RRT5

CLEVELAND WATER ALLIANCE

Mitigating Risk through Infrastructure & Innovation

Ebie (“E.B.”) Holst

Director, Clusters & Innovation

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Agenda:

- About CWA
- Smart Lake Erie Watershed (SLEW)
- Oil / Chem Spill Risk & Response
- Accelerating Innovation
- Opportunities

About CWA

CLEVELAND WATER ALLIANCE

CWA centrally connects 100+ Water Industry Partners, 30+ Utility Partners and 23 Research Institutions

Key Programs

- Smart Lake Erie Watershed
- Water Technology Testbeds
- Open Innovation Challenges
- Tech Showcase & Access
- Seed Fund

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Smart Lake Erie Watershed (SLEW)

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The Lake Erie Watershed

As the shallowest and warmest of the Great Lakes, Lake Erie is not only the most biodiverse and bioproductive, but the most vulnerable to the region's agricultural, community, maritime and manufacturing dynamics.

- ***Dynamic water levels & rising temperatures***
- ***Microbial concerns***
- ***Amplified algal blooms***
- ***Dynamic oxygen levels***
- ***Increasing storm activities***
- ***Aging infrastructure***
- ***Escalating vulnerability to toxic exposures***

- ***12M Population***
- ***11M DW Residents***

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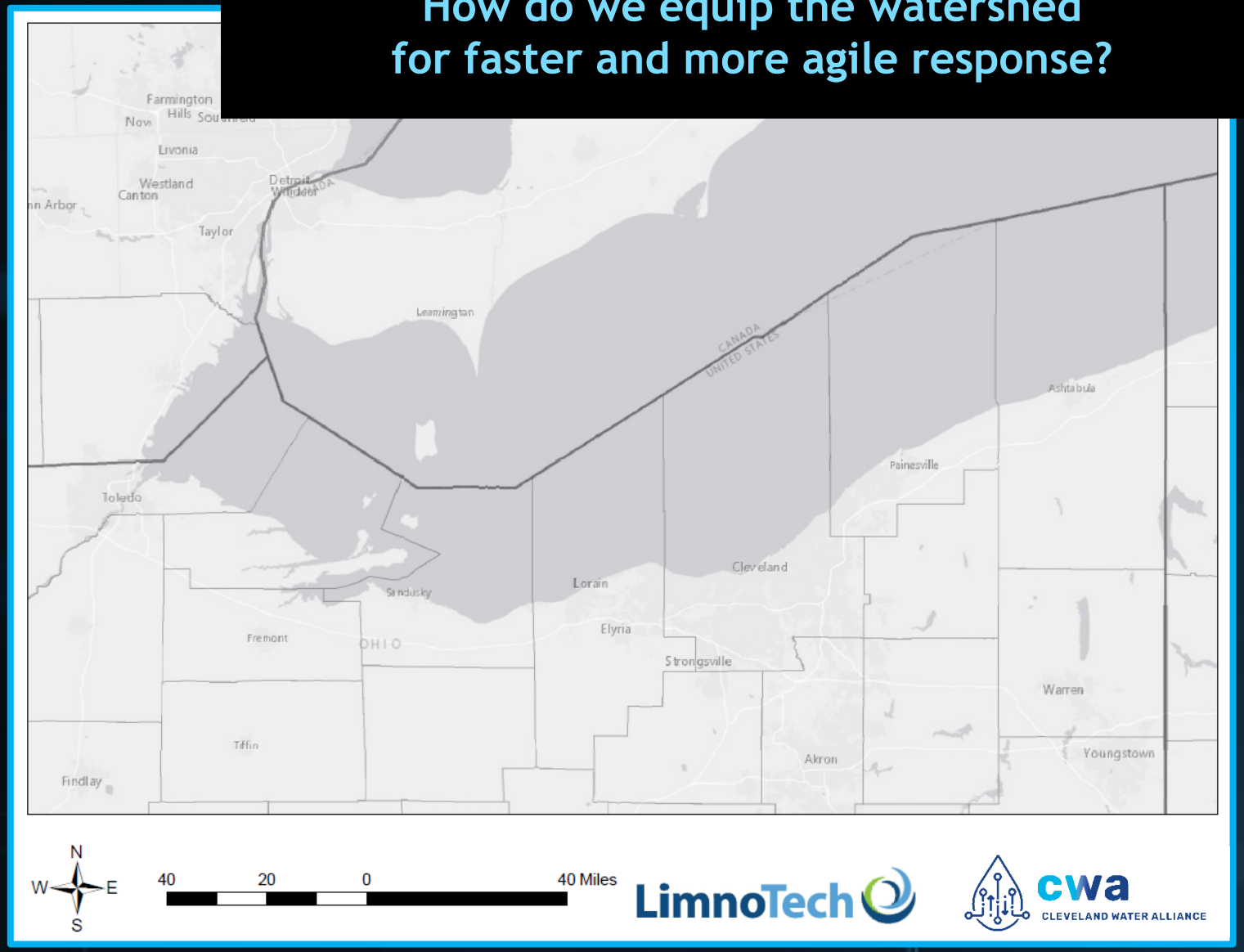
How do we equip the watershed for faster and more agile response?



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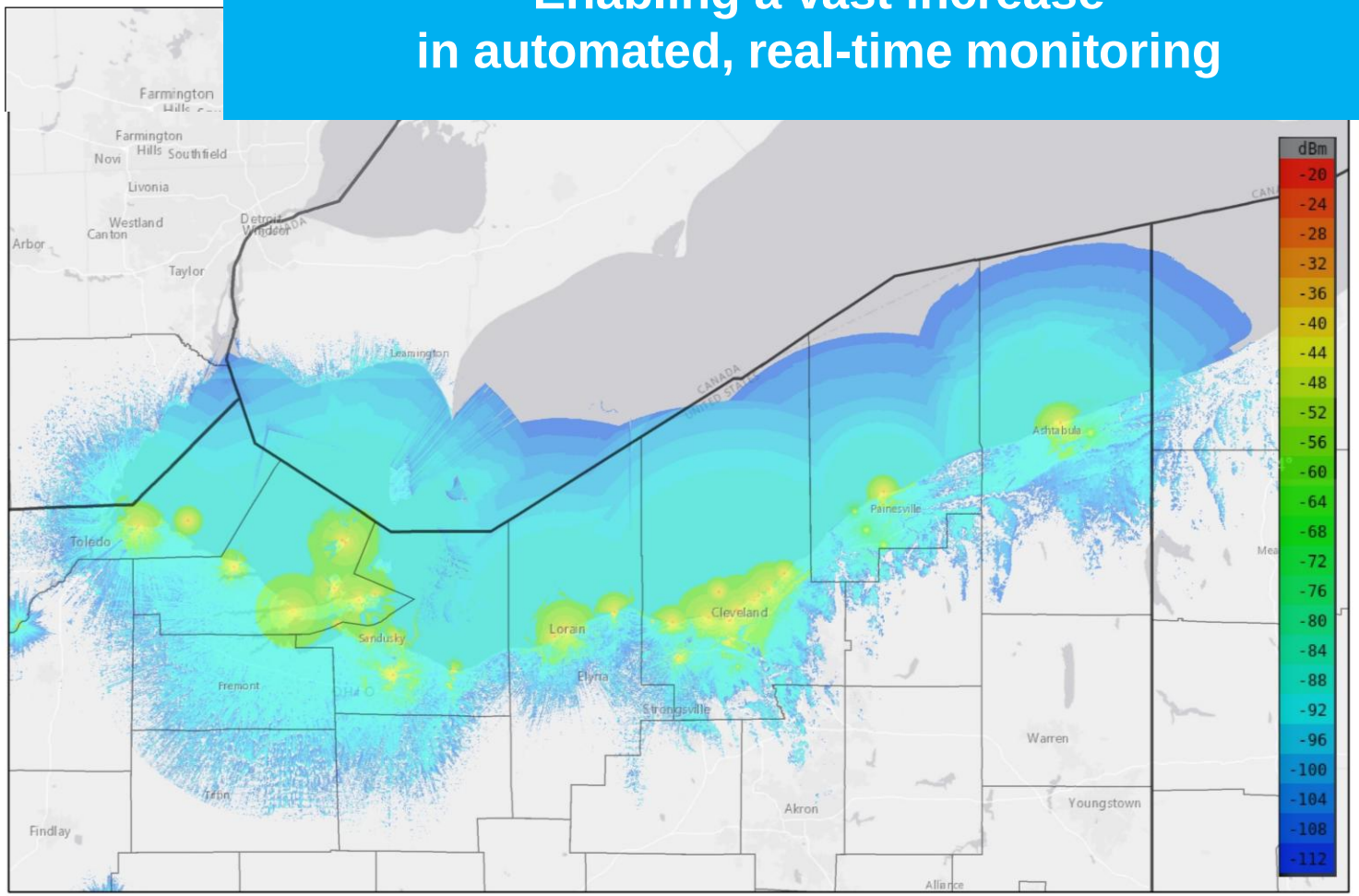
Enabling a vast increase in automated, real-time monitoring

Source: David Ruck



Over 7700 miles² of Telecommunications Coverage

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Source: David Ruck

Nearshore Buoy (4)	Offshore Buoy (1)	Value Water Quality Buoy (4)
Temperature/Conductivity	Temperature/Conductivity	Turbidity
Turbidity	Turbidity	Chlorophyll
Chlorophyll	Dissolved Oxygen	
	Temperature profile	

LoRaWAN Sensor Kit (20)	Stormwater Kit (15)	Water Quality 3 Parameter Kit (15)
GPS	Rainfall	Dissolved oxygen
Water level	Soil moisture	Turbidity
Temperature	Soil temperature	Conductivity
Relative humidity	Air temperature	
	Relative humidity	
	Solar radiation	
	Water temperature	
	Conductivity	
	Water level	

LoRaWAN Outdoor Kit (20)	LoRaWAN Indoor Kit (20)	LoRaWAN Outdoor Soil Kit (10)
Water Level	Door Sensor	Soil moisture
Temperature	Temperature	Soil pH
Humidity		
Motion detection (PIR)		

aWAN Sensors (20)
Sensor (motion detection (PIR), on/off magnet switch, accelerometer, g-force
t, light detection, temperature, humidity)
ture
perature

CWA deploys 200+ IOT devices annually

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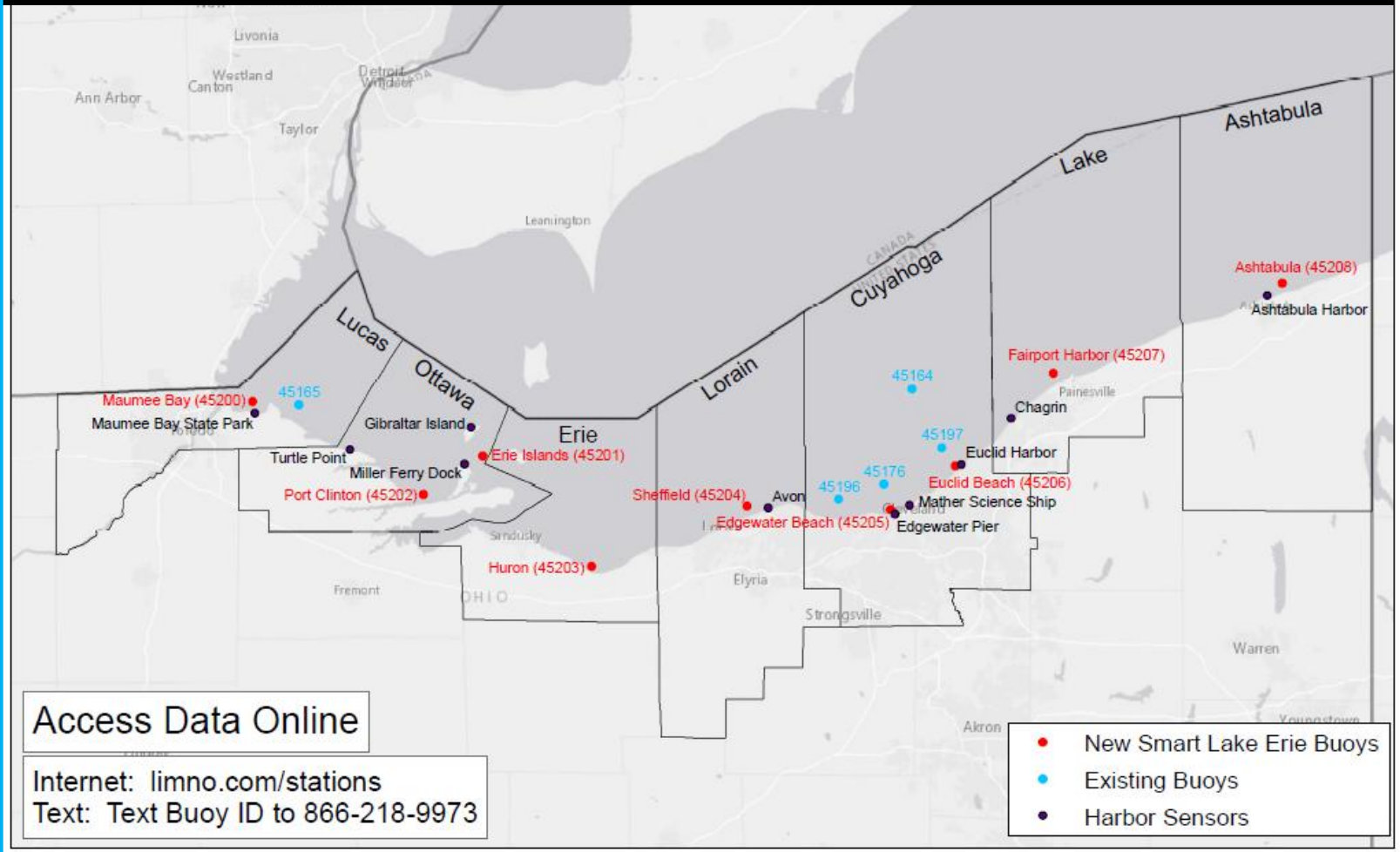
“Smart Lake Erie Watershed”



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Monitoring Stations

45200

Little Cedar Point, OH

Last Update: 11:00 PM EDT, September 21, 2023 (>1 week ago)

45202

Port Clinton Buoy

Last Update: 11:40 PM EDT, September 21, 2023 (>1 week ago)

45201

Erie Islands Buoy

Last Update: 11:40 PM EDT, September 21, 2023 (>1 week ago)

45203

Huron Buoy

Last Update: 11:40 PM EDT, September 21, 2023 (>1 week ago)

45204

Sheffield Buoy

Last Update: 11:40 PM EDT, September 21, 2023 (>1 week ago)

45196

Rocky River Buoy

Last Update: 11:30 PM EDT, September 21, 2023 (>1 week ago)

45205

Edgewater Beach Buoy

Last Update: 11:40 PM EDT, September 21, 2023 (>1 week ago)

45176

Cleveland Crib Buoy

Last Update: 11:40 PM EDT, September 21, 2023 (>1 week ago)

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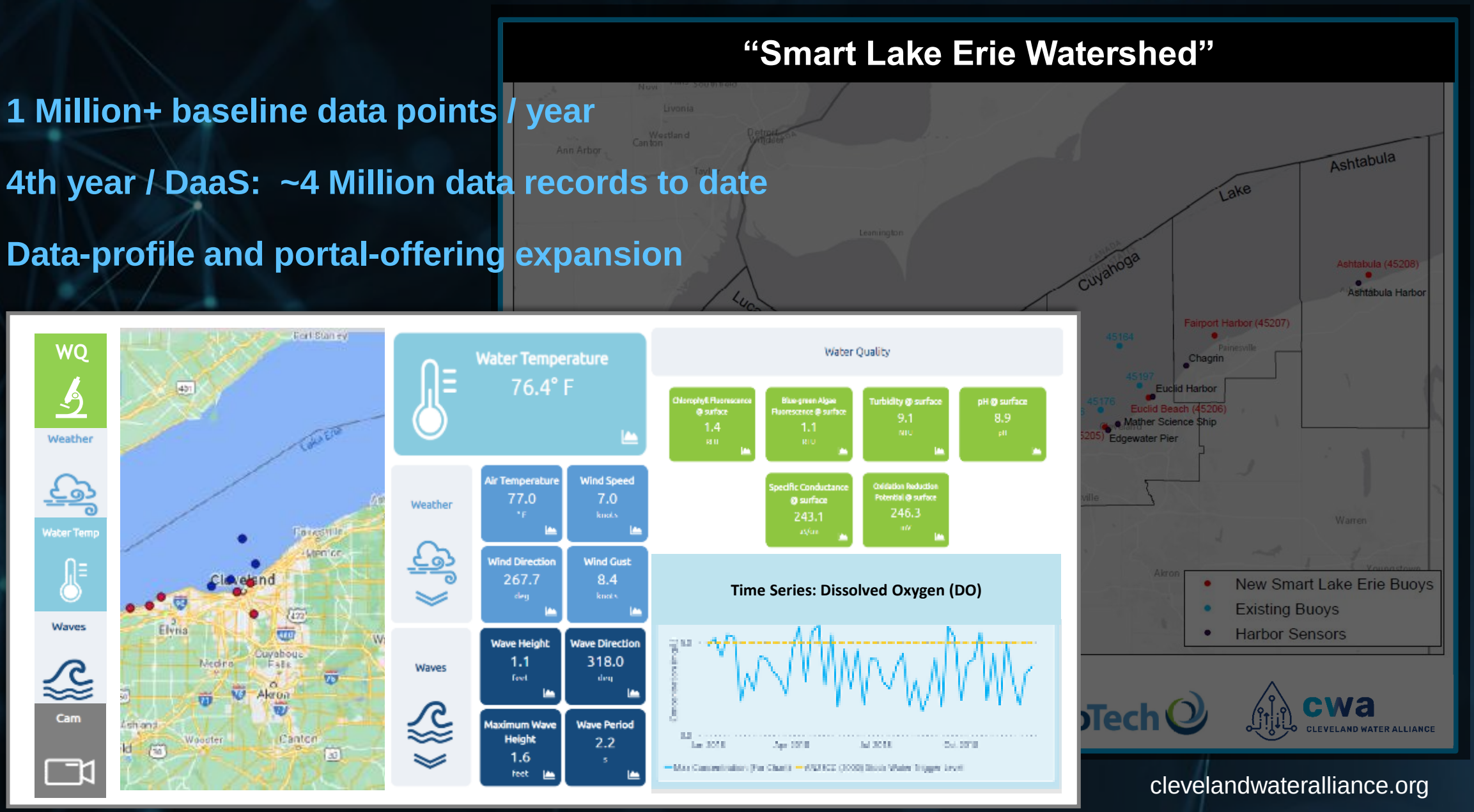
- ✓ 1 Million+ baseline data points / year
- ✓ 4th year / DaaS: ~4 Million data records to date
- ✓ Data-profile and portal-offering expansion



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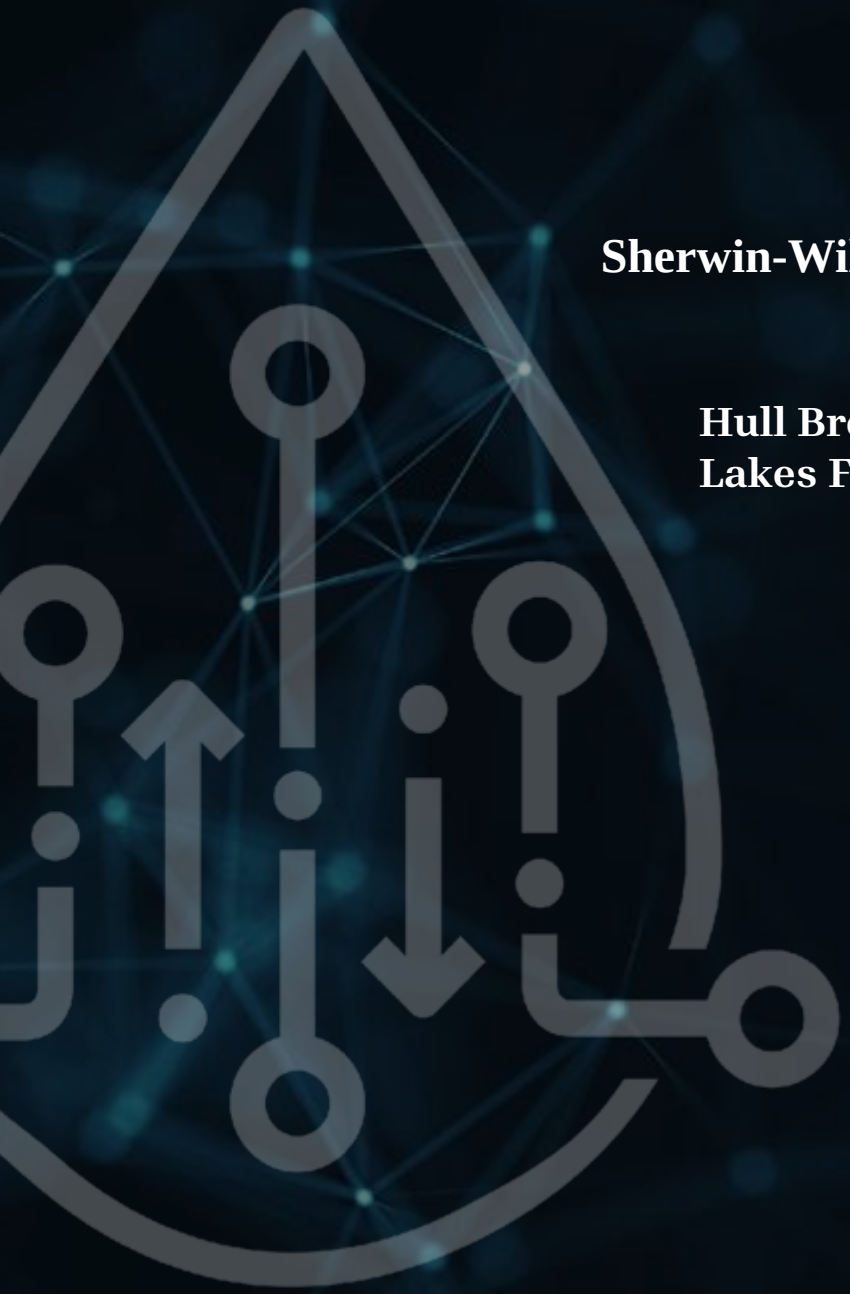
Spill Risk & Response

How do we leverage all this infrastructure to enhance disaster response?



Barge, shipwrecked on Lake Erie in 1930s, leaking oil

- Keith Matheny, Detroit Free Press, October 27, 2015

Sherwin-Williams plant spills 100 gallons of diesel fuel into Cuyahoga River

- Channel 19 News, January 22, 2024

Hull Breach Causes Oil Spill from Great Lakes Freighter off Michigan

- Maritime Executive, August 3, 2023

Oil travelling near Great Lakes on the rise, scientists probe impacts

- CBC News, December 10, 2018

New Year brings renewed concerns over Great Lakes Line 5 project

- Farah Siddiqi, WXPR, January 9, 2024

The health risks after derailment of train with toxic chemicals

- Anna Phillips, Washington Post, February 7, 2023

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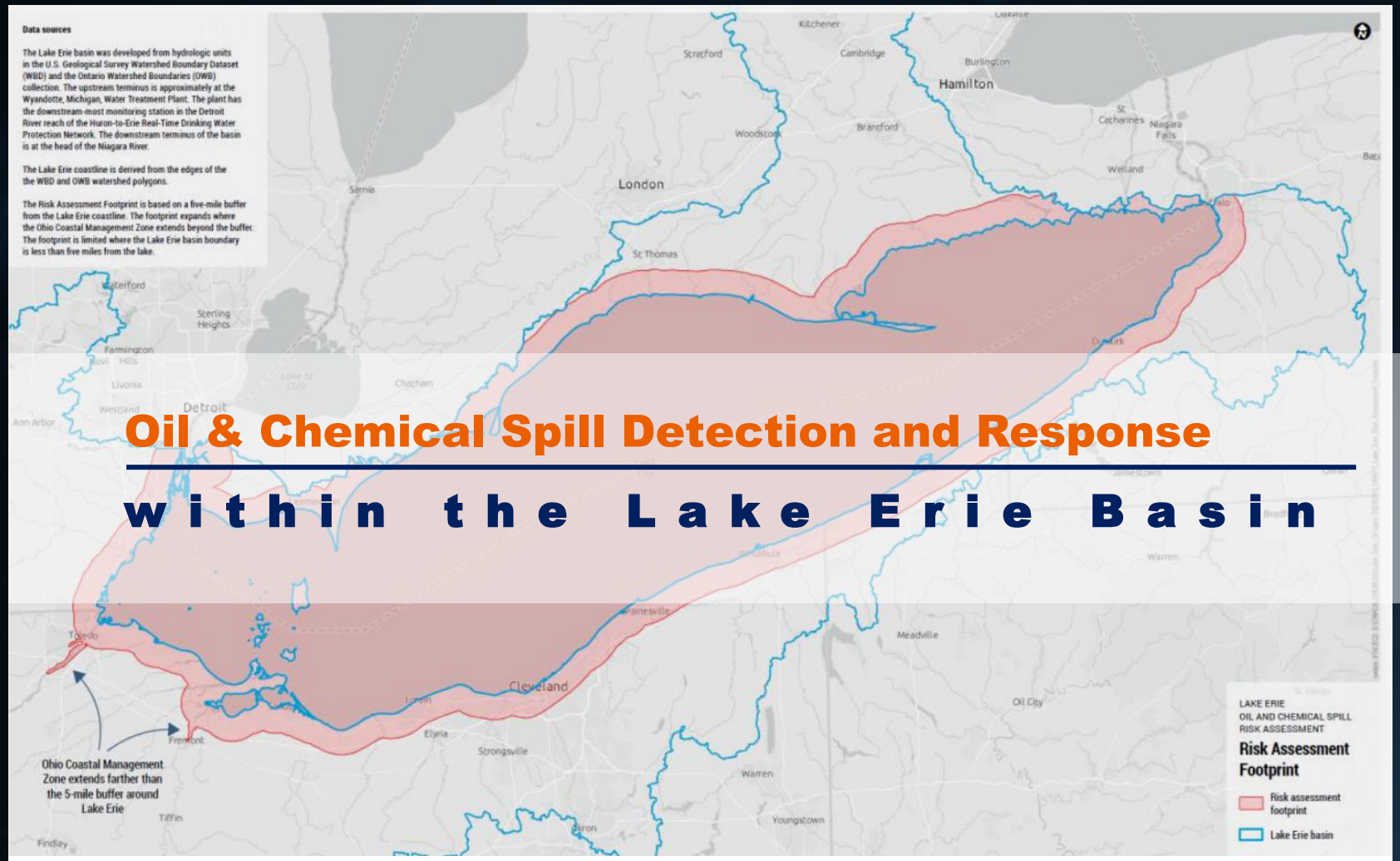
Oil & Chemical Spill Detection and Response

within the Lake Erie Basin



OFFICE OF COASTAL MANAGEMENT
OHIO DEPARTMENT OF NATURAL RESOURCES
Scudder D. Mackey, Ph.D.
Amanda Kovach

cwa CLEVELAND WATER ALLIANCE
Ebie Holst

John Bratton, PhD
Scott Wade

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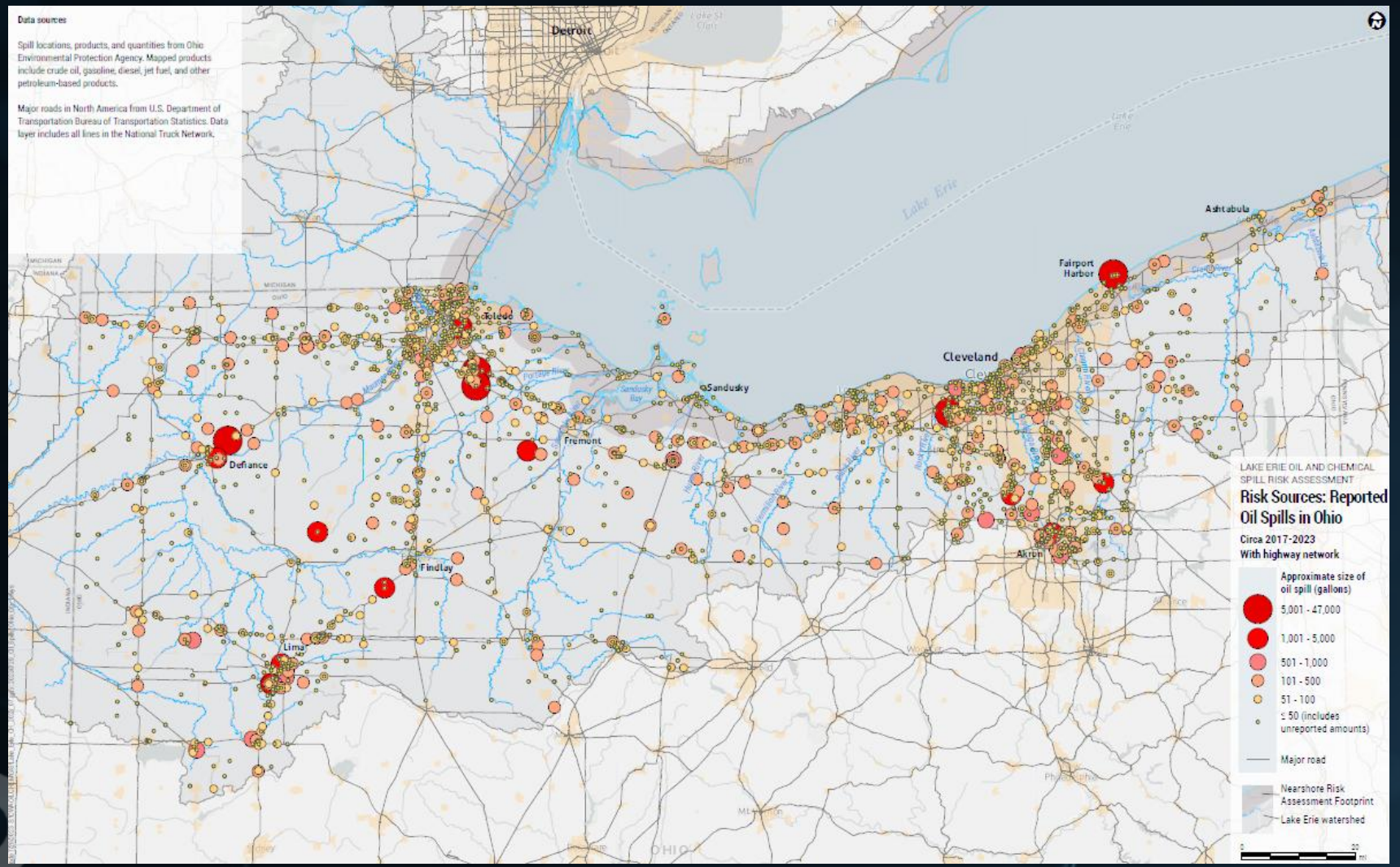
Assessing Oil & Chemical Spill Risk

Risks: Oil Spills 2017-2023 (Gallons)



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Assessing Oil & Chemical Spill Risk

Risks: Refineries, Pipelines, Storage

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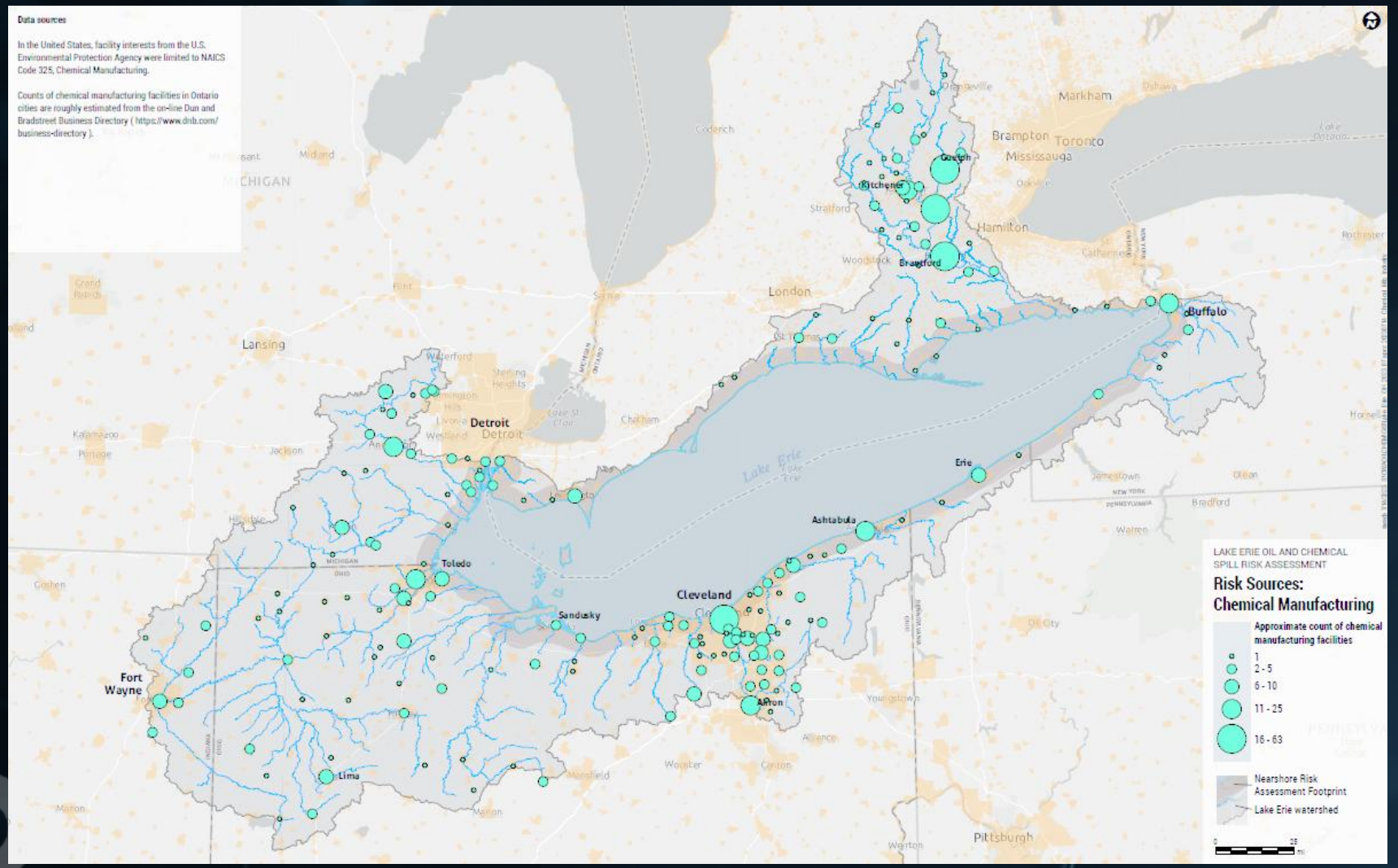
Assessing Oil & Chemical Spill Risk

Risks: Chemical Manufacturing



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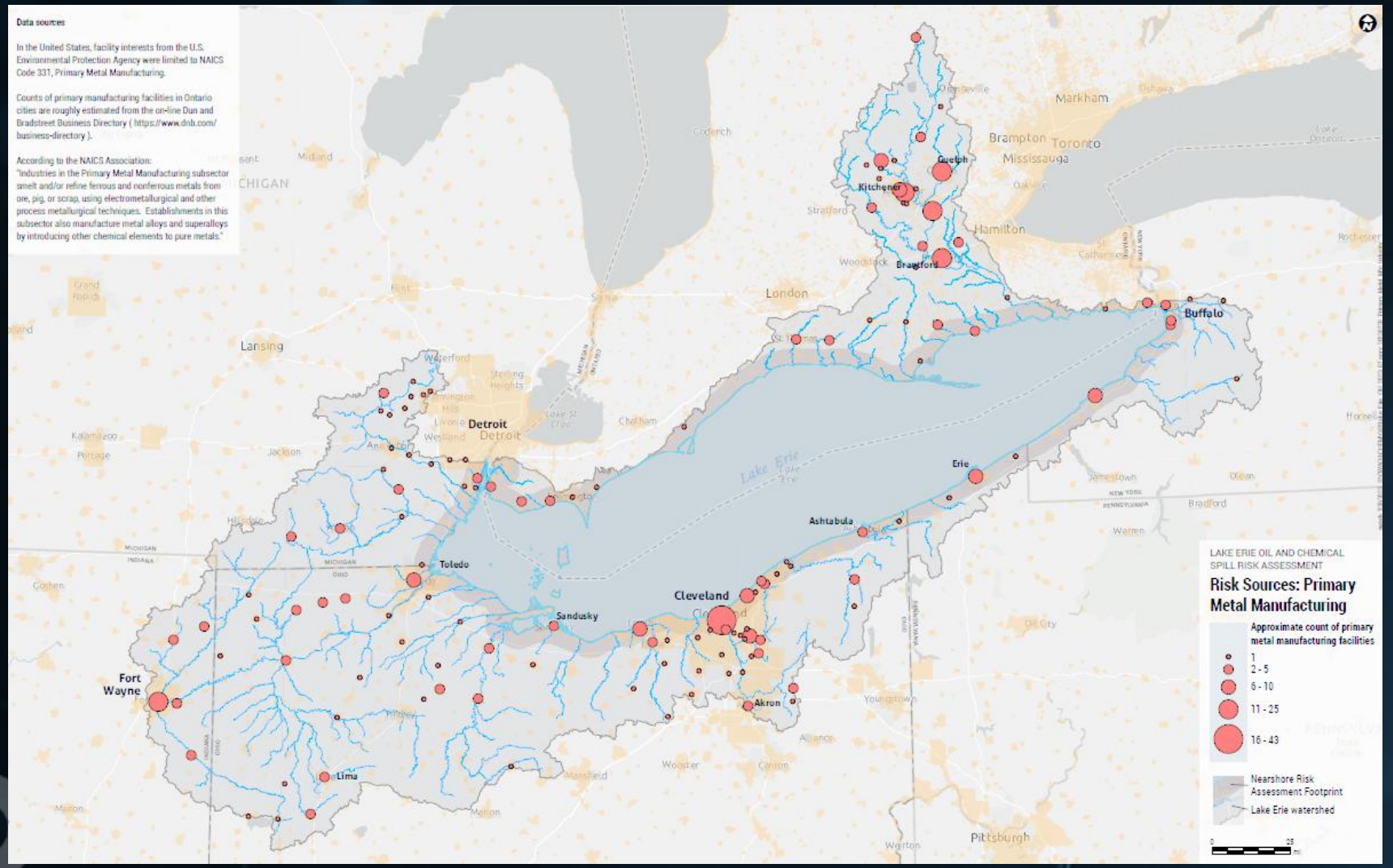
Assessing Oil & Chemical Spill Risk

Risks: Metals Manufacturing



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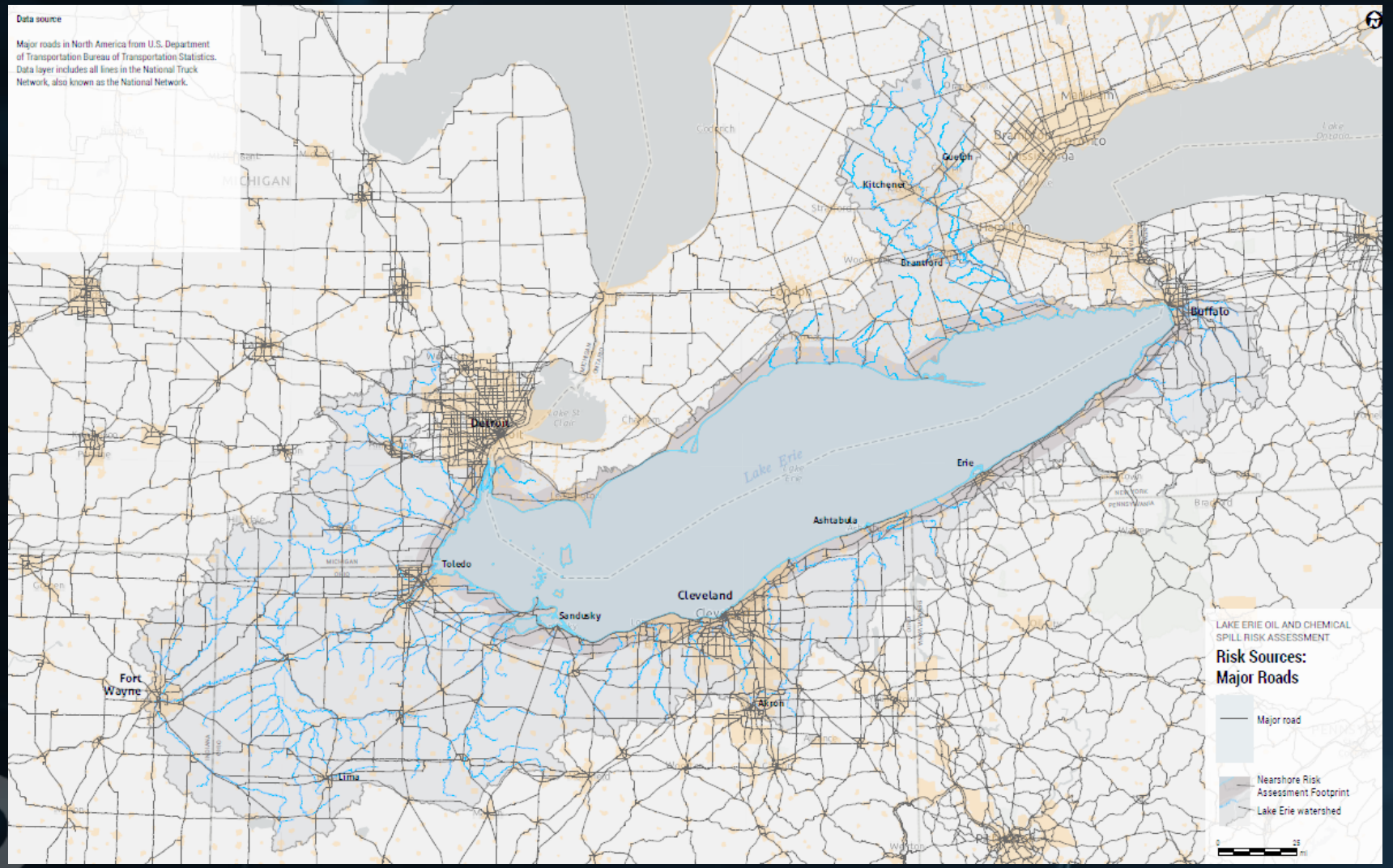
Assessing Oil & Chemical Spill Risk

Risks: Freeways, Railroads, Marine



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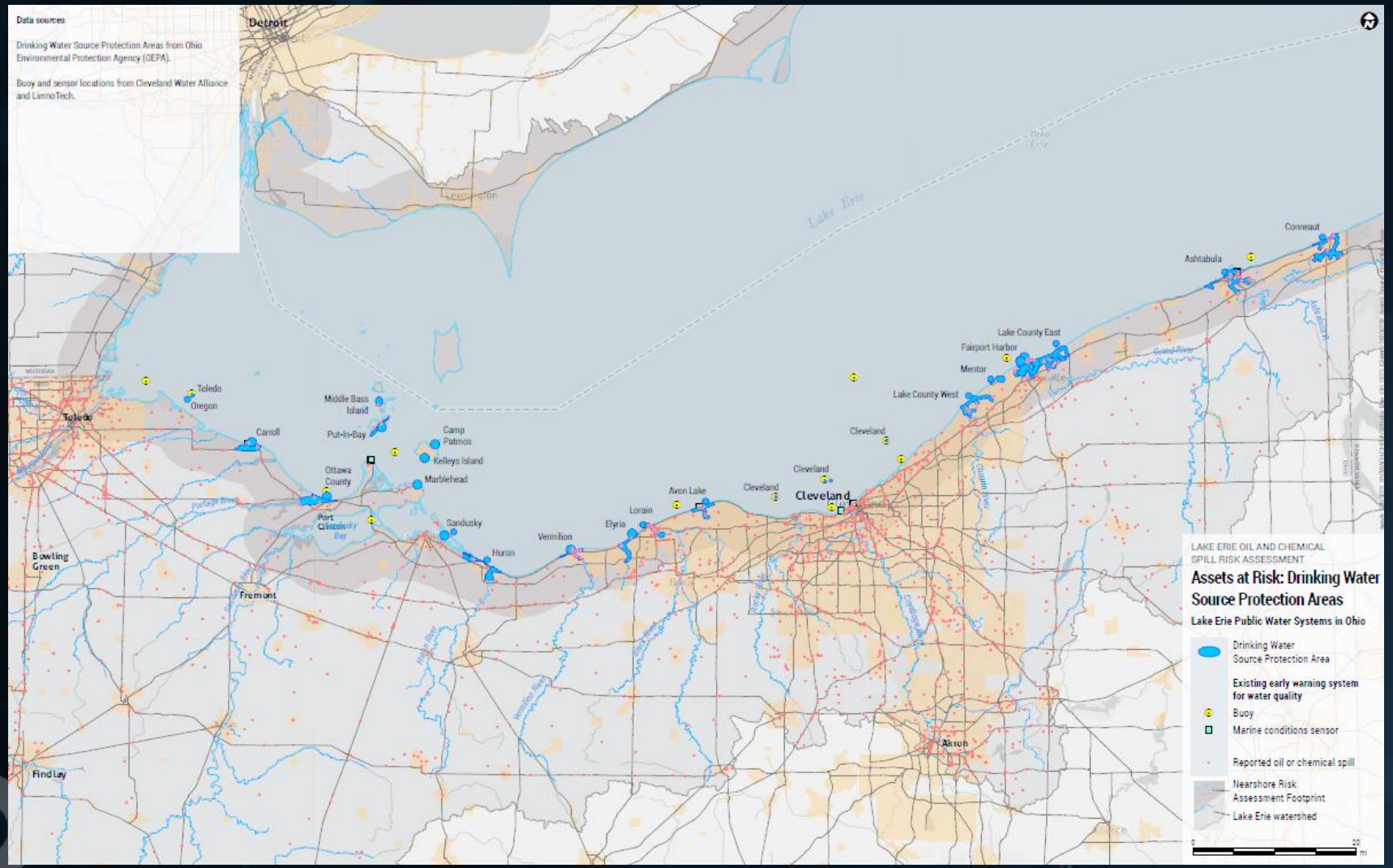
Assets at Risk from Spills

Assets: Drinking Water Intake Areas



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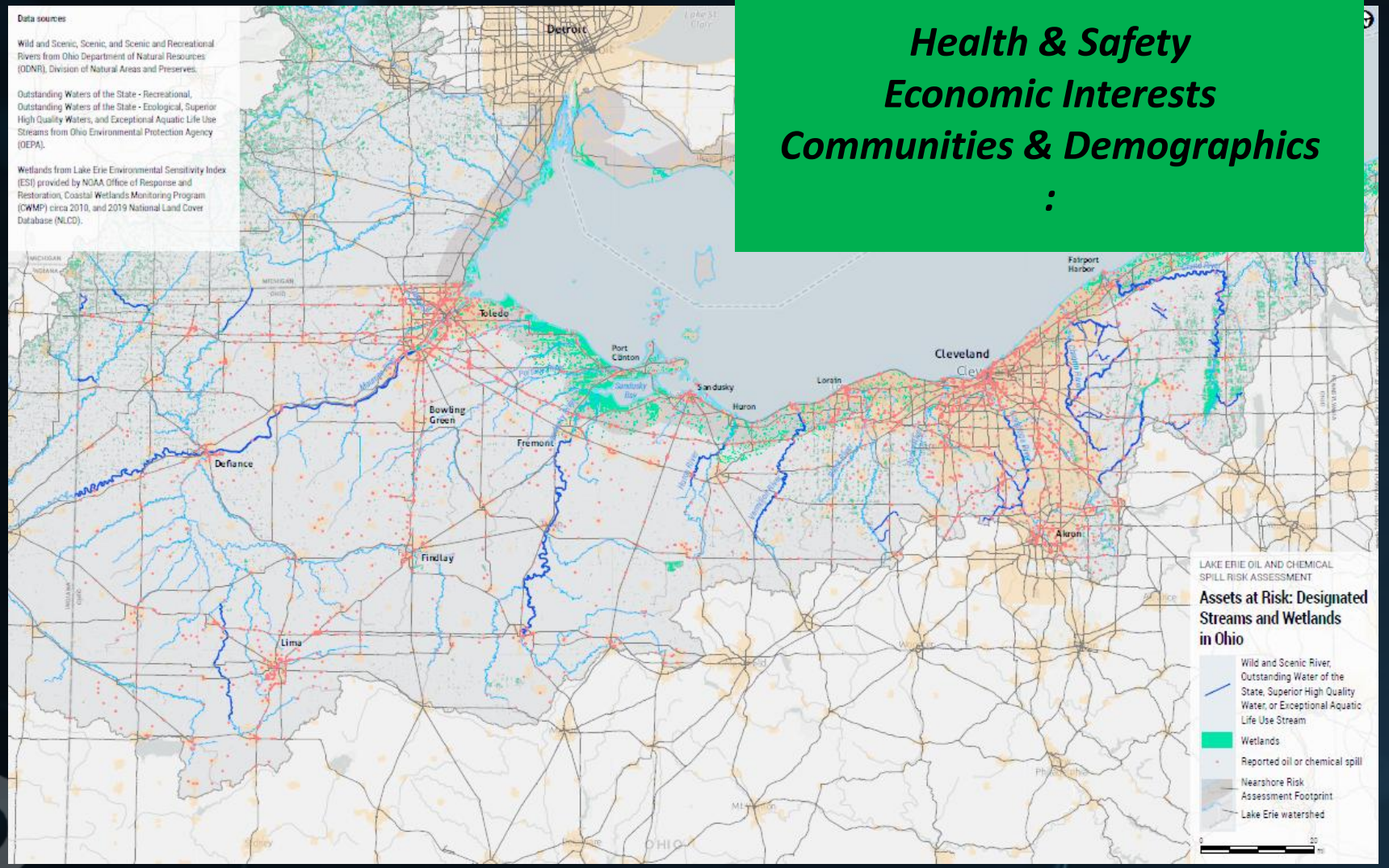
Assets at Risk from Spills

Assets: Streams and Wetlands

Health & Safety
Economic Interests
Communities & Demographics
:



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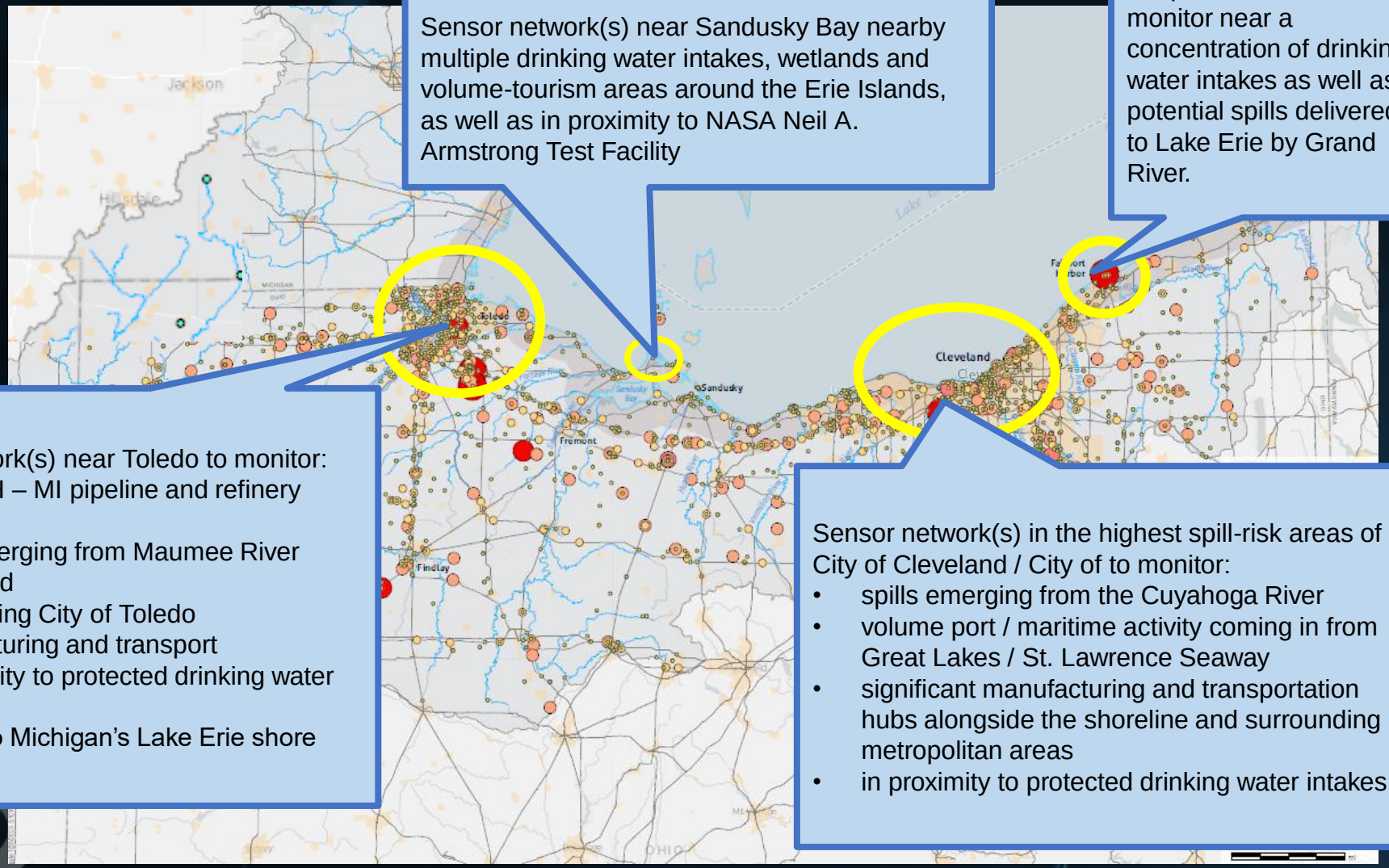
Initial “Hot Spot” Targets



Sensor network(s) near Sandusky Bay nearby multiple drinking water intakes, wetlands and volume-tourism areas around the Erie Islands, as well as in proximity to NASA Neil A. Armstrong Test Facility

Sensor network(s) near Fairport Harbor to monitor near a concentration of drinking water intakes as well as potential spills delivered to Lake Erie by Grand River.

Sensor network(s) near Toledo to monitor:

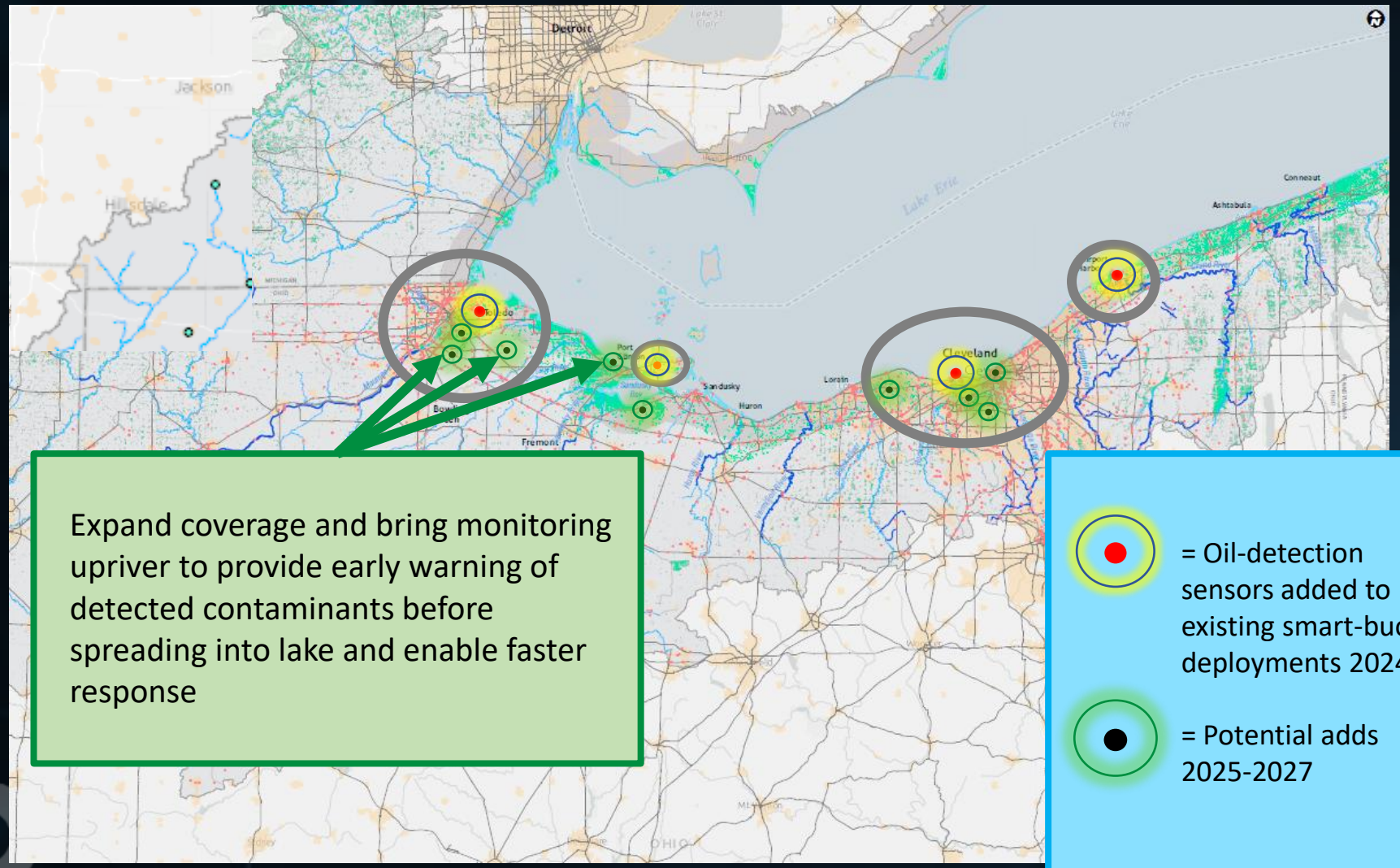
- along OH – MI pipeline and refinery corridor
- spills emerging from Maumee River watershed
- surrounding City of Toledo manufacturing and transport
- in proximity to protected drinking water intakes
- nearby to Michigan’s Lake Erie shore

Sensor network(s) in the highest spill-risk areas of City of Cleveland / City of to monitor:

- spills emerging from the Cuyahoga River
- volume port / maritime activity coming in from Great Lakes / St. Lawrence Seaway
- significant manufacturing and transportation hubs alongside the shoreline and surrounding metropolitan areas
- in proximity to protected drinking water intakes

Plan to Action…

Scaling Deployments



Expand coverage and bring monitoring upriver to provide early warning of detected contaminants before spreading into lake and enable faster response

= Oil-detection sensors added to existing smart-buoy deployments 2024

= Potential adds 2025-2027

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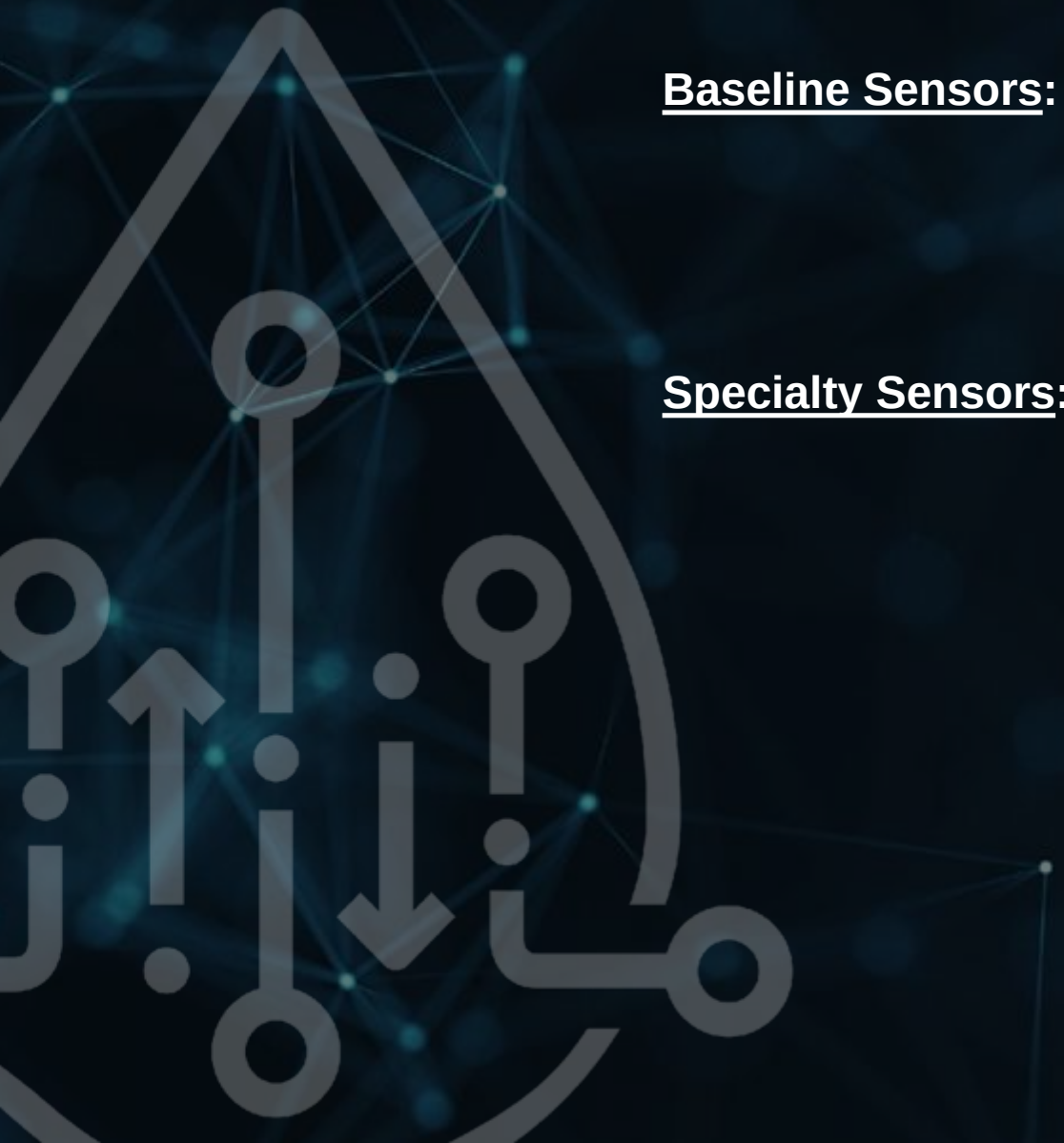
Scaling Deployments



Baseline Sensors:

- Wind speed
- Wind direction
- Air temperature
- Water temperature
- :
- Conductivity
- pH
- Turbidity
- Dissolved oxygen
- :

Specialty Sensors:

Hydrocarbons

Leveraging LimnoTech's synergistic work:

- ✓ LSSU Center for Freshwater Research and Education (CFRE)
- ✓ USCG Great Lakes Oil Spill Center of Expertise (GLCOE)
- ✓ High Quality | Medium Quality | Non-Contact Presence/Absence
- ✓ Scouting for technology

Chemicals, Metals, Microbiologics & More

- ➢ Scouting for technology
- ➢ Testbed promotion
- ➢ Open Innovation Challenges with global reach

Oil & Chemical-Spill Detection & Early Warning System

Next Steps: *(pending $)*

Trial sensors in key locations for baselines, sensitivities and location add-ons or refinements

Early Warning System Design – Baseline & Evolving

Data Access: USCG, EPA, State, Local Responders

"Missing" Parameters → **Scouting, Testbeds & Open Innovation**

2025:

Expanding into the Ohio River and Muskingum Watershed

Accelerating Innovation

Accelerating Innovation

Open Innovation Challenges

- ✓ to help align innovation focus with market need

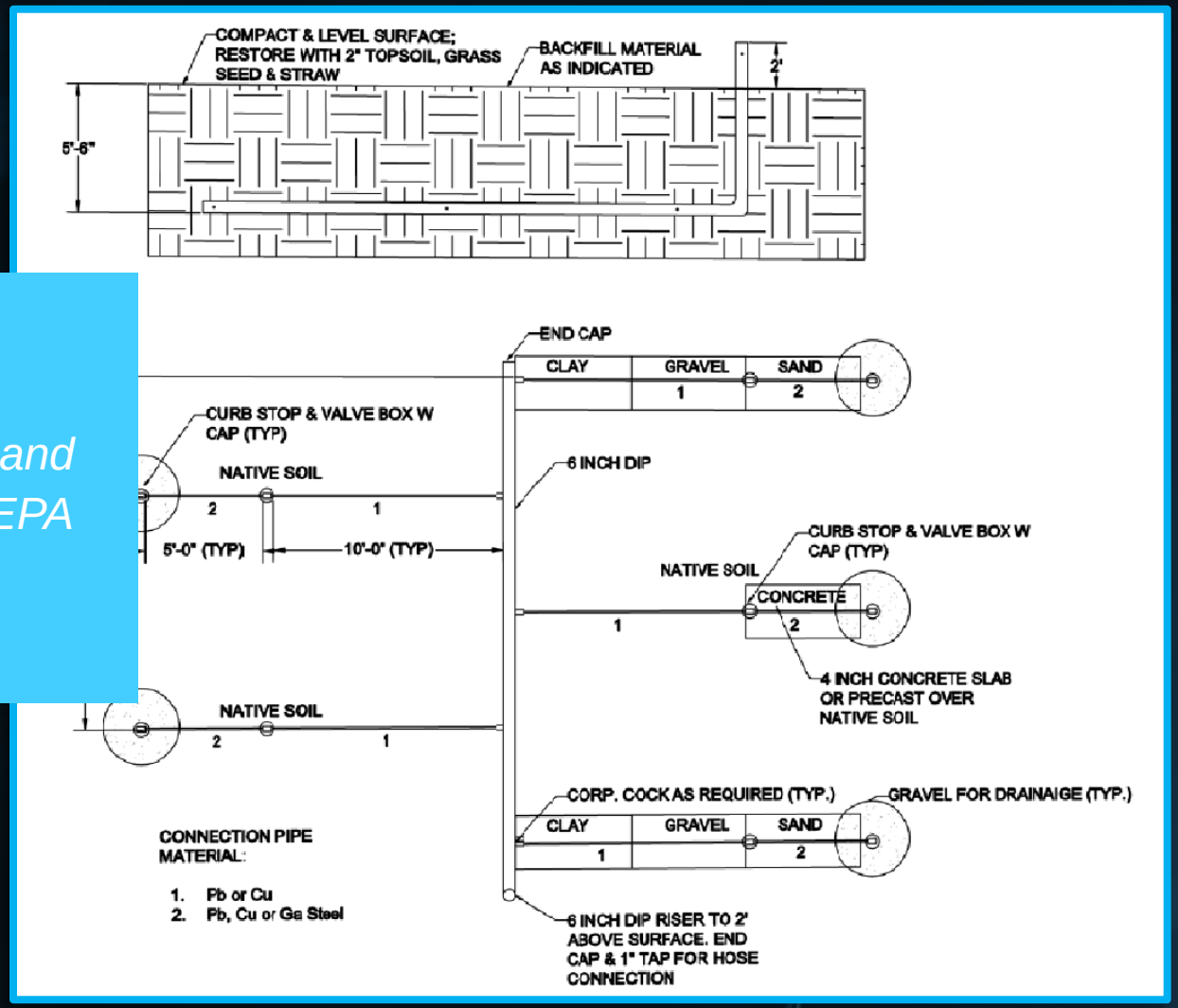
Testbeds

- ✓ to help accelerate innovations to market

Accelerating Innovation

Lead-Pipe Detection

State-level, industry association, and utility-specific interests vs. 2023 EPA Lead and Copper Rule



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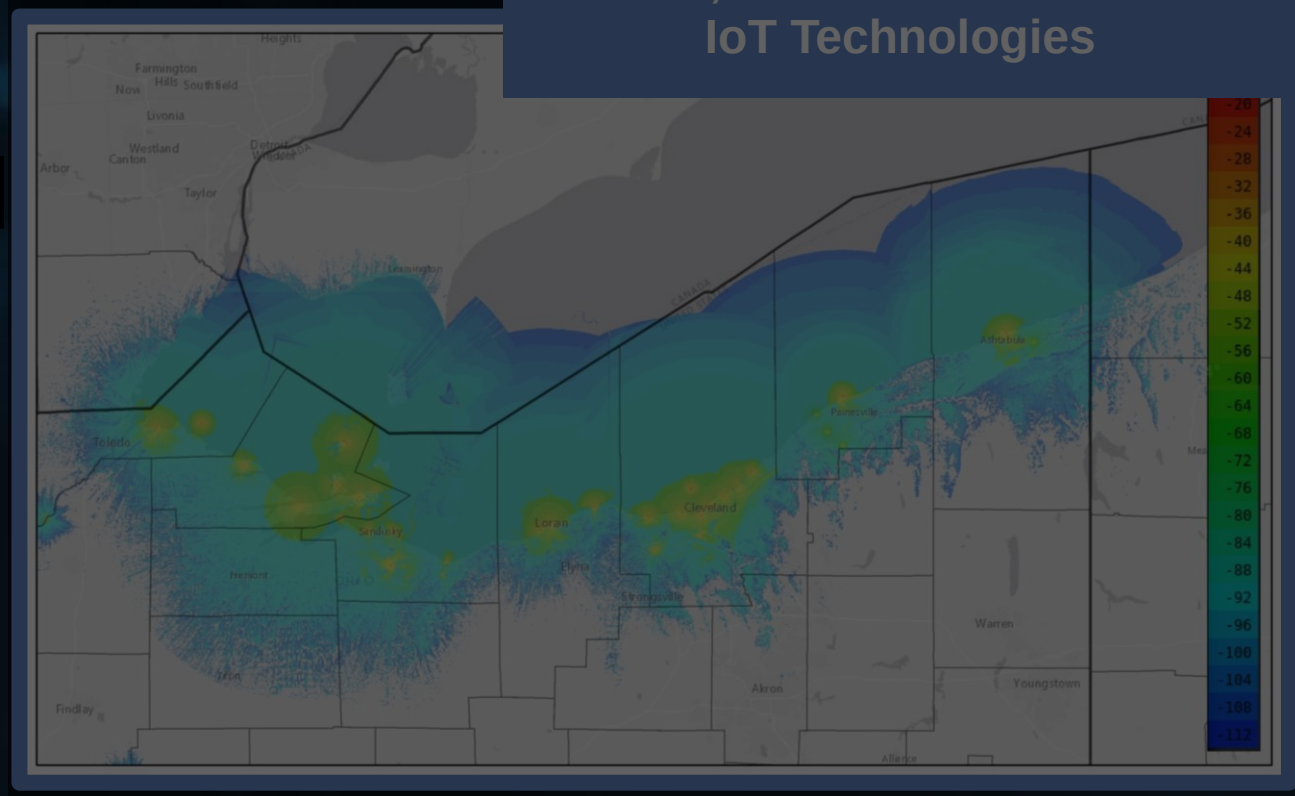
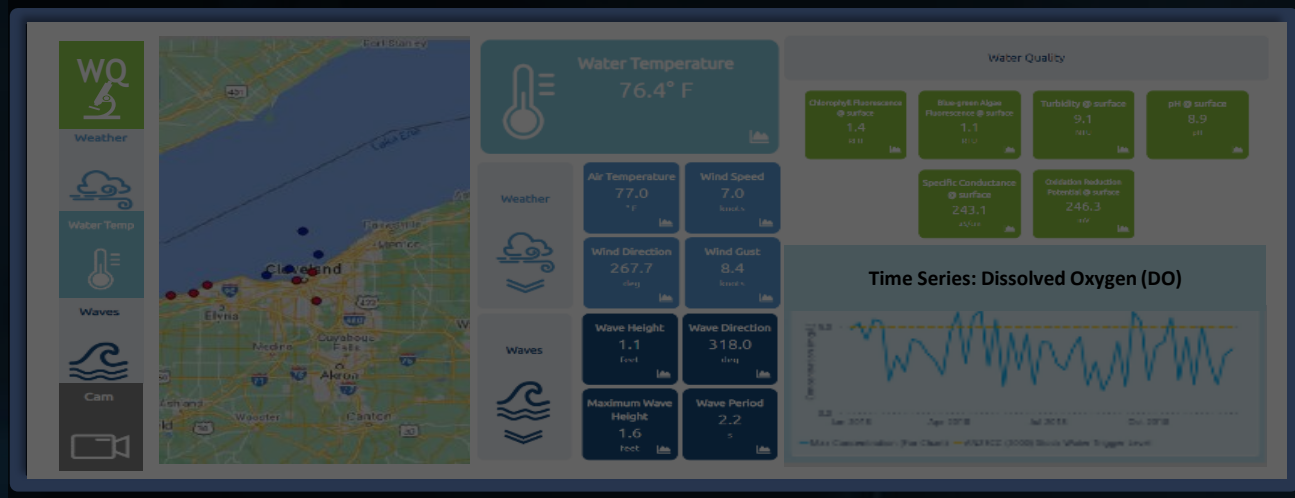
Hub for Water IoT

A Smart, Connected Sandbox for IoT Technologies

Testbed for IoT Solutions Across the Lifecycle:

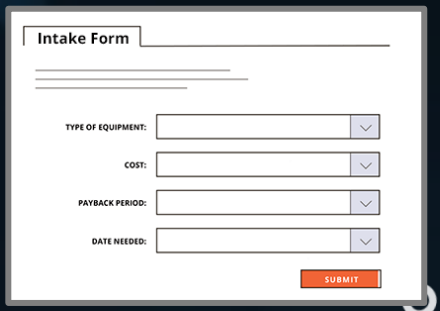
- Sensors
- Automation
- Telemetry
- Data Hosting
- Tech-Adjacent *(e.g. anti-fouling, wipers, etc.)*
- Data Management
- Cloud Platforms
- AI & Predictive Analytics
- Cybersecurity





- ✓ **Benchmarking:** Data access, industry-standard processes and/or industry-standard equipment
- ✓ **Wide Range of Settings:** Creeks, ponds, rivers, beaches, marinas, utility / research settings, open water
- ✓ **Wide Range of Conditions:** Turbulent/calm, turbid/ clear, windy/sheltered, HABs variable, weather variable, depth variable, parameters variable

Accelerating Innovation



- Testbeds support testing ***and demonstration*** *of solutions to increase market visibility*
- A single “Intake” can be used to match against ***dozens of potential deployment sites and partners***
- Pilot projects may qualify for CWA’s *insurance coverage to help mitigate risk concerns*

- ✓ **Evidence-based validation**
- ✓ **De-risked trials → faster commercialization**
- ✓ **250-300 innovators / year**
- ✓ **60+ deployments to date from 13 countries**
- ✓ **Deal-Flow , Deployment & Tech-Validation Collaborators, including:**

- USEPA
- NOAA
- USGS
- GLATOS
- ERDC
- Argonne National Labs
- NASA Glenn
- Battelle
- OEPA
- ODNR
- W / WW Utilities
- Industry

Opportunities

Q & A

RRT5

thank you!

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Ebie (“E.B.”) Holst
Director, Clusters & Innovation
eholst@clewa.org
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