Surface Water and Foam Sampling on Nantucket

Sampling Methods, Analytical Challenges, and Communication

October 28, 2026

MHOA 2026

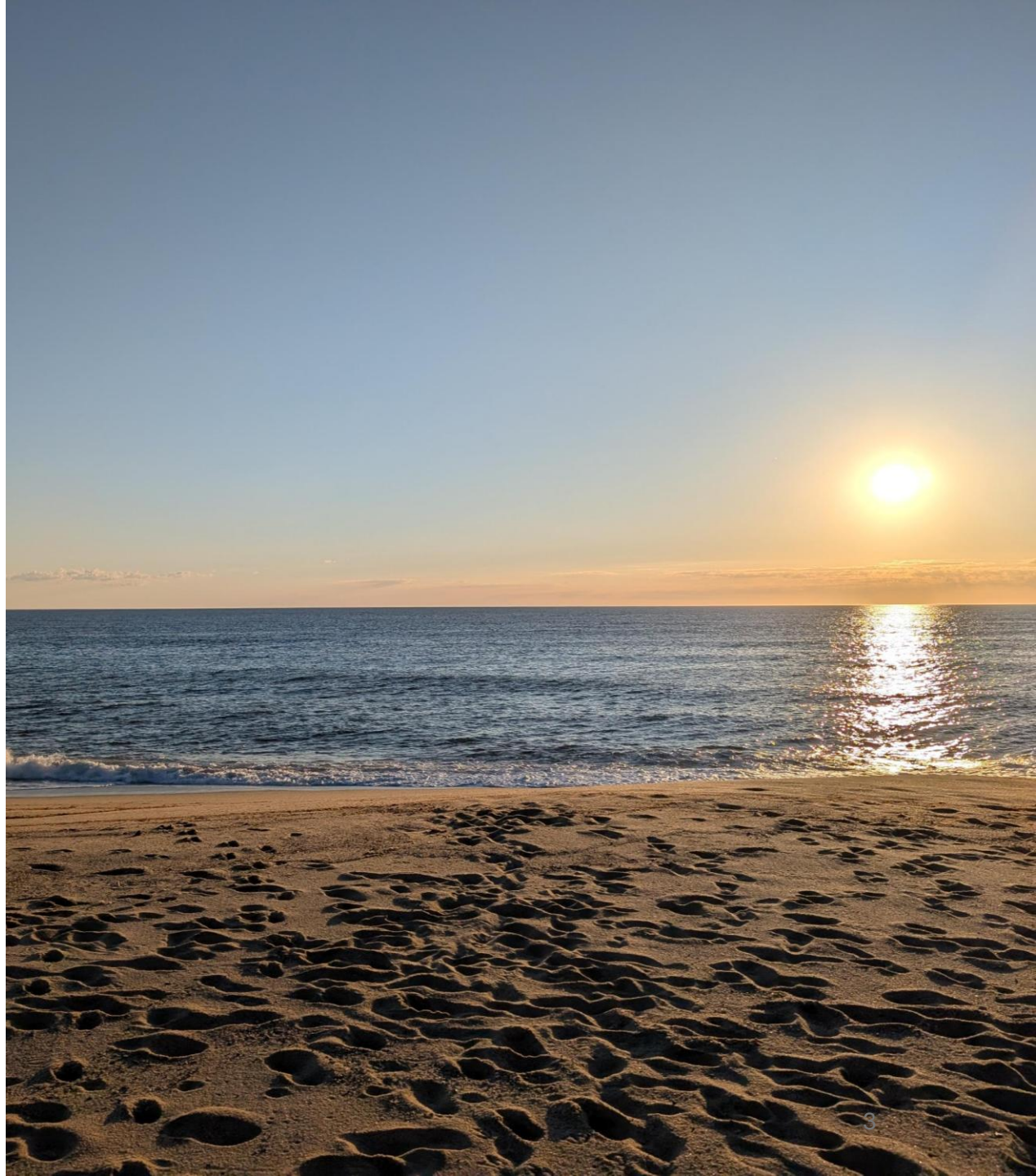
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Environmental Contamination Administrator
Nantucket Health & Human Services

Environmental Contamination Administrator Role

1. Implement and promote private well regulations
2. Provide technical support across departments with a focus on health risk
3. Increase PFAS awareness and education
4. **Conduct community exposure assessments**

This presentation will cover:

- What PFAS are and how they get into surface water
- Why the Town conducted this study
- What we found in surface water and foam from Nantucket's beaches, harbors, and ponds
- What these findings mean for recreational water use on the island





Study Background

What are PFAS?

- A large group of human-made chemicals used for their water-, grease-, and stain-resistant properties in consumer products and industrial applications.
- Found in items such as non-stick cookware, carpets, clothing, upholstery, and firefighting foam.
- Persist in the environment and can build up in the human body over time.
- Pose a risk of exposure through air, water, soil, food, and consumer products.

How do PFAS get into surface water?

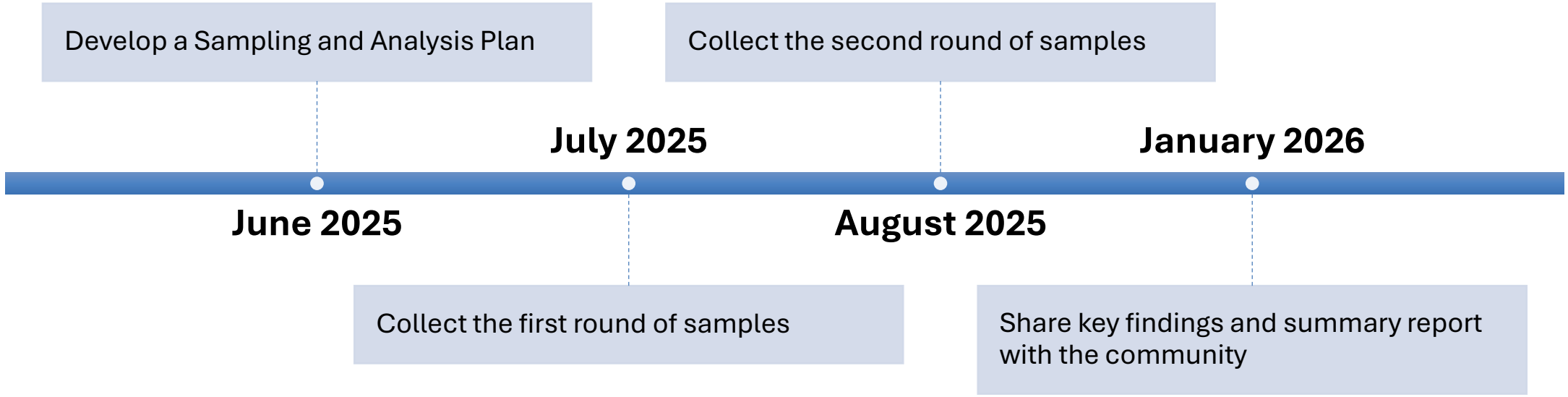
- PFAS can enter ponds, harbors, and coastal waters when:
  - Contaminated groundwater flows into surface waters
  - Rain or snowmelt carry contamination from roads and other surfaces into nearby waters
  - They are released from landfills
  - Septic systems, wastewater treatment, or industrial sources discharge them
  - They are released into the air (by local or distant sources), then deposited onto water
- Once in the water, PFAS can concentrate in foam on the water surface.

Why this study?

- PFAS can end up in recreational waters and surface foam, creating opportunities for exposure—especially for children.
- Nantucket's beaches, harbors, and ponds are widely used for swimming and outdoor recreation.
- There was limited local data on PFAS levels in these waters and the foam on them.
- This study helps fill those gaps, inform public health guidance, and support the safe use of Nantucket's natural resources.

Study goals and timeline

- Measure PFAS levels in surface water, as well as any visible surface foam, at coastal beaches and inland ponds.
- Use these data to better understand how PFAS might affect public health for recreational water users.

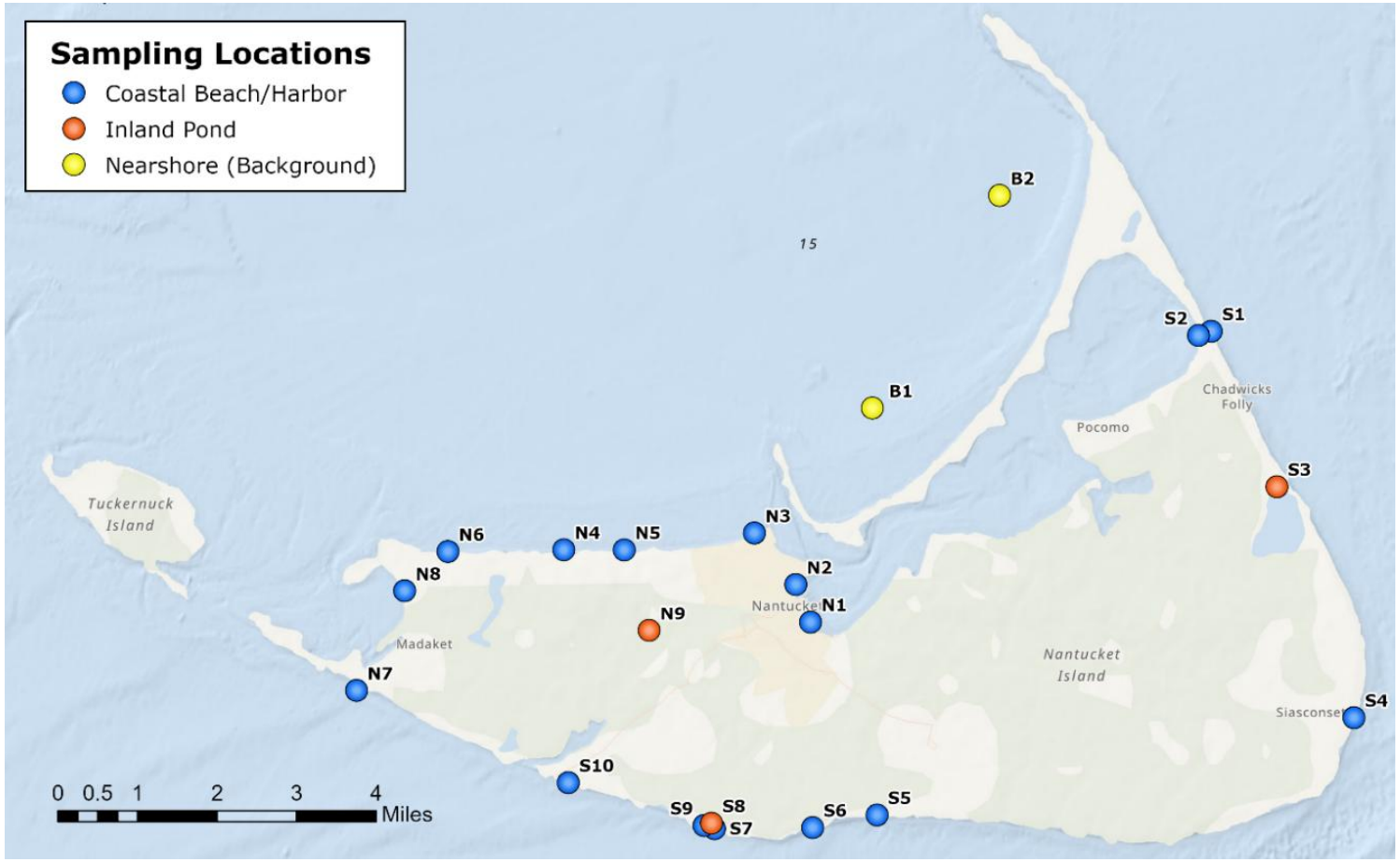




Study Methods

Sampling locations

- Surface water was collected at:
  - 16 coastal beaches/harbors
  - 3 inland ponds
  - 2 nearshore (background) locations
- Foam was collected where it was present:
  - Sesachacha Pond (S3)
  - Madaket Harbor (N8)



Sample collection methods: surface water

- Collected surface water at all locations by wading into the water (beaches and ponds) or by boat (nearshore locations).
- Sampled 1to 1.5 feet below the surface.
- Collected into bottles provided by the lab.

Methods follow Massachusetts Department of Public Health (DPH) guidance and were designed to minimize the potential for PFAS cross-contamination.



Sample collection methods: foam

- Collected foam where enough was present.
- Collected three or four one-gallon bags of foam per sample.
- Allowed foam to collapse in the bags for at least 24 hours.
- Transferred the liquid from the collapsed foam (foamate) into sample bottles for analysis.

This is a new area of study. Sample collection methods follow recommendations from other state agencies and in peer-reviewed literature.

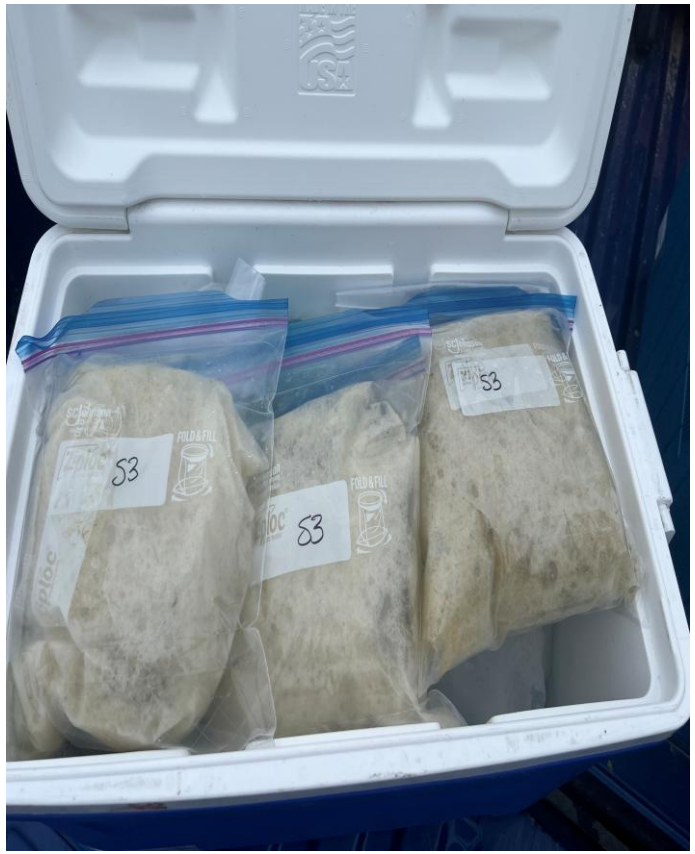


Stages of foam sampling

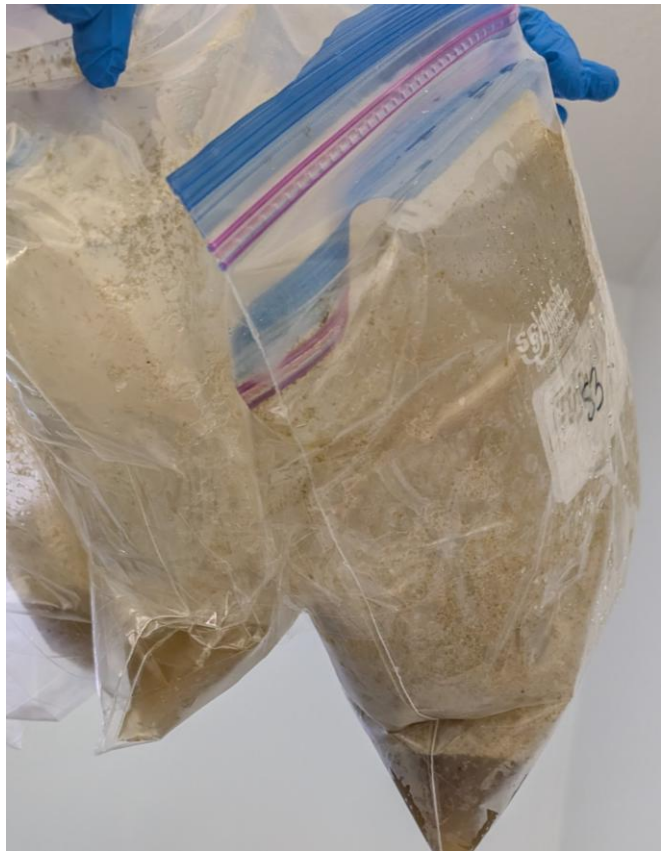
Photos of foam collected at Sesachacha Pond (July 2025)



Foam at the pond



Foam immediately after collection



Foam 10 hours after collection

Stages of foam sampling (continued)

Photos of foam collected at Sesachacha Pond (July 2025)



Foam 24 hours after collection



Foam 24 hours after collection



Resulting foamate for analysis

Additional quality control samples

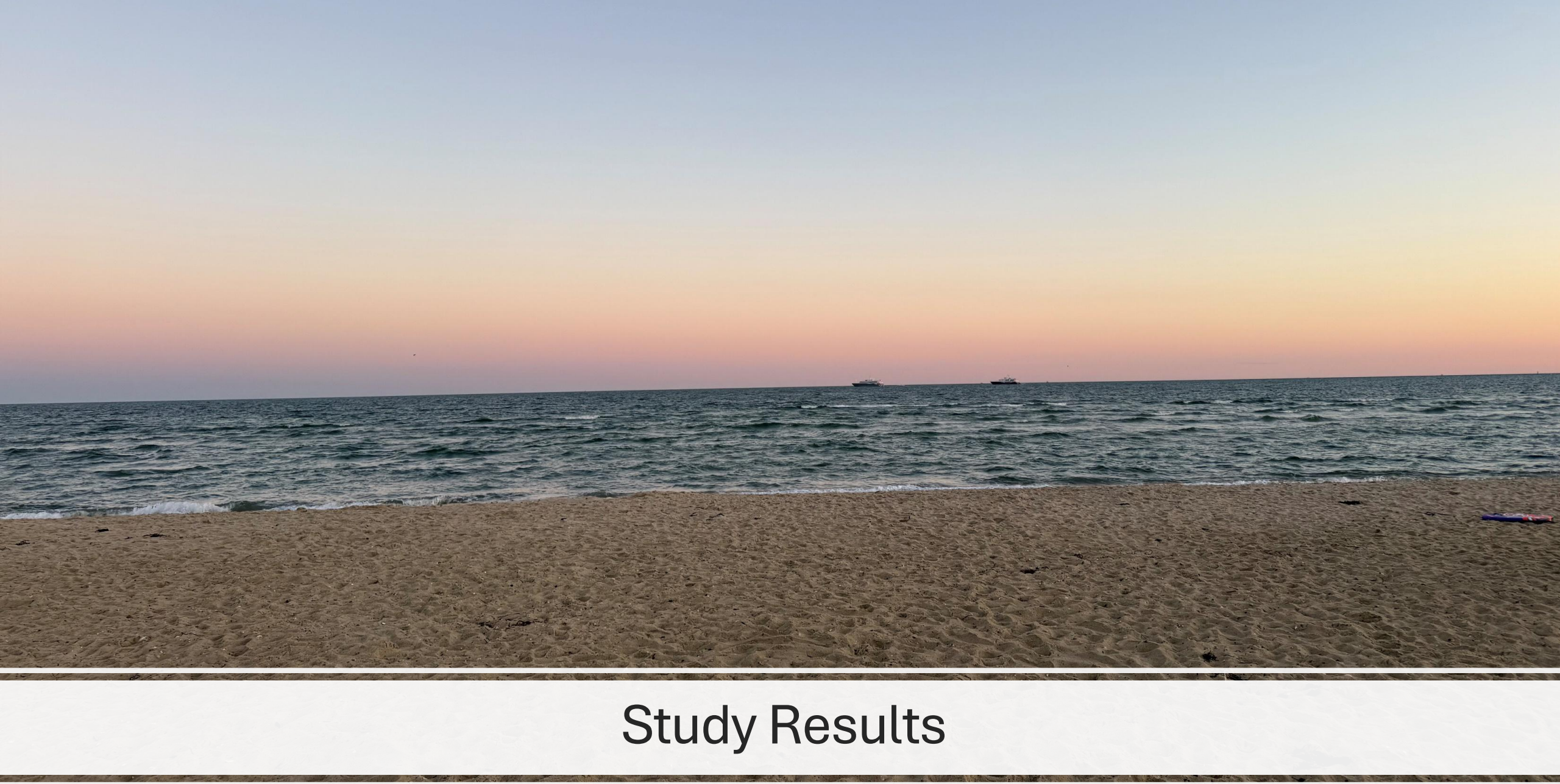
- Surface water field duplicates
  - Verify consistency/precision of water samples.
  - All duplicates were within acceptable ranges.
- Surface water field blanks
  - Check for contamination during collection.
  - No PFAS were detected in field blanks.
- Foam equipment blanks
  - Ensure bags didn’t introduce PFAS.
  - No PFAS were detected in equipment blanks.



Laboratory analysis

- Samples were sent to Pace Analytical Services in East Longmeadow, Massachusetts, for PFAS testing.
- They were analyzed for 40 PFAS using EPA Method 1633A. This is a validated method for detecting and measuring PFAS in environmental samples.

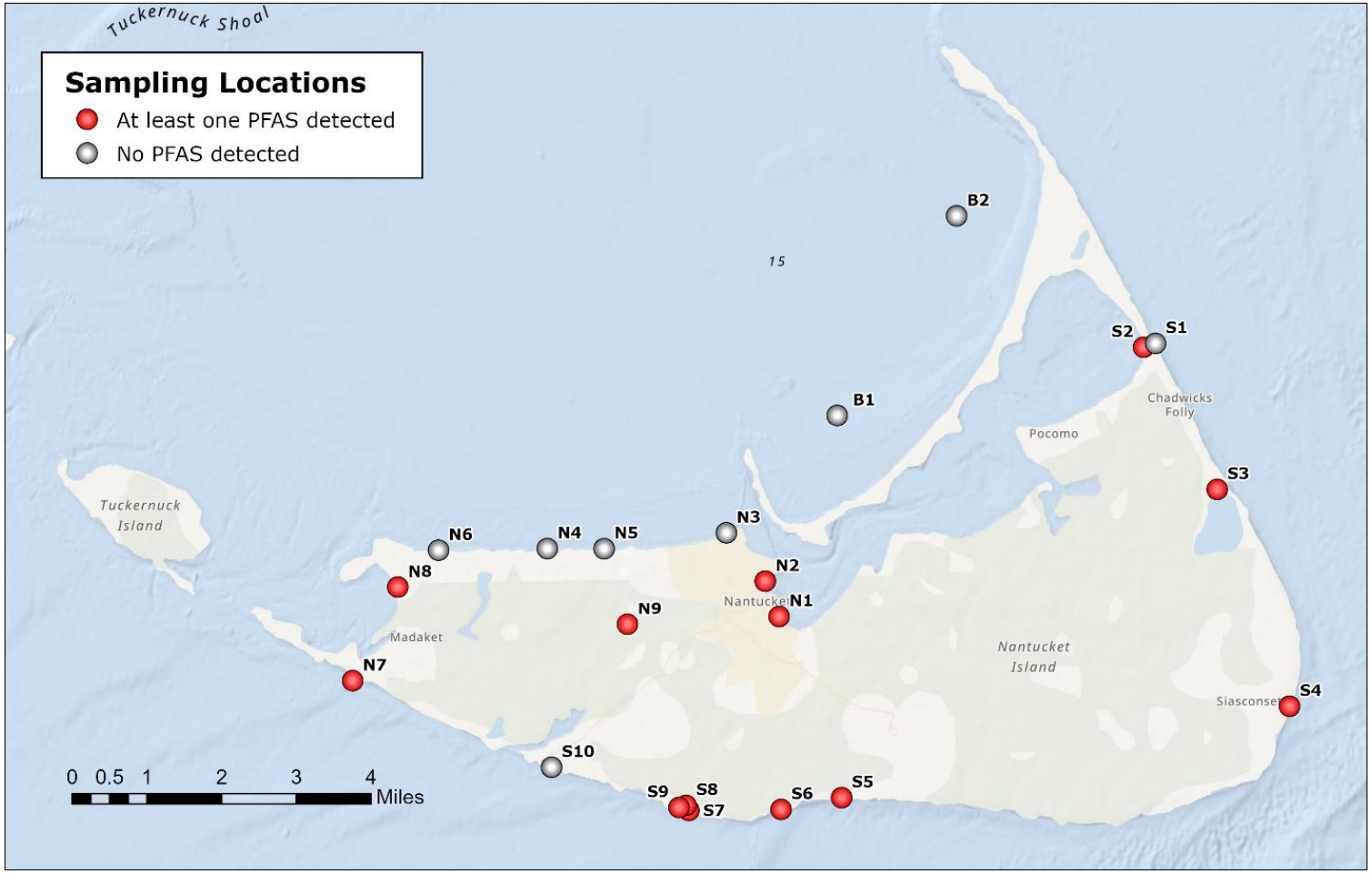
U.S. Environmental Protection Agency, 2024. Method 1633, Revision A: Analysis of Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous, Solid, Biosolids, and Tissue Samples by LC-MS/MS.
https://www.epa.gov/system/files/documents/2024-12/method-1633a-december-5-2024-508-compliant.pdf



Study Results

Surface water sample results

- PFAS were detected at 13 of 21 locations.
- Detections occurred at some harbors, at downtown beaches, at inland ponds, and along parts of the south and east coasts.
- Several locations, including the two nearshore/background sites, had no PFAS detections.



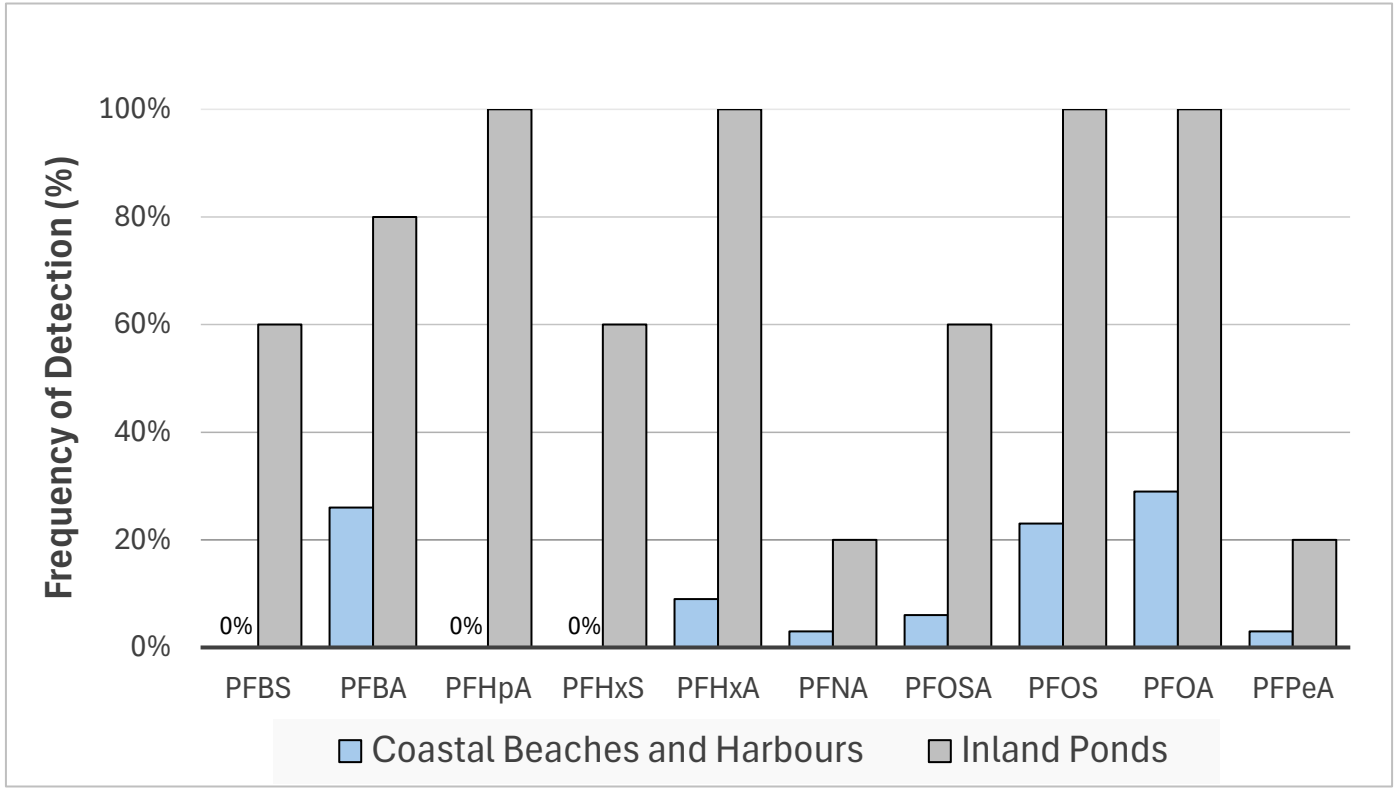
Surface water sample results (continued)

- PFOA, PFBA, and PFOS were detected most often, each found in about one-third of samples.
- Other PFAS were detected less often, generally in one-fifth or fewer of samples.
- Most detected PFAS had relatively low maximum concentrations, with one isolated PFPeA result.
  - This PFAS was not detected in two subsequent rounds of resampling.

PFAS	Frequency of Detection (Count [%])	Maximum (ng/L)
PFOA	15 (38%)	3.95
PFBA	13 (33%)	10.0
PFOS	13 (33%)	1.76
PFHxA	8 (20%)	2.18
PFHpA	5 (13%)	1.60
PFOSA	5 (13%)	1.40
PFBS	3 (8%)	2.33
PFHxS	3 (8%)	2.20
PFNA	2 (5%)	0.739
PFPeA	2 (5%)	210

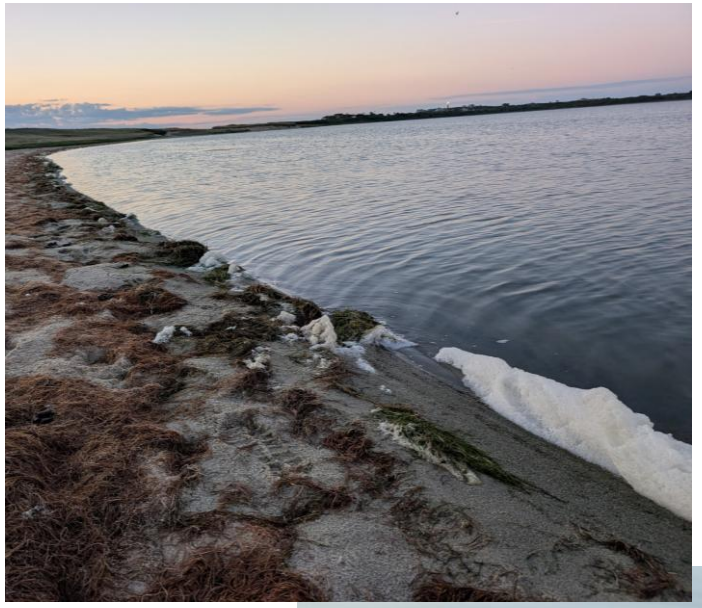
Surface water at coastal beaches vs. ponds

- PFAS were detected more often in inland ponds than in coastal beaches and harbors.
- Several PFAS were not detected at coastal sites but were detected in inland ponds.



Foam sampling overview

- Foam was observed and sampled at two locations: Sesachacha Pond and Madaket Harbor.
- These were the only sites with enough foam for sampling.
- Foam samples were collected at each of these sites during both sampling rounds.



Sesachacha Pond (August 2025)



Madaket Harbor (August 2025)



Foam sample results

- Foam behaves differently than surface water and can concentrate PFAS.
- Multiple PFAS were found in foam at both sampled locations, at substantially higher levels than in surface water.
- Findings are consistent with other studies of PFAS in surface water foam.

Foam sample results (continued)

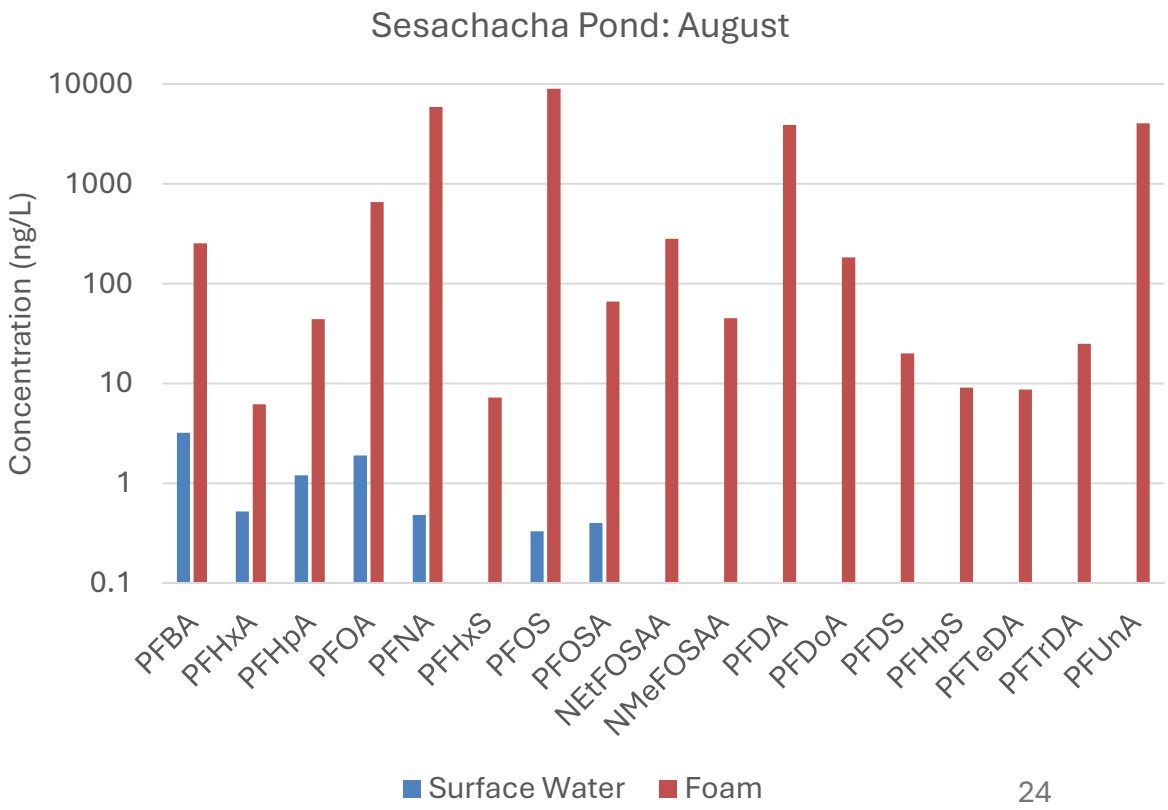
- 21 different PFAS were detected in foam.
- PFAS levels varied by location and sampling round, but similar PFAS were consistently dominant.
- Across all samples, PFOS was measured at the highest levels.

Location	Sampling Round	Number of PFAS Detected	PFAS Concentration Range (ng/L)	PFAS with Highest Levels
Sesachacha Pond	July	16	<10 to ~30,000	PFOS, PFNA, PFOA, PFDA
Sesachacha Pond	August	17	<1 to ~9,000	PFOS, PFNA, PFUnA, PFDA
Madaket Harbor	July	19	<3 to ~8,000	PFOS, PFNA, PFDA, PFDoA
Madaket Harbor	August	13	<1 to ~2,000	PFOS, PFNA, PFOA

Foam sampling and analysis is a new and evolving area of study; many results were qualified by the laboratory, meaning the exact concentrations are uncertain, but the overall pattern is clear.

PFAS in surface water vs. foam

- PFAS concentrations in foam were much higher than in surrounding surface water.
- Several PFAS detected in foam were not detected in paired surface water samples.
- This reflects the tendency of PFAS to accumulate at the water surface and in foam.





Public Health Considerations

What this means for exposure

- Swimming and general water contact primarily involve surface water.
- Foam can increase the potential for direct contact, especially for children.



How results were interpreted

- Surface water results were interpreted using DPH guidance.
- There are no established health-based guidelines for PFAS in foam.
- Foam results were evaluated using a precautionary, qualitative approach.

Health-based guidelines for surface water

- In May 2024, DPH published *Operational Guidance for Bathing Beaches at PFAS-Impacted Waterbodies*.
- It includes an initial screening value of 20 nanograms per liter (ng/L), which is applicable to eight PFAS with established toxicity criteria: PFOS, PFOA, PFNA, PFHxS, PFHxA, PFBS, PFBA, and HFPO-DA (also known as GenX).
  - If all PFAS levels are below 20 ng/L, no action is required.
  - If any of PFAS levels are above 20 ng/L, collect a confirmatory sample.

Massachusetts Department of Public Health, 2024. Operational Guidance for Bathing Beaches at PFAS Impacted Waterbodies. *https://www.mass.gov/info-details/operational-guidance-for-bathing-beaches-at-pfas-impacted-waterbodies*

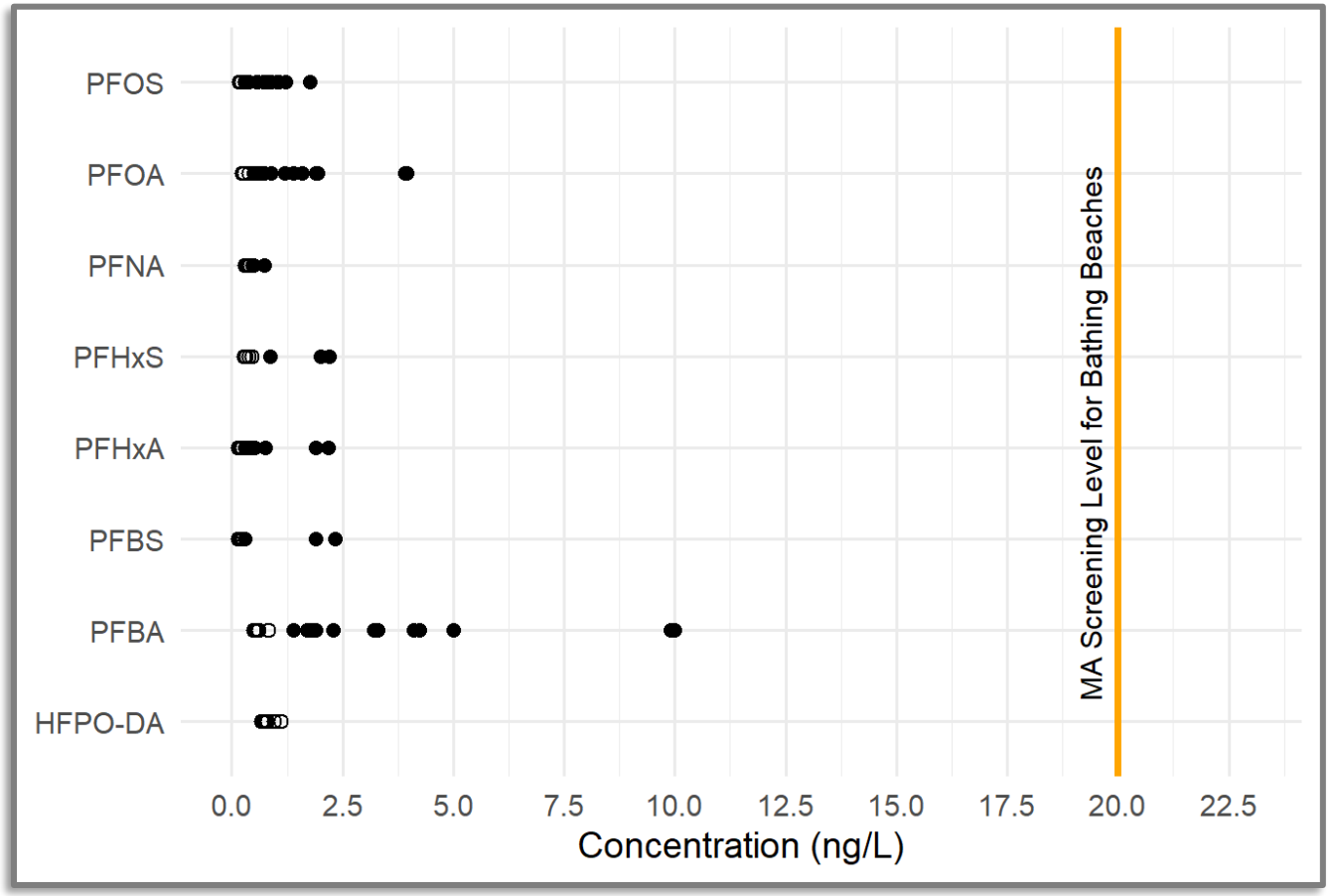
Health-based guidelines for surface water (continued)

Guidance Value	Water Quality Evaluation
>20 to 90 ng/L	No restrictions on swimming
>90 – 500 ng/L	Conduct a beach-specific evaluation to determine if restrictions are necessary
>500 ng/L	Swimming prohibited

Massachusetts Department of Public Health, 2024. Operational Guidance for Bathing Beaches at PFAS Impacted Waterbodies. *https://www.mass.gov/info-details/operational-guidance-for-bathing-beaches-at-pfas-impacted-waterbodies*

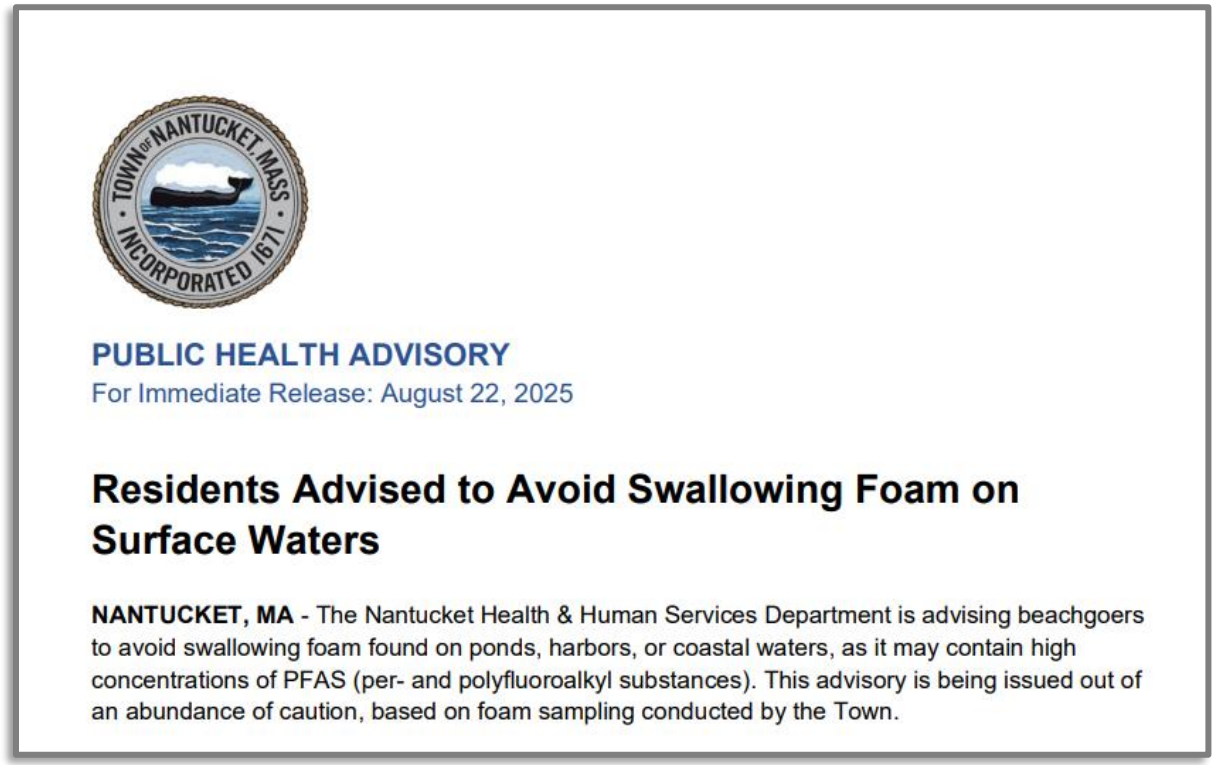
Surface water screening

- All surface water PFAS levels were below DPH's screening value.
- Other PFAS without screening values (PFOSA, PFHpA) were detected at low levels.
- PFPeA was detected at one location (Sconset Beach) at a higher concentration during the July sampling event; the Town resampled this location twice and did not detect PFPeA.



Foam evaluation

- There are no health-based comparison values for PFAS in surface water foam.
- Foam contained much higher PFAS levels than surface water.
- Out of an abundance of caution, the Nantucket Health & Human Services Department issued a public health advisory on August 22, 2025.



PUBLIC HEALTH ADVISORY

For Immediate Release: August 22, 2025

Residents Advised to Avoid Swallowing Foam on Surface Waters

NANTUCKET, MA - The Nantucket Health & Human Services Department is advising beachgoers to avoid swallowing foam found on ponds, harbors, or coastal waters, as it may contain high concentrations of PFAS (per- and polyfluoroalkyl substances). This advisory is being issued out of an abundance of caution, based on foam sampling conducted by the Town.

https://nantucket-ma.gov/DocumentCenter/View/53030/Residents-Advised-to-Avoid-Swallowing-Foam-on-Surface-Waters---August-22-2025

Nantucket foam health advisory

- Avoid swallowing surface water foam, such as the foam at Sesachacha Pond and Madaket Harbor.
- If you come in contact with foam, rinse off with fresh water as soon as possible.
- Supervise children closely around foam, as they may accidentally ingest it.
- Keep pets away from foam. If your pet comes in contact with foam, keep them from ingesting it by rinsing them off with fresh water.



Conclusions

Key takeaways

- PFAS were detected in some of Nantucket's recreational surface waters, but at generally low levels.
  - Surface water results suggest there is no risk related to swimming or other recreational activities that involve direct contact with water.
- Foam contained much higher PFAS levels than surface water.
  - Avoiding contact with foam is a wise precaution, especially for children.

Limitations

- Sampling represents a snapshot in time and may not capture all conditions.
- Foam sampling and analysis is a developing area of science.
- Only 40 PFAS were measured, out of many PFAS used globally.

Recommendations

- Continue monitoring surface water and foam every five years.
- Share results transparently with the community.
- Revisit sampling as methods and guidance evolve.

Refer to the Town's PFAS webpage for additional related materials, including a copy of the Sampling and Analysis Plan and the Project Summary Report.
https://www.nantucket-ma.gov/1574/PFAS

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Thank you!

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For more information:
Visit the Town's PFAS website:
https://www.nantucket-ma.gov/1574/PFAS



Backup Slides

All Foam Sample Results

PFAS	Madaket Harbor			Sesachacha Pond		
	July (ng/L)	August (ng/L)	RPD (%)[a]	July (ng/L)	August (ng/L)	RPD (%)[a]
NEtFOSAA	180[b]	25	151	1000[b]	282[b]	112
NEtFOSE	33 J[b]	< 13	134	< 100	< 10	NA
NMeFOSA	9.2[b]	< 1.3	174	< 10	< 1.0	NA
NMeFOSAA	60[b]	< 5.2	183	370[b]	45[b]	157
NMeFOSE	54 J[b]	< 16	150	< 120	< 12	NA
PFBA	< 4.0	< 3.9	NA	< 31	254	177
PFDA	1900[b]	161[b]	169	12000[b]	3890[b]	102
PFDoA	1800[b]	12	197	410[b]	183[b]	77
PFDS	3.9 J[b,c]	< 1.7	127	180[b,d]	20[b]	160
PFHpA	48	6.8	150	500[b]	44[b]	168
PFHpS	89[b]	12.9	149	190[b,c]	9.1[b,c]	182
PFHxA	5.3	< 1.1	162	< 8.8	6.2[b,d]	34
PFHxS	48	10	131	330[b]	7.2[b]	192
PFNA	2500[b]	515	132	27000[b]	5910[b]	128
PFOA	1000	201	133	13000[b]	659[b]	181
PFOS	8300	2040	121	30000[b]	8960[b]	108
PFOSA	110[b,c]	26[b,c]	124	640[b]	66[b,c]	163
PFPeA	< 2.5	< 2.4	NA	130[b]	< 1.9[b]	197
PFTeDA	1100[b]	9.3	197	81[b]	8.7[b]	161
PFTrDA	490[b]	5.0 J	196	210[b,d]	25[b,d]	157
PFUnA	1400[b]	60	184	5500[b]	4050[b]	30

Notes:

This table presents results for the 21 PFAS that were detected in at least one foam sample.

NA: not applicable; both results are below the MDL.

< MDL: This PFAS was not detected above the MDL shown. Because the MDLs had more variation for these samples, sample-specific MDL values are included in this table.

All samples were extracted at dilution due to insufficient volume.

Results with a J flag were detected between the laboratory's MDL and its MRL; the concentration is an approximate value.

[a]The relative percent difference (RPD) represents the difference between results from the same location during the July and August sampling events. RPDs between a detect and non-detect were calculated using the MDL ÷ 2 as a substitution for the non-detect.

[b]Extracted internal standard is outside of control limits and there was insufficient sample volume for re-extraction. Result is likely biased high.

[c]Qualifier ion ratio > 150% of associated calibration; the detection is considered suspect by the laboratory.

[d]Qualifier ion ratio < 50% of associated calibration; the detection is considered suspect by the laboratory.

All Surface Water Sample Results

Waterbody	Date	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFBS	PFHxS	PFOS	PFOSA
40th Pole Beach	7/8/25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	8/26/25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Children's Beach	7/8/25	1.8 J	ND	ND	ND	ND	ND	ND	ND	ND	ND
	8/26/25[a]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cisco Beach	7/8/25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	8/26/25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dionis Dunes	7/8/25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	8/26/25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hummock Pond[b]	7/8/25[a]	ND	ND	0.76 J[c]	0.54 J	1.9	ND	0.29 J	0.86 J	1.0 J	ND
Jetty's Beach	7/8/25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	8/26/25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Madaket Beach	7/8/25	ND	ND	ND	ND	0.73 J	ND	ND	ND	ND	0.61 J[d]
	8/26/25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Madaket Harbor	7/8/25	3.3 J	ND	0.32 J[d]	ND	1.2 J	ND	ND	ND	ND	ND
	8/26/25	ND	ND	0.30 J	ND	0.73 J	ND	ND	ND	1.1 J	ND
Miacomet Beach	7/8/25	2.3 J	ND	ND	ND	0.67 J	ND	ND	ND	0.39 J	ND
	8/26/25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Miacomet Pond	7/8/25	4.1 J	1.5 J	1.9	1.6 J	3.9	ND	1.9	2.2	0.88 J	1.0 J
	8/26/25	9.9	ND	2.2[c]	1.6 J	4.0	ND	2.3	2.0	1.2 J	ND
Nobadeer Beach	7/8/25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	8/26/25	ND	ND	ND	ND	ND	ND	ND	ND	0.56 J	ND
Northern Nearshore Area [b]	7/9/25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Northern Nearshore Area [b]	7/9/25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sconset Beach	7/8/25[e]	ND	210	0.40 J	ND	1.4 J	ND	ND	ND	0.71 J	ND
	8/5/25	1.9 J	ND	ND	ND	ND	ND	ND	ND	ND	ND
	8/26/25	4.2 J	ND	ND	ND	ND	ND	ND	ND	ND	0.67[d] J
Sesachacha Pond	7/8/25	10	ND	0.47 J	1.0 J	1.6 J	ND	ND	ND	0.58 J	1.4 J
	8/26/25[a]	3.2 J	ND	0.52 J	1.2	1.9	0.48 J	ND	ND	0.33 J	0.41 J
Sewerbeds	7/8/25	1.4 J	ND	ND	ND	1.4 J	ND	ND	ND	0.82 J	ND
	8/26/25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Surfside Beach	7/8/25	5.0 J	ND	ND	ND	0.55 J	ND	ND	ND	ND	ND
	8/26/25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Washing Pond Beach	7/8/25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	8/26/25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Washington Street Beach	7/8/25[a]	1.7 J	ND	ND	ND	ND	ND	ND	ND	0.29 J	ND
	8/26/25	ND	ND	ND	ND	0.50 J	ND	ND	ND	ND	ND
Wauwinet Harbor	7/8/25[a]	ND	ND	ND	ND	0.74 J	ND	ND	ND	0.72 J	ND
	8/26/25	3.2 J	ND	ND	ND	0.88 J	0.74 J	ND	ND	1.8	ND
Wauwinet Ocean	7/8/25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	8/26/25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

This table presents results for the 10 PFAS that were detected in at least one surface water sample.
ng/L: nanogram per liter.
ND: non-detect; this PFAS was not detected above the laboratory's method detection limit (MDL).
Results with a J flag were detected between the laboratory's MDL and its MRL; the concentration is an approximate value.
[a] Results reflect the average of paired parent and duplicate samples collected at this location on this date. If an analyte was detected in the parent sample but not in the duplicate (or vice versa), the reported concentration is the average of the detected value and one-half the MDL for the non-detect. Aside from J flags, laboratory qualifiers are not shown for these results.
[B] Hummock Pond, Northern Nearshore Area (near Coskata Beach), and Northern Nearshore Area (near Trap/Pot Waters) were only sampled during the July sampling round. PFAS were not detected in either of the nearshore background samples and additional samples were not collected in August. Hummock Pond was not sampled in August due to presence of a harmful algal bloom near the sampling site.
[C] Qualifier ion ratio > 150% of associated calibration; the detection is considered suspect by the laboratory.
[D] Qualifier ion ratio < 50% of associated calibration; the detection is considered suspect by the laboratory.
[E] Sample underwent centrifugation per the laboratory's protocol.