

PFAS Background Sampling in CT



Grace Pagano, Gregory Roberts, Travis Molnar, Julia Jackson
Department of Civil and Environmental Engineering



Project Overview

Objectives

- Identify background concentration PFAS levels in undisturbed areas of the state

Background

- What are PFAS (polyfluoroalkyl substances)?**
 - Persistent and widespread family of emerging contaminants
- Need for Sampling**
 - No prior information for background levels
 - Need data to establish future regulations

Constraints

- Time
- Number of samples willing to be analyzed by the lab
- Accessibility: sampling only done on CT DEEP owned property
- Avoiding contamination of samples

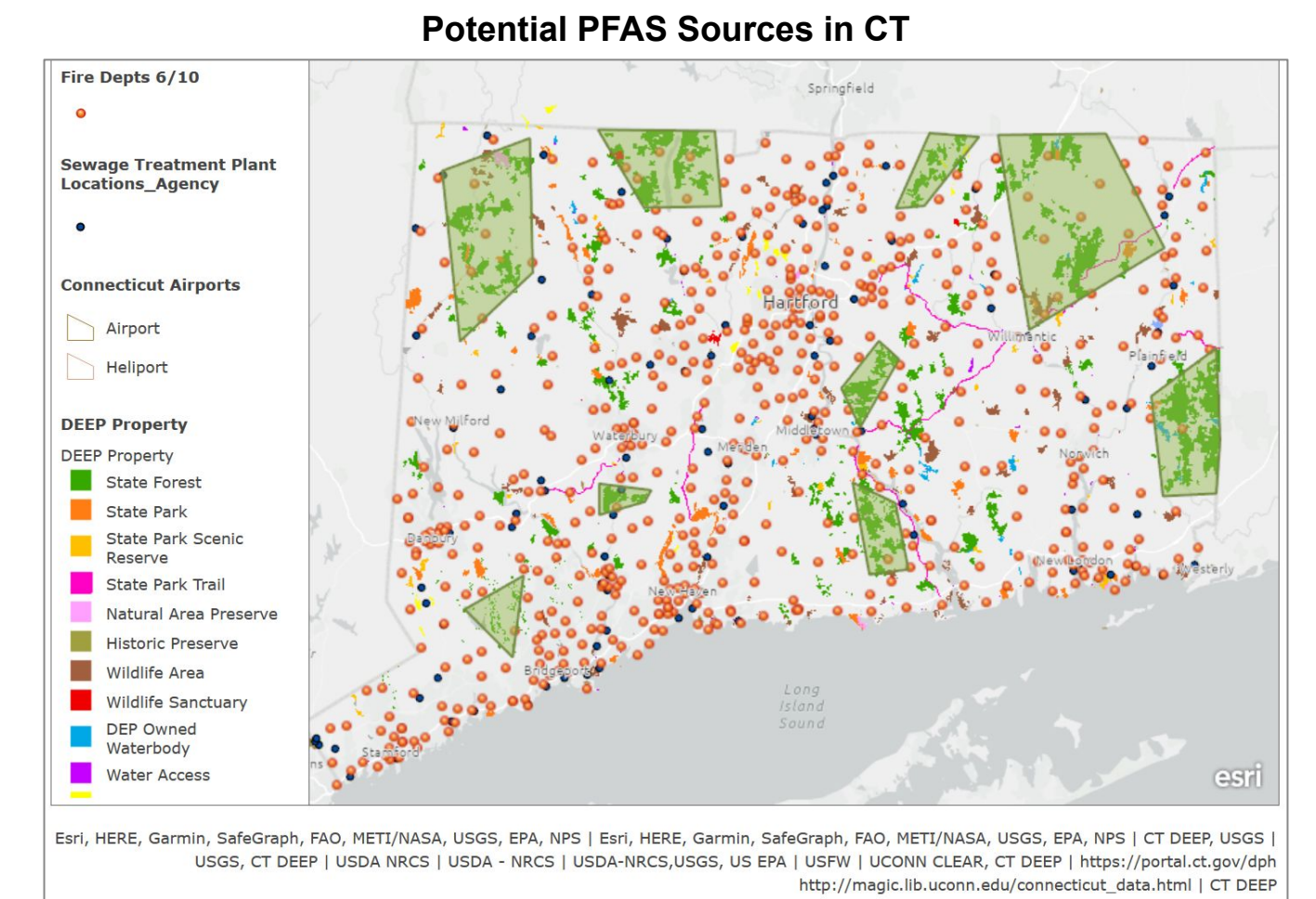
Goals

- Develop map displaying measured concentrations of PFAS around CT

Conceptual Model or Existing Conditions

Choosing Locations

- CT DEEP's online ArcGIS database was analyzed for potential PFAS sources that would indicate areas of possible contamination
 - Fire departments, airports, and sewage treatment plants are all common sources to avoid for background sampling²
 - DEEP property was identified for ease of access in sampling
- State forests and parks became the main areas for background sample locations: most "untouched" by PFAS



Sampling Plan

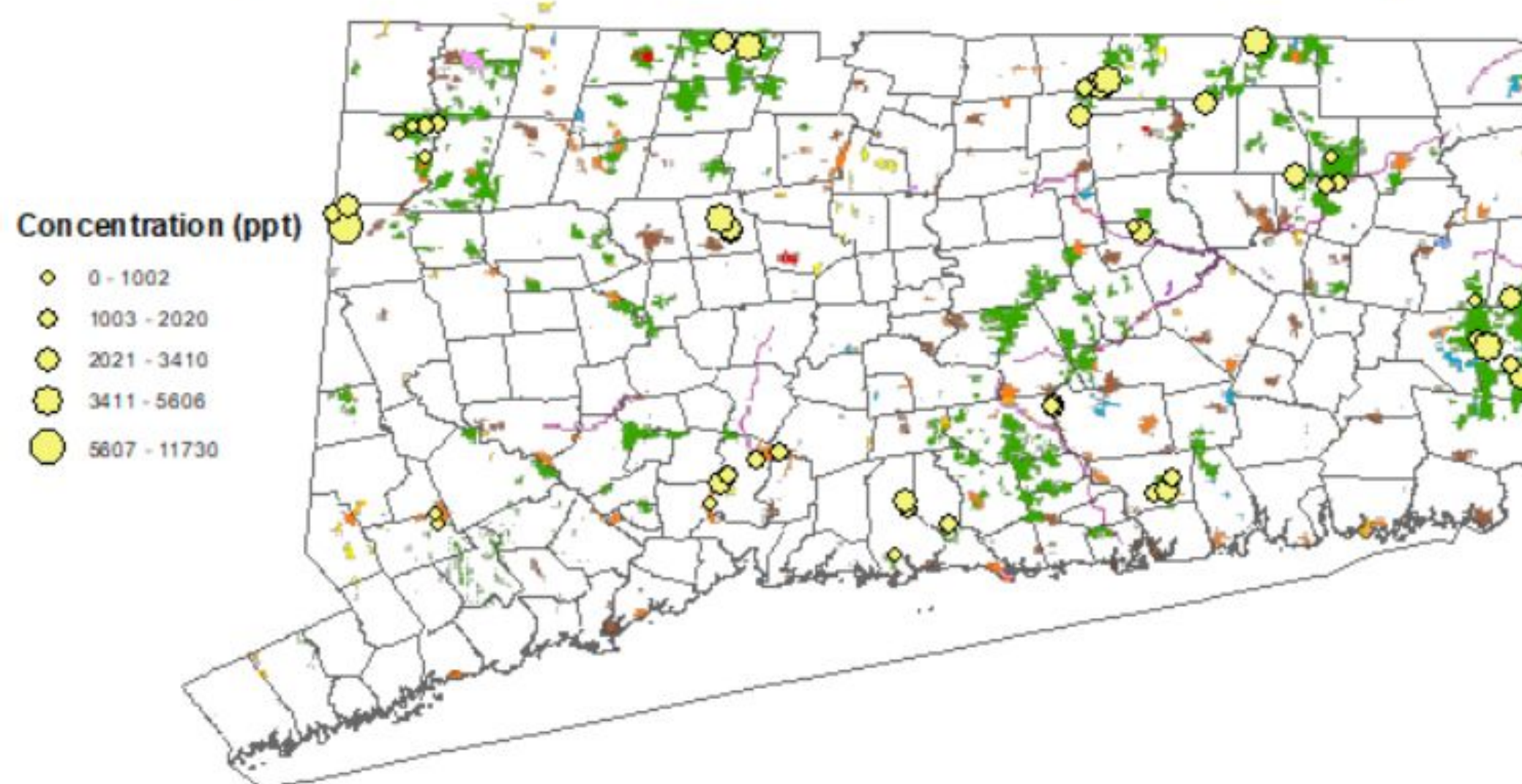
- 16 properties; 110 soil samples at 55 sites
- Two depths collected at each site: 0-6 inches, 18-24 inches
- Timeline:** last 3 weeks of March

Execution

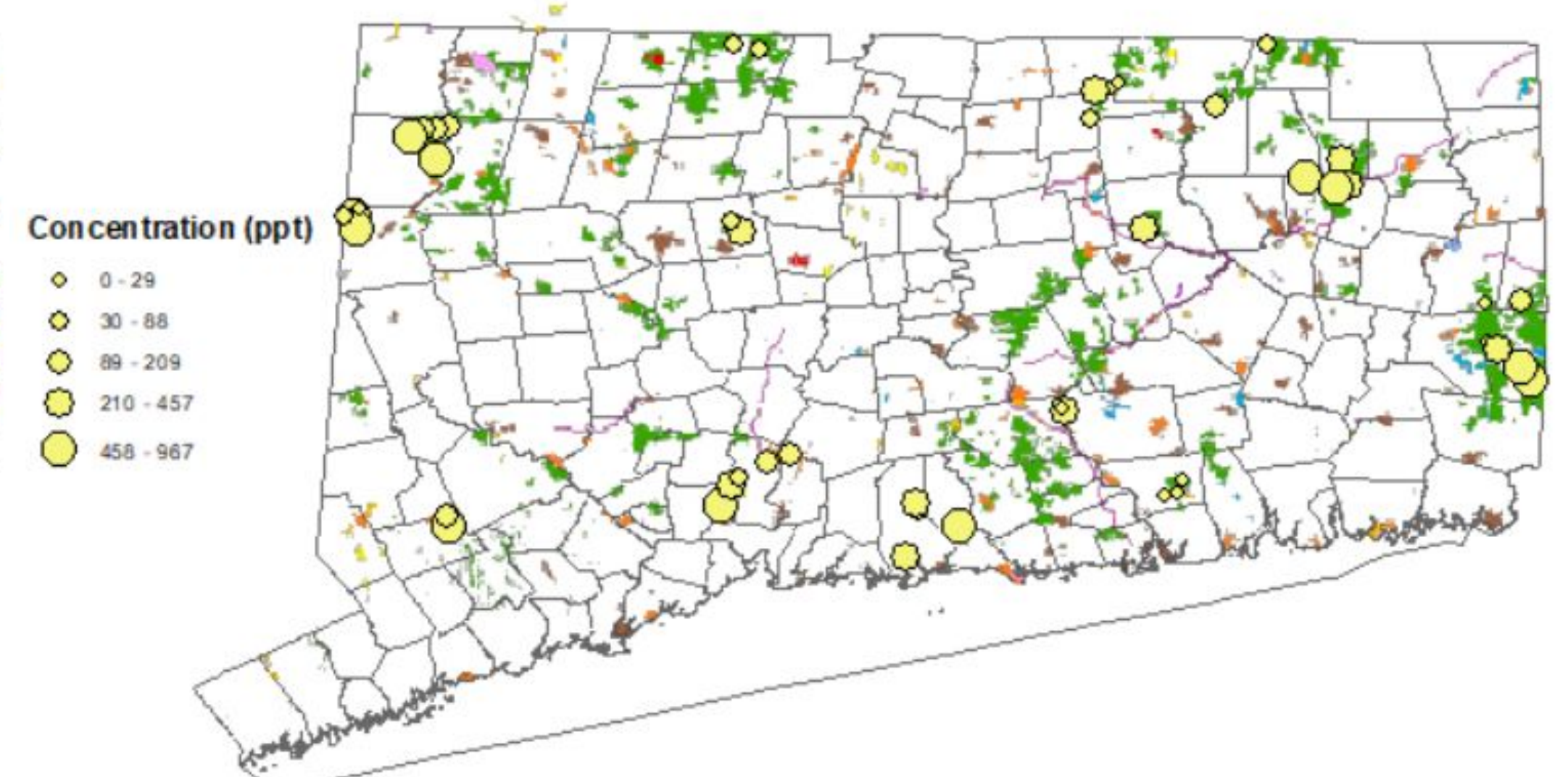
- Large bore soil sampler with acetate liner driven with a slide hammer used to obtain 2 ft of soil
- GPS device recorded coordinates to be entered into ArcGIS
- Samples delivered to lab (CET Labs) for analysis by EPA method 8327 for 18 PFAS compounds

Final Design

Background Concentrations of Total PFAS in Soil at 0-6 in Depth



Background Concentrations of Total PFAS in Soil at 18-24 in Depth



Sample Analysis:

- On average, concentrations of PFAS compounds decreased by half from 0-6 in to 18-24 in
 - ◆ Potential explanation: higher PFAS deposition from the atmosphere onto surface soils
- High concentrations of PFOA and PFOS (180-1600 ppt) were found throughout the state
 - ◆ Differing concentrations across properties attributed to transport through heterogeneous subsurfaces
- Concentrations were highest in Southern Connecticut where there is a greater industrial presence

Alternative Design

Smaller Sampling Area

- Considered sampling two counties instead of eight
 - Higher density of samples for a better understanding of true background concentrations in the focused area

Future Sampling Study

- Considered sampling groundwater but too time consuming
- Groundwater sampling can be subject of a future study and compared to the drinking water standard of 70 ppt

Cost Analysis

Sample Cost

- Typical soil sample cost = \$240
- Sample Analysis:** 110 x \$240 = **\$26,400**
- Actual cost is \$0 – special thanks to CET Labs for analyzing all samples for free

Other Costs

- Sample Collection** (existing equipment provided by DEEP) = **\$15,000**
 - Supplies included: Poland Springs Distilled water (PFAS Free) and ice to preserve samples
- Sample Delivery** (fuel) = **\$2,000**

Total Cost

- Analysis + Collection + Delivery = **\$43,400**

References

- ¹Image Source: <https://www.logolynx.com/images/logolynx/be/be0d287057c0edc737a7b36508fae4a6.jpeg>
²Environmental Factors Map Sources:
 CT DEEP. "Connecticut Airports." 1:24,000 Scale. "ArcGIS Online." October 30, 2019.
 CT DEEP. "Sewage Treatment Plant Locations." Scale Not Given. "ArcGIS Online." October 19, 2021.
 DMHSAAdmin. "Fire Depts 6/10." Scale Not Given. "ArcGIS Online." June 10, 2021.
 CT ECO. "DEEP Property." Scale Not Given. "ArcGIS Online." June 28, 2017.

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