



Back River WWTP Community Meeting January 29, 2026

Maryland Department of the Environment
Baltimore County
Baltimore City

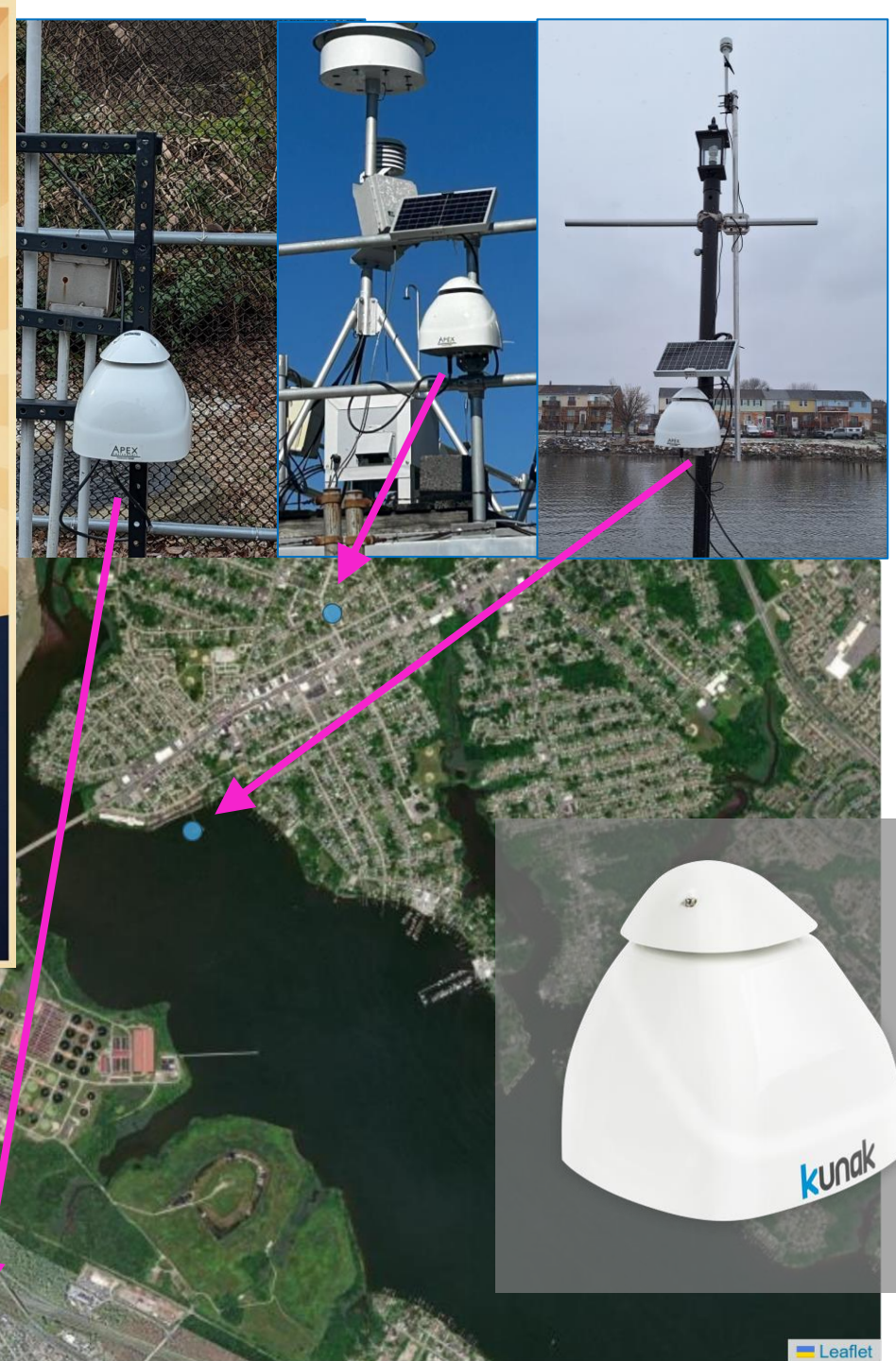
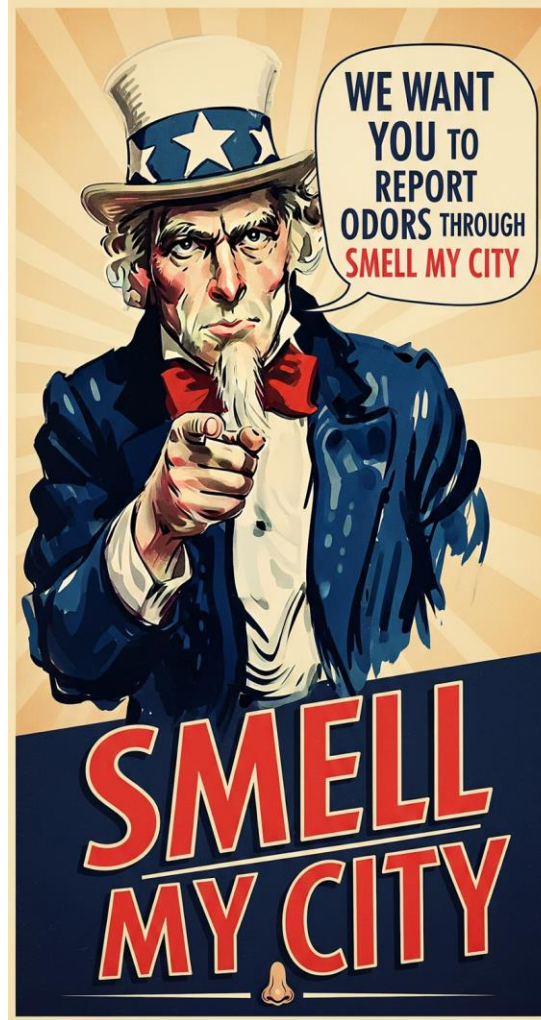
Meeting Logistics

- Please mute your microphone
- Questions welcome throughout the presentation
 - These slides will be posted to MDE's website



Agenda

1. Introductions
2. Overview
 - a. MDE Website
 - b. Odor Complaints and Response
 - c. Bypasses
3. Air Monitoring Campaign
 - a. H₂S and Sensor Overview
 - b. Results so far
4. Smell MyCity Campaign
 - a. Smell Paths
 - b. Results so far
5. Baltimore County
6. Baltimore City



Action Items From November Meeting

Transparency

- **Public Access:** Launched a new MDE website providing direct access to data, studies, and official reports.
- **Operational Visibility:** Published utility maps and inspection logs to give the public a clear view of plant infrastructure and oversight.
- **Data Sharing:** Partnered with Blue Water Baltimore to share bacteria data and solids operations updates.

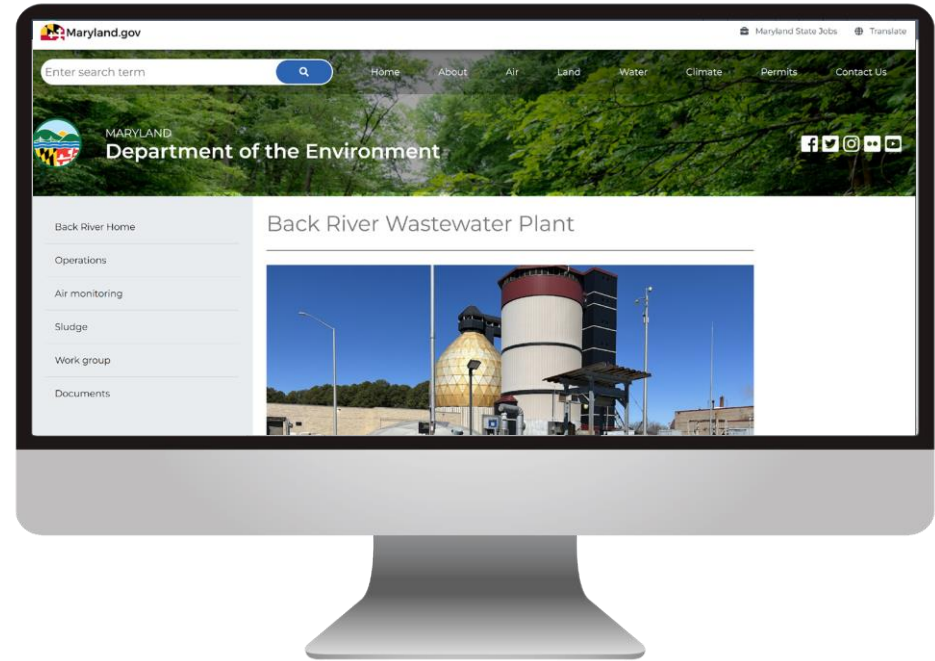
Investigation

- **Smell MyCity App:** Extended the resident reporting app through 2026 to align⁴ community odor reports with official MDE inspections.
- **Enhanced Air Monitoring:** Expanding the network of on-site sensors to better detect, track, and mitigate odors.



New website is Live

- Online complaint forms for odor and operations issues
- Interactive maps showing air monitoring data
- Clear explanations of agency roles and jurisdictions
- Plain-language information addressing common questions, including the relationship (and non-relationship) between midges and wastewater sludge



mde.maryland.gov/backriver



Who to call



24-Hour Contact Availability

- **Business Hours:** Call the Main Plant at **410-396-9806**
- **After Hours:** Call Sludge Control at **410-396-9660**

How the Process Works

- **Constant Coverage:** A representative is available to assist 24 hours a day
- **Coordination:** Upon receiving a report, the City will immediately contact the County to ensure a unified response



What is a Bypass?

December 19, 2025 Power Outage

- **Cause:** A power outage disrupted the **denitrification** process.
- **Duration:** 2.5 hours.
- **Volume:** ~1.2 million gallons bypassed that specific step.
- **Critical Fact:** **All water was fully disinfected** before leaving the plant.

Why are Bypasses Necessary?

- **Equipment Protection:** Prevents critical mechanical failure.
- **Safety & Stability:** Ensures the rest of the treatment process remains operational.



Investments in Infrastructure

Significant State Investment: Over \$32.6 million in dedicated funding for the Back River Wastewater Treatment Plant.

Specific Improvements: Installing sand filter and digester upgrades, having already completed major repairs to primary settling tanks, sludge pumps, and safety systems.

Major Nutrient Reductions: Strategic upgrades have already resulted in a 60% decrease in nitrogen pollution and an 80% decrease in phosphorus discharged from the facility.

Joint Jurisdiction Support: Financing is strategically split between Baltimore City and Baltimore County (utilizing state loans and grants) to ensure regional stability for the facility.



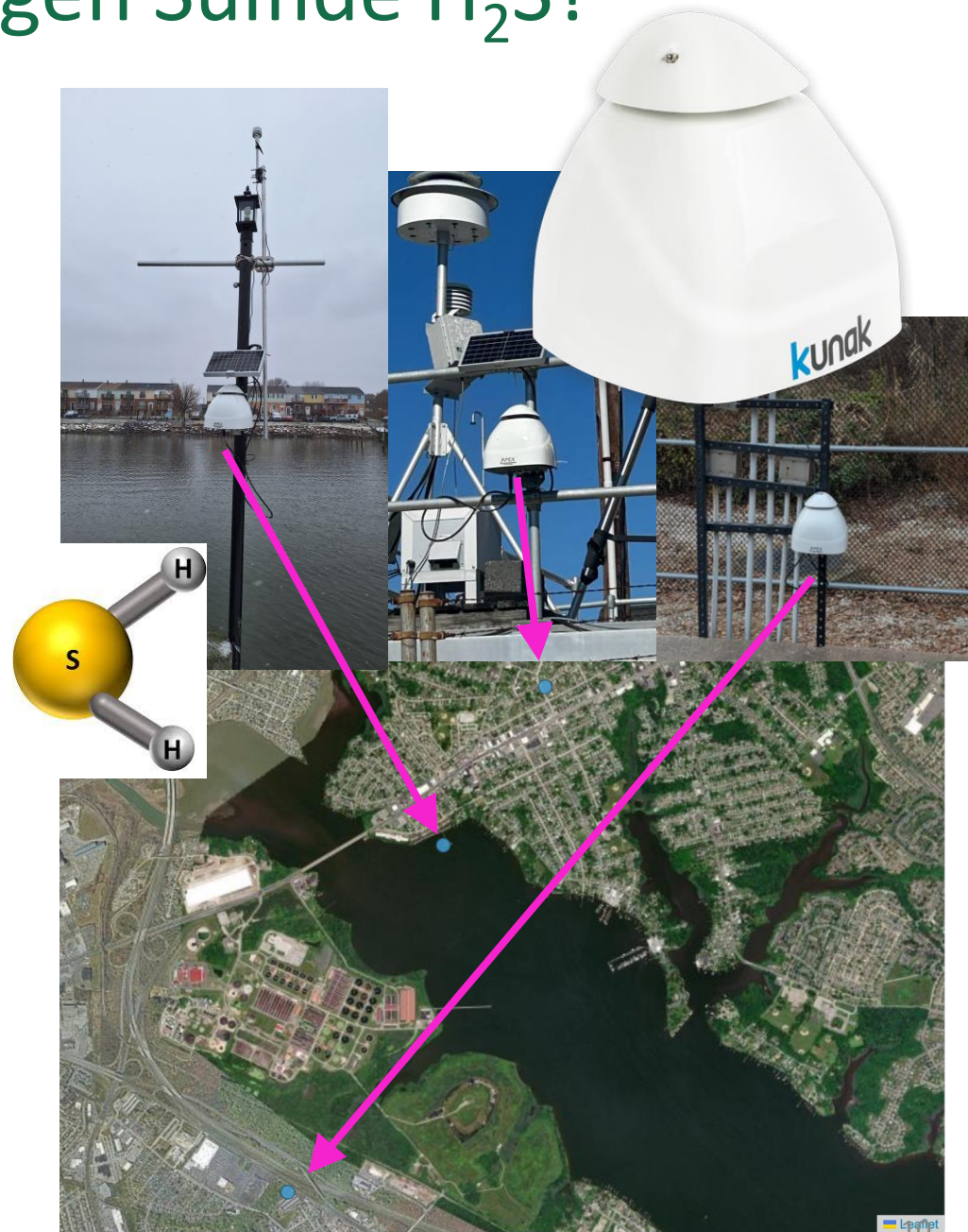
Data Collection Project Goals

- Identify when and where strong odors are reported in Essex, Dundalk, North Point, and nearby communities
- Use wind and air monitoring data to track odors back to possible sources
- Determine whether odors are linked to specific operations at Back River, nearby pumping stations, or other sources
- Assess how weather and atmospheric conditions affect odor movement



Sensor Campaign: What is Hydrogen Sulfide H₂S?

- MDE deployed sensors capable of measuring Hydrogen sulfide (H₂S), and other pollutants and weather relevant to odor complaints, to Essex, Villa Capri, and a pumping station south of the Back River WWTP. Data is available online.
<https://mde.maryland.gov/BackRiver/Pages/airmonitoring.aspx>
- H₂S is relevant to odor complaints.
- H₂S is a colorless, toxic, and flammable gas known for its distinct “rotten egg” odor. H₂S forms as bacteria “eat” decaying organic matter.
- H₂S is heavier than ambient air. In still conditions (no wind), H₂S settles to the lowest location, something like water flowing to the lowest spot.



Sensor Campaign: H₂S correlates with CH₄; Natural Gas

- Sensor's H₂S cartridge has a cross-sensitivity with Mercaptan, the natural gas odorant.
- We have measured a strong connection between methane (natural gas) and H₂S, a sure indication of natural gas interference.
- H₂S measured at sensors largely a result of natural gas; this could explain some "rotten egg" odors
- **Measured amounts of natural gas are too low for combustion risk.** Methane in natural gas needed for combustion: **>50,000 ppm**; largest concentrations found in this campaign to date: **48.6 ppm** (Essex)

Baltimore CH₄ leak refs: 1) <https://doi.org/10.1029/2018JD028851>

2) <https://pubs.acs.org/doi/10.1021/acs.est.3c05050?ref=PDF>

- **Measured amounts of H₂S are well below hazard risks[#].** The largest concentrations from this campaign to date: **948 ppb** (a single minute observation at Essex aligned with methane above & SMC reports)

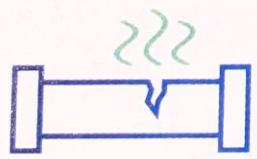
[#]10,000 ppb considered a hazardous level; odors detectable as low as 2 ppb for some; Only 17 minutes >200 ppb in data collected



H₂S and CH₄ in Villa Capri

DO YOU KNOW WHAT **NATURAL GAS SMELLS LIKE?**

Natural gas is colorless, tasteless and odorless. Therefore, **BGE puts mercaptan, a safety additive, in natural gas to give it a rotten egg odor** and make it easier to detect. Recognizing natural gas is important even if you are not a gas customer. Natural gas can enter buildings through walls, even buildings that are not supplied with gas.

MERCAPTAN **SMELLS LIKE** **ROTTEN EGGS**

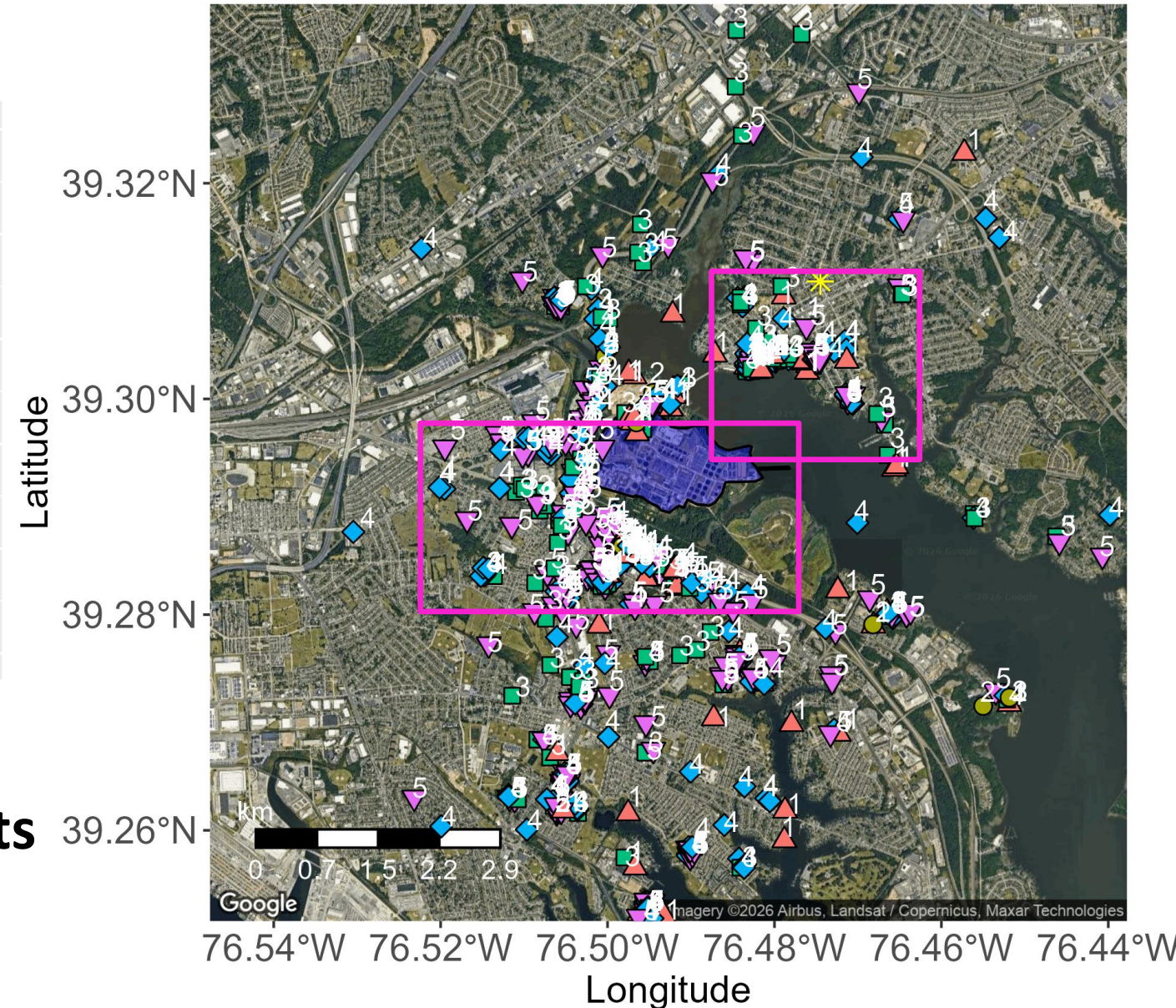
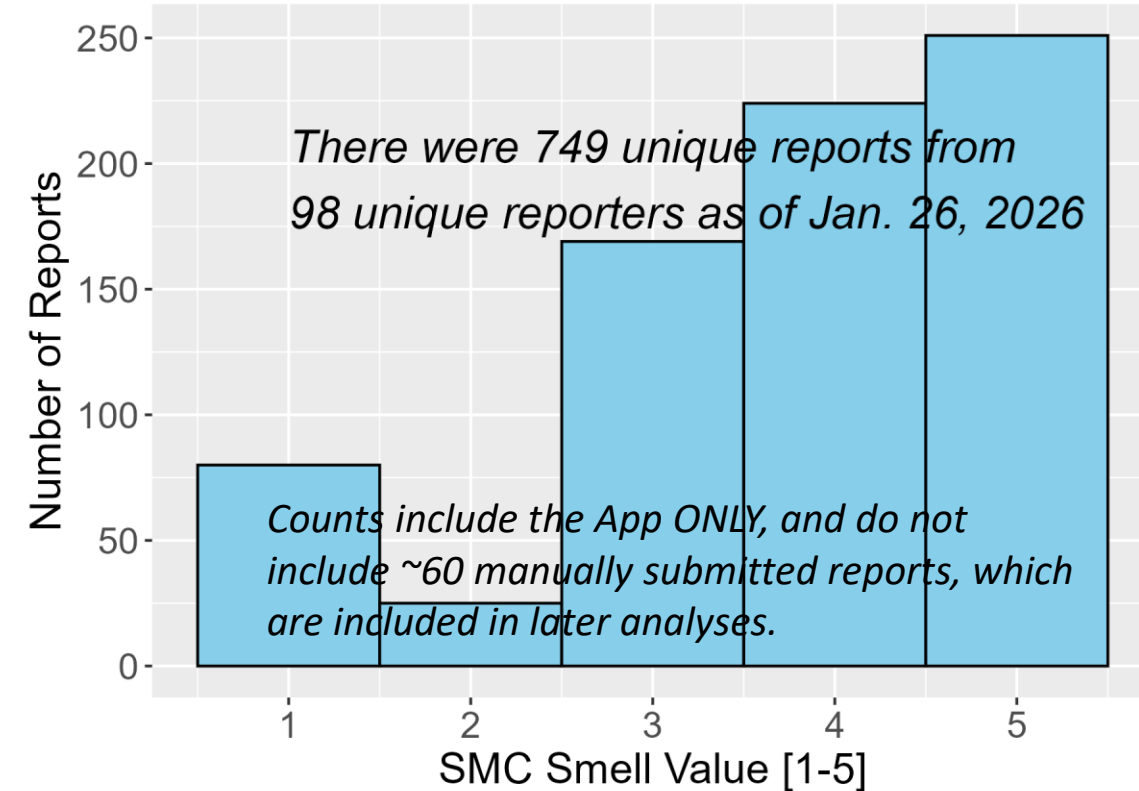
BGE Natural Gas Safety Mailer

3000 fewer observations available

“Smell MyCity” Campaign

Smell Reports through 2026-01-26

Smell MyCity App Contributed Ratings as of Jan. 26, 2026



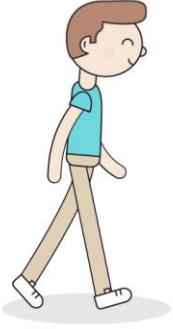
How do we use Smell MyCity reports to trace the origins of odors?



Report locations were “jittered” to maintain anonymity of reporters 12

Origin of Odors: Method Slide

Traveling forward in time, we know that:



Walking 2 mph to the right

2 miles traveled

...in one hour....

10 am
In Dundalk

11 am
In Essex

Not knowing our starting point, we travel backwards based on the path:

We were walking 2 mph, so...

...one hour ago....

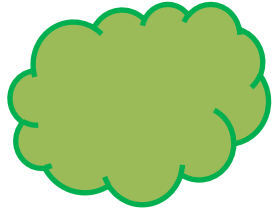
We started 2 miles away...

10 am
In Dundalk

11 am
In Essex

Origin of Odors: Method Slide

Traveling forward in time, we know that:



Drifting 2 mph to the east

2 miles traveled

...in one hour....

10 am
In Dundalk

11 am
In Essex

Not knowing the origin of the odor, the winds are followed backward:

Were drifting 2 mph east...

...one hour ago....

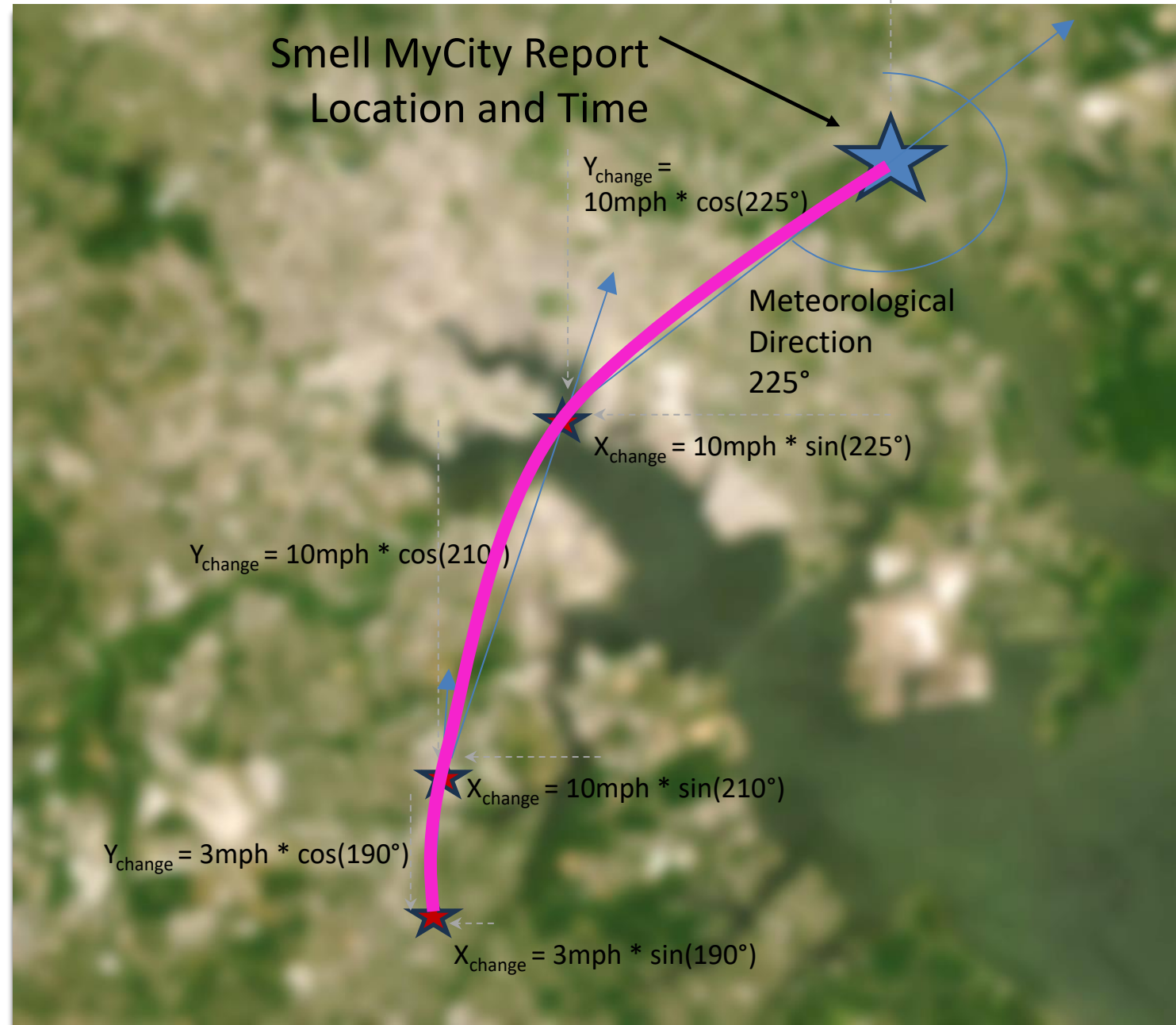
Odor was 2 miles to the west...

11 am
In Essex

Origin of Odors: Method Slide

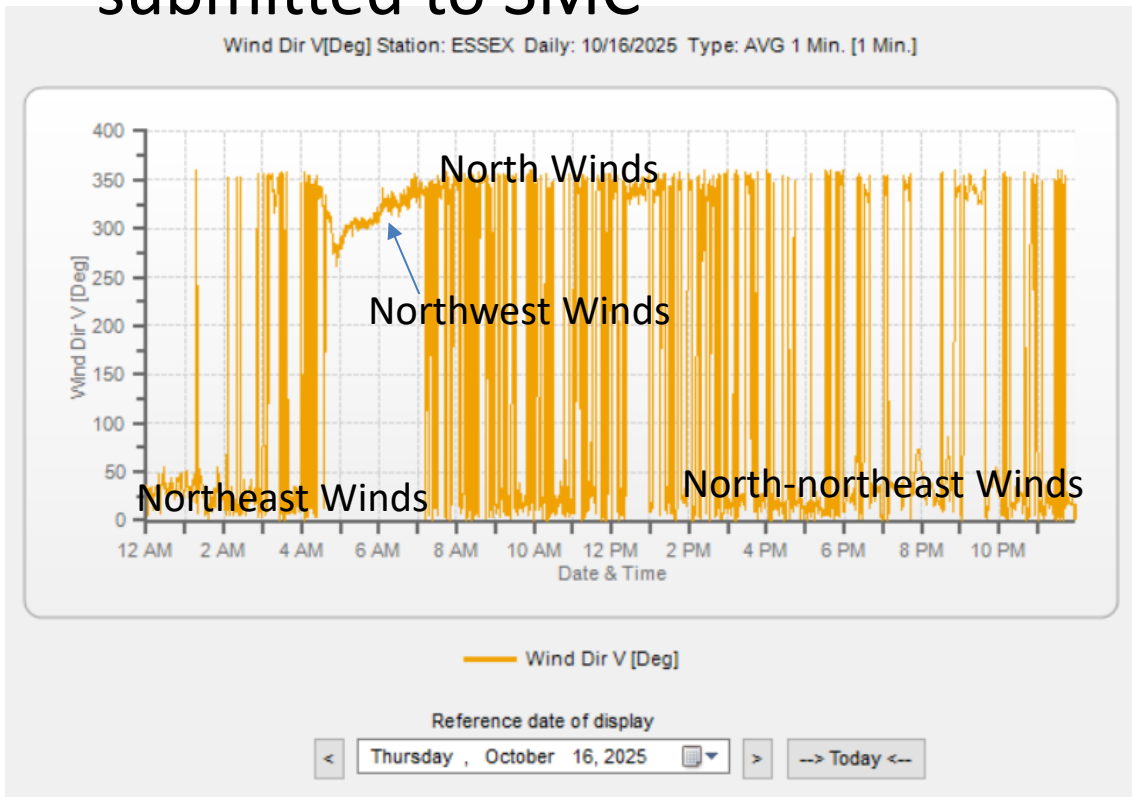
- At 12pm: 10mph from 225°
- At 12:01pm: 10mph from 210°
- At 12:02pm: 3 mph from 190°

We don't know where the odor starts, but we do know where it passes probable sources.

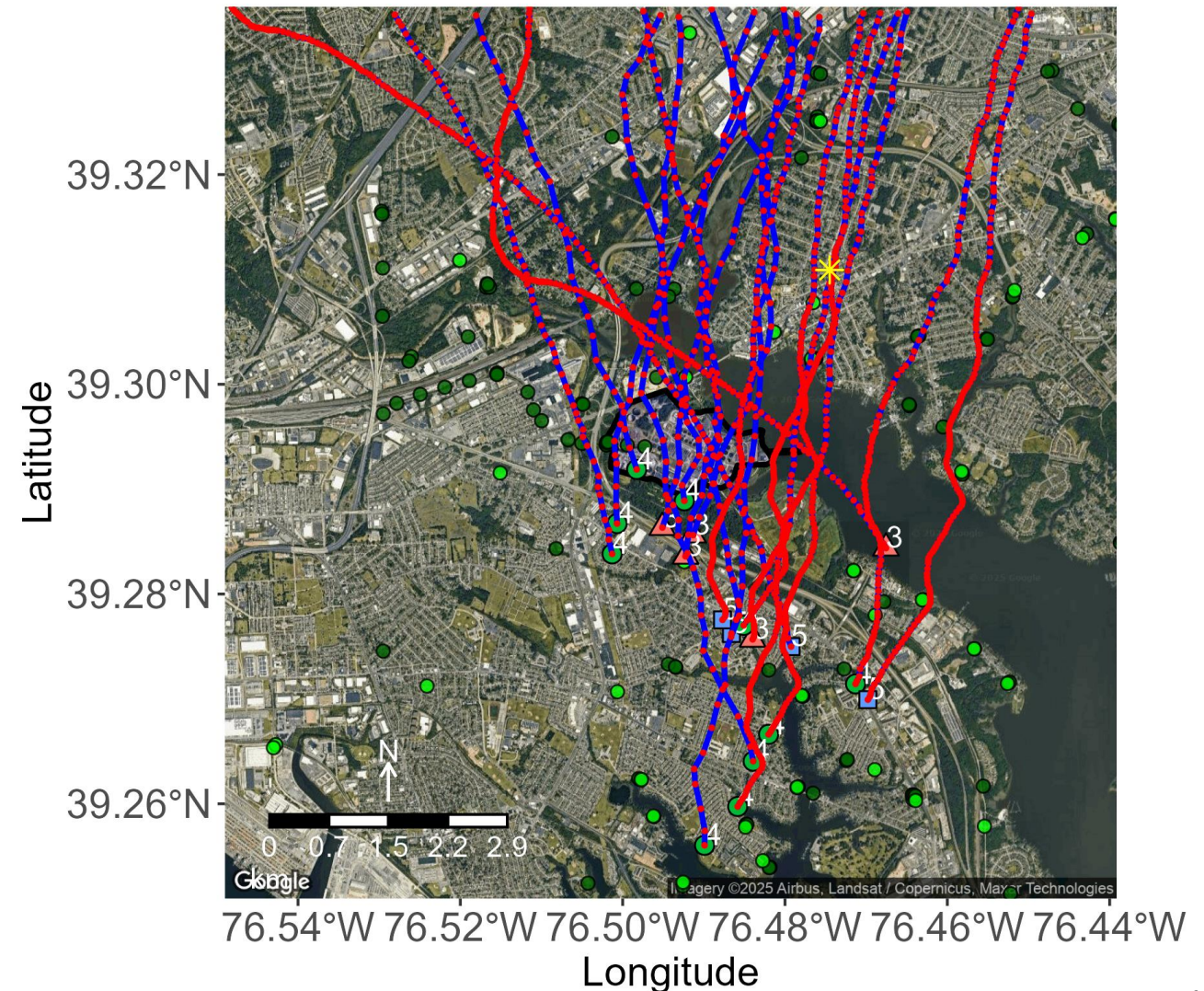


Single Day – Oct 16, 2025

- Northerly winds reported all day at Essex (~345-45)
- Air traced back from when report submitted to SMC



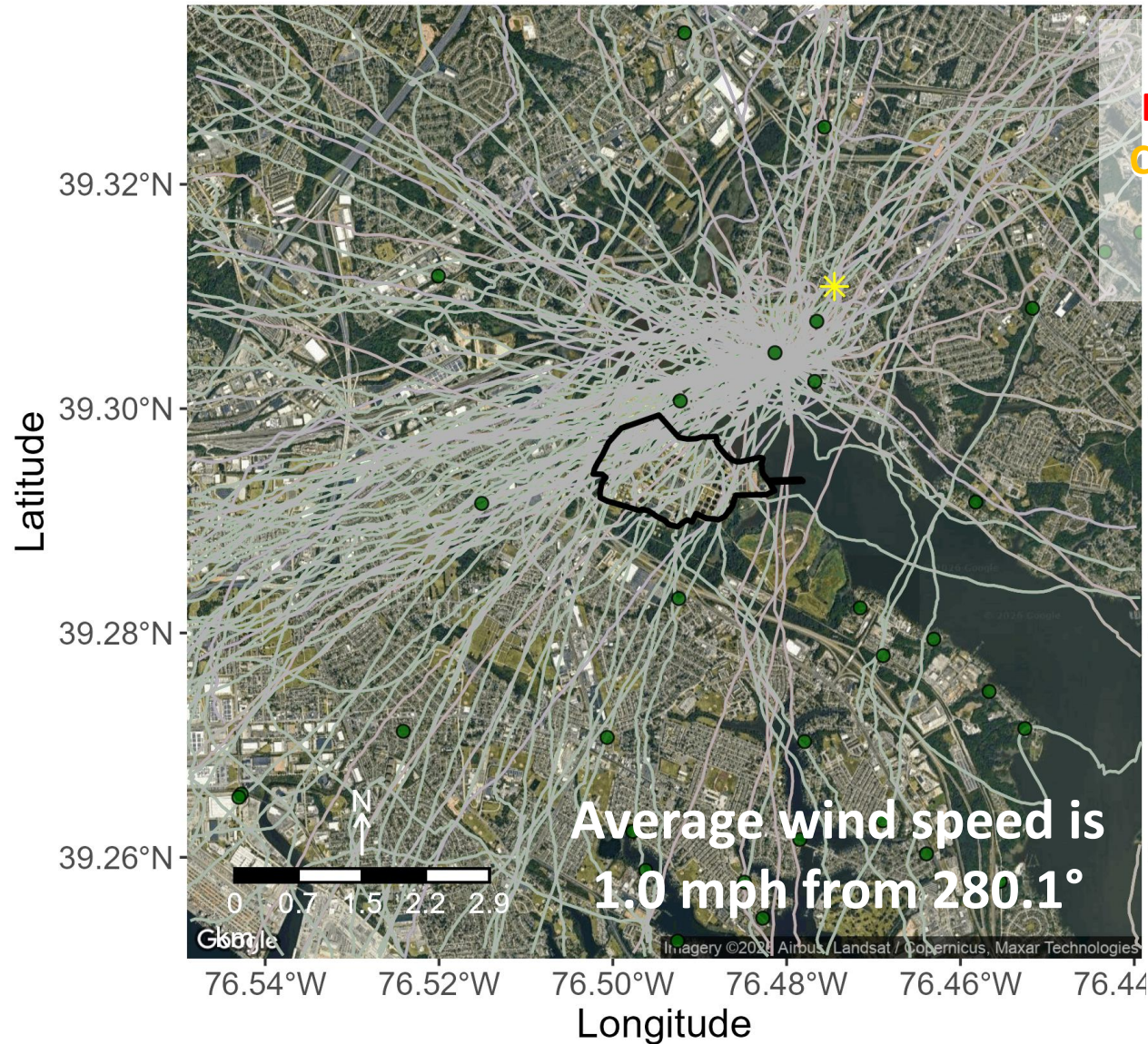
SmellMyCity Reports (3+) with Smell Path
Oct. 16, 2025



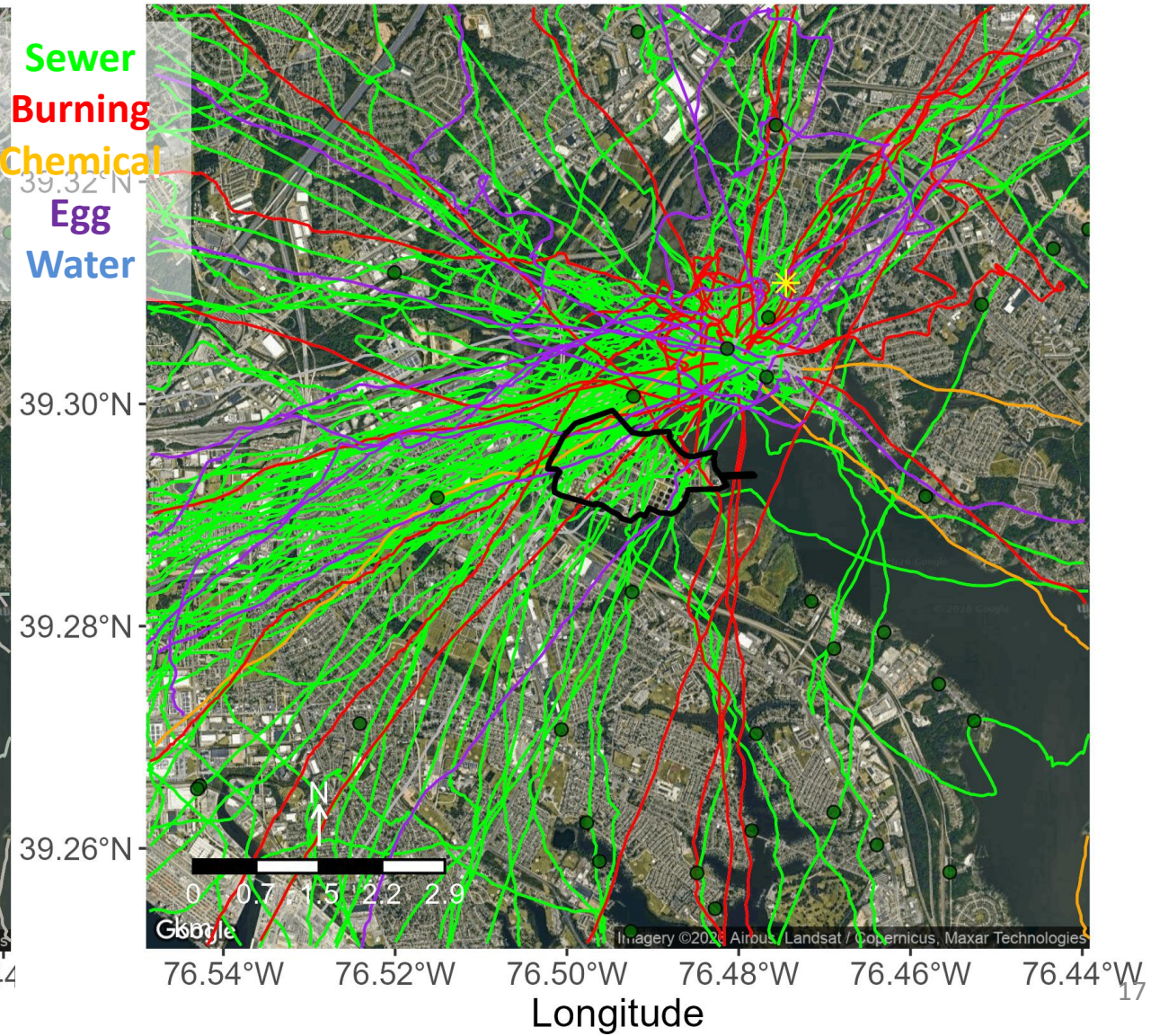
*SmellMyCity report locations were rounded and randomly 'jittered' to preserve anonymity¹⁶

“Smell MyCity” Campaign: Geographic Filtering

SmellMyCity Reports (4+) with Smell Path
Villa Capri & Essex

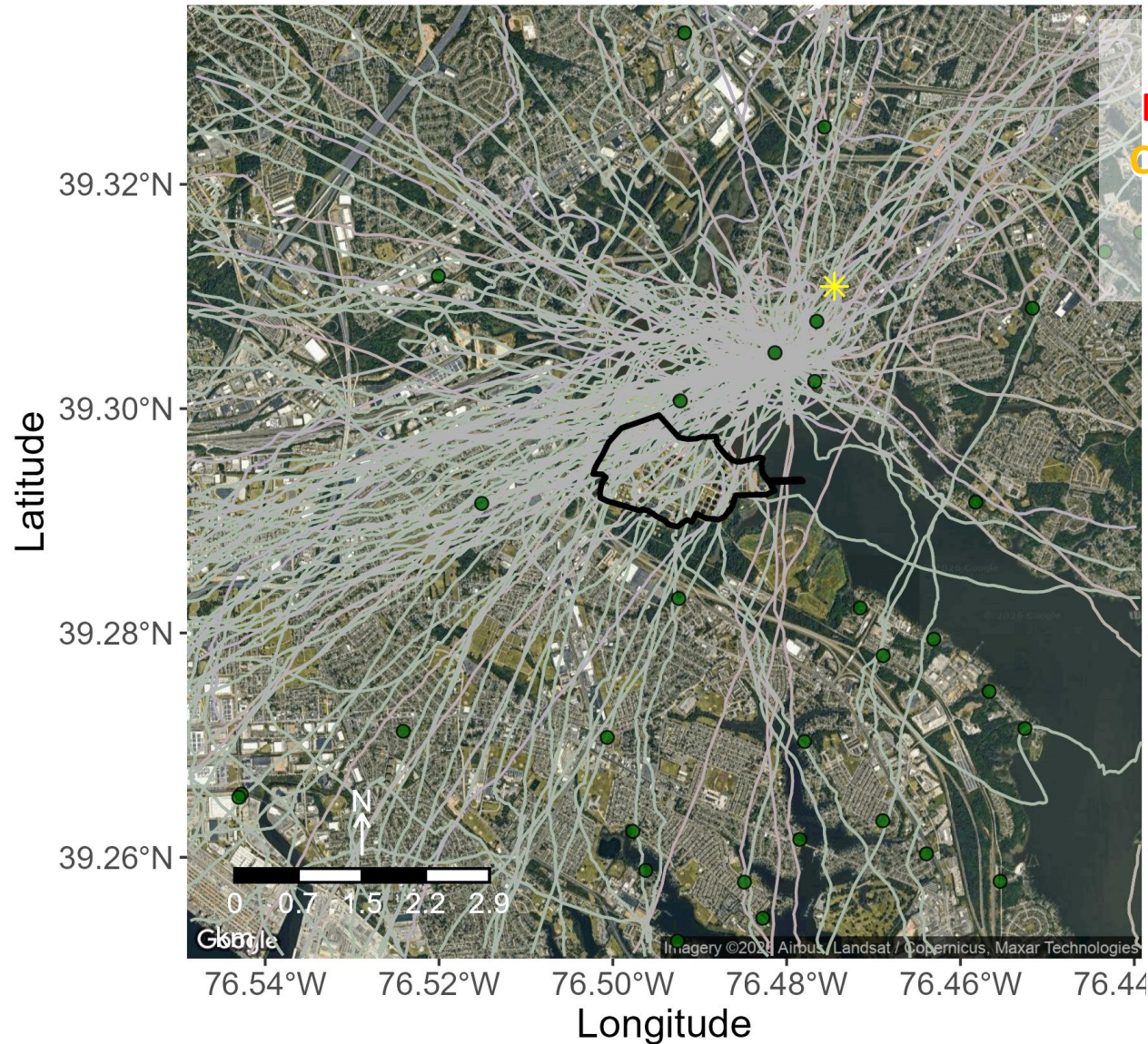


SmellMyCity Reports (4+) with Smell Path
Villa Capri & Essex

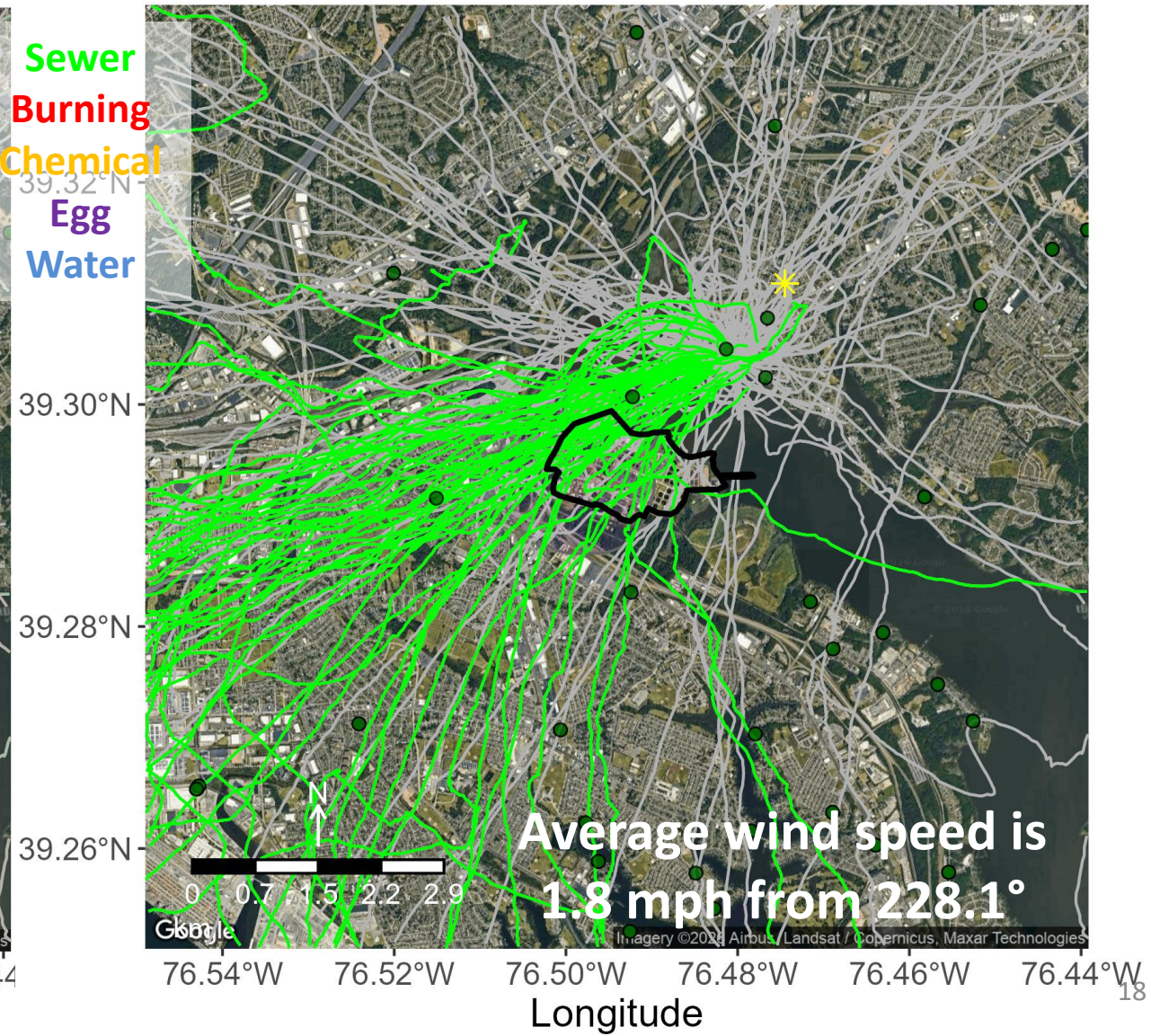


“Smell MyCity” Campaign: Geographic Filtering

SmellMyCity Reports (4+) with Smell Path
Villa Capri & Essex

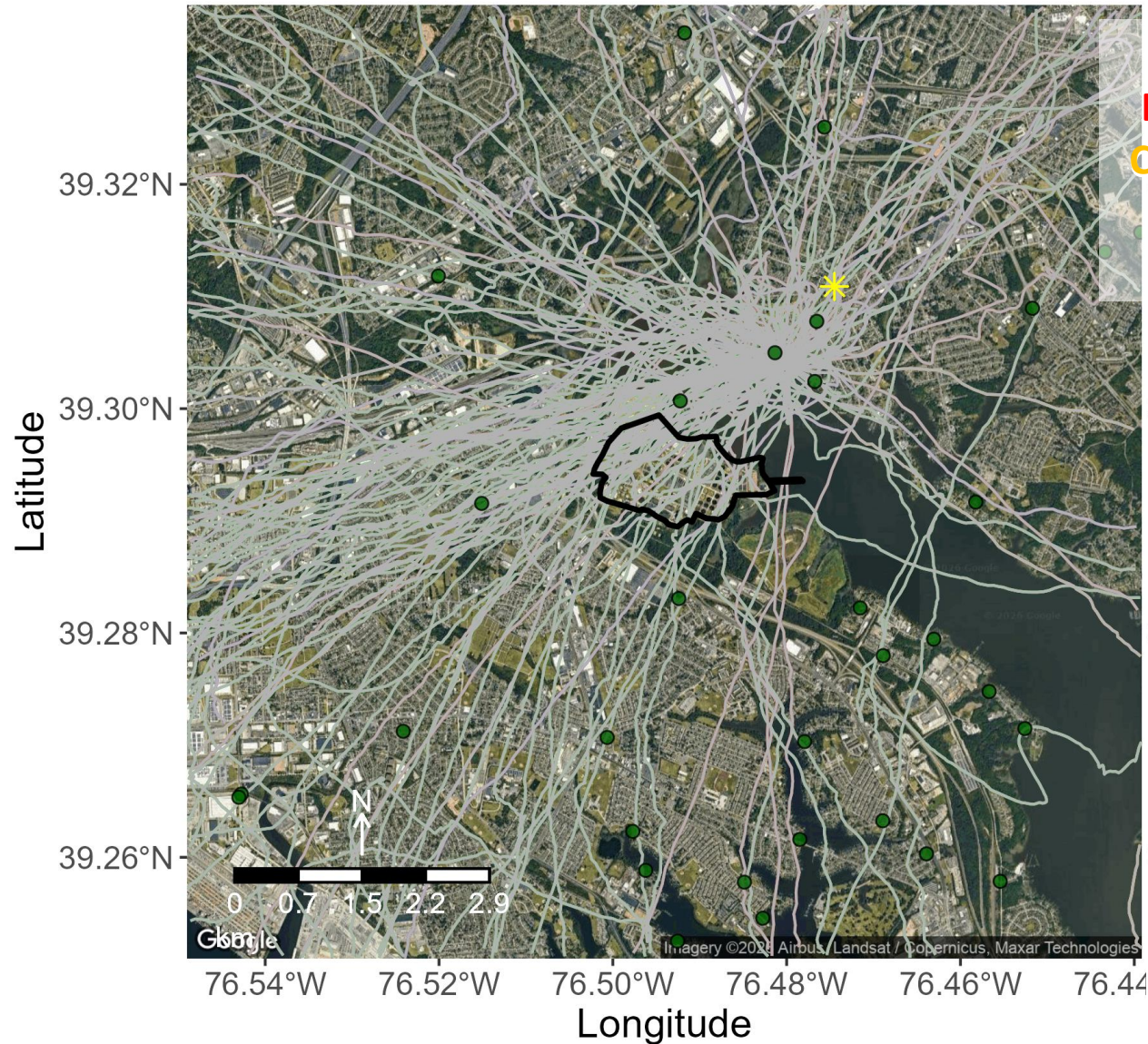


SmellMyCity Reports (4+) with Smell Path
Villa Capri & Essex

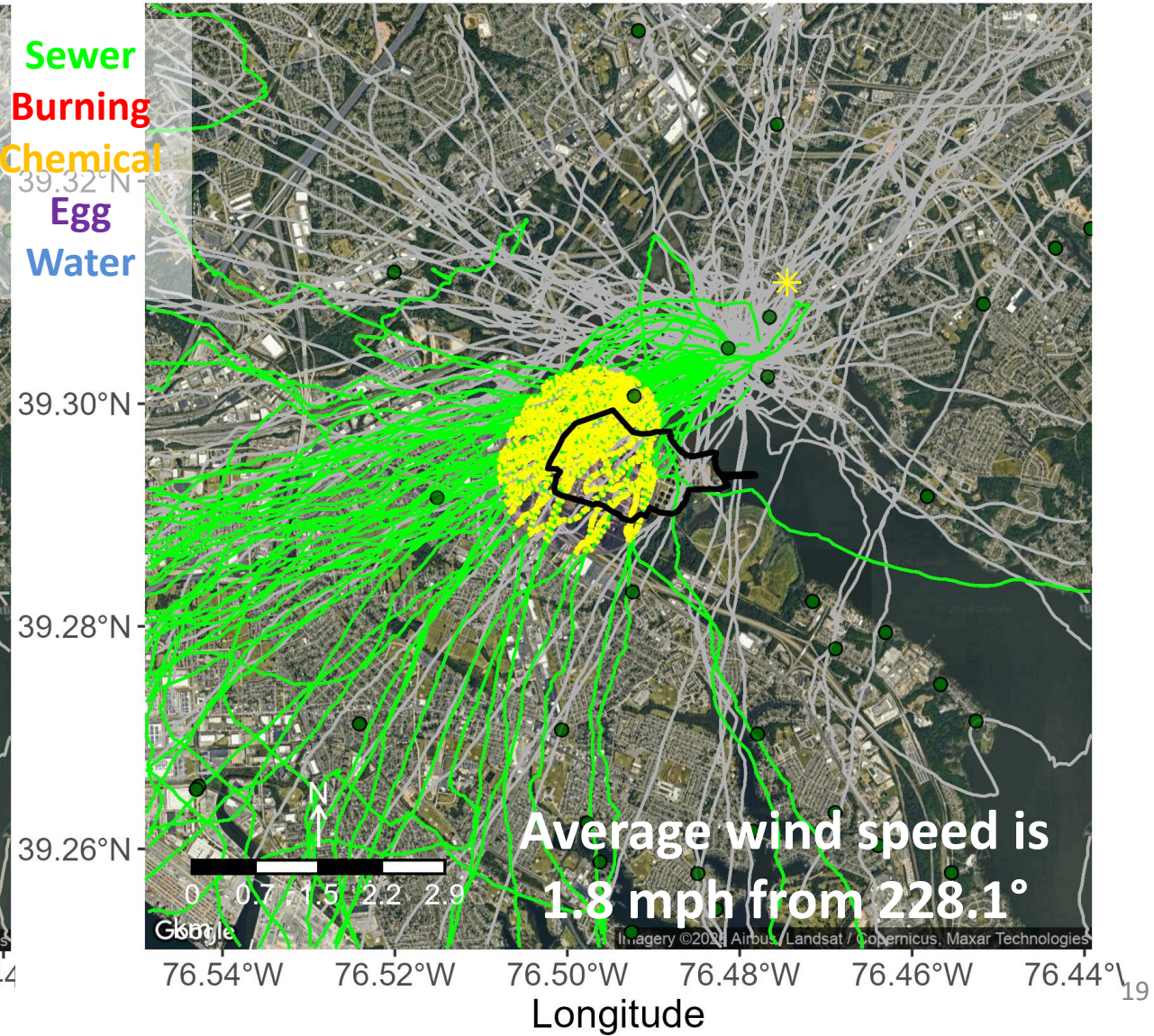


“Smell MyCity” Campaign: Geographic Filtering

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SmellMyCity Reports (4+) with Smell Path
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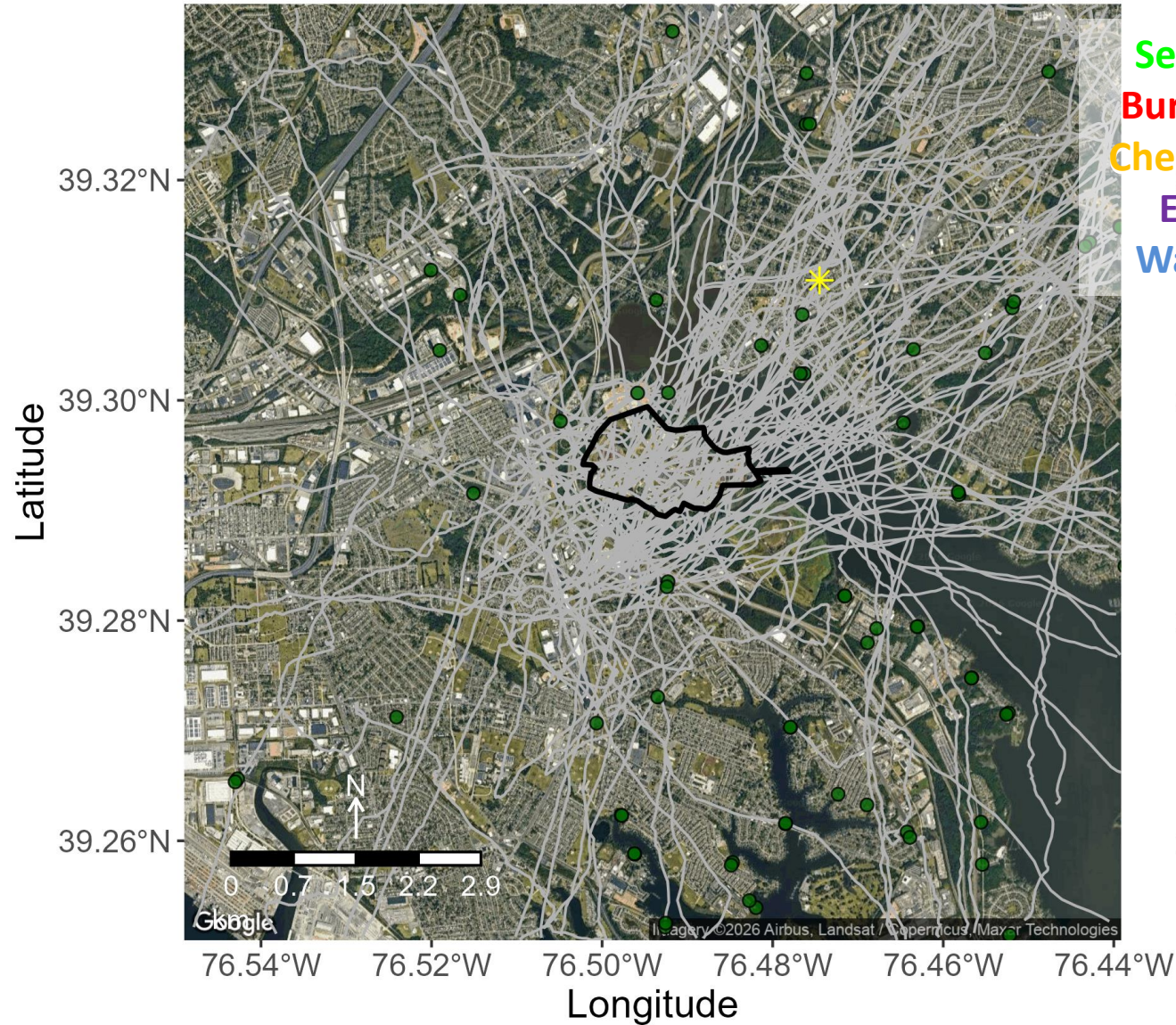
Times Over Back River WWTP based on SMC

	A	B	C	D	E	F	G	H	I	J	K	L
1	step	latitude	longitude	datetime	trajnum	smell_valu	smell_desc	symptoms	source_cat	tod_min	hr	
2	17	39.29807	-76.4896	5/27/2025 15:29	4	5	BRWWTP s	NA	sewage	929	15	
3	18	39.29765	-76.4901	5/27/2025 15:28	4	5	BRWWTP s	NA	sewage	928	15	
4	19	39.29709	-76.4905	5/27/2025 15:27	4	5	BRWWTP s	NA	sewage	927	15	
5	20	39.29662	-76.4909	5/27/2025 15:26	4	5	BRWWTP s	NA	sewage	926	15	
6	21	39.29564	-76.4917	5/27/2025 15:25	4	5	BRWWTP s	NA	sewage	925	15	
7	22	39.29456	-76.4925	5/27/2025 15:24	4	5	BRWWTP s	NA	sewage	924	15	
8	23	39.29312	-76.4931	5/27/2025 15:23	4	5	BRWWTP s	NA	sewage	923	15	
9	24	39.29195	-76.4937	5/27/2025 15:22	4	5	BRWWTP s	NA	sewage	922	15	
10	25	39.29121	-76.4942	5/27/2025 15:21	4	5	BRWWTP s	NA	sewage	921	15	
11	26	39.29069	-76.4949	5/27/2025 15:20	4	5	BRWWTP s	NA	sewage	920	15	
12	27	39.28927	-76.4954	5/27/2025 15:19	4	5	BRWWTP s	NA	sewage	919	15	
13	28	39.28857	-76.4959	5/27/2025 15:18	4	5	BRWWTP s	NA	sewage	918	15	
14	29	39.28814	-76.4963	5/27/2025 15:17	4	5	BRWWTP s	NA	sewage	917	15	
15	30	39.28763	-76.4966	5/27/2025 15:16	4	5	BRWWTP s	NA	sewage	916	15	
16	31	39.28692	-76.4973	5/27/2025 15:15	4	5	BRWWTP s	NA	sewage	915	15	
17	11	39.30183	-76.4932	5/27/2025 15:50	5	5	BRWWTP o	NA	sewage	950	15	
18	12	39.30171	-76.494	5/27/2025 15:49	5	5	BRWWTP o	NA	sewage	949	15	
19	13	39.30125	-76.4949	5/27/2025 15:48	5	5	BRWWTP o	NA	sewage	948	15	
20	14	39.30106	-76.4954	5/27/2025 15:47	5	5	BRWWTP o	NA	sewage	947	15	
21	15	39.30046	-76.4963	5/27/2025 15:46	5	5	BRWWTP o	NA	sewage	946	15	
22	16	39.3001	-76.4968	5/27/2025 15:45	5	5	BRWWTP o	NA	sewage	945	15	
23	17	39.29982	-76.4975	5/27/2025 15:44	5	5	BRWWTP o	NA	sewage	944	15	
24	18	39.29931	-76.4984	5/27/2025 15:43	5	5	BRWWTP o	NA	sewage	943	15	
25	19	39.29898	-76.4994	5/27/2025 15:42	5	5	BRWWTP o	NA	sewage	942	15	
26	20	39.29893	-76.4997	5/27/2025 15:41	5	5	BRWWTP o	NA	sewage	941	15	
27	21	39.2989	-76.4999	5/27/2025 15:40	5	5	BRWWTP o	NA	sewage	940	15	
28	22	39.29872	-76.5	5/27/2025 15:39	5	5	BRWWTP o	NA	sewage	939	15	

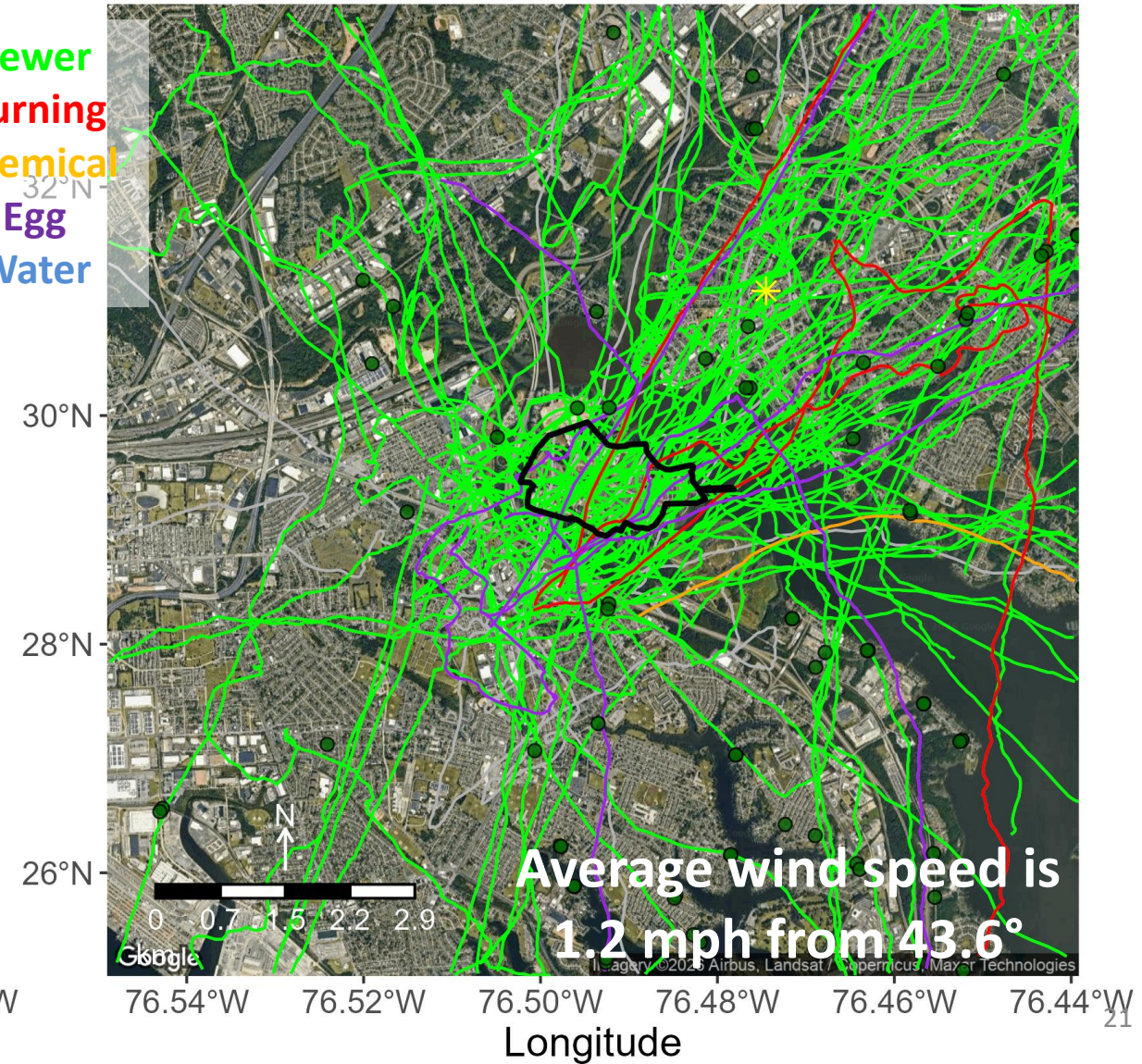


“Smell MyCity” Campaign: Geographic Filtering

SmellMyCity Reports (4+) with Smell Path
North Pt Blvd & Dundalk

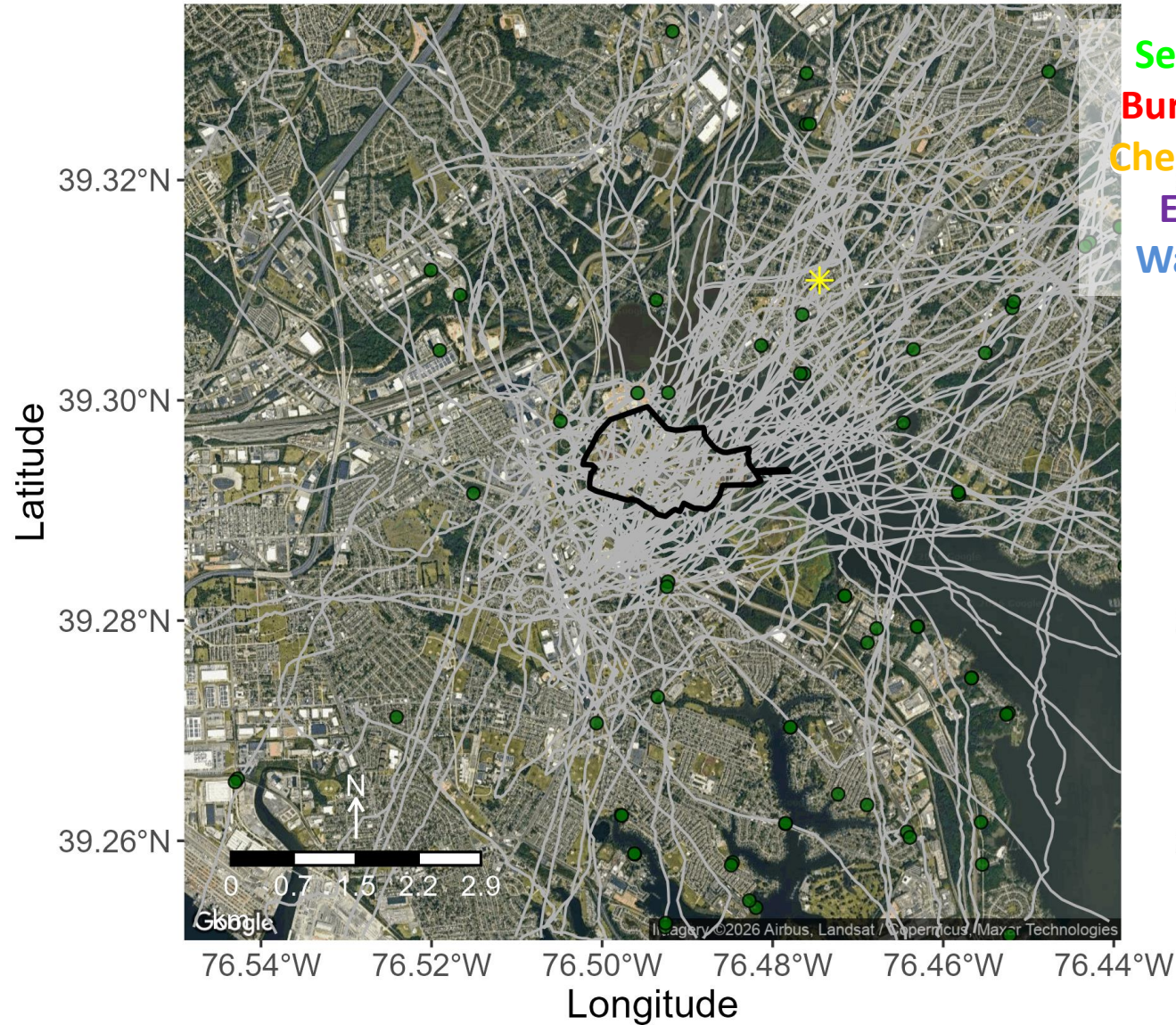


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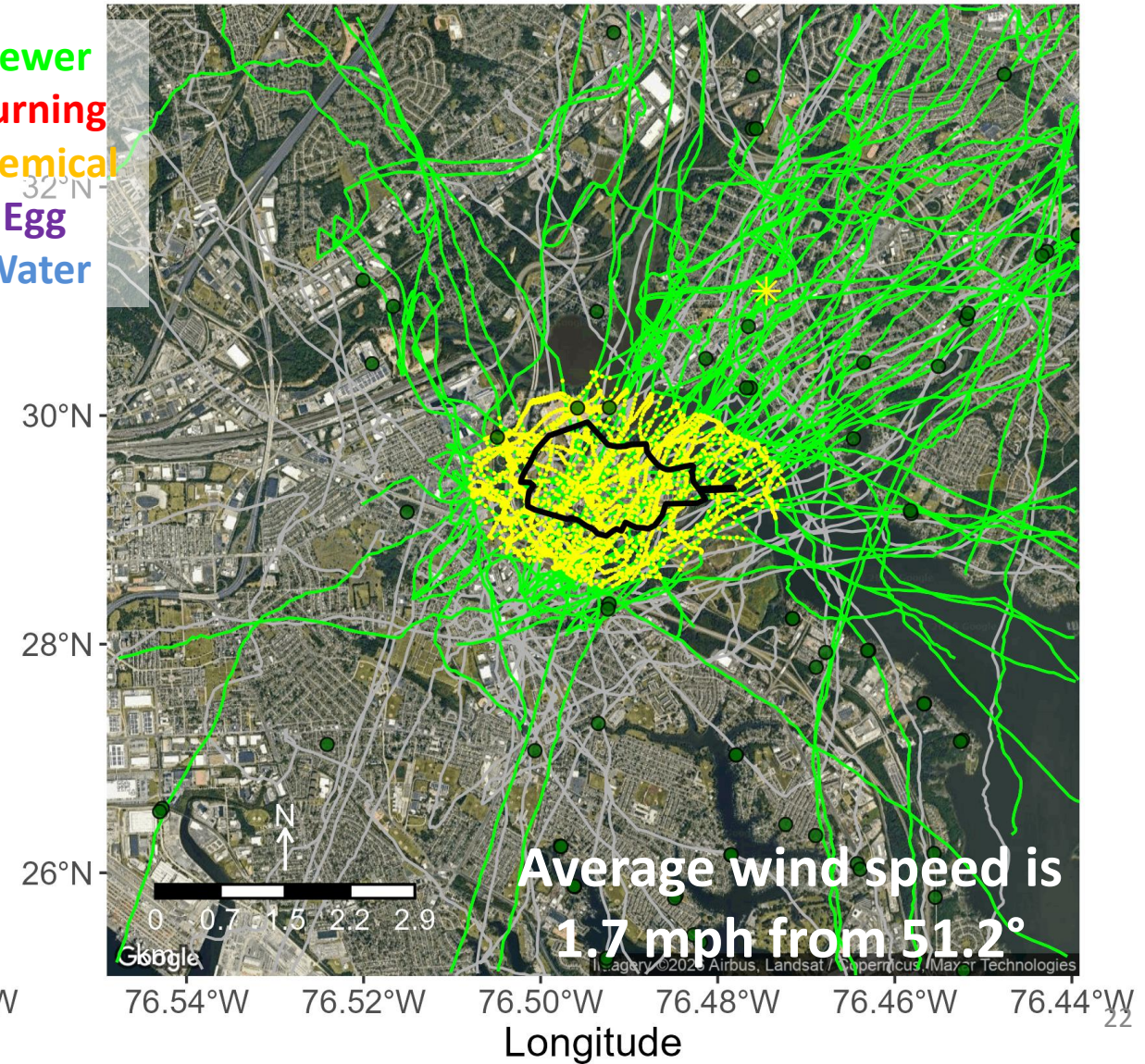


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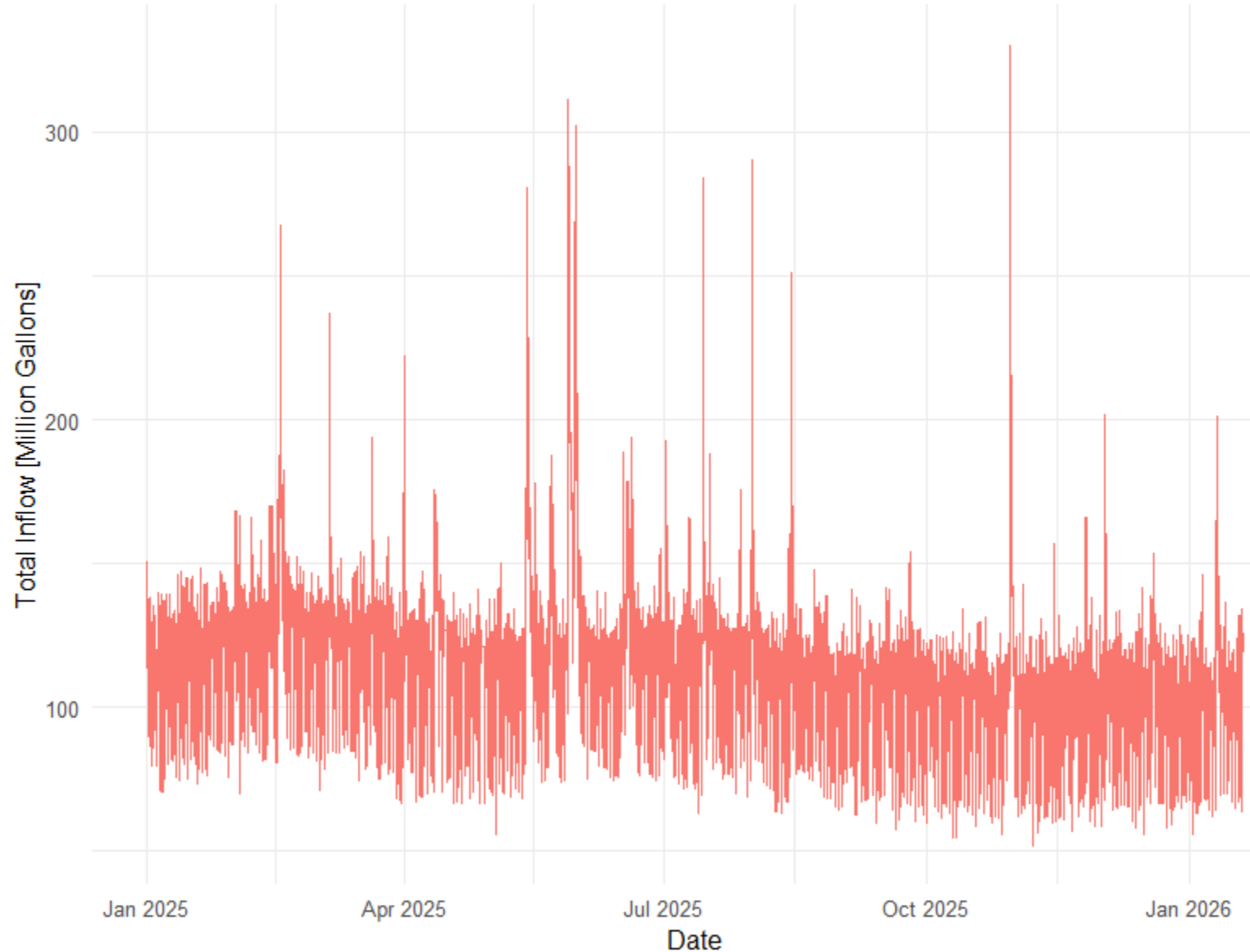
SmellMyCity Reports (4+) with Smell Path
North Pt Blvd & Dundalk



Next Steps for Odor Data:

1. Comparison of smell path results to facility operations
2. Additional smell path analysis for low-odor periods
3. Continued data collection to build more results

Back River WWTP Hourly Inflow 2025–Jan 2026



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Baltimore County Updates

County Updates

- Baltimore County has begun passive monitoring at several stations.
- Includes several visits per day, along with the use of a PID (“sniffer”) at several locations
 - No significant findings to date
- Coordination with MDE to provide access to Pump Stations rapidly
- Coordinated with MDE to install permanent monitor at Bread and Cheese PS; adjacent to Walmart





**Stemmers Run New
Inspection 2024
Additional Line Walk 2026**

**Duck Creek
Inspection 2026**

**Eastpoint
Inspection 2012**

**Essex Bridge
Inspection 2026**

**Essex Sub
Inspection 2026**

**Stemmers Run Old
Inspection 2024
Additional Line Walk 2026**

**Bread & Cheese
Inspection 2024
Additional Line Walk 2026**

**Gray Manor PCCP
Inspection 2023
Additional Line Walk 2026**

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When we reviewed all odor spikes, the overall levels were low. To be extra cautious, we focused on the highest readings within those low levels. That review showed the sludge pad, gravity sludge thickeners (GST) area, and the centrate tanks as the most on-site sources during those events.

Objective Analysis and Monitoring Approach

Baltimore City

Odor complaints are systematically tracked and analyzed, including:

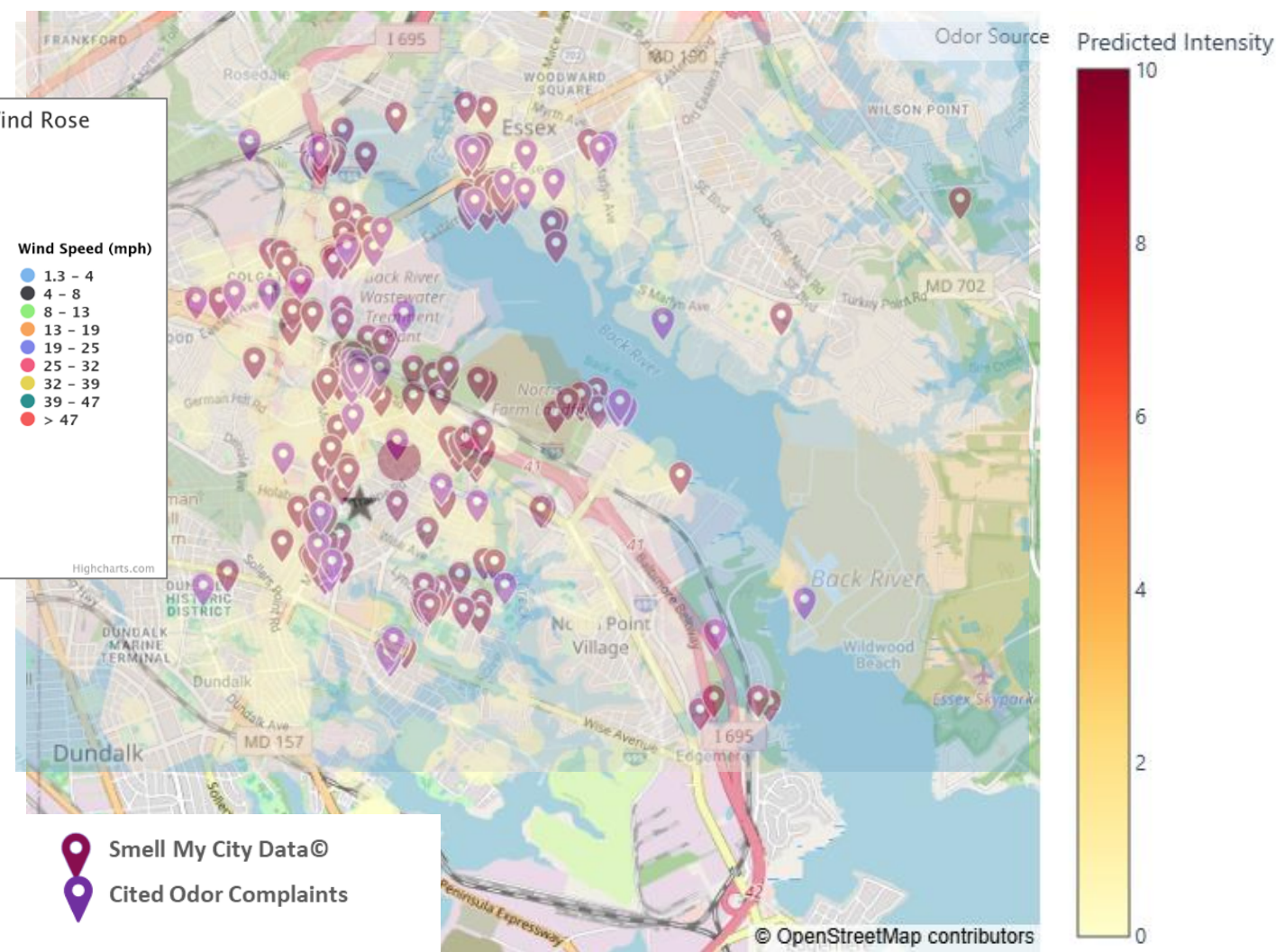
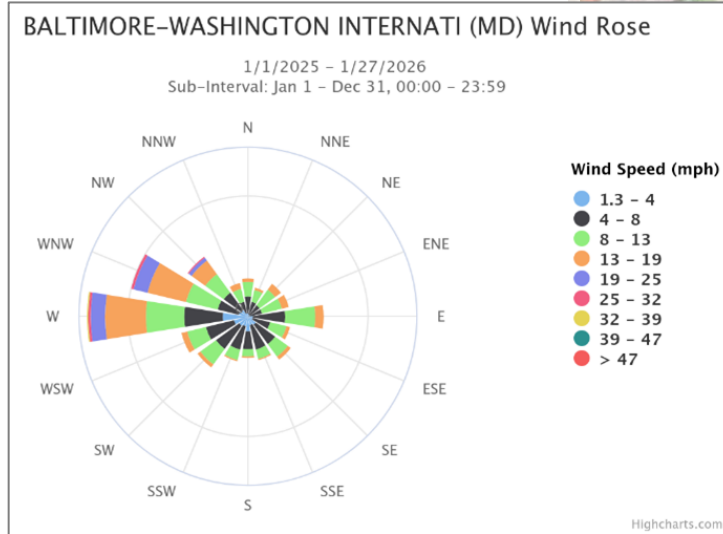
- Date, time, location, and reported intensity (MDE, Call-ins, and Smell My City databases).

Environmental and meteorological conditions are evaluated (using NOAA and MRCC):

- Wind speed and direction.
- Humidity and atmospheric conditions.
- Field-based observations and odor logs are collected by trained staff (taking samples on all three shifts).

Air monitoring and sampling are conducted:

- Hydrogen sulfide (H₂S) monitoring (using Jerome J605 meters.)
- 9 On-site and 18 off-site sampling locations.



Analytical Methods:

- Calculated odor-origin and back-trajectory analysis (Gaussian Plume Model).
- Correlation of complaint patterns with wind conditions and plant operations.

Leadership, transparency, and regional coordination

Baltimore City

The City is committed to protecting community quality of life and addressing odor complaints promptly and responsibly.

Odor management efforts prioritize regulatory compliance and proactive coordination with MDE and County partners.

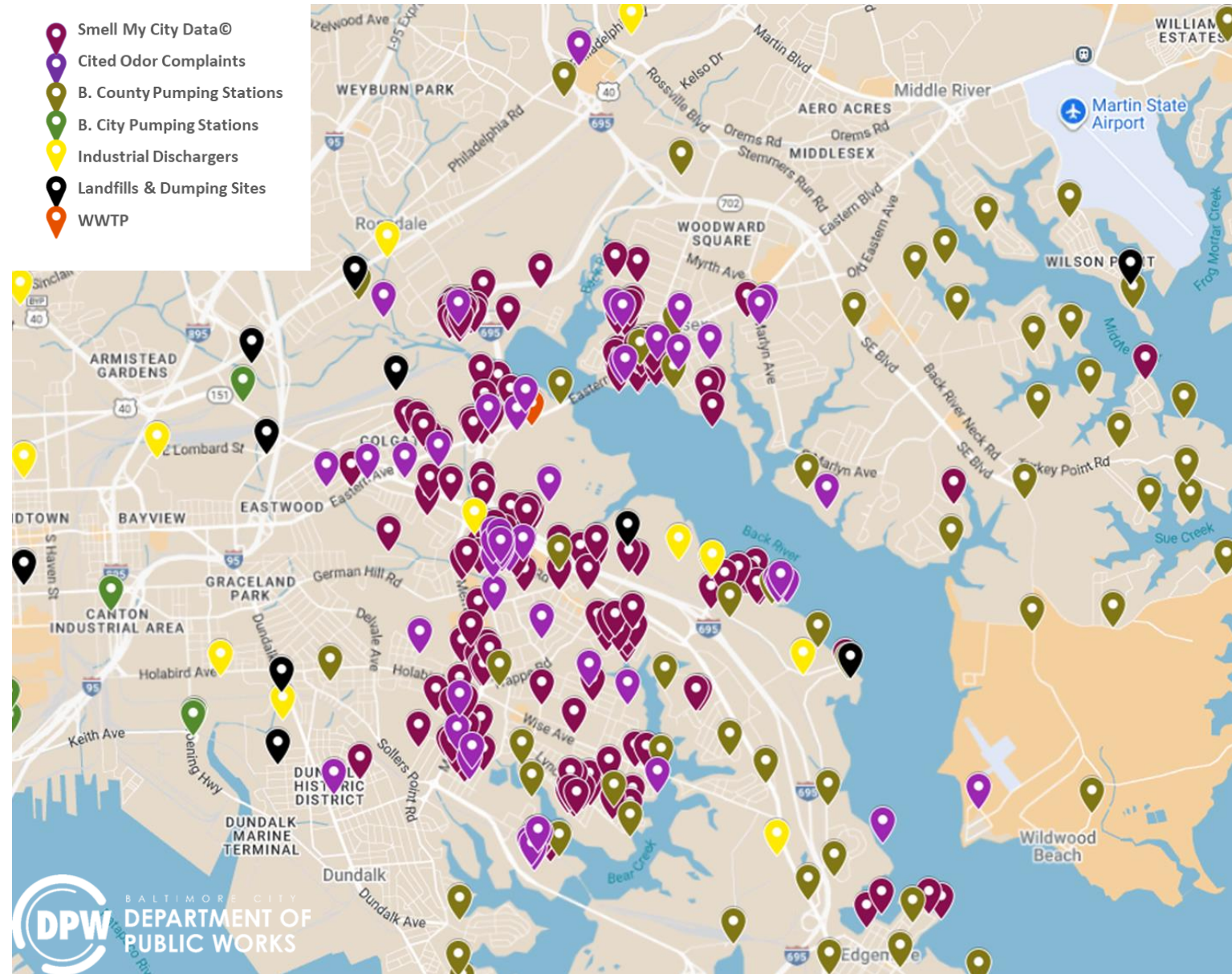


The City recognizes the complexity of odor impacts in the area, which includes multiple potential sources:

- 29 Industrial facilities
- 86 combined Landfills and dump sites
- City 11 wastewater pumping stations
- City 2 wastewater treatment plants (WWTP)

As owner and operator of the WWTP, the City:

- Actively evaluates plant operations as a potential Contributor(s).
- Participates collaboratively in regional odor assessments.
- Supports evidence-based evaluation rather than assumptions.



Mitigation Measures and Ongoing Improvement

Baltimore City

The City has implemented multiple odor-reduction measures, including:

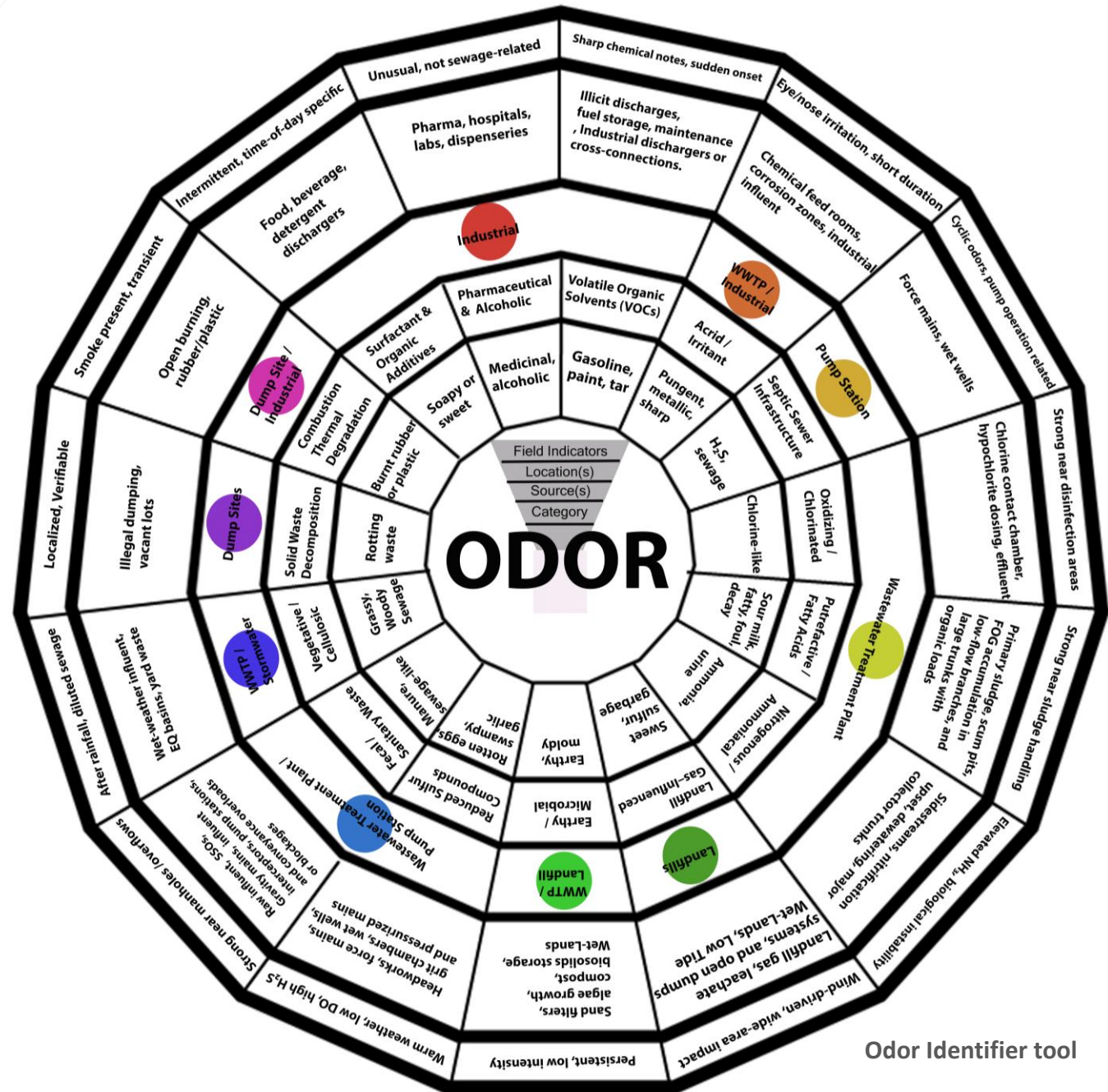
- Operational and process adjustments.
- Improved handling, storage, and timing of odor-generating process areas.
- Enhanced housekeeping and maintenance practices
- Optimization to odor control systems (BioAir Filters and Hydrogen Peroxide dosing).
- Staff training and standardized response protocols.
- Improve Understanding of All Potential Odor Sources and Their Key Indicators.

Early Outcomes:

- Improved response and investigation timelines.
- Enhanced understanding of complaint patterns.
- Increased confidence in odor-source correlation analysis.

Next Steps:

- Continued monitoring and data sharing with MDE and County partners.
- Targeted mitigation actions based on verified data and findings.
- Ongoing engagement with the community and regulators.



Odor Identifier tool

Q & A and Wrap-up



Extra

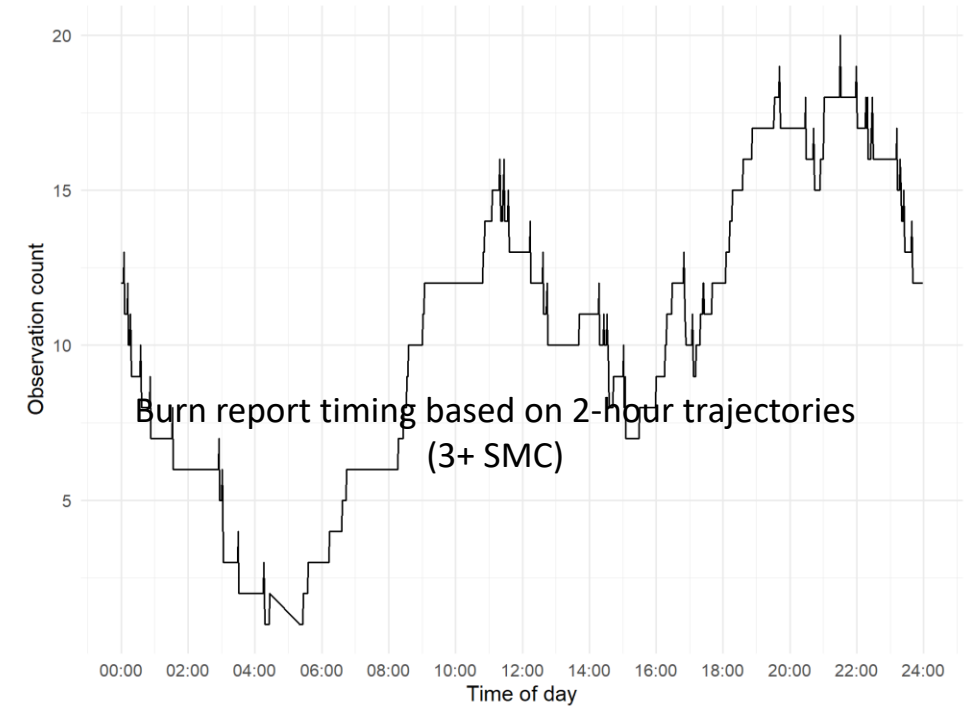
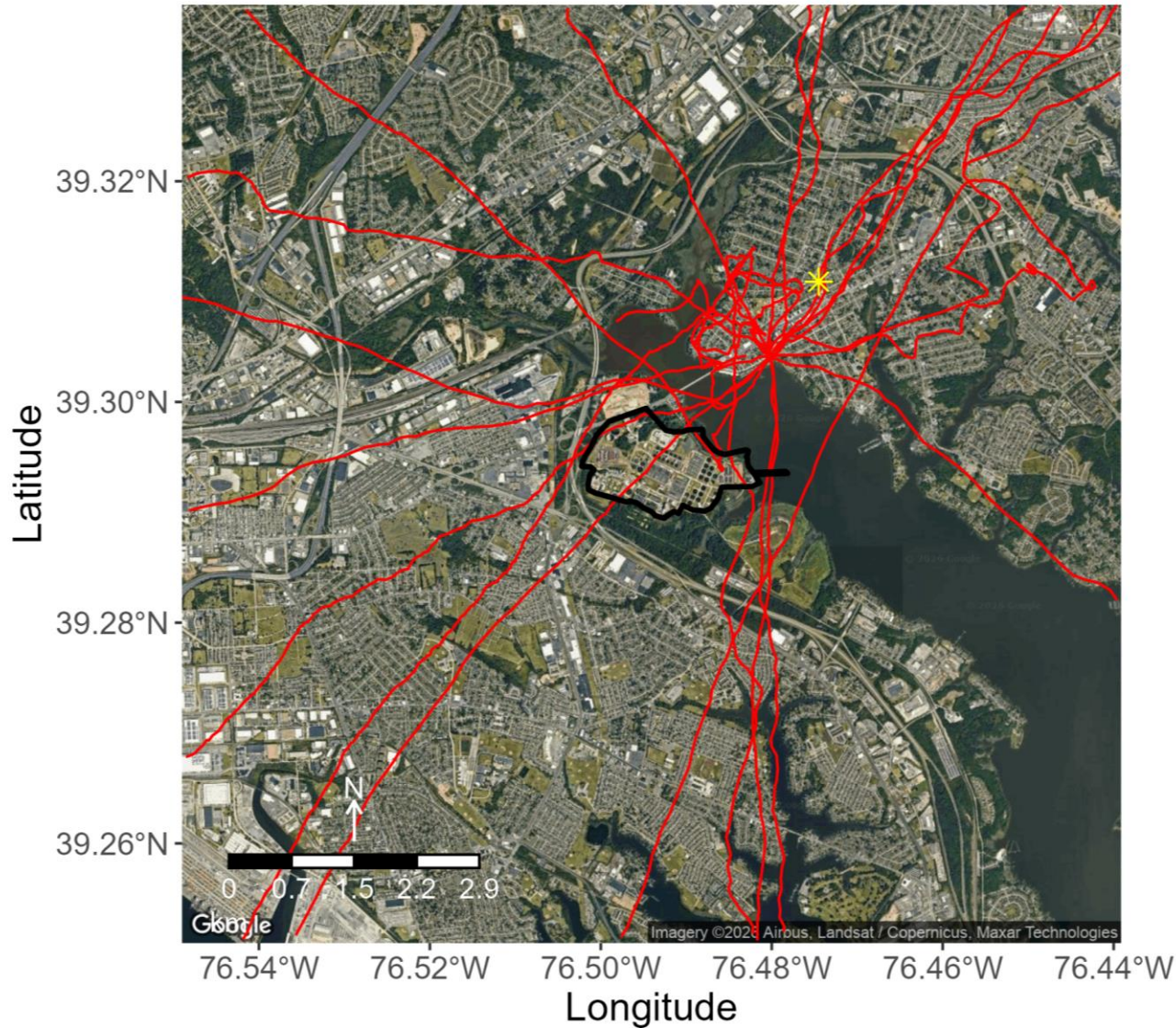


Project Goals From Previous Meeting (November 4, 2025)

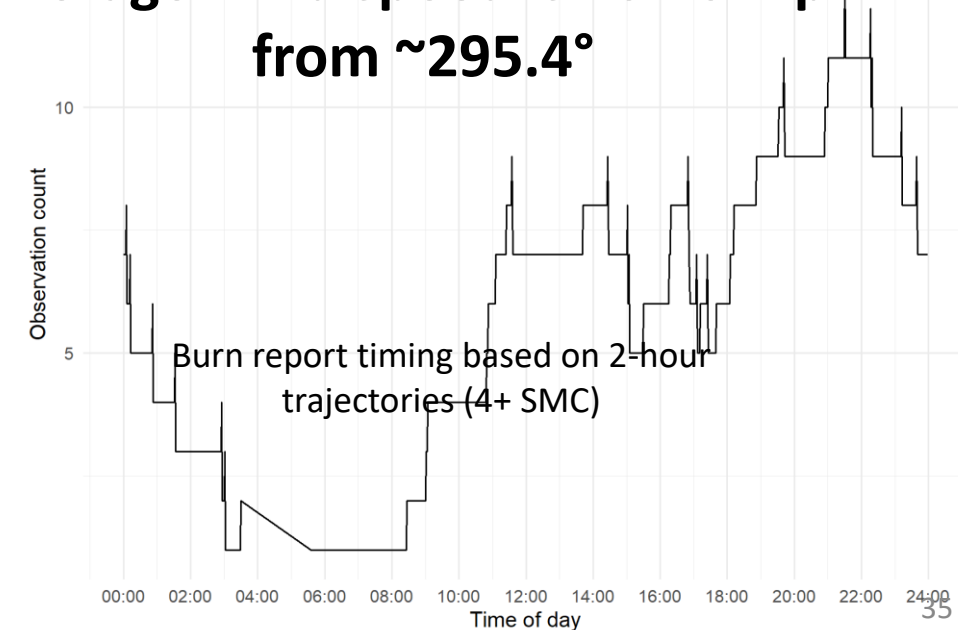


Burning Conditions

SmellMyCity Reports (4+) with Smell Path
Villa Capri & Essex: 'Burning'



**average wind speed is ~0.70 mph
from ~295.4°**

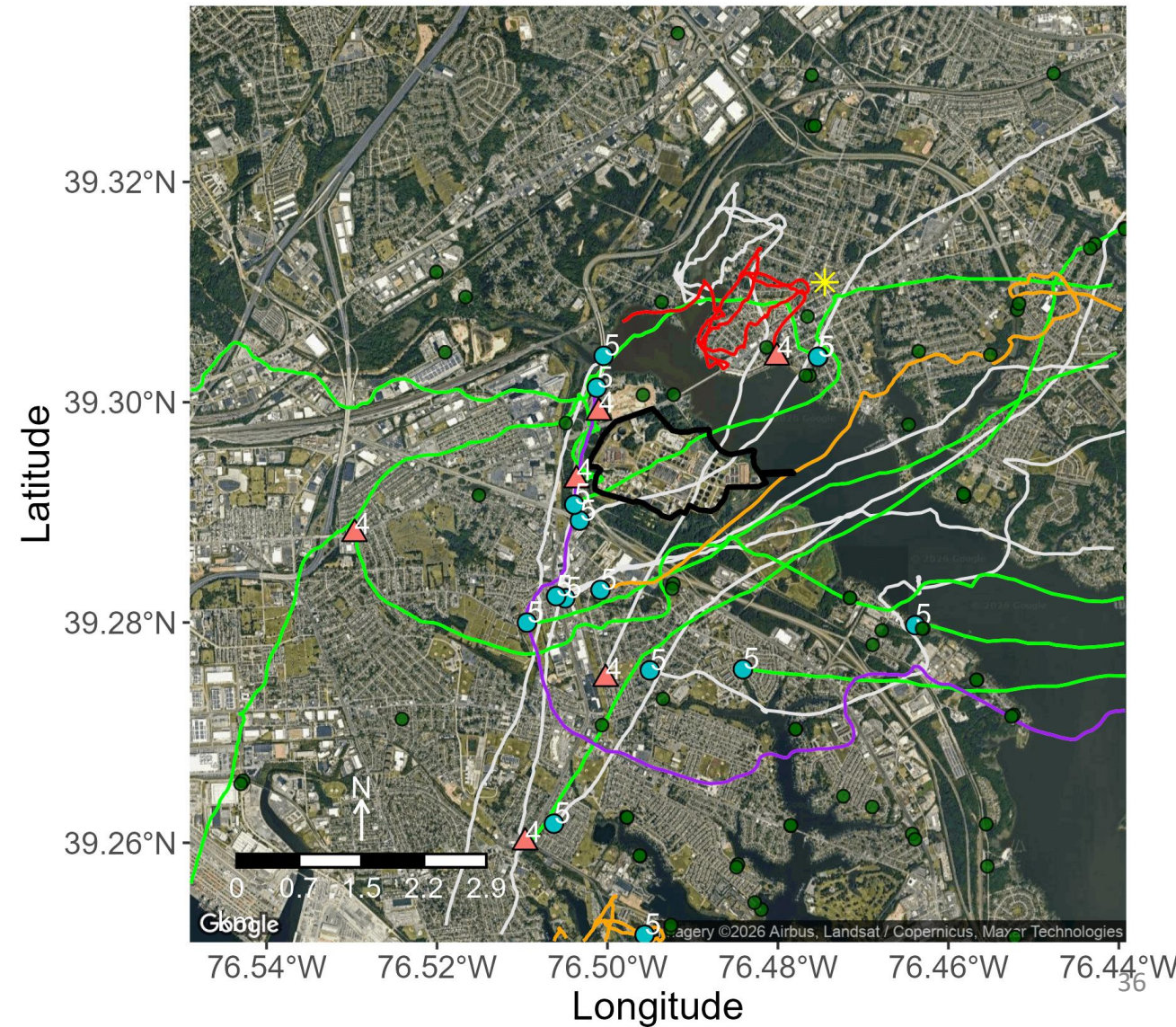


Case Study: January 9-11, 2024

- Burning Evidence in Essex (Red)
- Several Green (sewage) and grey (unclassified) clustered together over the eastern side of the plant
- Eastern cluster includes a “Burning Urine” (orange line) description
- Also several reports and paths on the western side of the WWTP clustered near the Head Works



SmellMyCity Reports (4+) with Smell Path
January 9-11, 2026



Average Met Conditions @ Report Time

- Very light winds (typically from the northeast at Essex, but these would be highly variable location to location)
- Relatively high barometric pressure (consistent with light winds)
- Relatively warm temperature, but average includes summer nights. 62°F is relatively cool for summer evenings

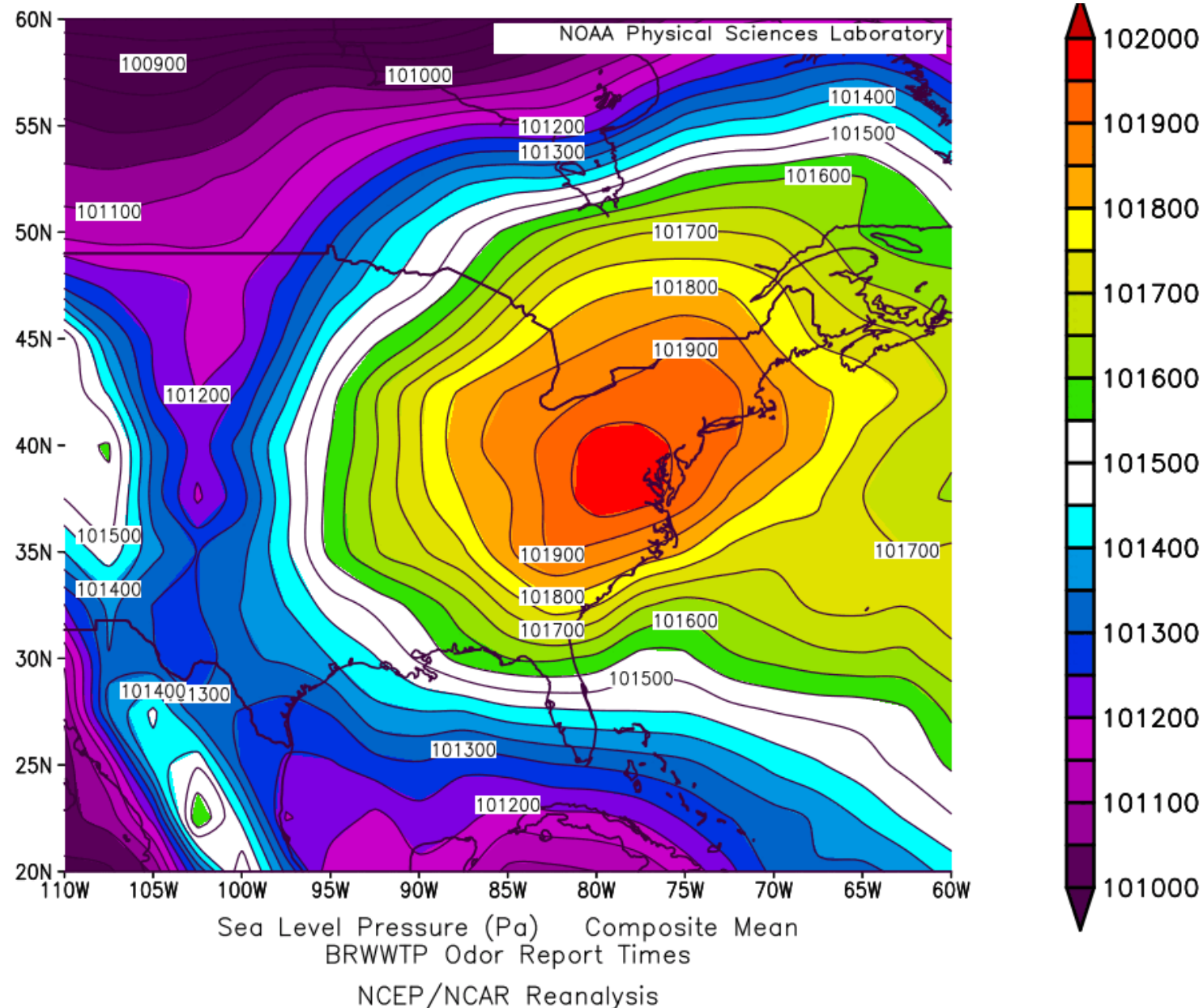
Parameter	Value
Temperature	62.7 °F
Relative Humidity	68.5 %
Barometric Pressure	1017 mb
Wind Speed	0.6 mph
Wind Direction	24 °



Synoptic Weather Conditions During Smell Reports

- High pressure dominates smell reports
- High pressure patterns are associated with light winds and weak pollutant/odor dispersion
- Inversions are frequent, particularly at night

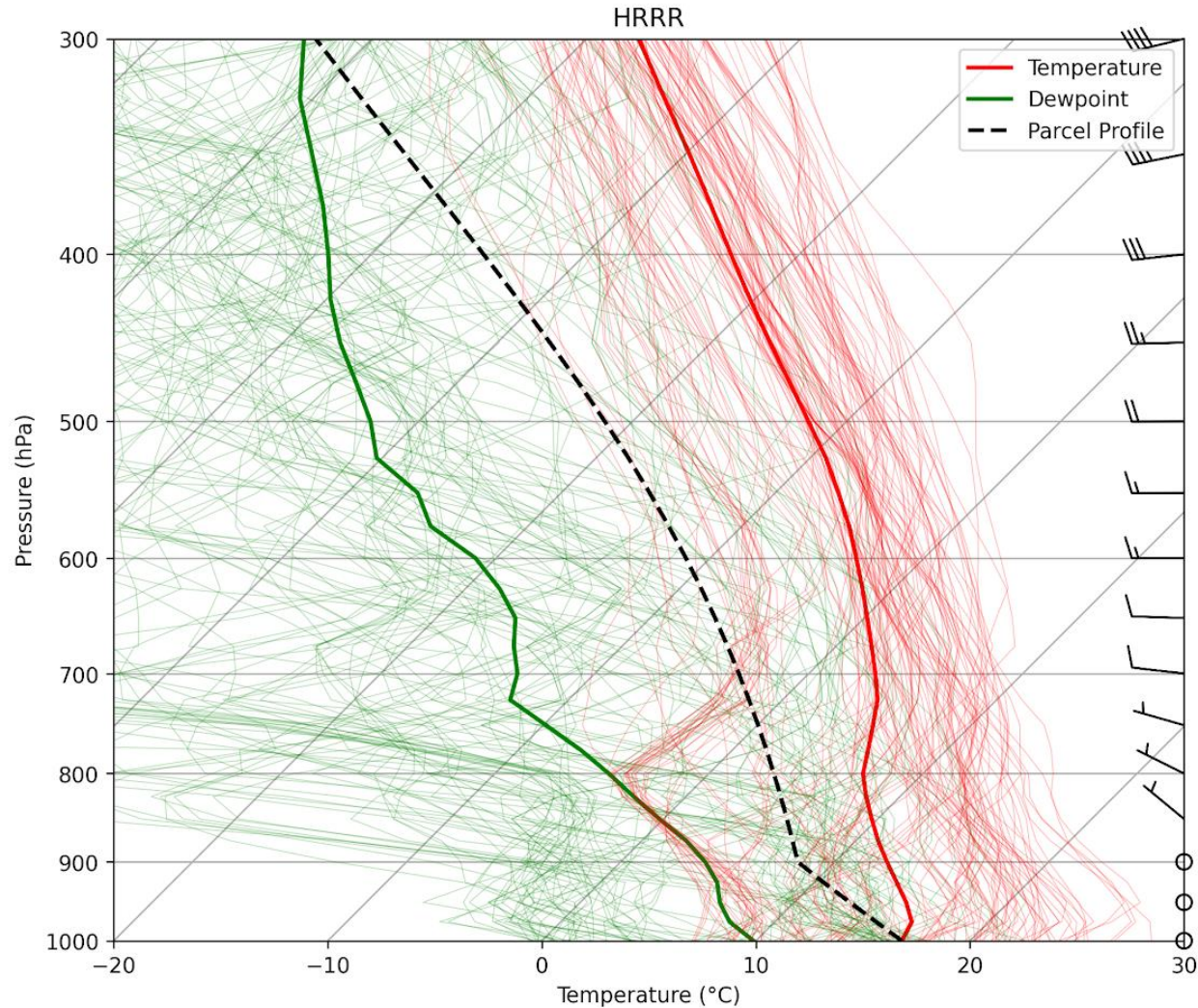
Smell MyCity reports considered for this plot



Atmospheric Profiles

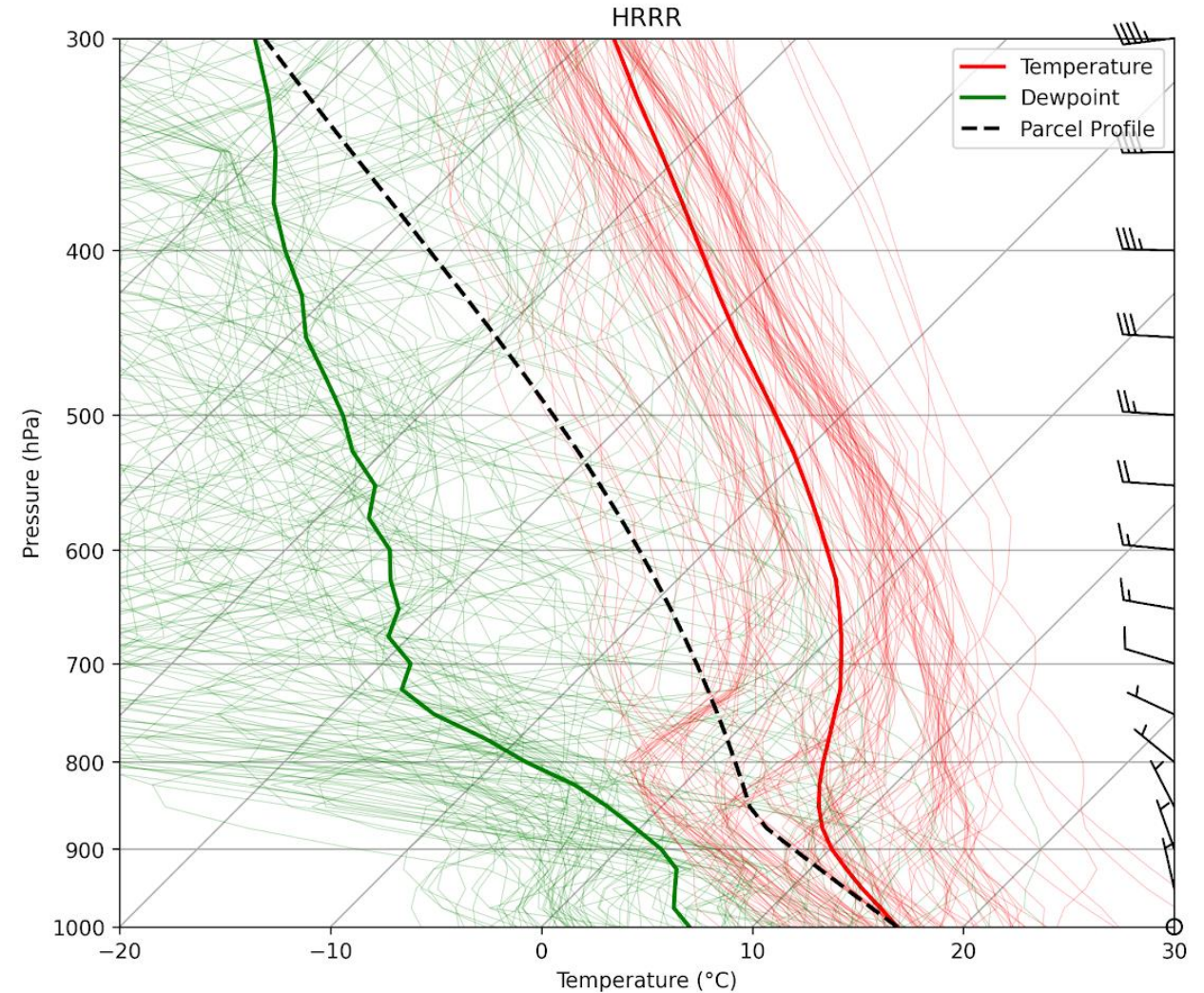
Nocturnal/Stable Profile

(02-14 UTC: 10pm – 10am EDT)



Daytime/Mixed Profile

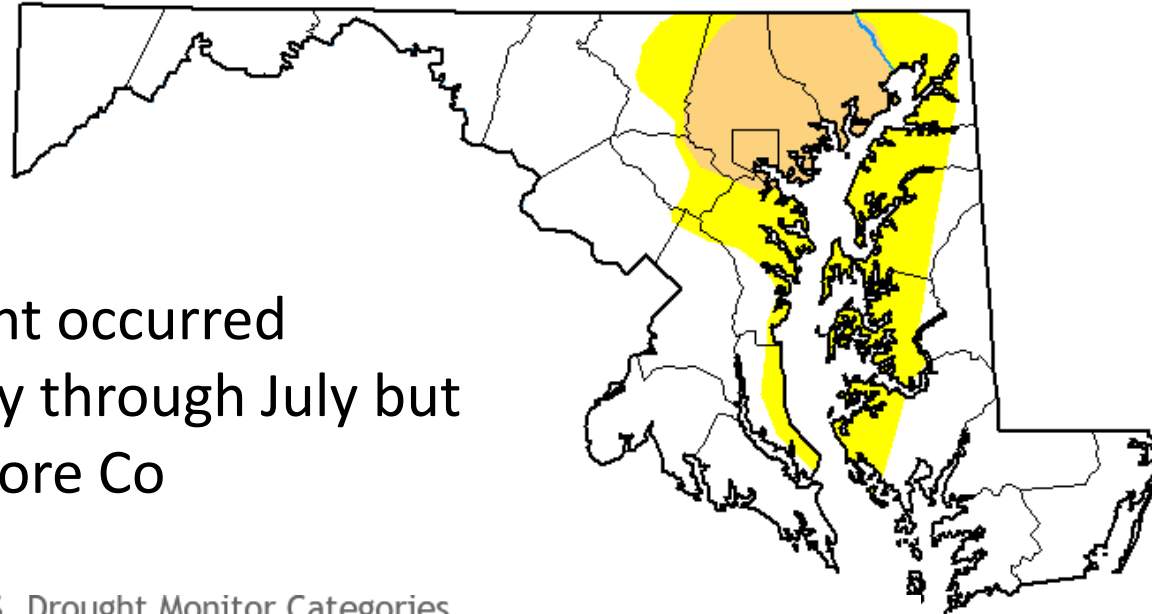
(15-01 UTC: 11am – 9pm EDT)



Rainfall & Drought

- Central and northern Maryland was in severe drop by the middle of May, 2025.
- Significant improvement occurred through the rest of May through July but not as much for Baltimore Co

U.S. Drought Monitor Maryland

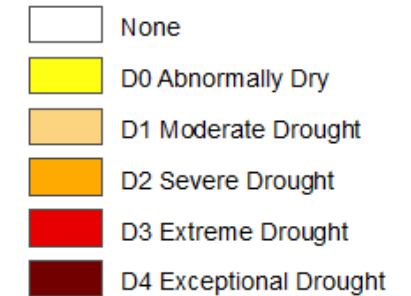


July 1, 2025

(Released Thursday, Jul. 3, 2025)

Valid 8 a.m. EDT

Intensity:



The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <http://droughtmonitor.unl.edu/About.aspx>

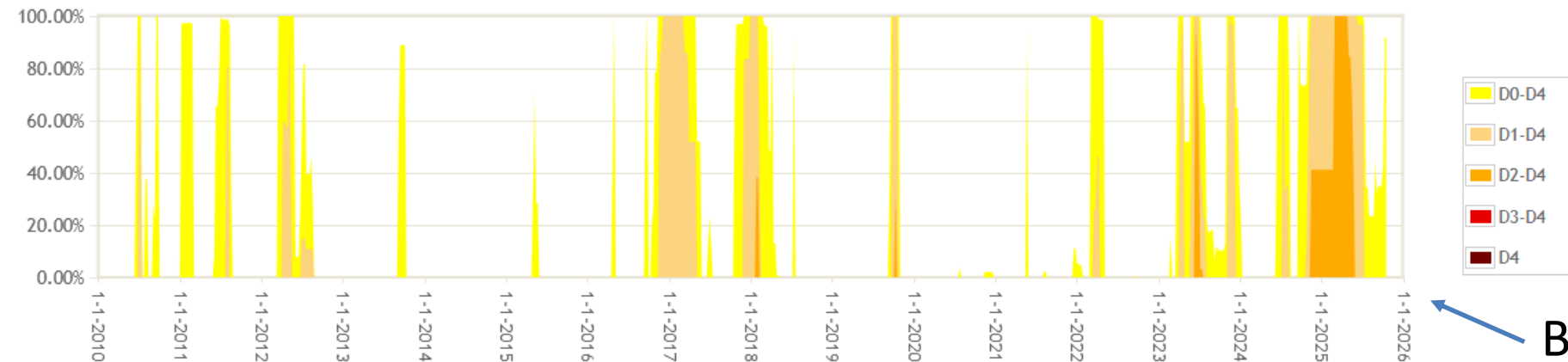
Author:

Curtis Riganti
National Drought Mitigation Center

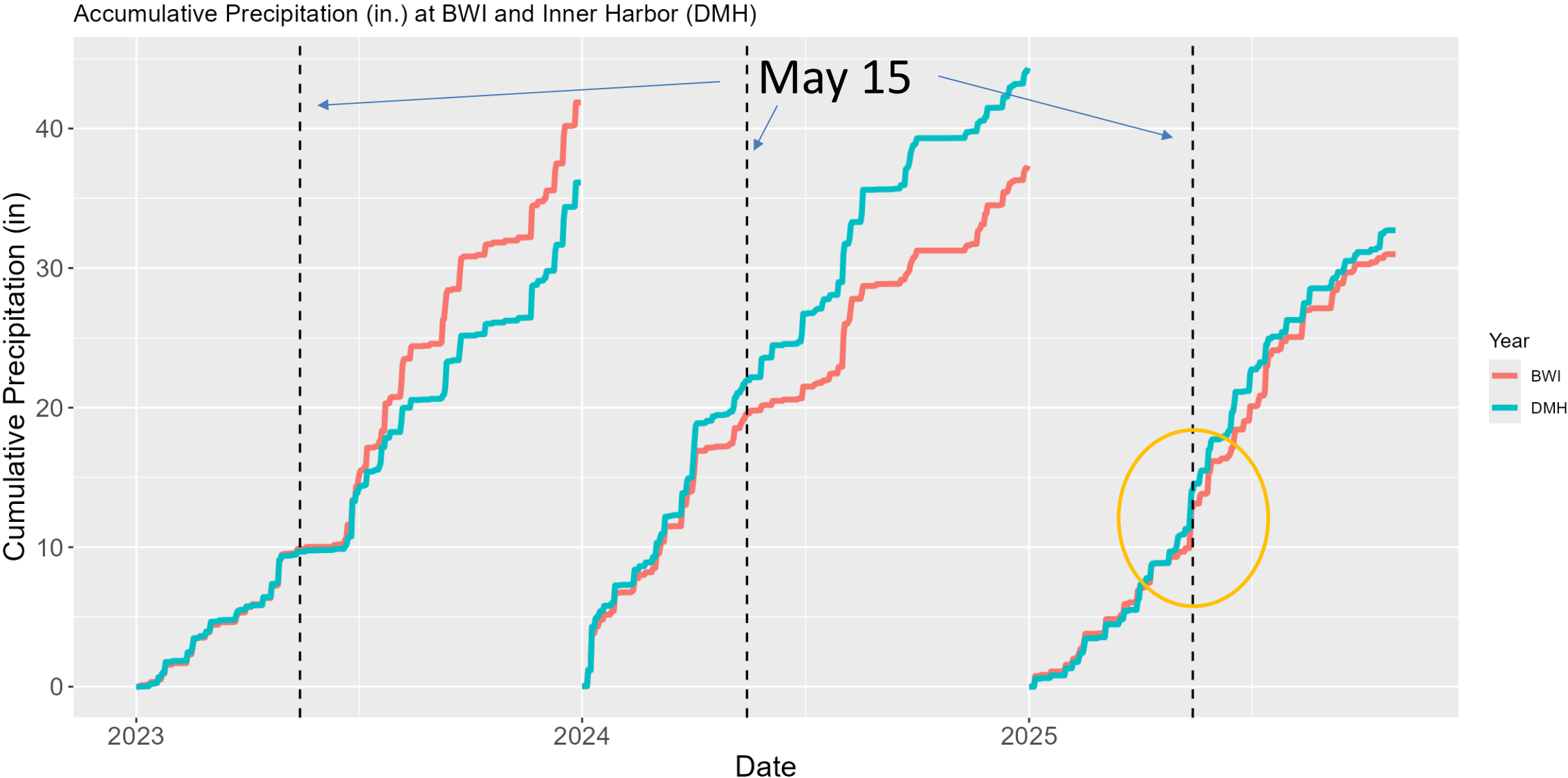


droughtmonitor.unl.edu

Percent Area in U.S. Drought Monitor Categories



Accumulated Annual Rainfall

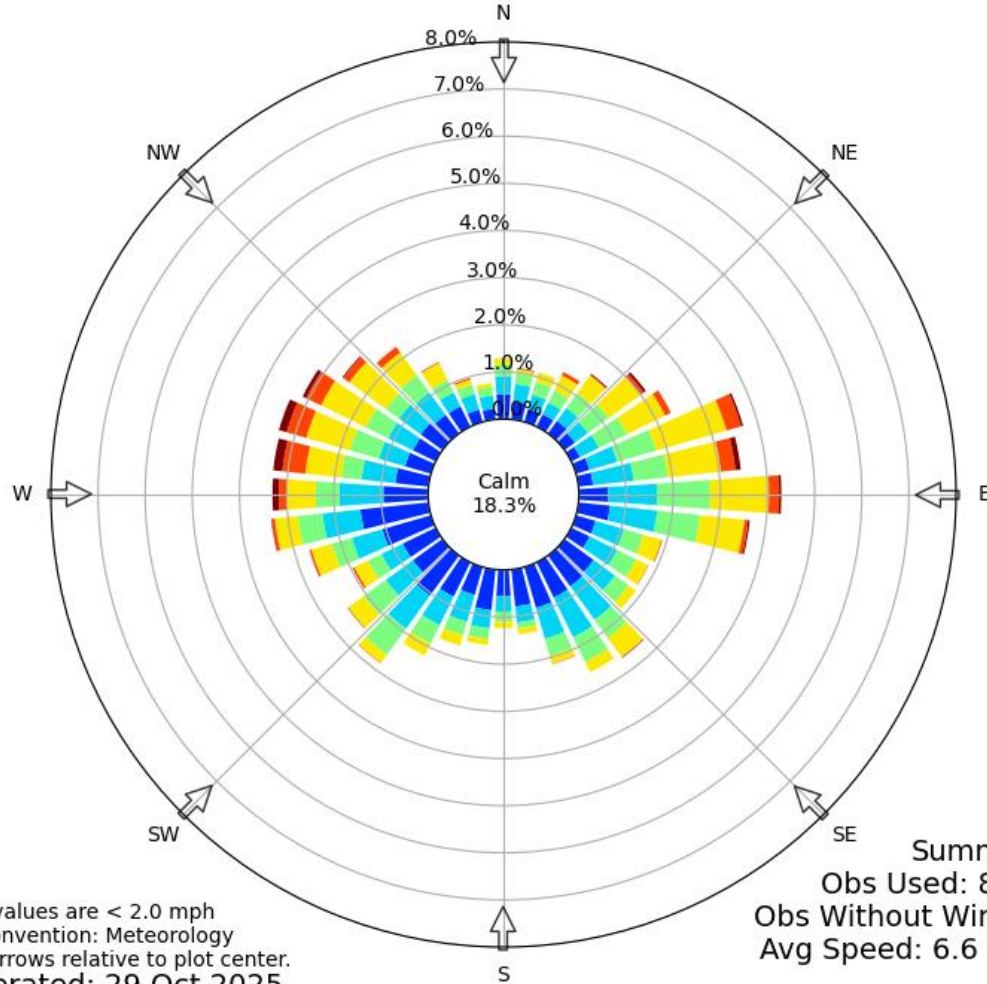


 rainfall event of 2-3" across Baltimore on May 13-14, 2025

Wind in 2025 vs Previous Years



Windrose Plot for [BWI] Baltimore - Wash Intl
Obs Between: 06 May 2010 01:54 AM - 31 May 2024 11:54 PM America/New_York
↳ constraints: May 6 - Jun 1



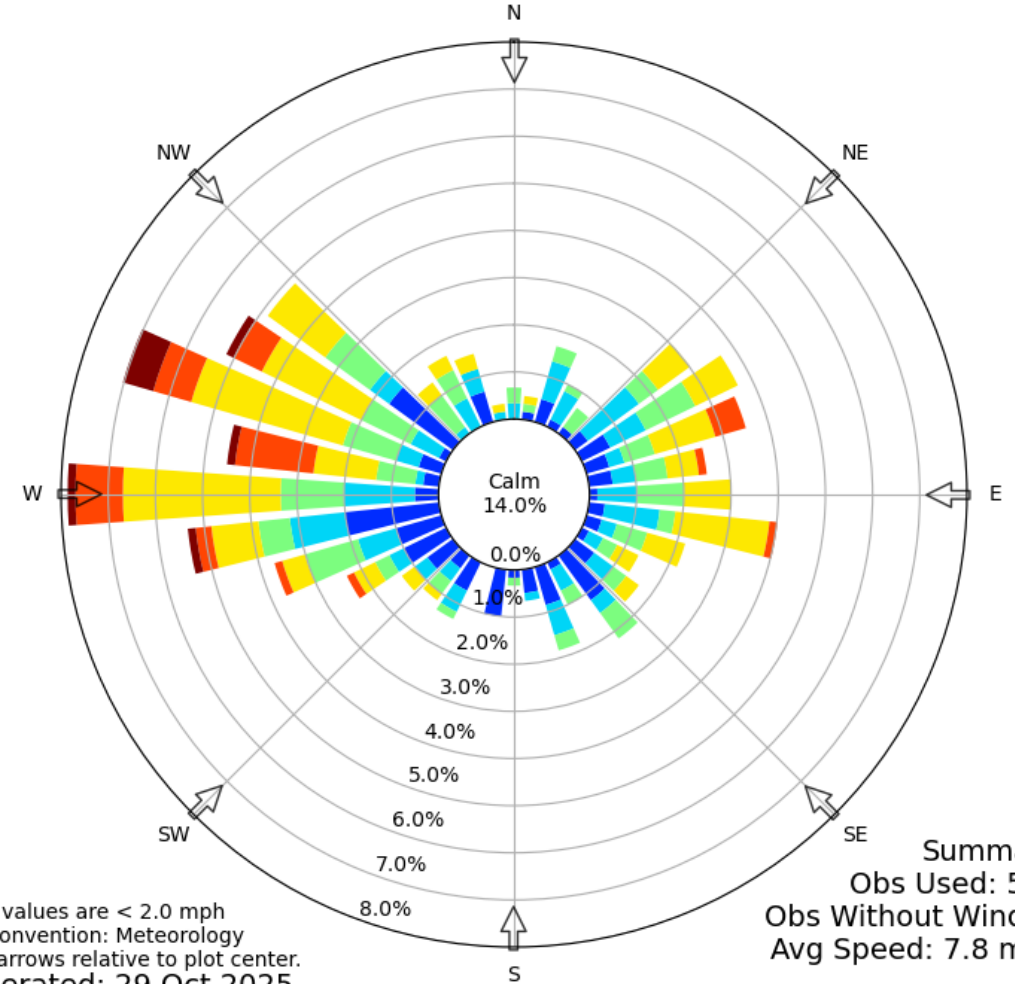
Calm values are < 2.0 mph
Bar Convention: Meteorology
Flow arrows relative to plot center.
Generated: 29 Oct 2025

Wind Speed [mph]

2 - 4.9 5 - 6.9 7 - 9.9 10 - 14.9 15 - 19.9 20+



Windrose Plot for [BWI] Baltimore - Wash Intl
Obs Between: 06 May 2025 01:54 AM - 31 May 2025 11:54 PM America/New_York
↳ constraints: May 6 - Jun 1



Calm values are < 2.0 mph
Bar Convention: Meteorology
Flow arrows relative to plot center.
Generated: 29 Oct 2025

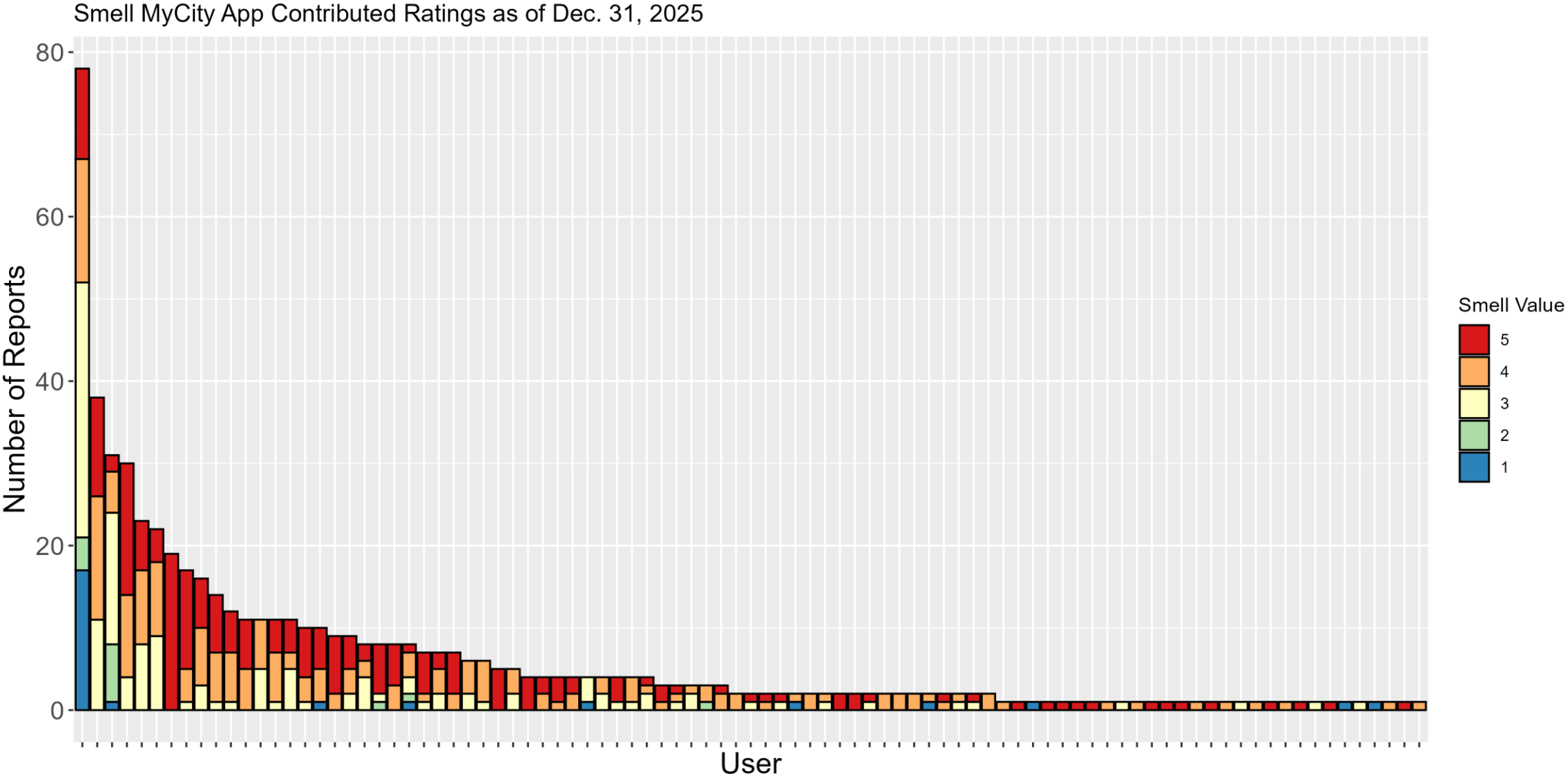
Wind Speed [mph]

2 - 4.9 5 - 6.9 7 - 9.9 10 - 14.9 15 - 19.9 20+



Greater frequency and magnitude of westerly winds in 2025 than typical for this period of May

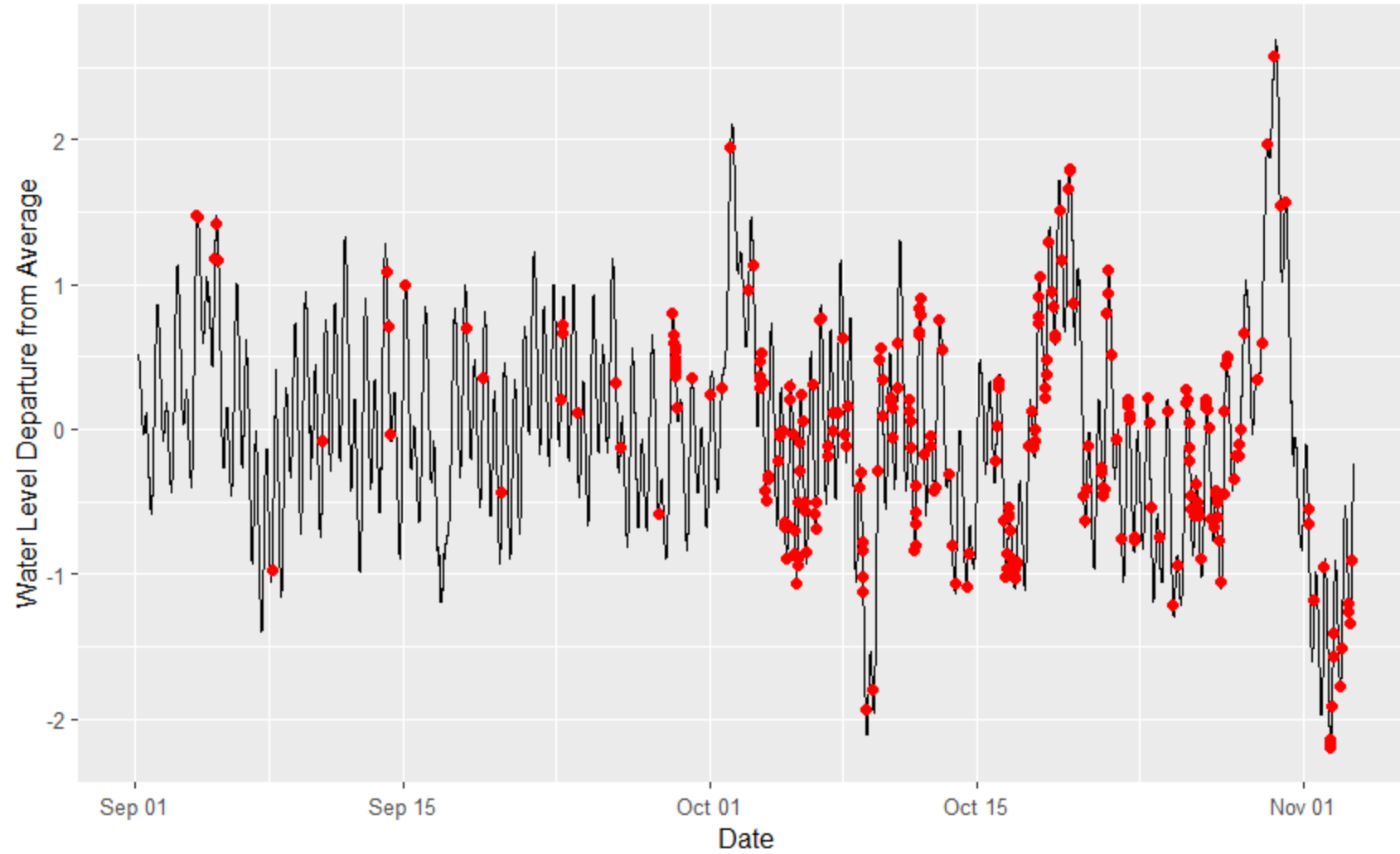
Smell MyCity Report Distribution by Reporter



Counts include the App ONLY, and do not include ~60 manually submitted reports, which are considered in later analyses.



Back River tributary at Rocky Point Park Tides, USGS Site And SMC Odor Complaints



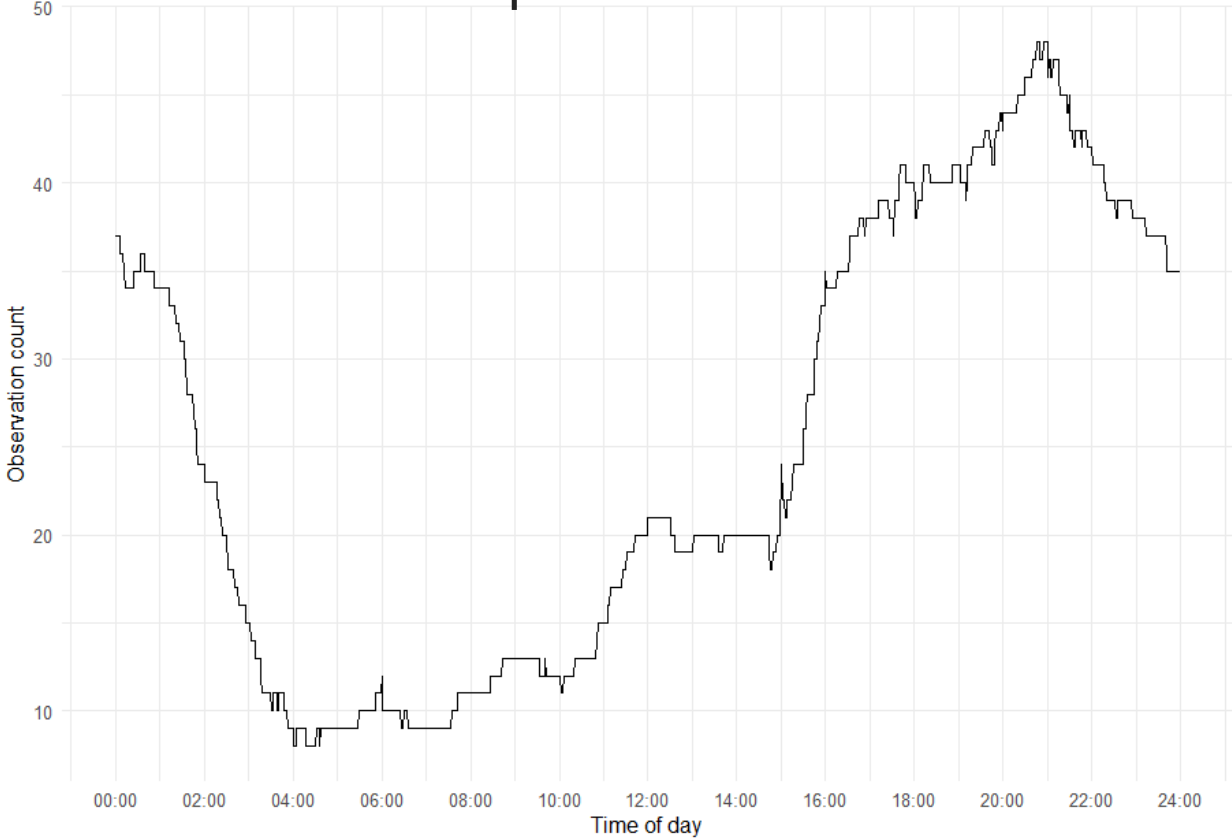
Reference

- **sewage**["sewer", "sewage", "poop", "feces","sh*t","outhouse", "Fecal","waste water","f*c*s", "p**p", "sewagw", "smells like sulfur sh*t", "seesge","seeage","septic","Piip", "Smells like butt","s###t","poo","Old bathroom smell","diarrhea", "pooted","portable toilet","s***","hog pen","Walking into Walmart 1 hour ago and hard to breath"],
- **chemical**["ammonia", "uria", "chemical","Industrial", "caustic", "bleach", "sulfur","Asphalt", "Oil, gasoline","old bleech","Sulfer","Tide","chicken house"],
- **Burning**["burning", "burning smell","burn", "toxic smoke from fire", "burn smell (not wood)", "burning smell (not wood)", "burn (not wood)"],
- **river**["dirty water and poo"],
- **eggs** ["egg"],
- Trajectories remaining gray could not be categorized....



SMC Smell Path Report Times

Villa Capri/Essex



Dundalk

