



LAX/Community Noise Roundtable

Briefing on ACRP Research Report 02-48:
Assessing Community Annoyance
of Helicopter Noise

March 13, 2019

Presentation Overview



- What is the Airport Cooperative Research Program (ACRP)?
- Overview of ACRP Project 02-48
- Key Noise Monitoring and Survey Site Selection Criteria
- Is Helicopter Noise Similar to Fixed-Wing Noise?
- Sample of Key Research Questions Investigated
- Site Imagery
- Resident Survey Methods
- Key Findings

What is the Airport Cooperative Research Program (ACRP)?



- The ACRP was established by the Federal Aviation Administration (FAA) in 2005 as a body that undertakes independent research to benefit the airport industry in numerous subject matter areas including, but not limited to:
 - Planning
 - Operations
 - Environmental issues
- ACRP receives its annual funding from the FAA
- The ACRP governing board, known as the ACRP Oversight Committee (AOC), selects research projects and defines funding levels on an annual basis

Overview of ACRP Project 02-48

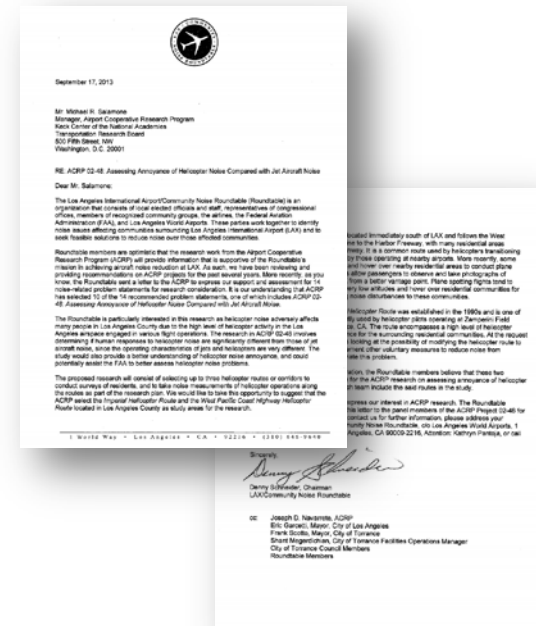


- ACRP Project 02-48, Assessing Community Annoyance of Helicopter Noise, was established to examine whether helicopter noise is more annoying to communities than fixed-wing noise
- The study explored helicopter noise annoyance using:
 - A comprehensive review of scientific literature;
 - Site-specific noise measurements;
 - Noise modeling; and,
 - Telephone surveys of community members.

Overview of ACRP Project 02-48 (cont.)



- In September 2013, the LAX/Community Noise Roundtable submitted a letter to ACRP recommending that two helicopter routes be included in the 02-48 research:
 - Imperial Highway Helicopter Route (El Segundo)
 - West Pacific Coast Highway Helicopter Route (Torrance)
- The researchers chose the following sites for the noise measurements, noise modeling, and telephone surveys:
 - Long Beach, CA
 - Las Vegas, NV
 - Washington, D.C.



Key Noise Monitoring and Survey Site Selection Criteria



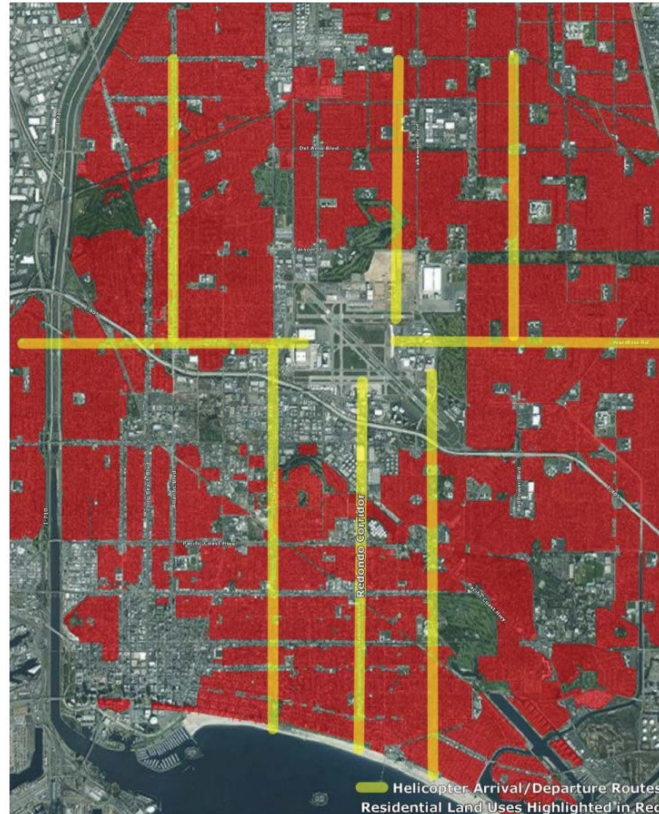
- Sufficient frequency of civil helicopter flights over residential areas
- Availability of flight track and performance data for helicopters operating at the sites
- Feasibility and cost of resident surveys at the sites
- Sufficiently low background noise levels, so that helicopter noise could be measured
- A wide range of noise exposure levels, helicopter types, and helicopter operating regimes

Key Noise Monitoring and Survey Site Selection Criteria (cont.)



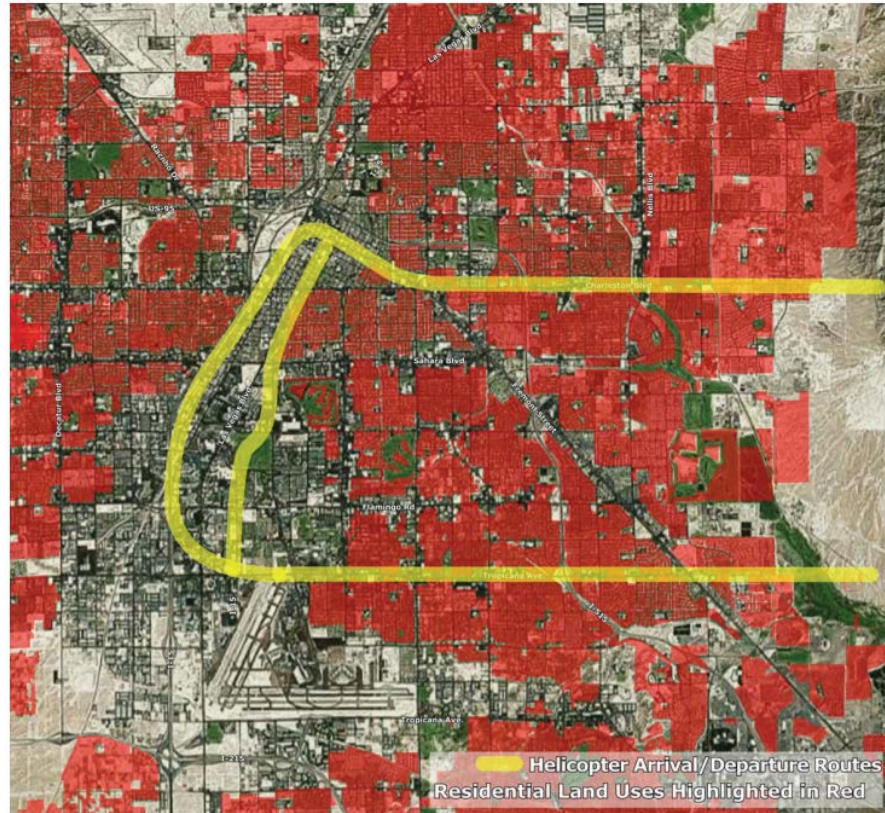
- Sufficient mix of helicopter and fixed-wing operations, to compare helicopter and fixed-wing annoyance
- A full list of criteria is contained in ACRP Research Report 181, Chapter 3
- A combination of noise measurement and noise modeling was used, where possible, to estimate noise exposure due to helicopter operations
- Noise monitoring was not performed at the Washington, D.C. site due to the heavy volume of fixed-wing traffic in comparison to helicopter traffic; only noise modeling was used to estimate helicopter noise levels

Site Imagery: Long Beach, CA



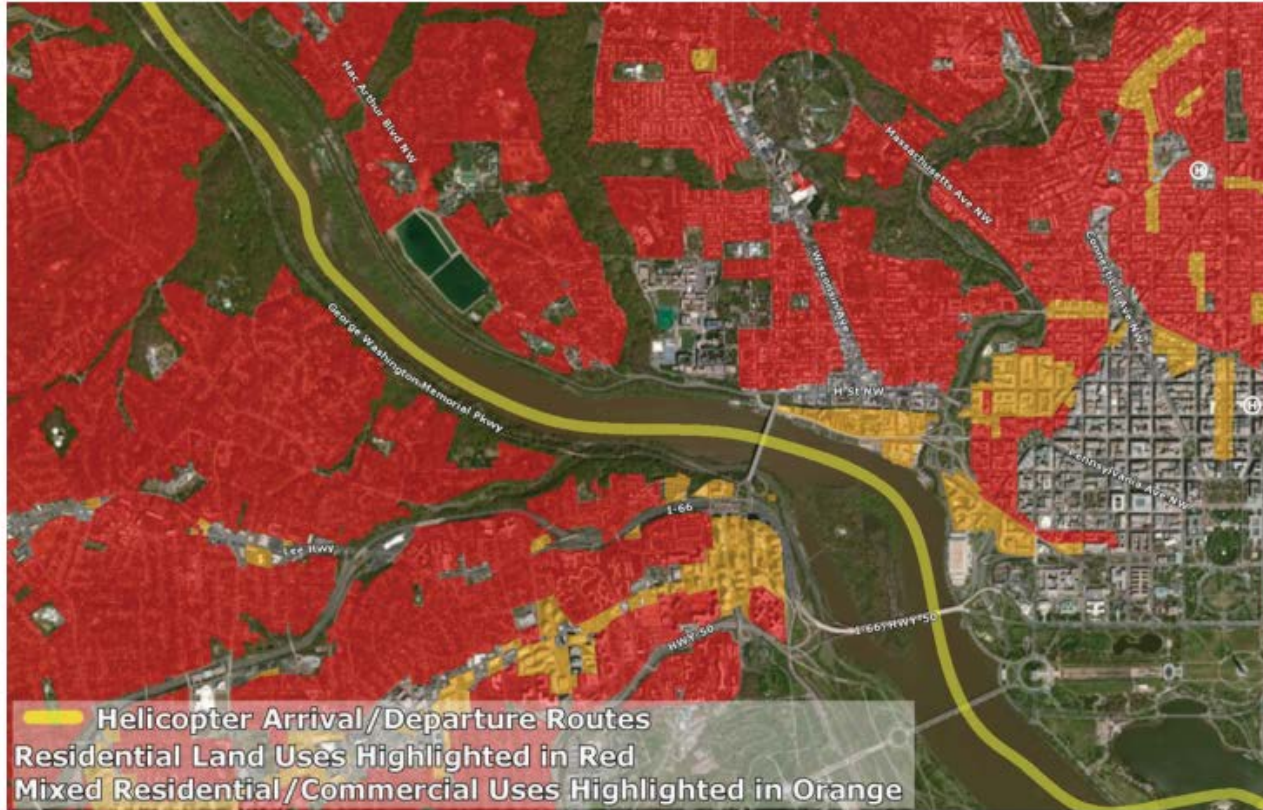
SOURCE: ACRP Research Report 181, Figure 3-3.

Site Imagery: Las Vegas, NV



SOURCE: ACRP Research Report 181, Figure 3-5.

Site Imagery: Washington, D.C.



SOURCE: ACRP Research Report 181, Figure 3-7.

Is Helicopter Noise Similar to Fixed-Wing Noise?



- Helicopter noise levels are more unpredictable and variable than fixed-wing noise due to:
 - The unique flight paths used by some helicopter operations, such as lower altitudes, hovering, and multiple orbits around the same location;
 - The physical sources of helicopter noise, such as main rotor and tail rotor movements; and,
 - A strong correlation between helicopter noise levels and helicopter maneuvers such as accelerations, turns, and descents

Is Helicopter Noise Similar to Fixed-Wing Noise? (cont.)



- Residents may view certain kinds of helicopter operations as unnecessary, which contributes to annoyance. Notional reactions may include, but are not limited to:
 - Why are multiple helicopters circling the same spot? Isn't one helicopter enough?
 - Am I or my neighbors being watched by helicopters?
 - Why do some people take short-haul trips and tours by helicopter instead of by ground transportation like the rest of us?
- ACRP Project 02-48 explored both acoustic (noise generation) and non-acoustic contributors to helicopter noise annoyance

Resident Survey Methods



- The survey questionnaire structure was based on a literature review of other noise annoyance surveys
- For each site, surveys were administered by telephone to samples of landline and wireless telephone subscriber households located in areas with “reasonably homogenous aircraft noise exposure”*
- The sample sizes were as follows:

	Long Beach		Las Vegas		Washington, D.C.	
	Landline	Wireless	Landline	Wireless	Landline	Wireless
Number of Households Contacted	2,260	1,437	1,975	2,107	492	408
Number of Interviews Completed	794	295	607	134	340	102
Interview Completion Rate	35.1%	20.5%	30.7%	6.4%	69.1%	20.7%

* ACRP Research Report 181, Section 3.3.

Resident Survey Methods (cont.)



- Key topics covered by the survey included, but were not limited to:
 - Duration of residence;
 - Characterization of neighborhood as quiet or noisy;
 - Frequency of notice of helicopter noise;
 - Frequency of notice of other aircraft noise;
 - Annoyance by different types of sounds produced by helicopters (such as thumping, buzzing, and whining);
 - Frequency of notice of vibration or rattling noises; and,
 - Frequency of complaint.
- A full list of survey questions is contained in ACRP Research Report 181, Section 3.3.

Key Findings



- Is helicopter noise more annoying than fixed-wing noise at the same decibel level?
 - No compelling evidence was found that would indicate a “yes” to this question. Note that this is not the same as a “no” answer.
 - Frequency of helicopter overflight and types of helicopters at the selected sites may have influenced this finding.
- Are A-weighted noise measurements adequate for predicting helicopter noise annoyance?
 - Neither A-weighted nor C-weighted measurements were observed to be better at predicting annoyance due to helicopter noise levels.
 - Site selection, such as lack of sites near military helicopter facilities, may have influenced this finding.

Key Findings (cont.)



- Is helicopter noise annoyance strongly influenced by non-acoustic factors?
 - Acoustic factors could not account for observed differences in helicopter noise annoyance across the three sites.
 - It is therefore likely that non-acoustic factors were more relevant than helicopter noise levels in determining helicopter noise annoyance.
- Is proximity to helicopter flight tracks a better predictor of annoyance than helicopter noise levels?
 - Relationships were observed between helicopter noise annoyance and distance to helicopter flight tracks.
 - It could not be determined whether direct overflights were considered more annoying than helicopter flights passing to the sides of surveyed residents.

Key Findings (cont.)



- Does the rattling of houses and objects inside houses strongly influence helicopter noise annoyance?
 - There was no statistically significant relationship observed between annoyance due to rattle and annoyance due to helicopter noise level alone.
- All findings are specific to this study and to the methods employed
 - A different study methodology and/or site selection may lead to different findings.
 - In particular, the Research Report suggests that surveys of sites with greater operating frequencies of larger helicopters, such as military operations, may provide different findings.
- Full research findings were published in 2017 in ACRP Research Report 181 and are available at <http://nap.edu/24948>



Roundtable Member Questions?