



2011 NATA

# Overview of the 2011 National Air Toxics Assessment (NATA)

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# Presentation Overview

- Background on NATA
- The 2011 NATA: Methods & Results
- Map App
- 2014 NATA Status
- Conclusions

# NATA Background

- NATA is a screening-level characterization of air toxics across the nation
  - Nationwide assessment with *census tract* resolution
  - Cancer and noncancer risk estimates for about 140 Clean Air Act hazardous air pollutants (HAP) with health data based on chronic exposures
  - Ambient concentration estimates for 180 HAP plus diesel particulate matter (DPM)
- NATA Uses
  - To help state, local agencies and tribes identify locations/sources of interest for further study
  - To prioritize pollutants and emission sources
  - To inform monitoring programs
- 2011 NATA is the 5<sup>th</sup> national-scale assessment (1996, 1999, 2002, 2005) and was released to the public Dec 17, 2015
  - Concentrations, exposures, and risks based on air quality modeling of emissions from the 2011 National Emissions Inventory (NEI)

# NATA Background (continued)

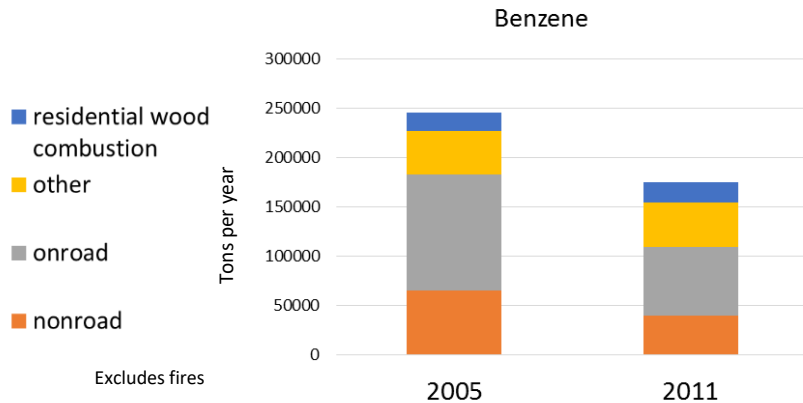
## It's important to note that:

- Emissions, modeled ambient concentrations, and estimated inhalation exposures are only from sources of outdoor origin via the inhalation route of exposure
- Results are more uncertain at finer geographic scales
  - Surrogates used to allocate mobile and nonpoint source emissions
- Results should not be used to compare risks among different areas of the country
  - Underlying emissions data vary in level of detail from state to state
- 2011 NATA results should not be compared to previous NATAs
  - Changes in results are due to both actual emission changes and the use of different modeling and emissions processing techniques

# Air Toxic Trends

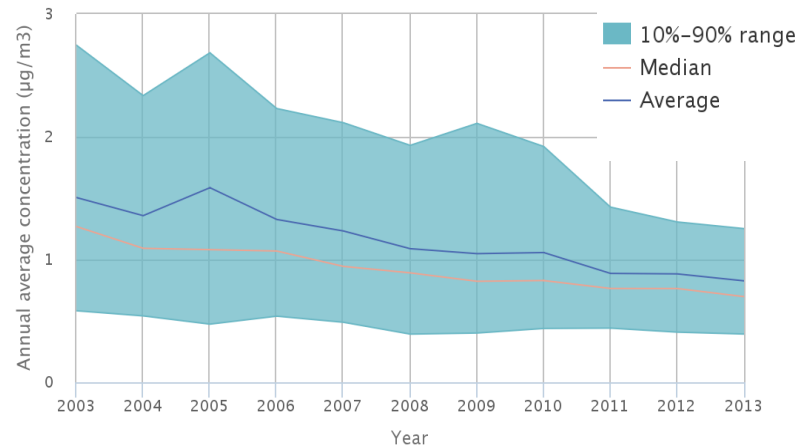
- Emissions and monitoring data indicate a marked reduction in air toxics over past decade.
- Emissions reductions due in large part to programs such as the federal mobile source programs.

## 2005 and 2011: National Trends in Emissions and Monitored Concentrations -- Benzene



Benzene Trend 2003-2013, EPA's Report on the Environment (ROE)

Exhibit 3. Ambient benzene concentrations in the U.S., 2003-2013



For Additional – monitoring trends– see Air Trends Report

<https://www.epa.gov/air-trends>

# 2011 NATA Methods

## NATA Analytical Steps

Compile National Emissions Inventory (2011 NEI)

2011 NEI includes stationary, mobile and natural sources (fires, biogenics).

NATA includes 180 HAPs and diesel particulate from mobile sources.

Estimate ambient concentrations of air toxics across U.S.

Uses CMAQ and AERMOD to predict census tract ambient concentrations nationwide.

Estimate population exposures

Includes an exposure model (HAPEM7) to account for human activity data, commuting patterns, and near roadway exposures.

Characterize potential public health risks from inhalation

Census tract level cancer and noncancer risks nationwide.



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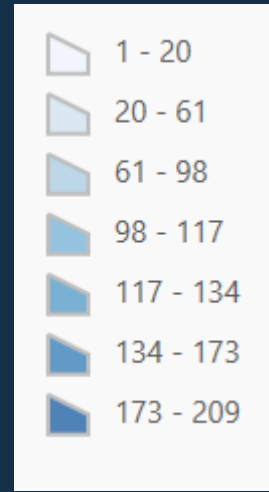
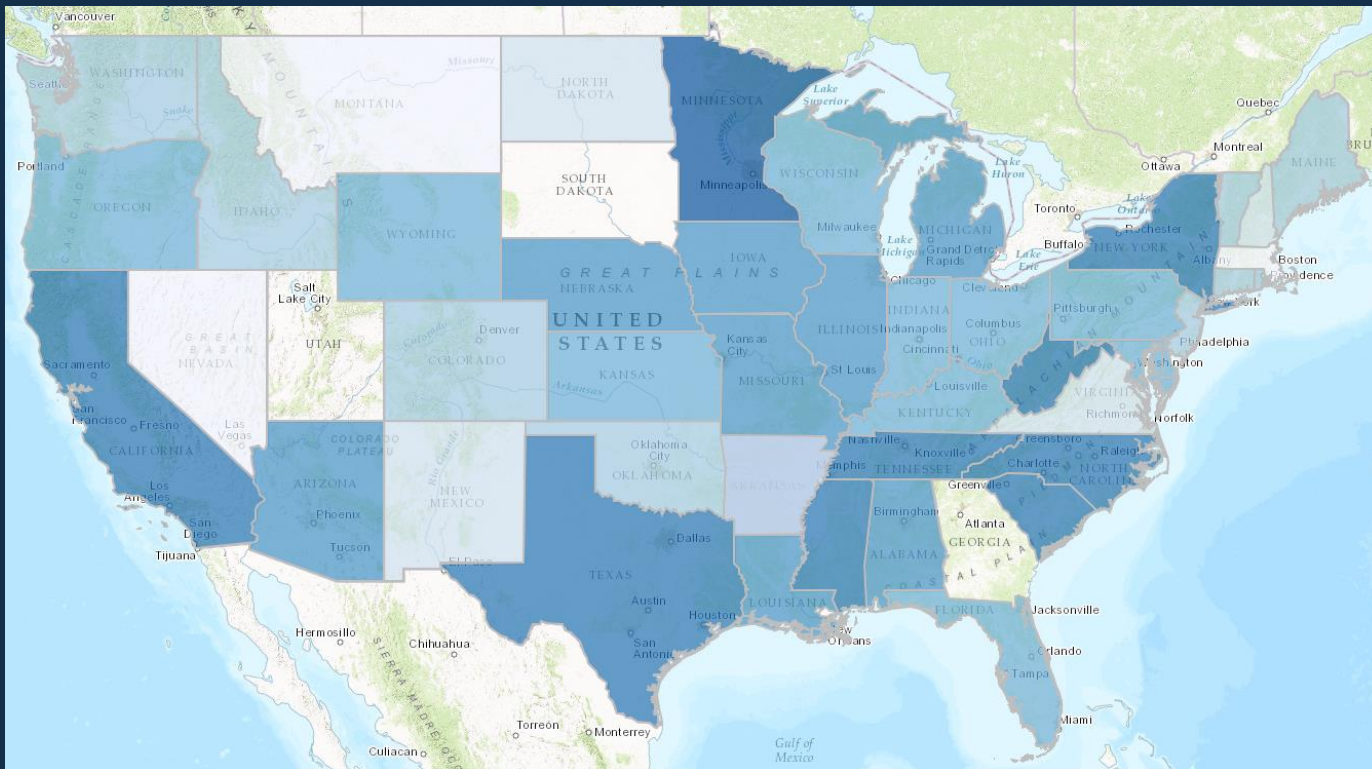


# Emission Inventory For NATA is the NEI

- NEI Hazardous Air Pollutants are voluntarily submitted by State/local tribal agencies and supplemented by EPA
- 2011 NATA went through a series of reviews with data submitters –resulted in a better inventory
  - In the review process for the 2014 NATA
- Updates to models (MOVES), emission tools, and better spatial allocation



# 2011 NEI Point Source Voluntary HAP Counts by State



AK, HI and Puerto Rico are in the 1-20 bin

3 tribes reported HAPs (1-20 and 20-61) bins



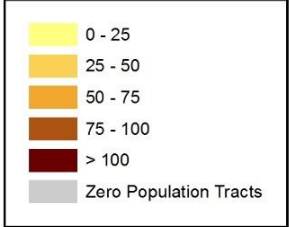
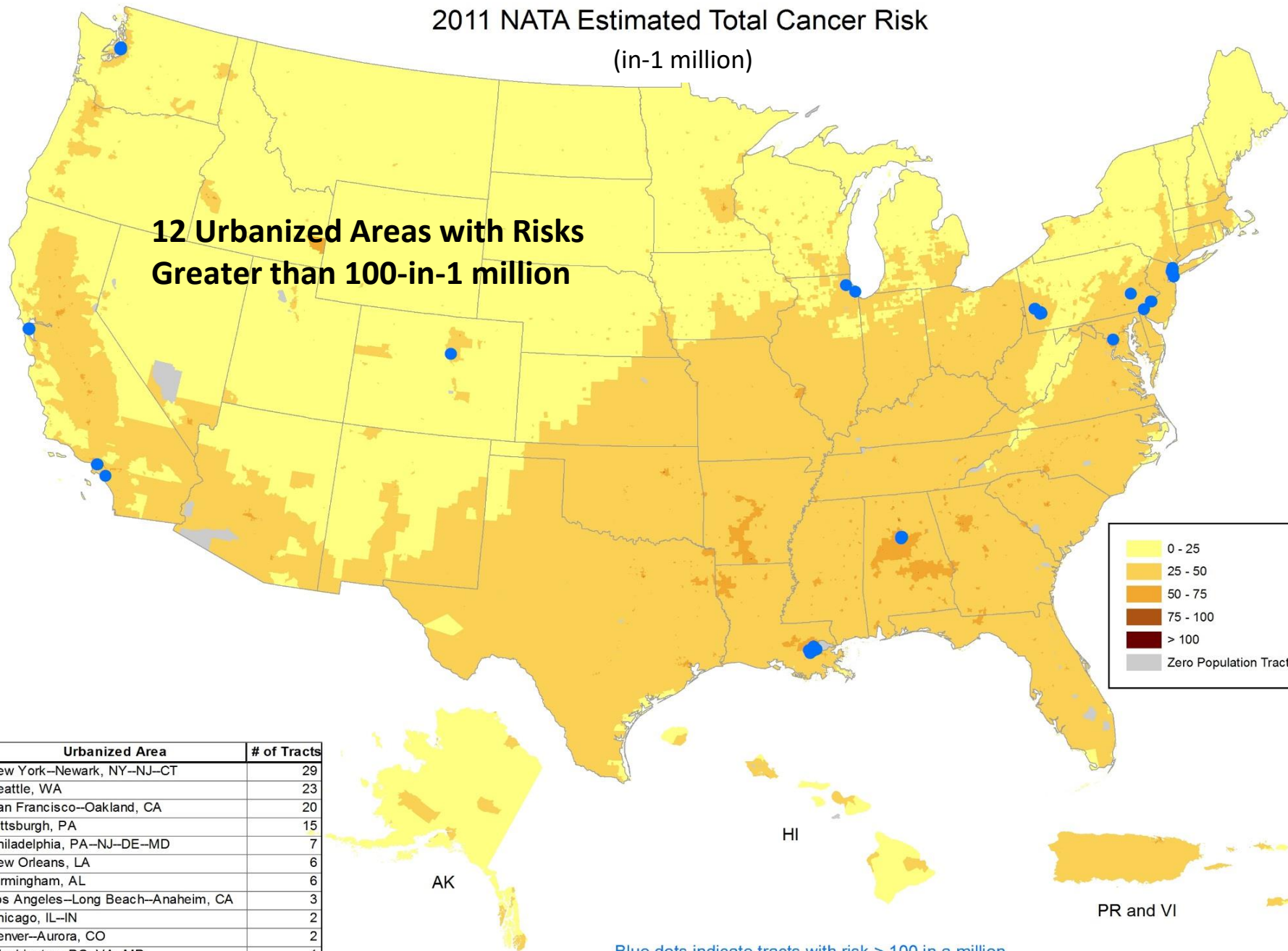


# 2011 NATA Spatial Allocation Approach

Category	Inventory Resolution	Spatial Approach for AERMOD	Spatial approach for CMAQ
Point (non Airports)	Point	Point – vertical stack and fugitive	12 km by 12 grid cells
Airports	Point	Point – runways & 10mX10m areas	
Locomotives	Point (railyards) and County/Shape	Nonpoint - Tracts Point - Point Fugitives	
Commercial Marine Vessels	County/Shape	Shapes	
Onroad, Nonroad Equipment and other nonpoint	County	Tracts	
Fires (prescribed and wild)	Point	Not Modeled	

2011 NATA Estimated Total Cancer Risk  
(in-1 million)

**12 Urbanized Areas with Risks  
Greater than 100-in-1 million**



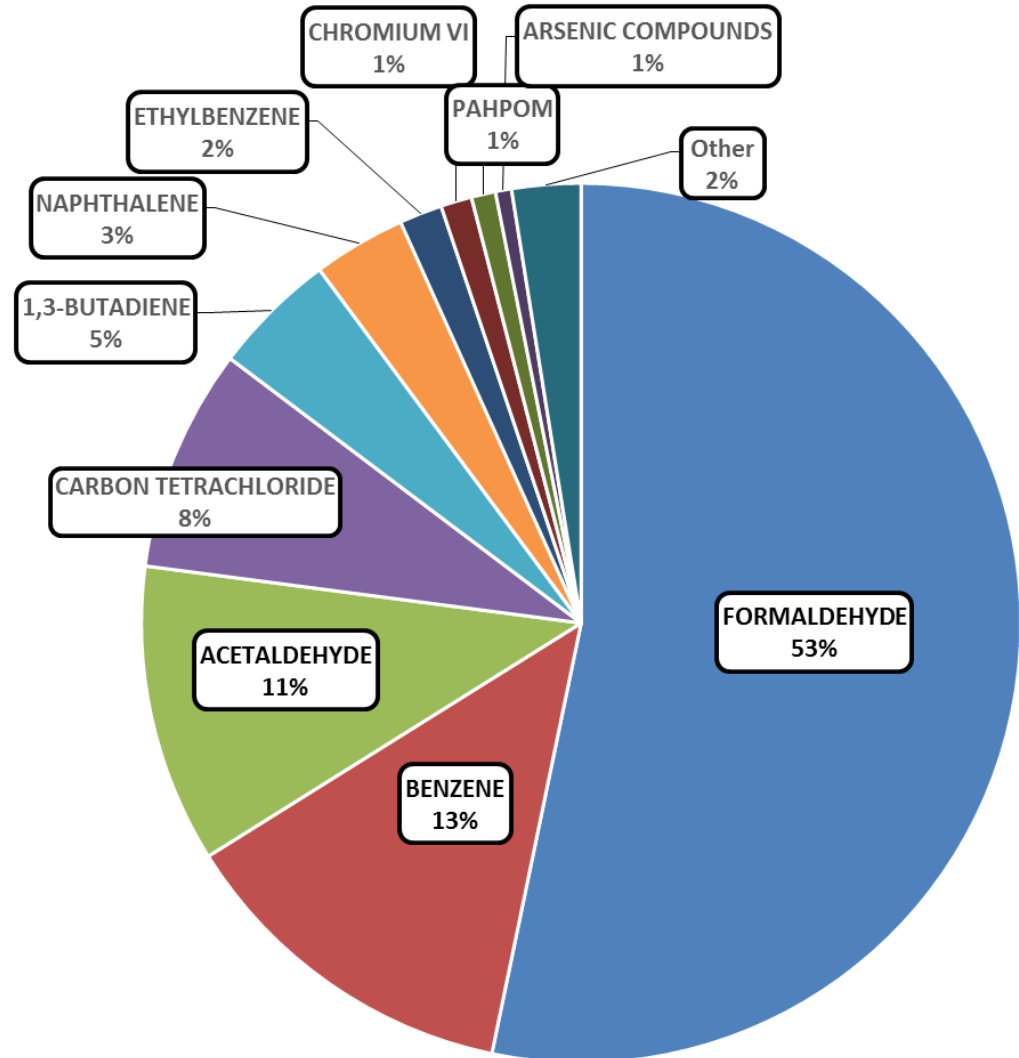
Urbanized Area	# of Tracts
New York–Newark, NY–NJ–CT	29
Seattle, WA	23
San Francisco–Oakland, CA	20
Pittsburgh, PA	15
Philadelphia, PA–NJ–DE–MD	7
New Orleans, LA	6
Birmingham, AL	6
Los Angeles–Long Beach–Anaheim, CA	3
Chicago, IL–IN	2
Denver–Aurora, CO	2
Washington, DC–VA–MD	1
Reading, PA	1

Blue dots indicate tracts with risk > 100 in a million  
121 tracts nationwide (12 Urbanized Areas)



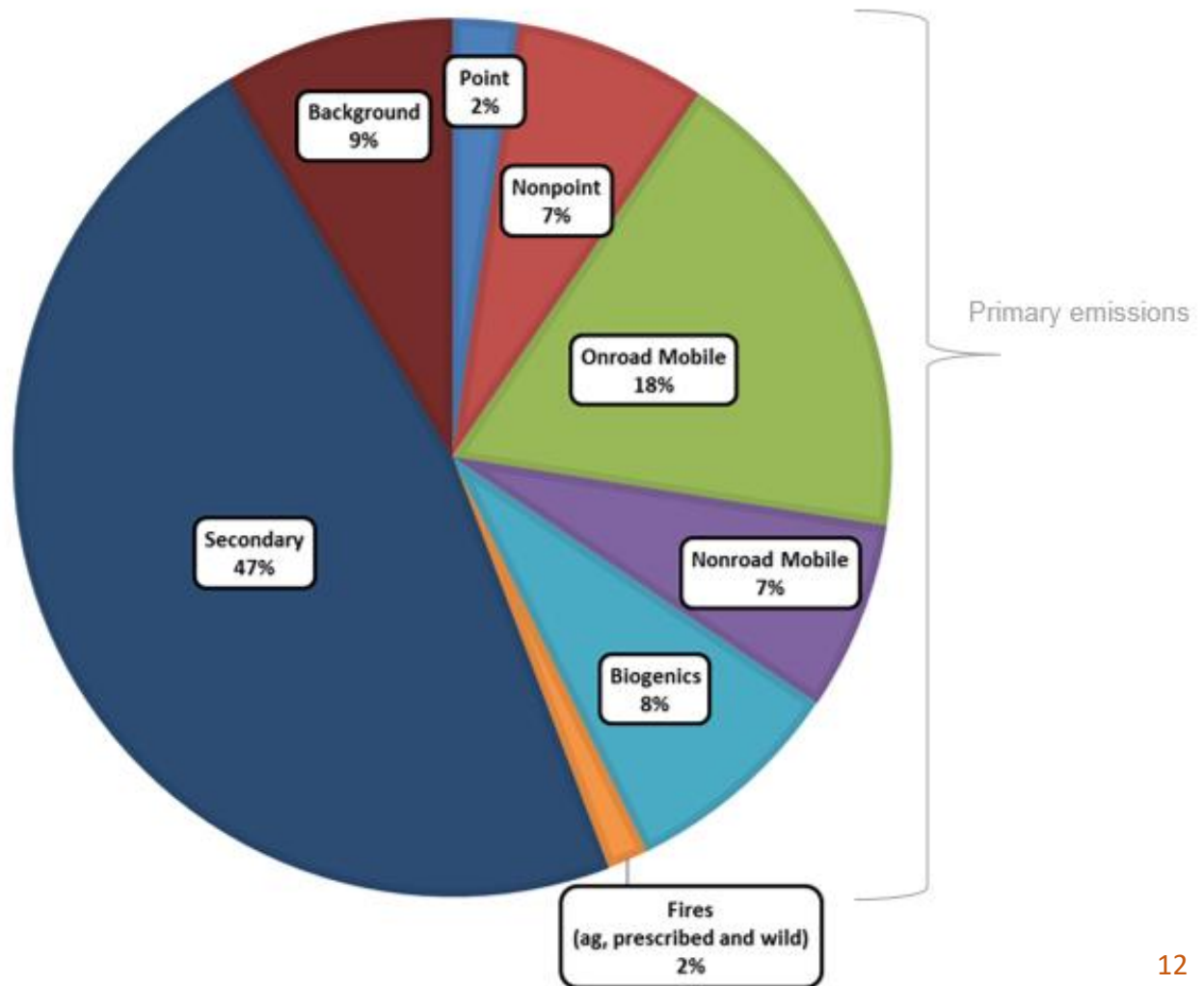
# 2011 NATA Cancer Risks

## Entire US - Pollutant Contributions (40-in-1 million)



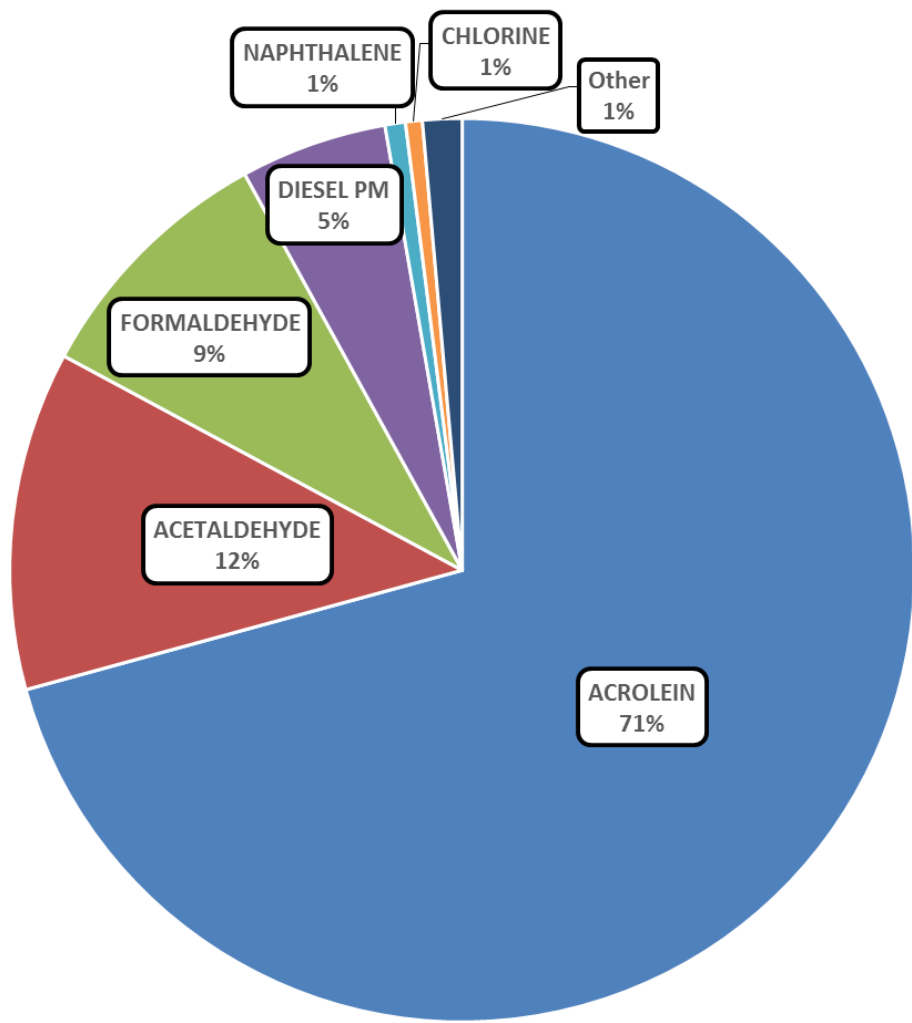
# 2011 NATA Cancer Risks

## Entire US – Source Category Contributions (40-in-1 million)





# 2011 NATA Noncancer Respiratory Risks Entire US - Pollutant Contributions (HI=2)



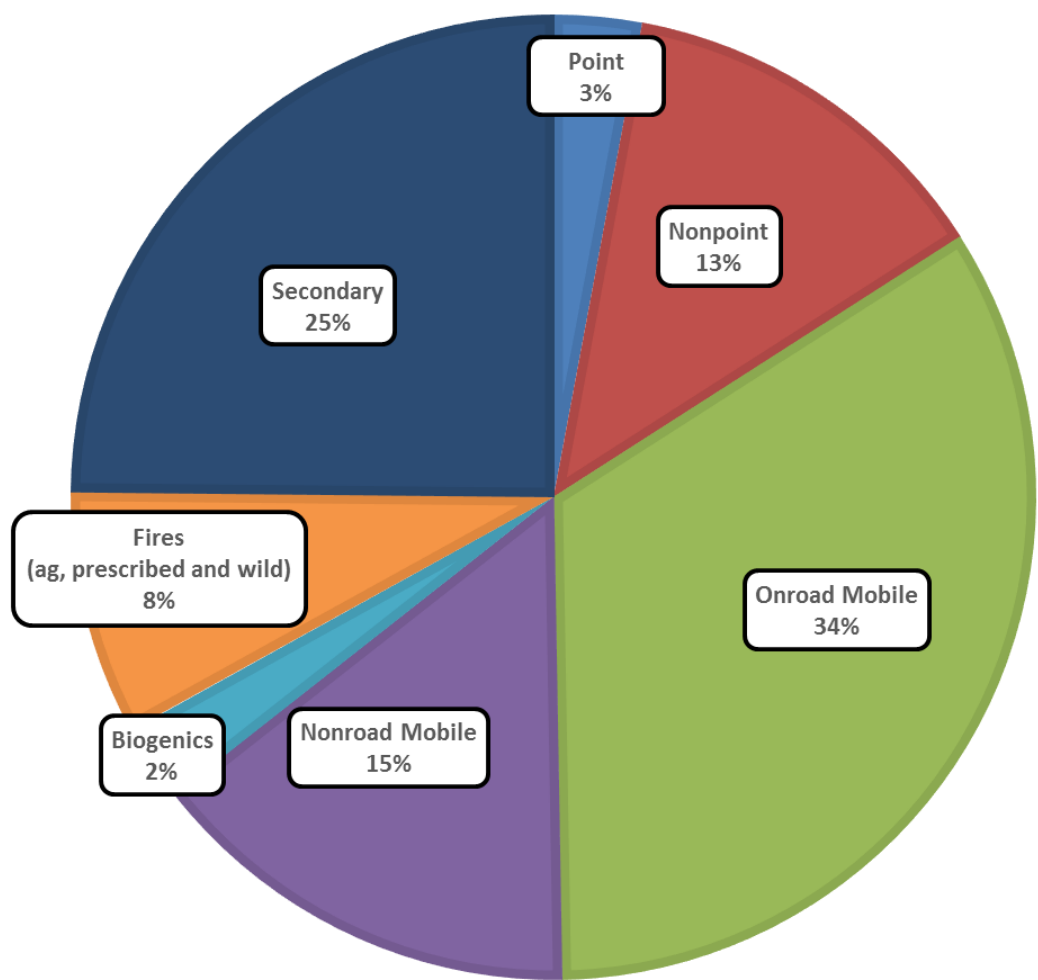




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# 2011 NATA Respiratory Risks Entire US - Source Sector Contributions (HI=2)







# NATA Web App

## Enhanced GIS-Based NATA Web App

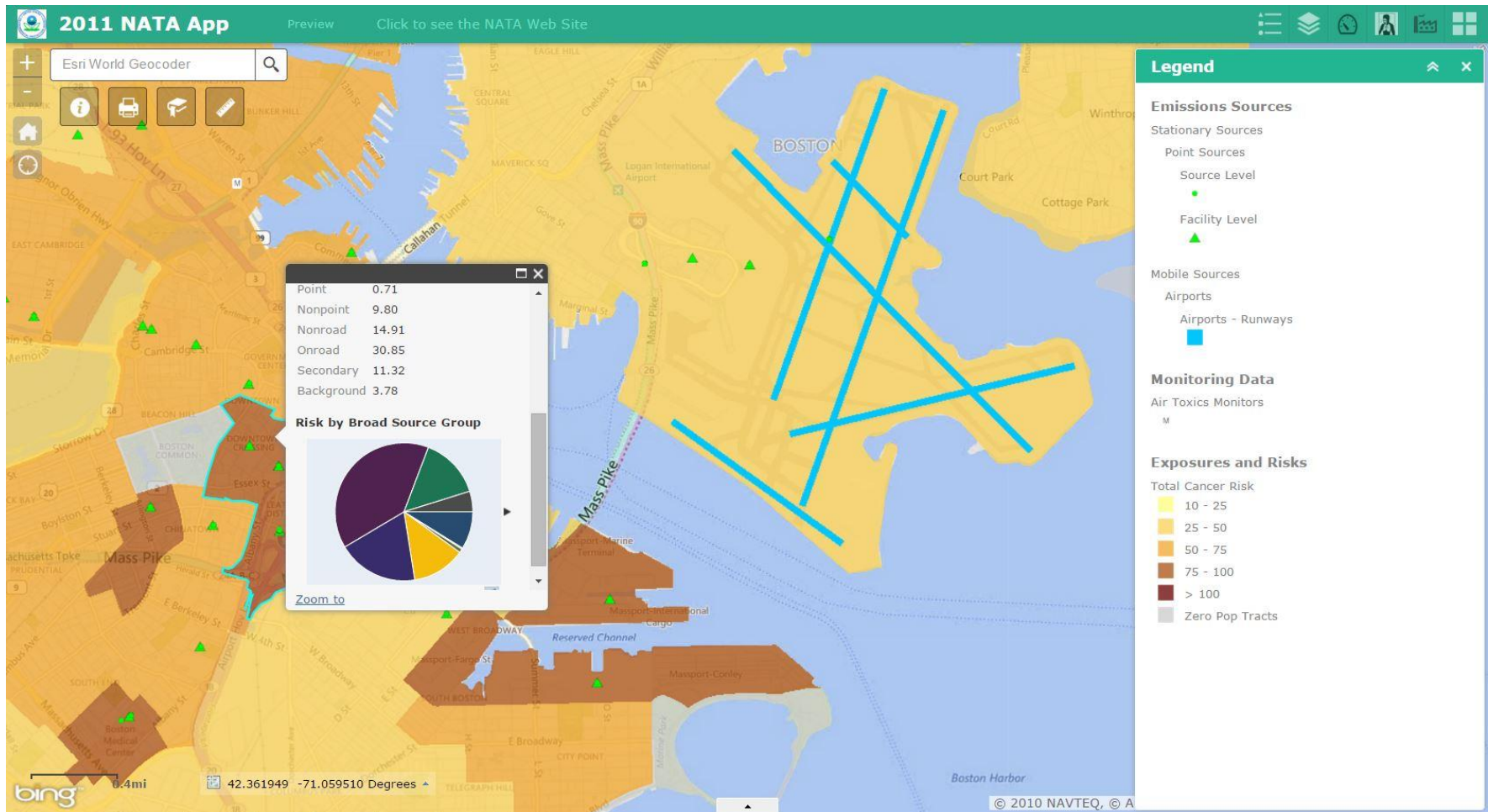
- Shows estimated risks at the census tract level and displays risks, emissions sources, and monitoring data on a map -- generates pie charts and tabular results
- The NATA web map can help users identify the sources and pollutants that contribute to potential risks in their community
- Users can compare the NATA modeling results to local ambient monitors
- The NATA web app is also available on tablets and smartphones

# NATA Web App

The screenshot displays the NATA Web App interface within a browser window. The browser's address bar shows the URL: `http://epa.maps.arcgis.com/apps/webappviewer/index.html?id=42c0fafed38646349677f8c660cd102`. The browser's title bar includes tabs for "2011 NATA Preview Collabora..." and "2011 NATA App". The application header features the EPA logo, the text "2011 NATA App", and a "Preview" button. A search bar labeled "Esri World Geocoder" is present. The main map area shows a detailed view of Boston, Massachusetts, with numerous green triangular markers indicating data points. The map includes labels for various neighborhoods such as Cambridge, Boston, Brookline, and Dorchester Bay. The interface also includes a toolbar with navigation and tool icons, a scale bar at the bottom left, and copyright information at the bottom right: "© 2010 NAVTEQ, © AND, © 2015 Microsoft Corporation | OAQPS | esri". The Windows taskbar at the bottom shows the system clock as 4:33 PM on 11/12/2015.

The next slide drills down on this area to show risk.

# NATA Web App – Tract Risk Breakdown



This slide shows the census tract risk by broad source group (e.g., point, nonpoint).



# NATA Web App - Detailed Source Information

EPA 2011 National Air Toxics Assessment (NATA) App Click to see the NATA Web Site

Find address or place

Options Filter by Map Extent Zoom to Clear Selection Refresh

Cancer Risk Respiratory Hazard Index By Cancer Risk Level\_Query Result

1	STCOFIPS	State	County	FIPS	POP2010	Area (m2)	Total Risk	Point Risk	Nonpoint Risk	Onroad Risk	Nonroad Risk	Biogenics Risk	Fires (ag, prescribed and wild) Risk	Secondary Risk	Background Risk	OR Light-Duty Gas Risk	OR Du
	48201	TX	Harris County	48201324200	1647	7671317.6683	65.105	20.71	1.424	7.938	3.343	3.092	1.534	23.699	3.365	5.77	0.1
	48201	TX	Harris County	48201233300	4818	12052849.052	62.121	18.706	1.251	7.542	2.695	3.107	1.551	23.904	3.365	5.342	0.1
	48201	TX	Harris County	48201233703	2656	7760969.0421	61.464	19.217	1.168	6.035	3.117	3.107	1.551	23.904	3.365	4.41	0.0
	48201	TX	Harris County	48201252500	4325	41169484.915	61.29	24.069	1.114	5.748	2.192	2.52	1.483	20.799	3.365	3.41	0.0

16 features 1 selected

Green dots are individual emission points.



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# 2014 NATA Update

- Will be based on 2014 NEI Version 2
- Will use the most recently released version of MOVES (2014a) to generate both onroad and nonroad emissions
- Will include emissions allocations to 4- and 12-km grids instead of allocating emissions to census tracts for nonpoint and mobile source emissions
- Update to unit risk estimate of ethylene oxide
- Will include updates to the Map App
- Targeting completion in 2018



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# Conclusions

- NEI is critical input to NATA - HAPs and CAPs are used
- HAPs are Voluntarily submitted and gap-filled as necessary
- Continuing need for improving the data
  - Use of available source test data for emission inventories
  - Update emission factors and speciation profiles
  - Update and develop new inventory tools
  - Improve source test methods and detection levels



# Resources <http://www.epa.gov/nata>



The screenshot shows the EPA website's National Air Toxics Assessment page. At the top, there is the EPA logo and navigation tabs for 'Learn the Issues', 'Science & Technology', 'Laws & Regulations', and 'About EPA'. A search bar is also present. The main heading is 'National Air Toxics Assessment'. Below this, there is a map of the United States with a callout box over the Chicago area. To the right of the map, a text box states: 'On December 17, 2015, EPA released the most recent update to the National Air Toxics Assessment (NATA). NATA contains emissions data from 2011 and uses models to make broad estimates of health risks over geographic areas of the country.' Below the map and text, there are three main sections: 'NATA Overview' with links for 'Limitations', 'Glossary of Terms', and 'Frequent Questions'; '2011 NATA Assessment' with links for '2011 Assessment Results', '2011 NATA Map', and '2011 Assessment Methods'; and 'Quick Links' with links for 'Previous versions of NATA', 'Other environmental screening tools', 'Learn about risk assessment', 'Hazardous Air Pollutants website', and 'Urban Air Toxics website'.

- “Hybrid” approach citation:

## Hybrid Modeling Approach to Estimate Exposures of Hazardous Air Pollutants (HAPs) for the National Air Toxics Assessment (NATA)

Richard D. Scheffe, Madeleine Strum, Sharon B. Phillips, James Thurman, Alison Eyth, Steve Fudge, Mark Morris, Ted Palma, and Richard Cook. *Environmental Science & Technology* **2016** 50 (22), 12356-12364. DOI: 10.1021/acs.est.6b04752