mall area. Rwy 05 left turn out within 1/2 mile and proceed on course W of I–95. Arr Rwy 23 remain W of I–95 until as close in as practicable to avoid over flt of residential area. Rwy 23 departures turn to 255° as soon as practicable after passing rwy end (Case for using a graphic)*

# Noise Abatement Charting

## Approach & Methodology

- Analyzed database containing 488 airport noise abatement procedures
- Developed evaluation criteria to evaluate each noise abatement procedure
- Analyzed all noise abatement remarks according to the evaluation criteria:
  1. The **number of locations** within a resource that pilots need to reference.
    - Airport Remarks, Military Remarks, Special Notices (back matter)
  2. Consistency of **language** including nomenclature and taxonomy.
    - NS ABTMT usage 43% ; voluntary? 81% unclear ; time conditions 76% unclear
  3. **Clarity** issues that make it difficult for a pilot to follow the instructions or misinterpret what are the noise sensitive locations.
    - 36% of remarks had sufficient descriptions of noise sensitive area.
  4. Whether the information published in the Chart Supplement is **complete** or if a pilot needs to reference other sources of information to fully understand an airport's noise abatement program. 47% incomplete

# National Noise Annoyance Survey

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## Neighborhood Environmental Survey (NES)

### Results

# Purpose and Motivation for Conducting the Survey

### **The FAA recognizes that aircraft noise continues to be a challenge**

- As part of our longstanding noise research program to better understand the impacts of aircraft noise on human health and welfare, we decided that a new national survey should be conducted to gather data to improve our collective understanding of how communities are currently responding to aircraft noise
- The Survey is the first noise annoyance survey conducted by a US federal agency since the Federal Interagency Committee on Noise (FICON) performed an in-depth US Government agency review of human annoyance to noise in 1992
- FAA's goal for the Survey was to obtain updated information about the way people perceive aircraft noise

## ***Neighborhood Environmental Survey***

- The agency conducted a nationwide survey of over 10,000 people living near 20 representative airports regarding annoyance related to aircraft noise
- FAA conducted follow-up phone interviews with 2,000 of the respondents to obtain qualitative information regarding individual responses
- The responses to the survey were used to develop a nationally-representative “dose-response curve,” which is a tool that establishes the relationship between annoyance and noise exposure
- ***Results***
  - The survey results show a substantial increase in public annoyance to aircraft noise compared to the data that FAA and other agencies currently rely on to inform noise policy, which was acquired in the 1970s
  - While the results of the survey bring forward new data, they are consistent with the observed trend of increasing noise concerns, and consistent with the results of more recent surveys conducted outside the United States

# Neighborhood Environmental Survey Methodology

## Survey Instruments:

- A **mail survey** was issued to participants around 20 airports experiencing a range of DNL noise exposure from aircraft

Rate each on a scale of 1-5, with 5 meaning **"most annoying."**

Thinking about the last 12 months or so, when you are here at home, how much does each of the following **bother, disturb, or annoy** you?

a. Noise from cars trucks or other road traffic	b. Smells or dirt from road traffic	c. Smoke, gas or bad smells from anything else	d. Litter or poorly kept up housing
e. Noise from aircraft	f. Your neighbors' noise or other activities	g. Any other noises you hear when you are here at home. If this bothers or annoys you, what is the noise?	
h. Undesirable business, institutional or industrial property		i. A lack of parks or green spaces	j. Inadequate public transportation
k. The amount of neighborhood crime	l. Poor city or county services	m. Any other problems that you notice when you are here at home. If this bothers or annoys you, what is the problem?	

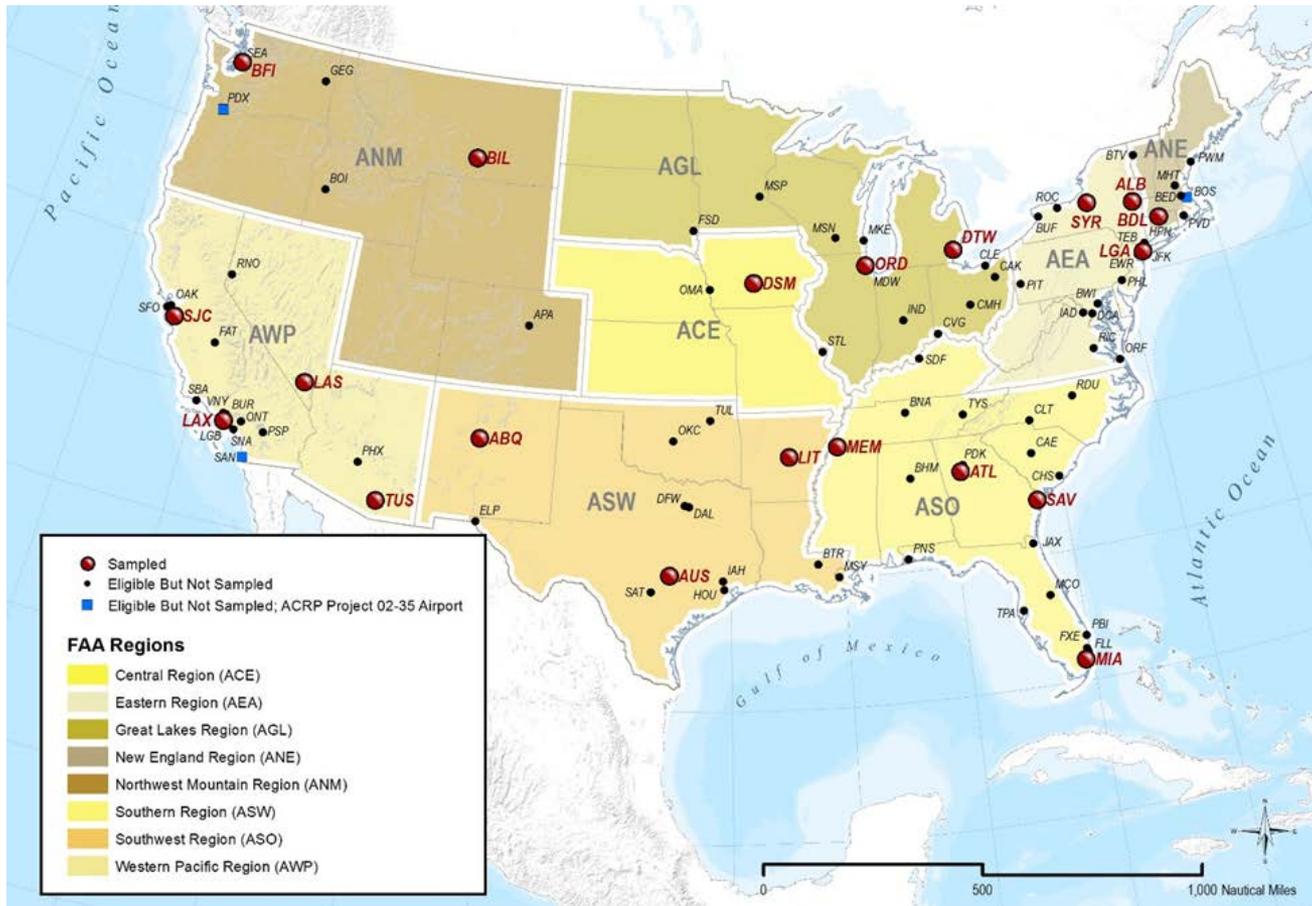
TOTAL NUMBER OF SURVEY RESPONSES	
DNL dB Categories	Survey Respondents
50-55	3,592
55-60	3,481
60-65	2,016
65-70	914
70+	325
<b>Total</b>	<b>10,328</b>

- Questionnaire used a five point scale of annoyance and top two levels (4 or 5 on the scale from 1 to 5) were combined to come up with number of people who are “highly annoyed”
- Since aircraft noise was one of 13 environmental concerns listed, the recipient did not know this was in fact an airport community noise survey
- A follow up **phone survey** was also issued to mail survey participants to gain further understanding why they were annoyed

# Neighborhood Environmental Survey

## Selected Airports

At the outset, the survey team assembled by the FAA decided to survey communities around a set of airports that represents the nation's airports as a whole



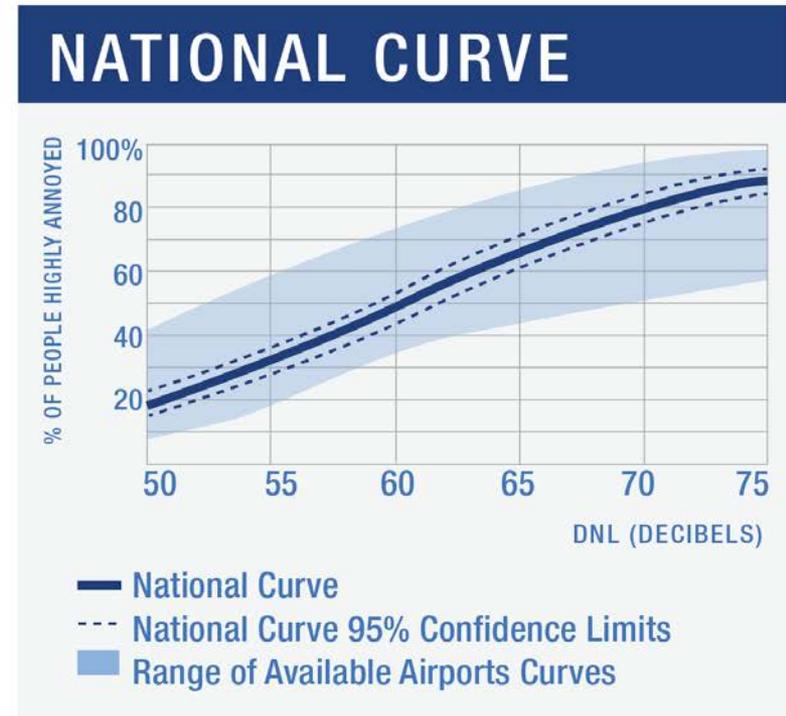
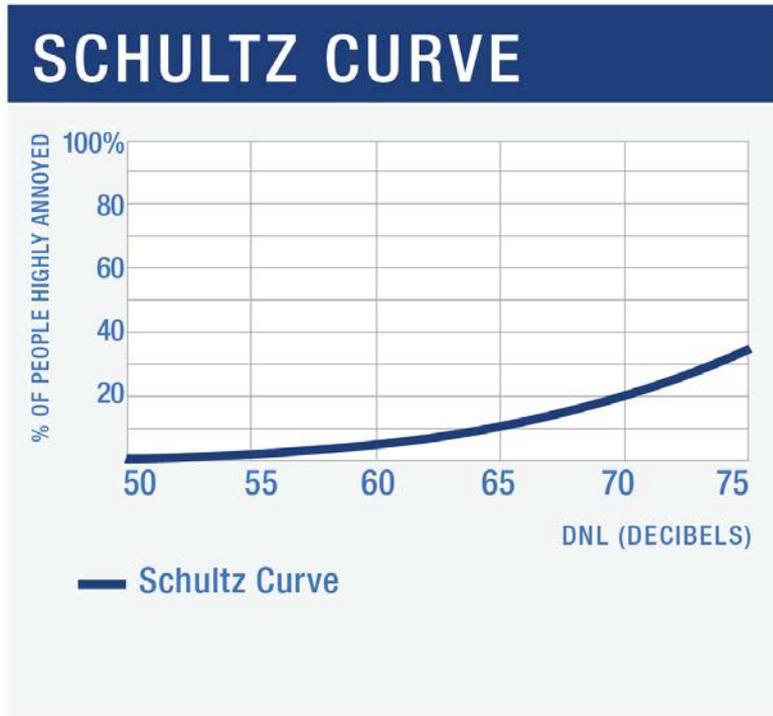
Airport Code	Airport Name
ABQ	Albuquerque International Sunport
ALB	Albany International
ATL	Hartsfield-Jackson Atlanta International
AUS	Austin-Bergstrom International
BDL	Bradley International
BFI	Boeing Field / King County International
BIL	Billings Logan International
DSM	Des Moines International
DTW	Detroit Metropolitan Wayne County
LAS	McCarran International
LAX	Los Angeles International
LGA	LaGuardia
LIT	Bill and Hillary Clinton National Airport / Adams Field
MEM	Memphis International
MIA	Miami International
ORD	Chicago O'Hare International
SAV	Savannah / Hilton Head International
SJC	Norman Y. Mineta San Jose International
SYR	Syracuse Hancock International
TUS	Tucson International

# Neighborhood Environmental Survey

## Aircraft Noise Annoyance Results

The NES results support an observed increase in Annoyance from Aircraft Noise:

- The results show a substantial increase in annoyance for the population living in the vicinity of airports
- The increase in annoyance is generally consistent across various levels of noise exposure



The new Survey was designed to use a consistent approach across each airport community surveyed. This has allowed for an enhanced ability to provide additional statistical information about the new results, such as the 95% Confidence Limits and range of results from each of the 20 airports, as shown on the plot above. This was not possible with the older Schultz Curve.

# Neighborhood Environmental Survey

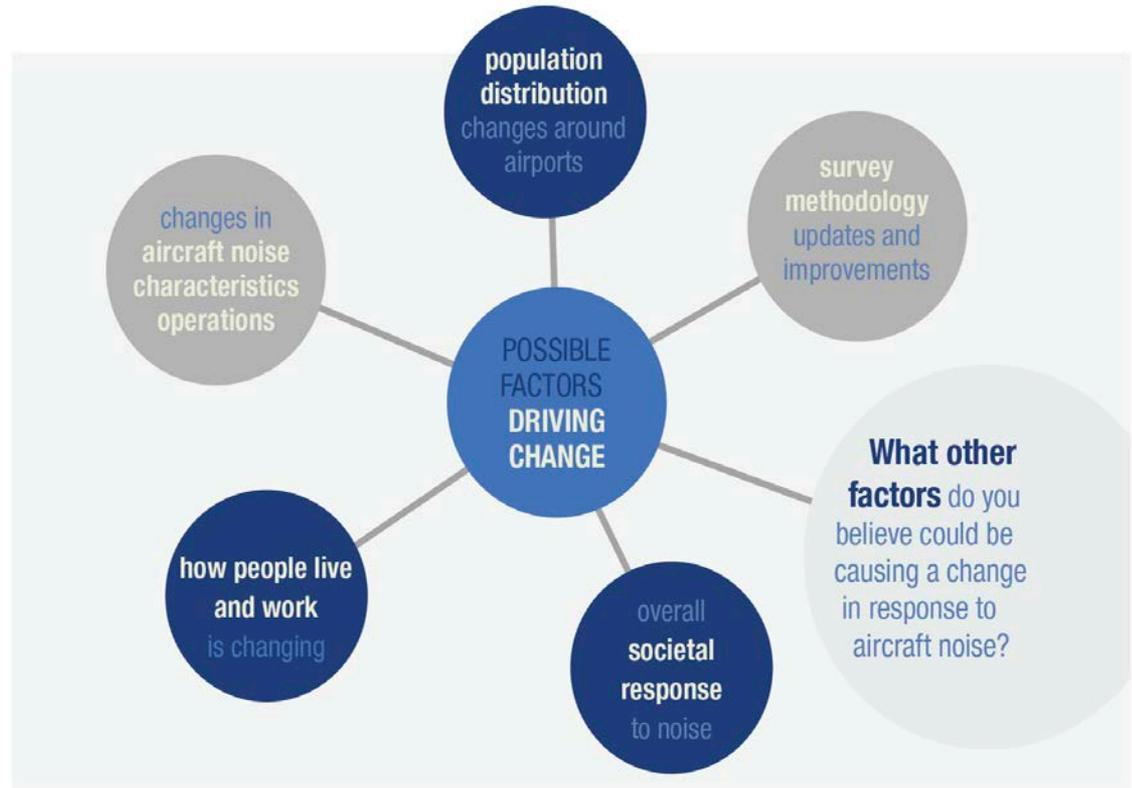
## What do the Results Mean?

**The results of the Neighborhood Environmental Survey show a substantial increase in the level of annoyance to aircraft noise relative to past surveys**

Multiple factors may be driving these changes and public input is requested to inform next steps

Public and stakeholder feedback on these and other factors will be critical to informing FAA's understanding of the Survey results

Taken together with the rest of the FAA's noise research program, FAA is seeking to establish a national dialogue on aircraft noise issues



# Recent Progress & Moving Ahead

## **FAA has made efforts to meaningfully engage communities on noise concerns and will continue to enhance these efforts**

- Hired community engagement officers across each FAA region to expand the reach of Regional Administrators into communities
- Working with airports and their noise officers to address legacy community noise concerns
- Working with roundtables across the country to continually provide information and expertise as they have asked for airspace changes
- Working within our air traffic organization to review procedures for reducing noise across the country
- Added research projects to our portfolio to study airspace management concepts to determine if there are options that are safe and may provide a net environmental benefit
- Implemented our noise portal nationwide through our Regional Aircraft Noise and Community Involvement webpages

## How will the FAA use the Findings from the Survey?

- The Neighborhood Environmental Survey provides data that quantitatively shows that substantially more people are highly annoyed by aircraft noise exposure than in the past
- The FAA will look at the NES findings alongside outputs from other noise research programs and inputs from public and stakeholder comment to inform future actions
- The ongoing research to understand the potential impacts to sleep and cardiovascular health should be particularly insightful

## The results of the survey are an important element of a broader portfolio of research and community engagement to investigate and mitigate the impacts of aircraft noise

- The FAA intends to continue reviewing these research findings in combination with public and stakeholder feedback to inform research and policy priorities

## **Publishing the Federal Register Notice (Notice) is a key first step towards engaging in a conversation with aviation stakeholders about FAA noise policy**

- FAA is encouraging the public and other stakeholders to review the Notice and Survey report, and provide constructive comments
- Please note that the Notice and the Survey report provide data that will be used in the upcoming discussion about policy, but is not policy in itself

## **Timeline**

- 60 day comment period on the Federal Register Notice
- Review public comments and identify general themes
- FAA will concurrently identify next steps beyond the Notice and engage with stakeholders as we move forward
- Keep the public and stakeholders up to date as we make progress

# Noise Research Federal Register Notice

## Public Comment Invited

- The Notice invites public comment on FAA’s noise research program, including the Survey
- Input on three questions is requested through a 60-day comment period
- To help provide additional information on aircraft noise, FAA’s existing noise policy, and a detailed overview of the methodology and results of the Neighborhood Environmental Survey, a website has also been made available at [www.faa.gov/go/aviationnoise](http://www.faa.gov/go/aviationnoise)



Factors that may be contributing to the **increase in annoyance** shown in the Survey results



### **Additional investigation** or analysis on:

- Effects of Aircraft Noise on individuals and Communities
- Noise Modeling, Noise Metrics, and Environmental Data Visualization
- Reduction, Abatement, and Mitigation of Aviation Noise



Additional categories of **investigation, analysis, or research** that should be undertaken to inform FAA noise policy



# Questions?

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