Welcome to the

U.S. EPA Trash Free Waters Webinar #16

Exploring the Escaped Trash Risk Map

Live Webinar: Tuesday, December 10, 1:00 - *2*:00 PM ET

Presenters:

- Romell Nandi | Trash Free Waters National Program Lead, US EPA
- Jenna Jambeck | Georgia Athletic Association Distinguished Professor of Environmental Engineering, University of Georgia
- Kathryn Youngblood | Senior Research Engineer, University of Georgia
- Kara Lavender Law | Research Professor of Oceanography, Sea Education Association

Housekeeping

Please remain muted for the duration of today's session.

Use the **Q&A** to submit questions throughout the presentations.

Use the **chat box** to share any comments or to report technical problems.

Closed captioning is available.

This event is being **recorded** and will be shared online along with slide decks.

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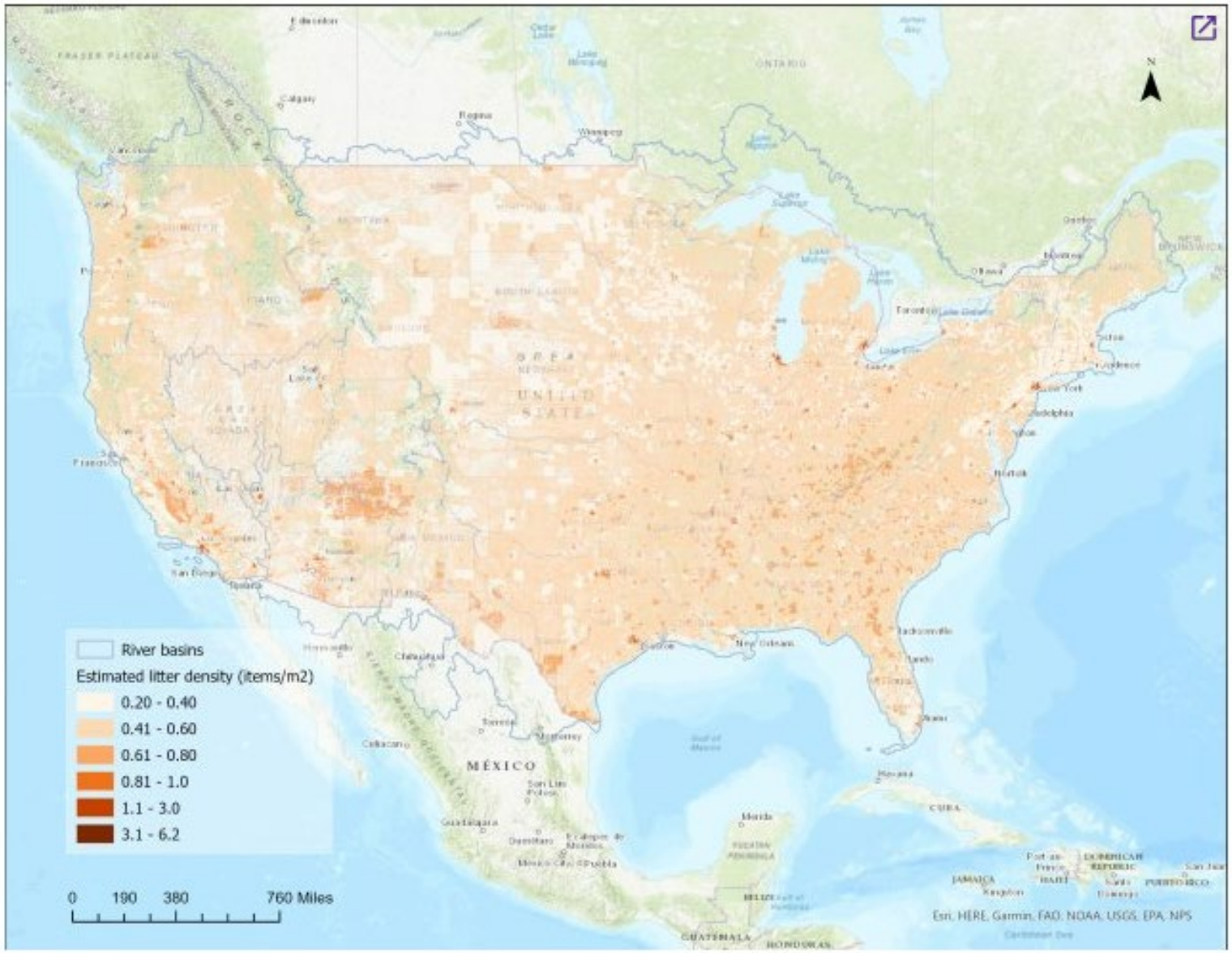

Escaped Trash Risk Map displaying estimated litter densities in the United States. Click on map image to go to

Project Goals

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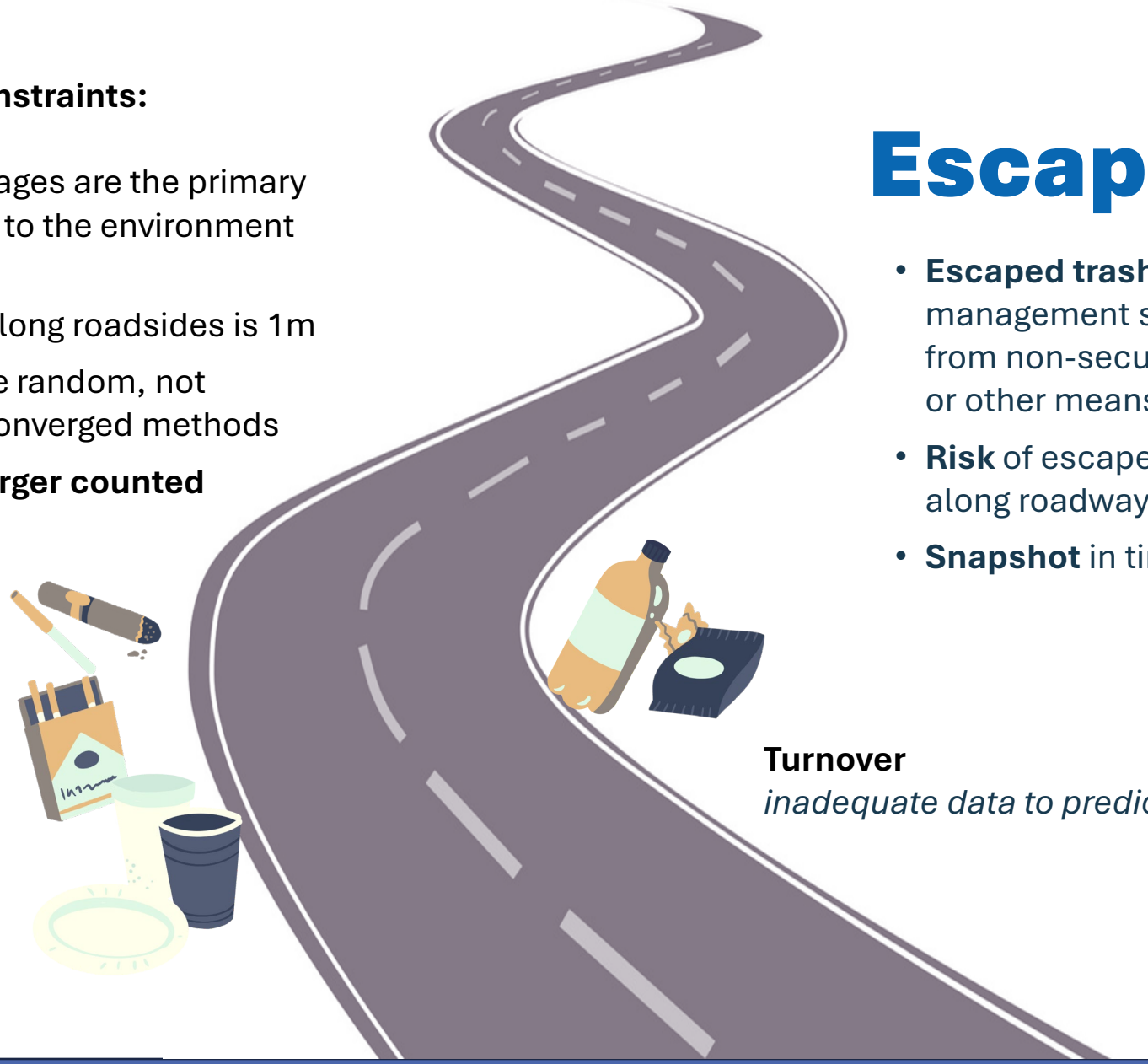
Escaped Trash Risk

Assumptions/Constraints:

- Roadways/passages are the primary pathway of litter to the environment in the U.S.
- Affected width along roadsides is 1m
- Data needs to be random, not opportunistic, converged methods
- **Items 2cm or larger counted**



- **Escaped trash** refers to litter that leaks from waste management systems, whether through spillage from non-secured containers, intentional littering, or other means.
- **Risk** of escaped trash densities (# of items/m^2) along roadways
- **Snapshot** in time (*not* a flux, *not* an annual input)

Turnover
inadequate data to predict

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Last Chance Capture
inadequate data to predict

Influencing Factors:
- Street sweeping
- Stormwater infrastructure
- DOT maintenance on highways

Debris entering US Waterways
Assumptions:
Litter deposited in land areas located in FEMA floodplains is likely to enter waterways.

Data Used for Density
- Circularity Assessment Protocol (CAP) data
- Litterati (2 cities)

Other Data Reviewed for Density
- Cleanups/River Sweeps, etc.
- Opportunistic Data
- Keep America Beautiful (KAB)
- Trash Traps

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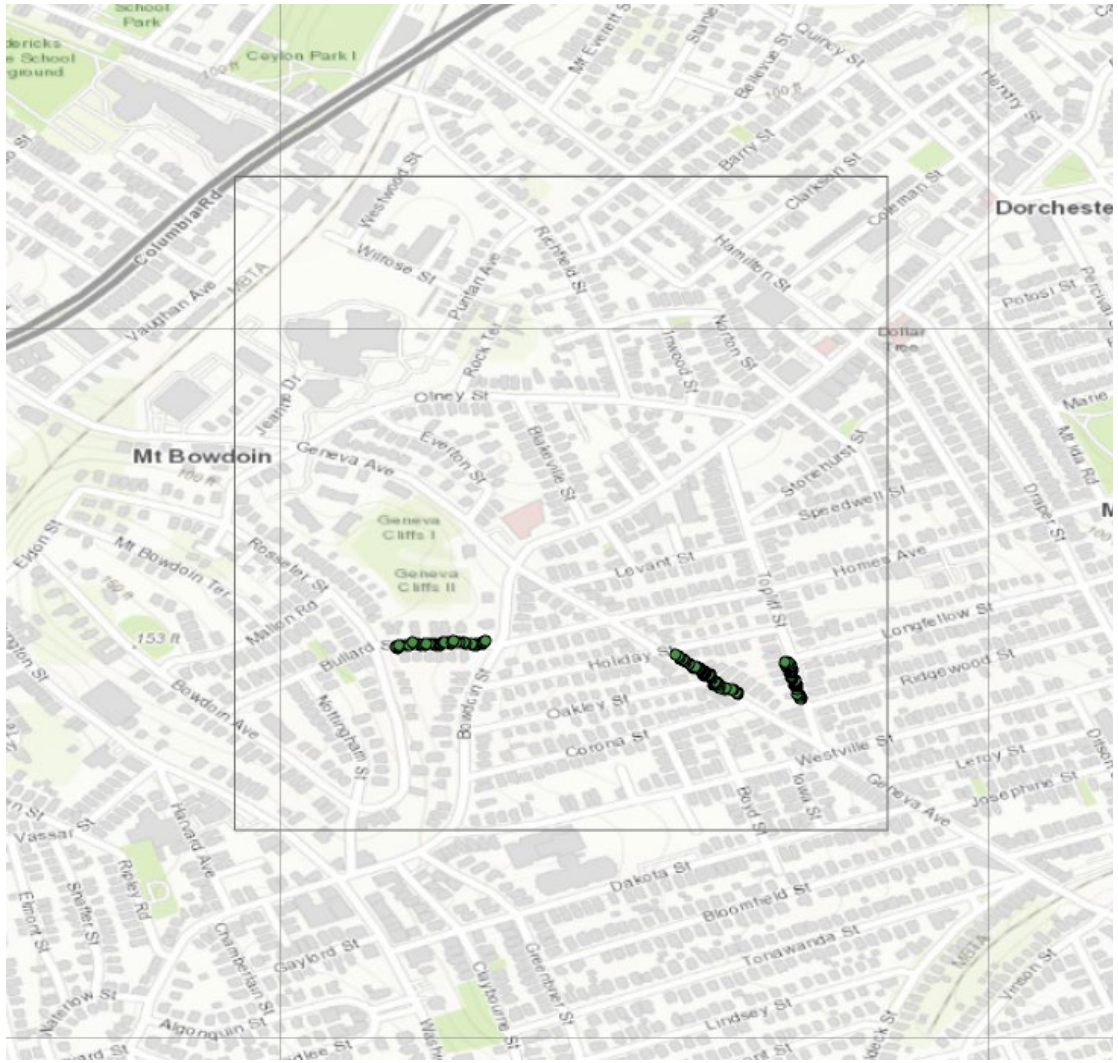
Escaped Trash data

- 315 sites, each about 1 x 1 km
- Random selection from stratified LandScan Data (ORNL, 24-hr societal activity)
- Three 100 m^2 transects in each site
- Data collected in all 20 US River Basins / 32 states / 53 cities

Albuquerque, NM
Amarillo, TX
Anchorage, AK
Ann Arbor, MI
Athens, GA
Atlanta, GA
Blytheville, AR
Boston, MA
Bozeman, MT
Cairo, IL
Canton, OH
Cape Girardeau, MO
Cincinnati, OH
Cortez, CO
Fargo, ND
Flagstaff, AZ
Galveston, TX
Georgetown, SC
Georgetown, SC
Grand Junction, CO
Haywood, CA
Hilo, HI
Key Largo, FL
Key West, FL
Louisville, KY
Marathon, FL
Massillon, OH
Memphis, TN
Miami, FL
Minneapolis, MN
Morris, MN
Murphy, NC
Norfolk, VA
Oklahoma City, OK
Orlando, FL
Pahrump, NV
Pawley's Island, SC
Pittsburgh, PA
Portland, ME
Pueblo, CO
Rapid City, SD
Ridgecrest, CA
Salt Lake City, UT
Santa Fe, NM
Savannah, GA
Seattle, WA
Sedona, AZ
Sheridan, WY
Talkeetna, AK
Taos, NM
Thief River Falls, MN
Tifton, GA
Tybee Island, GA
Vicksburg, MS



Example site with three 100 m2 transects

Escaped Trash Density

Influential Variables

- Human Development Index (HDI): Income, Education, Life Expectancy
- Land cover intensity

Inconsistently Correlated Variable

- Societal Activity

Confounding/Non-correlated Variables

- Restaurant/store density
- Education and awareness
- Sense of ownership and responsibility
- Governance
- Current level of litter (broken window theory)
- Perception (e.g., nature, protected areas)
- Differences in road types
- Hyper local influences (parking lots, trash cans)

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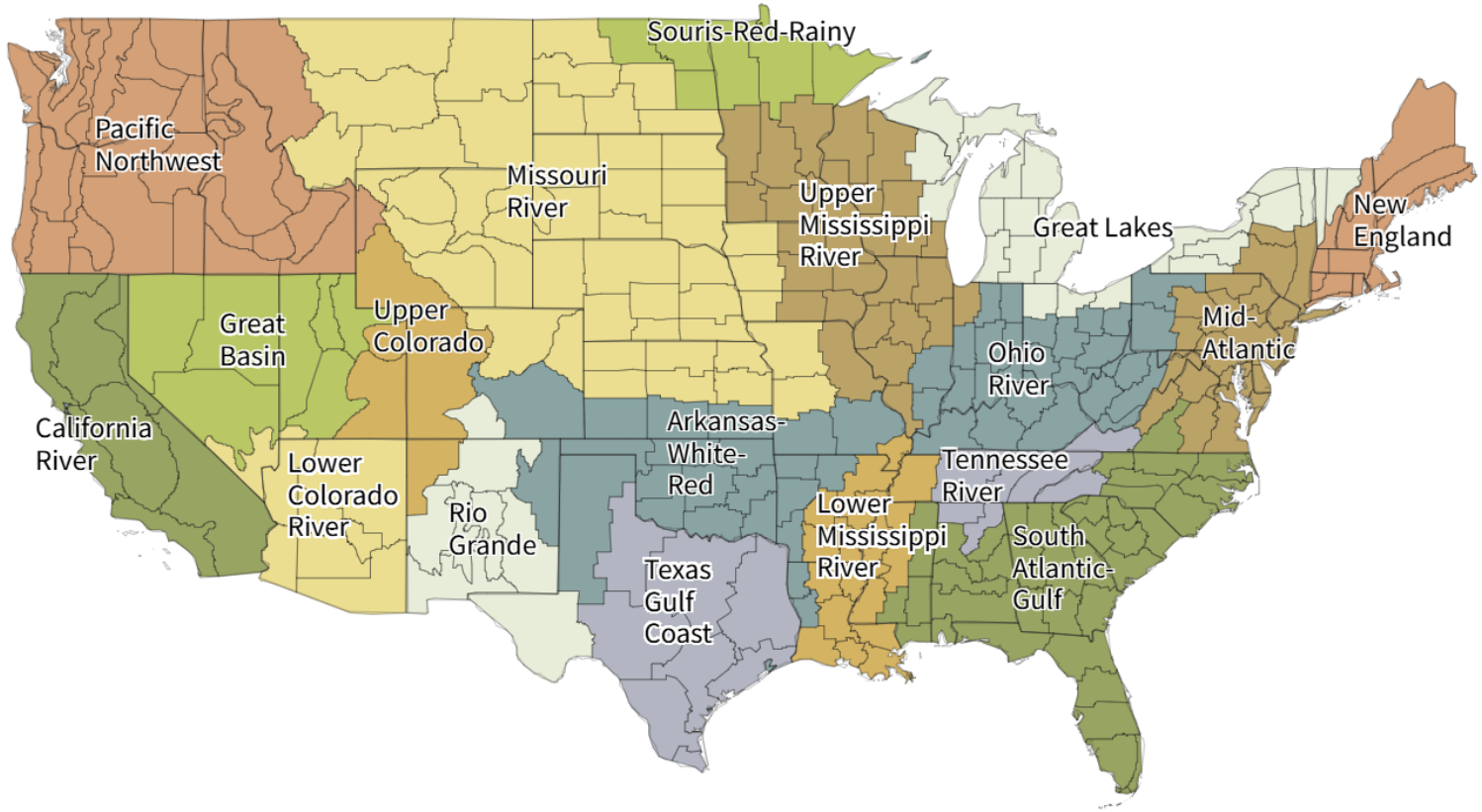
Escaped Trash Characterization



Opportunistic Data

- Data on more than 11.5 million escaped trash items logged by community scientists from 2021 – 2023
  - Debris Tracker
  - Clean Swell
- Used to characterize litter by item count at the river basin level
  - 20 River Basins

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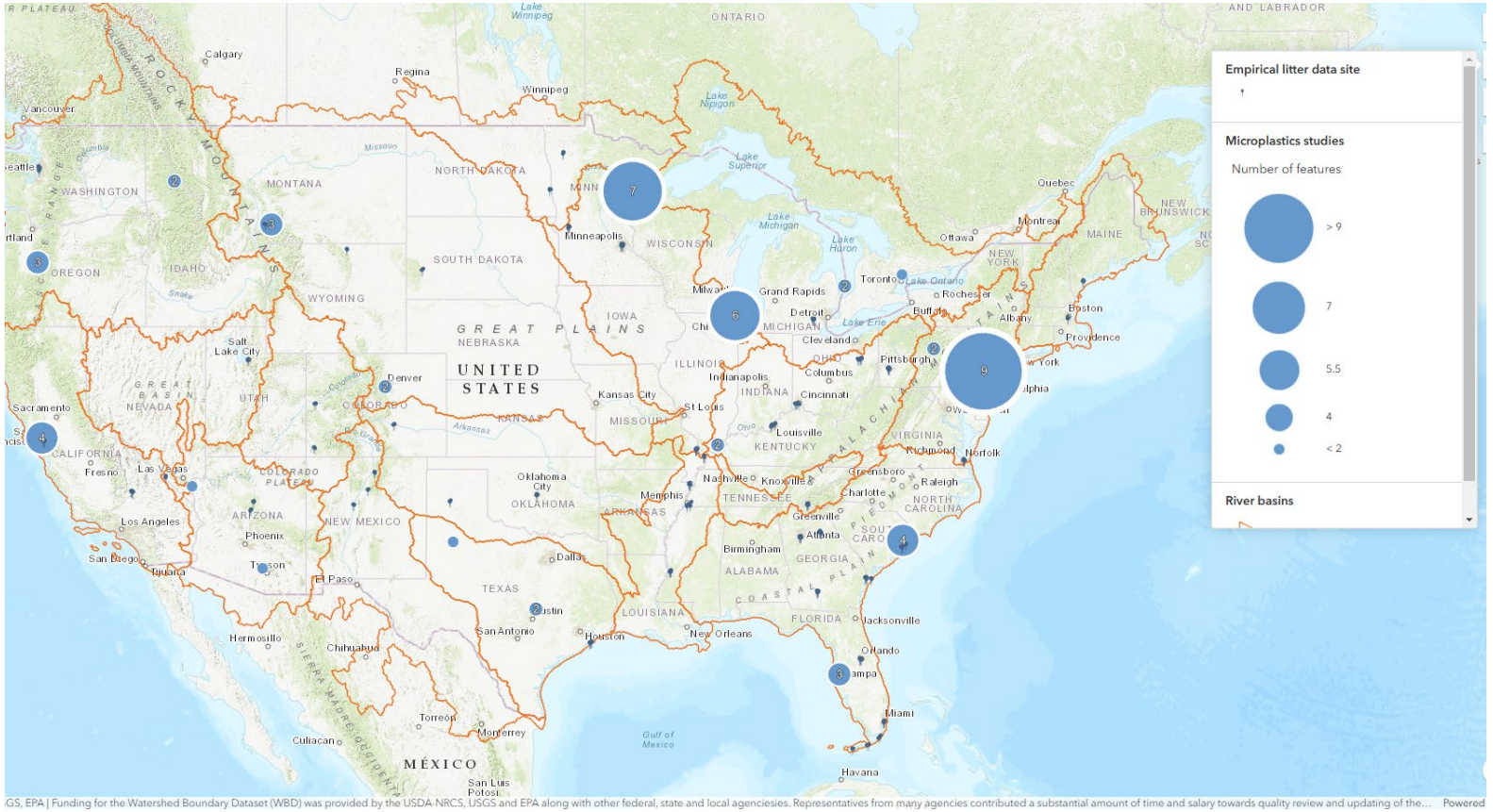
Microplastics in freshwater bodies

- We identified more than 65 studies of microplastic contamination in surface water of freshwater systems across the continental U.S.
- 44 studies met our criteria for inclusion
  - 37 peer-reviewed articles, 7 reports
- Sites span 28 states plus D.C.
- Water bodies include:
  - Urban waterways
  - Dam reservoirs
  - Creeks, streams, rivers
  - Ponds, lakes
  - Harbors
  - Estuaries and large bays



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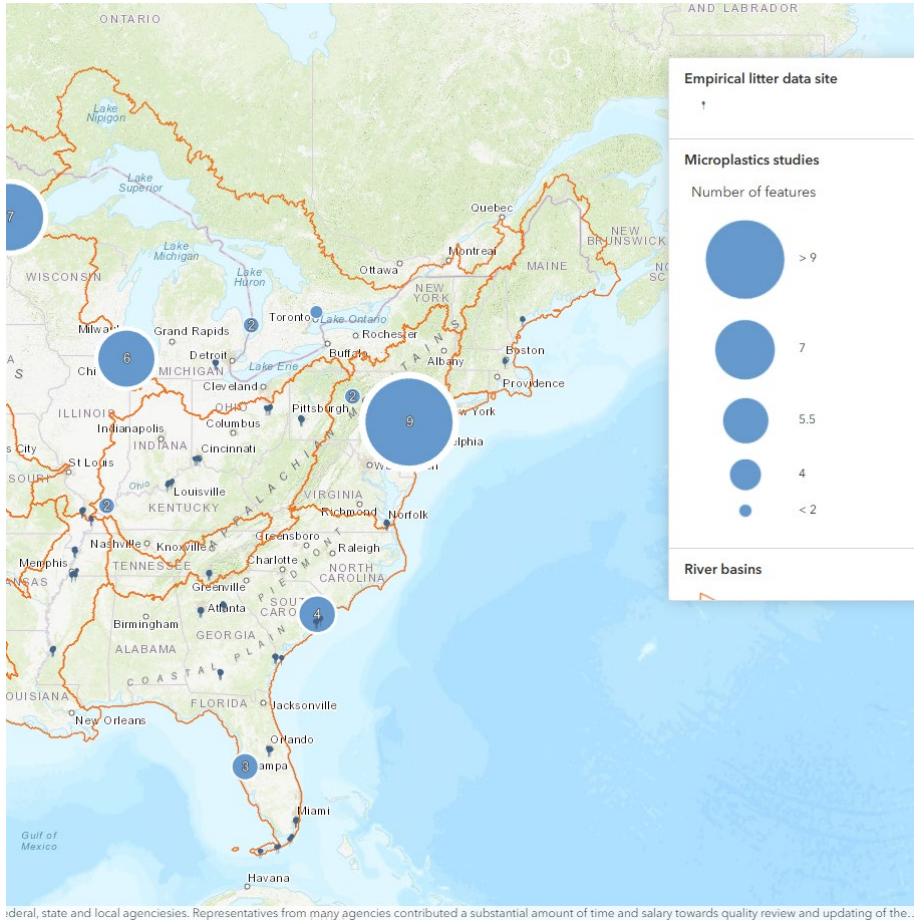
Microplastics in freshwater bodies



ederal, state and local agenciesies. Representatives from many agencies contributed a substantial amount of time and salary towards quality review and updating of the..

Variation in Methodologies

Collection:

neuston net, manta net, bulk water sample

particle size

samples, sample replicates, field blanks

Processing:

lab blanks, sieve sizes, chemical digestion, density separation, visual ID

Chemical ID:

none, Raman, Py-GCMS, FT-IR, SEM/EDS

Microplastic concentrations cannot be directly compared between studies.

For each study, we report the proportion of samples in which microparticles, either presumed or analytically confirmed to be plastic, were detected.

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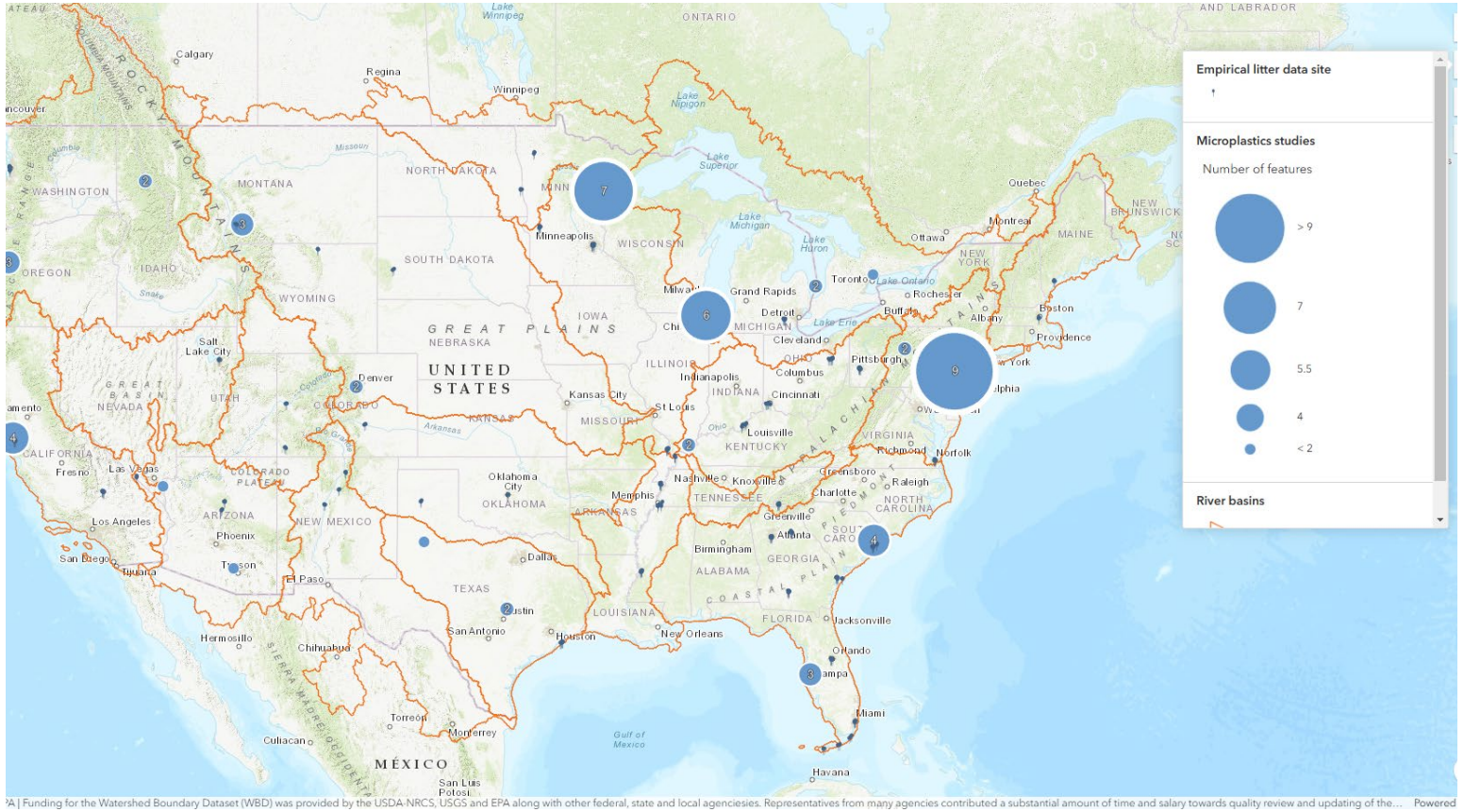
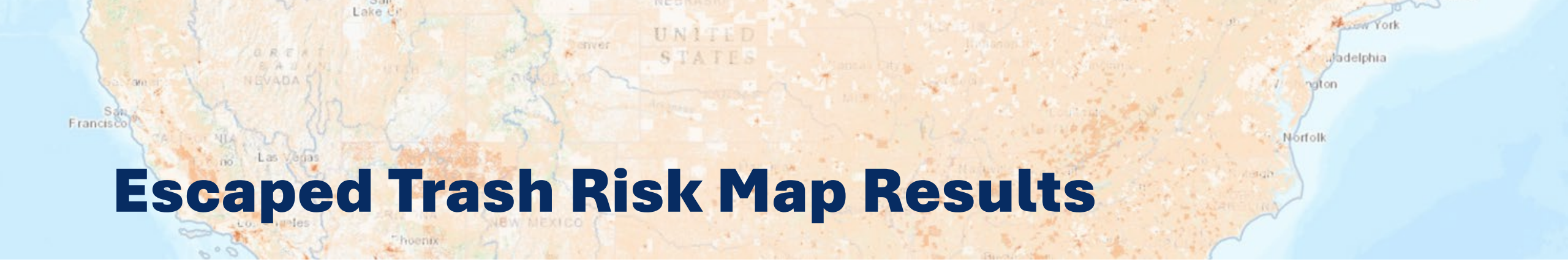
Microplastics in freshwater bodies

Results

For each study, we report the proportion of samples in which microparticles, either presumed or analytically confirmed to be plastic, were detected.

- Individual studies reported 53% to 100% of samples contained microplastics.
- 36 of 44 studies reported 100% of samples contained microplastics.
- The studies with the lowest proportion of samples with microplastics (< 60%) had a large number of samples (> 200).





Escaped Trash Risk Map Results

- An estimated **10.3 billion litter items** [8.7 – 12.2 billion] lie in areas adjacent to US roadways.
- **1.6 billion items** [1.3 – 2.0 billion] are in areas with a 0.2% or 1% annual chance of flooding, making them at a higher risk to enter waterways.
- The mean litter density estimated along roadsides in the U.S. is 46.8 items per 100 m^2 transect [40.2 – 54.0 items].

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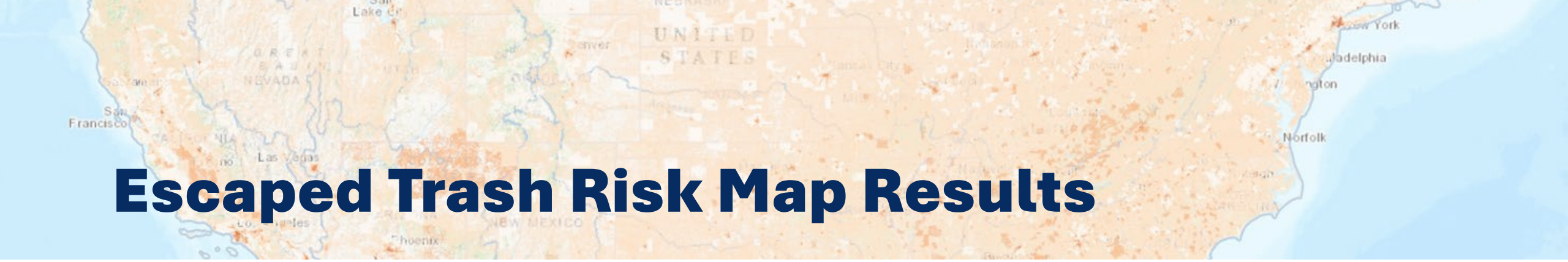

Escaped Trash Risk Map Results

- Based on citizen science data collected across all U.S. river basins between 2021 – 2023 (11,597,653 data points), **77% of litter items are estimated to be plastic**, followed by 8% metal, 3% paper and lumber, and 3% glass.
- The top 10 litter items across the entire U.S. are: **1) plastic & foam fragments, 2) cigarettes/cigars, 3) plastic caps or lids**, 4) plastic food wrappers, 5) plastic bottles, 6) plastic bags, 7) aluminum or tin cans, 8) straws, 9) foam or plastic cups or plates, and 10) metal bottle caps or tabs.
- The abundance of plastic bags and bottles in litter transect surveys is, on average, lower where policies (bans and deposit policies) are in place.

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How to use the map

- Zoom into a specific area to see estimate litter densities and floodplain areas.
- Zoom out and click on a river basin to see a summary of estimated item count and litter characterization. Use the bookmarks in the upper left corner to quickly toggle to a view of the entire US, or search for a specific place using the search tool.
- Click on a location for a microplastics study to see study information, including the proportion of samples containing purported microplastics.

Don't show this again

Enter

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Escaped Trash Monitoring Network

Scan this QR code & fill out the form to show your interest

- **Do you want to be a part of our future monitoring network?**
  - We will update the Escaped Trash Risk Map annually
  - We will determine monitoring frequency and assign locations in your area
  - Participants will take a brief online training, with certification
  - Debris Tracker (free/easy app) for data collection and upload
- **Sign up** to show your interest and to get updates on how to join in the future!

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Q&A

Scan this QR code & fill out the form to show your interest in joining the monitoring network