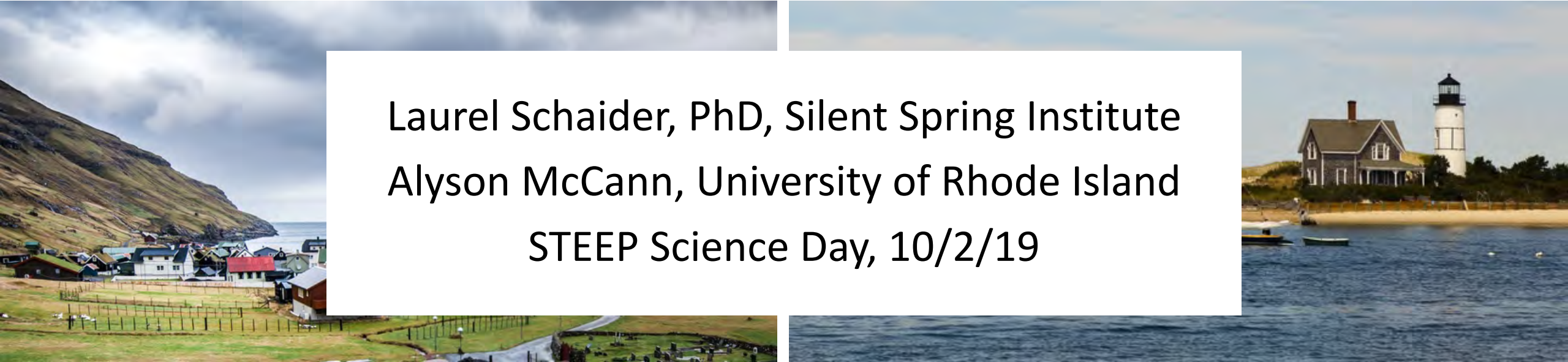




Sources, Transport, Exposure & Effects of PFASs
UNIVERSITY OF RHODE ISLAND SUPERFUND RESEARCH PROGRAM

PFAS chemicals in Cape Cod drinking water: Preliminary findings of STEEP private wells study

A collage of four photographs from Cape Cod, Massachusetts. The top-left photo shows a coastal town with colorful houses and a steep, grassy hillside under a cloudy sky. The top-right photo shows a white lighthouse on a small island with a blue house. The bottom-left photo shows a green field with a fence and a road. The bottom-right photo shows a blue body of water with a small boat.

Laurel Schaidler, PhD, Silent Spring Institute
Alyson McCann, University of Rhode Island
STEEP Science Day, 10/2/19

Overview

- Drinking water guidelines
- PFAS in Cape Cod drinking water
- STEEP private wells study
- Implications and next steps



Overview

- Drinking water guidelines
- PFAS in Cape Cod drinking water
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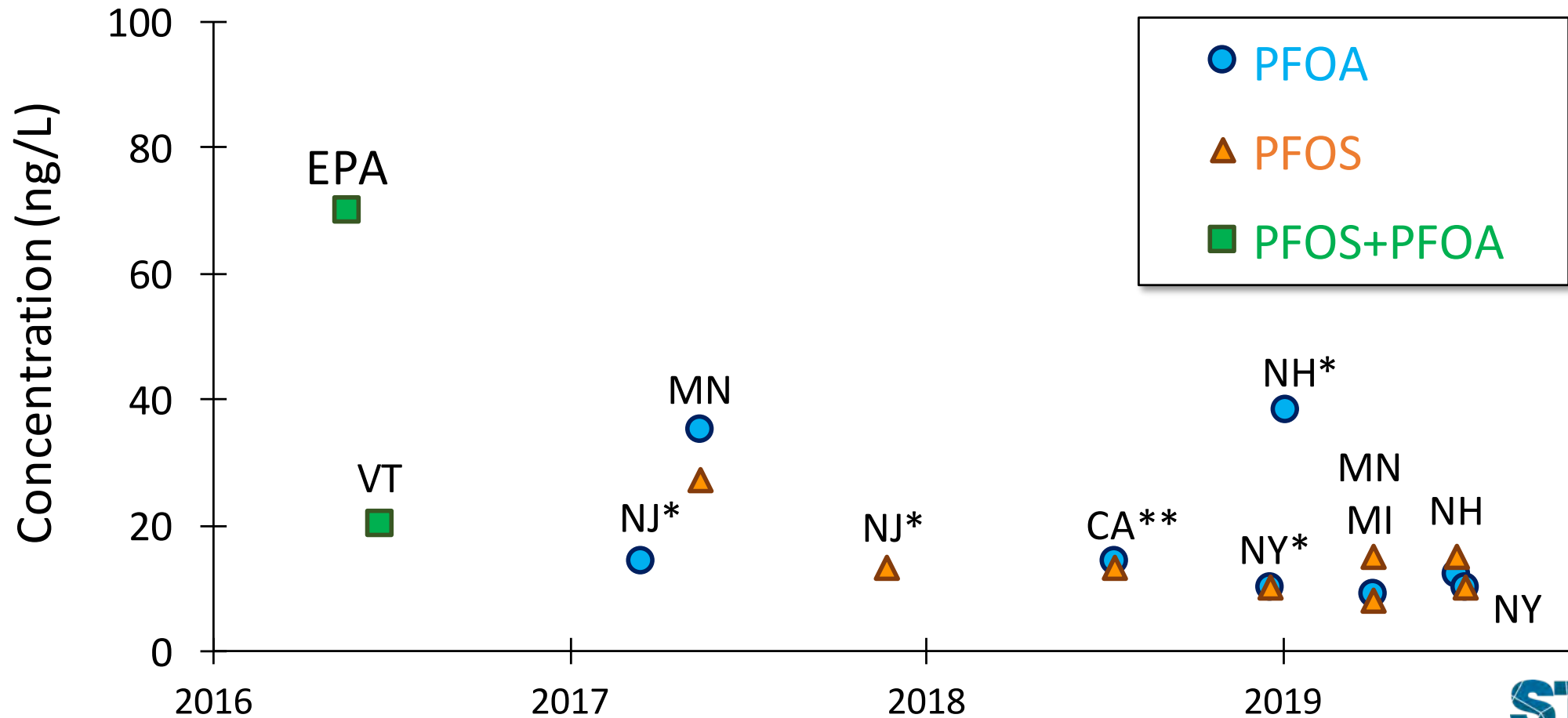


There are currently no Federal enforceable drinking water standards (MCLs) for PFASs.

EPA and some states, including Massachusetts, have developed non-enforceable Health Advisories for PFOS, PFOA, and a few other PFAS chemicals.

Recent guidelines are mostly in the 10-20 parts per trillion (ppt, or ng/L) range

** = proposed, ** = notification level*





MassDEP responses



- June 2018: Public health guideline (ORSG)
70 ppt for sum of 5 PFAS chemicals
(PFOS, PFOA, PFHpA, PFNA, PFHxS)
- Oct. 2018: Petition from CLF and Toxics Action Center
- Jan. 2019: Public hearing, comments on petition
- April 2019: Launched process to develop standards
- June 2019: Draft GW-1 standard (current or foreseeable drinking water)
20 ppt for sum of 6 PFAS chemicals
(PFOS, PFOA, PFHpA, PFNA, PFHxS, PFDA)

Overview

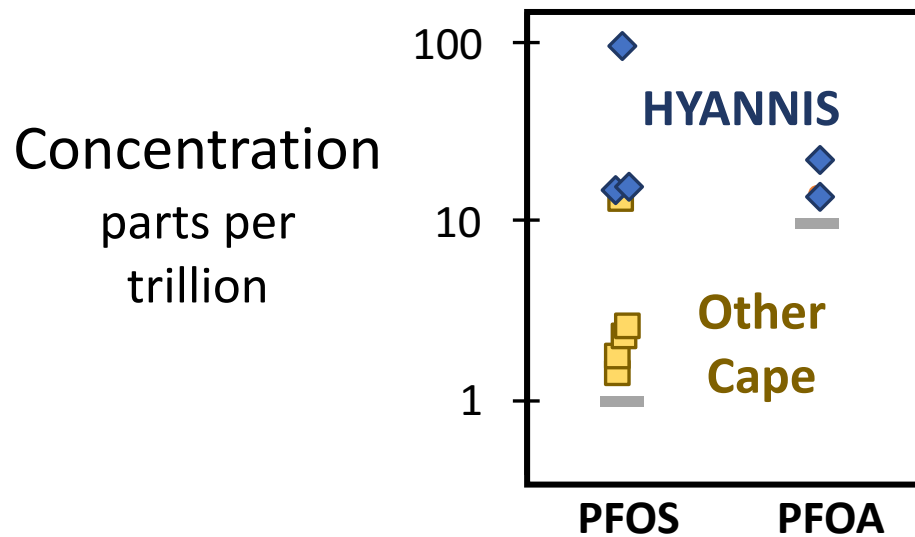
- Drinking water guidelines
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Silent Spring Institute studies

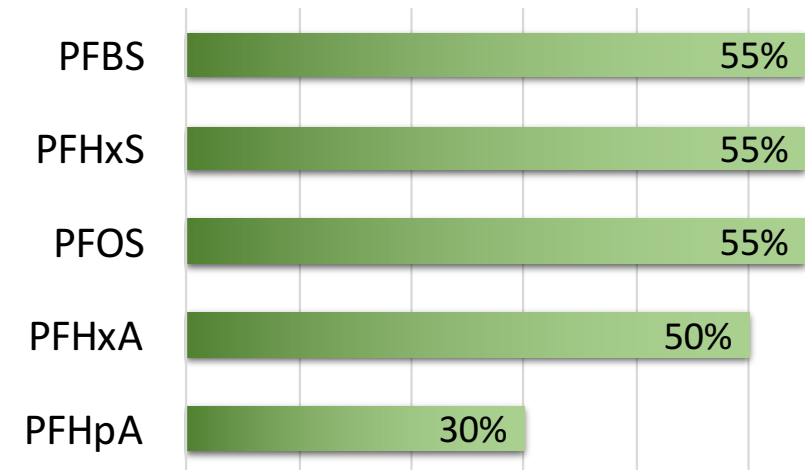
Public wells (2010)

PFOS & PFOA in Cape public wells, highest levels in Hyannis



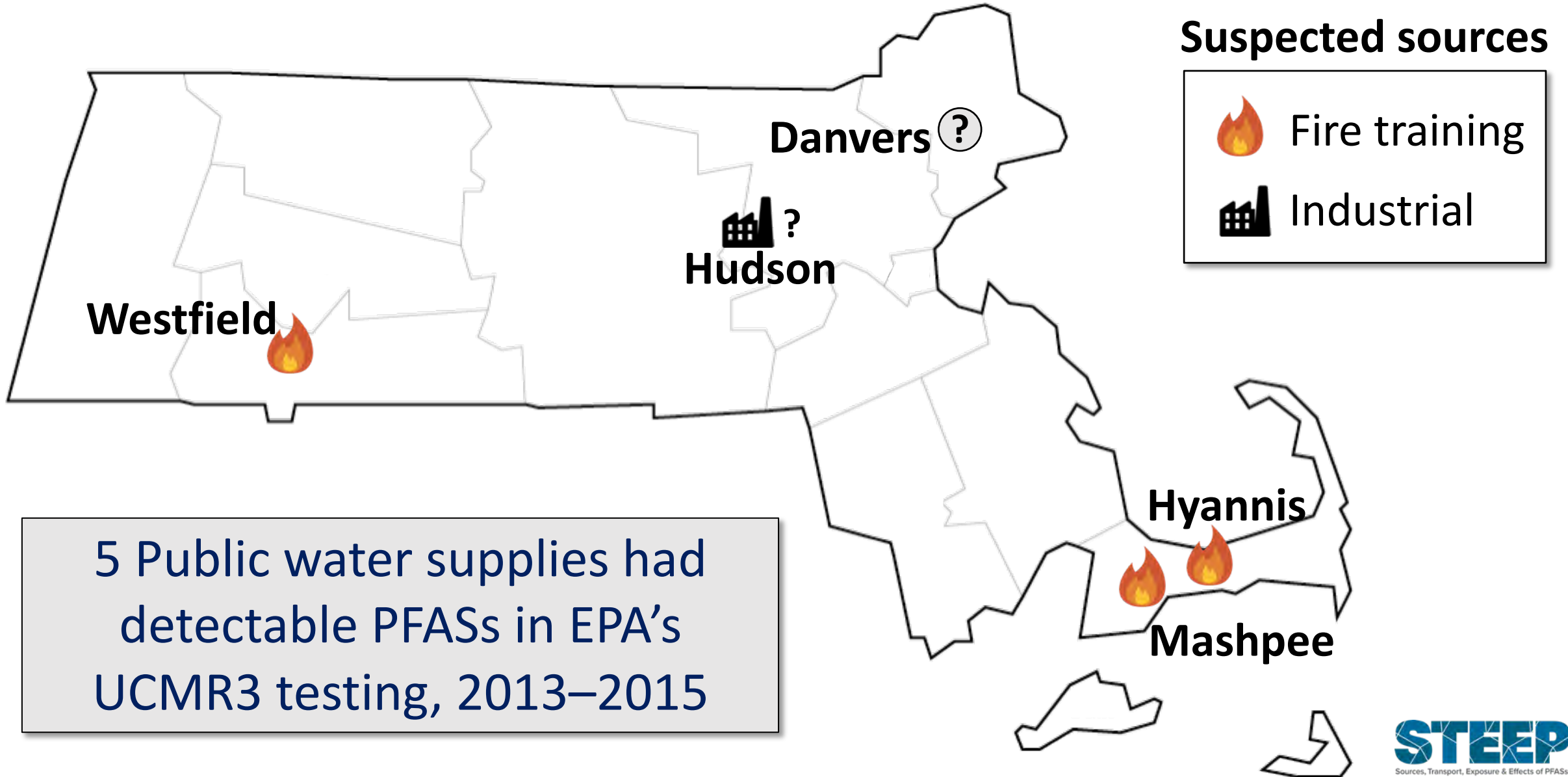
Private wells (2011)

Long-chain (older) and short-chain (newer) PFASs commonly detected

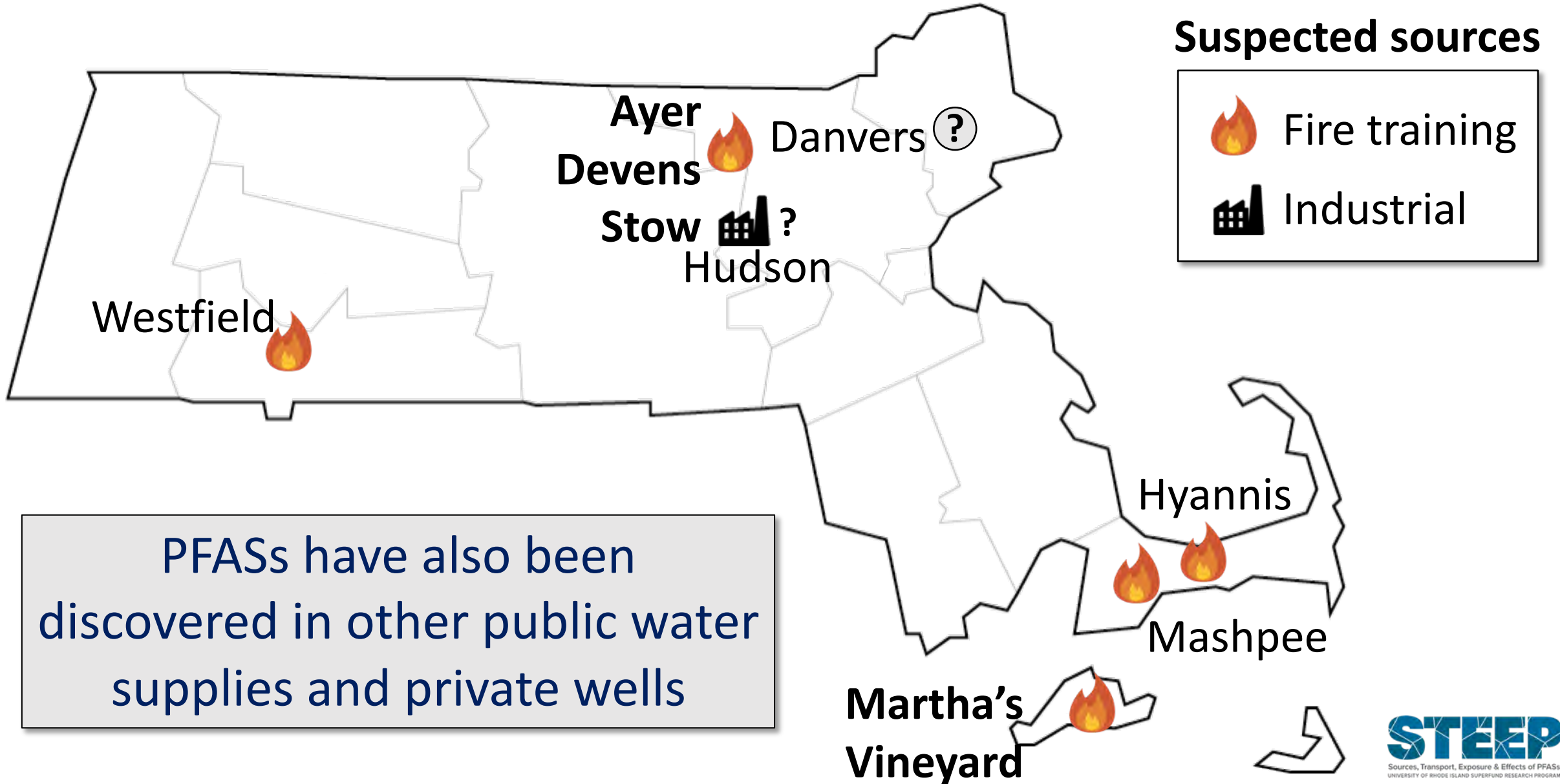


Data from Schaider et al. 2014 and 2016, Sci Tot Env

MA communities with PFASs in drinking water



MA communities with PFASs in drinking water



 CAPE COD TIMES

Hyannis residents warned about water quality

Posted May 24, 2016 at 3:05 PM

HYANNIS — Barnstable officials are recommending that pregnant women, nursing mothers and infants in Hyannis not drink or cook with well water until further notice after a federal agency changed thresholds for two contaminants in the drinking water.

 CAPE COD TIMES

Mashpee well taken offline

By Chris Lindahl

 Follow

MASHPEE — One of seven wells used for the town's public drinking water supply will remain shut down indefinitely after it recently tested positive for potentially cancer-causing chemicals, likely caused by past activity at Joint Base Cape Cod.

 CAPE COD TIMES

Air Force reacts to contaminated Falmouth water wells

Friday

Posted May 20, 2016 at 6:20 PM

Updated May 21, 2016 at 8:10 AM

By George Brennan

 Follow

Share



FALMOUTH — Four houses in the Currier Road neighborhood are receiving bottled water after a federal agency changed its advisory level for two emerging contaminants in drinking water.

On Thursday, the U.S. Environmental Protection Agency changed its advisory level for perfluorinated compounds, known as PFOS and PFOAs, from 0.2 micrograms per liter and 0.4 micrograms per liter to 0.07 micrograms per liter for both — a level that now puts the four properties in question at levels above those recommended.

Two other PFAS-related studies on the Cape



- Study of PFAS exposures and immune system toxicity in 120 preschool age children in Hyannis and Pease Tradeport
- Recruitment is underway
- Partners: Northeastern Univ., Michigan State, Mass. Breast Cancer Coalition, Testing for Pease, Toxics Action Center



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PFAS Exchange

Children's Health Study

As part of PFAS-REACH, we are investigating the effects of PFAS on the immune systems of young children in two communities that have been exposed to contaminated drinking water—Hyannis on Cape Cod, MA and Pease International Tradeport in Portsmouth, NH.

Two other PFAS-related studies on the Cape

ATSDR multi-site health study

NEW!

- 1000 adults and 300 children in Hyannis and Ayer
- PFAS exposures and associations with a range of health effects
- Random selection of participants
- Recruitment starts in 2020
- Partners: Harvard Chan School, Eastern Research Group, Mass. Breast Cancer Coalition, PACE (in Ayer)

 CAPE COD TIMES

Silent Spring Institute awarded \$1M to study health impacts of PFAS in drinking water

Overview

- Drinking water guidelines
- PFAS in Cape Cod drinking water
- **STEEP private wells study**
- Implications and next steps



Working with community partners to address community concerns

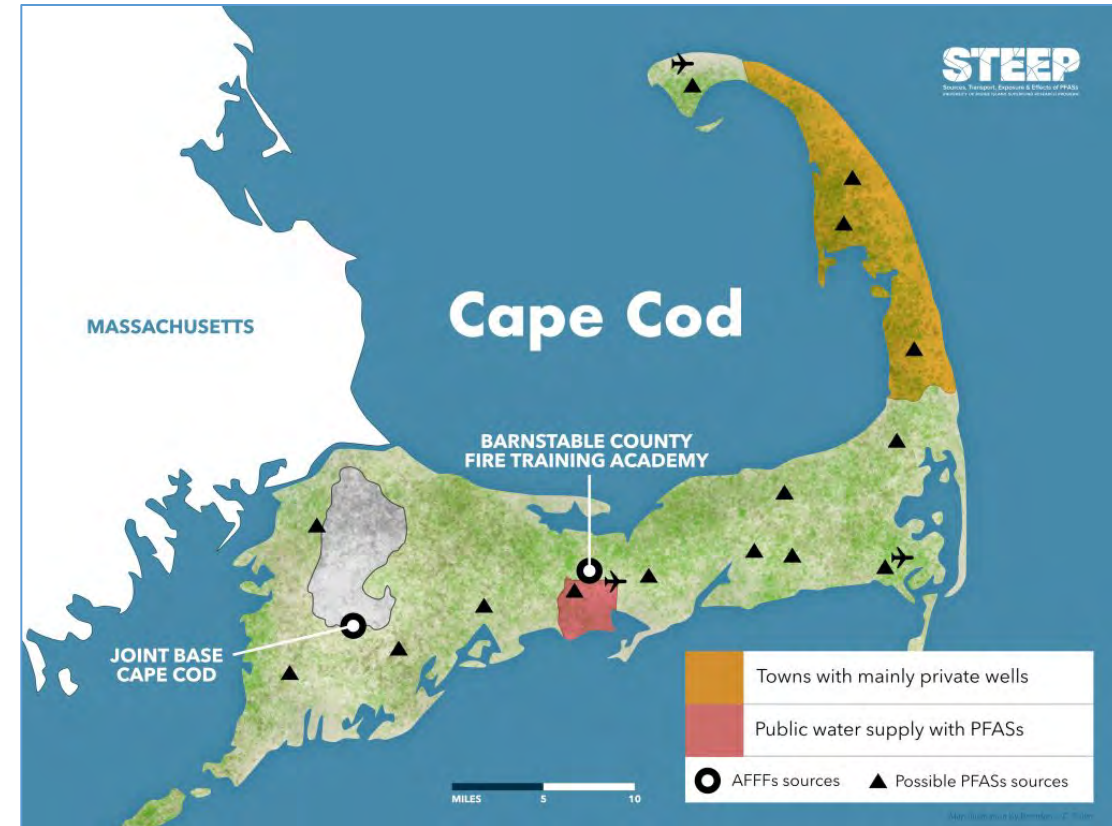
Community Partners:

- Massachusetts Breast Cancer Coalition
- Sierra Club Cape Cod Group
- STEEP Cape Cod Advisory Committee



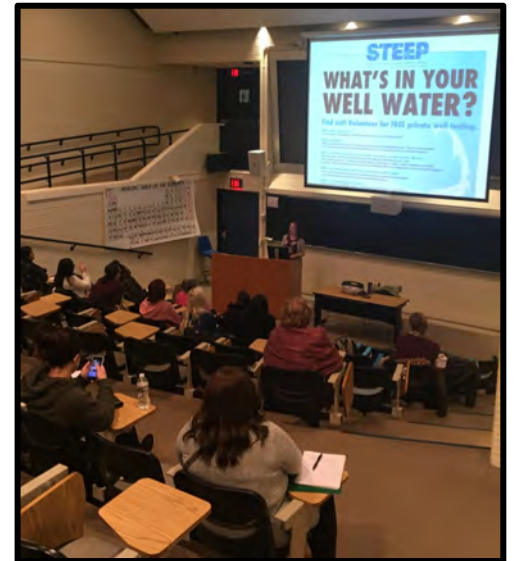
STEEP's focus on Cape Cod

- Vulnerable sole-source aquifer
- AFFF contamination of public and private drinking water wells
- Strong record of community engaged research by Silent Spring Institute, including early evidence of PFAS in drinking water wells
- Community concerns about water quality and health



Community Engagement Core

- Host an annual Science Day on Cape Cod
- Participate in community events and be responsive to community's needs
- Promote and implement prevention and intervention strategies
- Study PFAS in Cape Cod private wells to characterize exposures and identify potential sources



Goals of private well study

- Test 250 private wells for PFASs
- Report results back to participants
- Evaluate potential sources of PFASs
- Support private well testing and treatment
- Inform residents and decision-makers



WHAT'S IN YOUR WELL WATER?

Find out! Volunteer for FREE private well testing.

Why study well water?
In some areas of Cape Cod, PFASs have been found in drinking water.

What are PFASs?
PFASs are chemicals found in household products and firefighting foam. They've been around for 60 years, but their harmful health effects have only drawn concern in the last 20 years.

How can PFASs get into my well water and what are the harmful effects?
They can seep into the ground and move through groundwater to your well. They suppress certain immune system functions, particularly in kids, impact metabolic and liver functions, and are linked to some cancers and adverse effects on pregnancy, such as low birth weight.

Who can participate and how much time will it take?
Private well owners who live in Barnstable County on Cape Cod are eligible to participate, and participation will take about three hours.

What's the purpose of this study?
To test 50 private wells on Cape Cod each year over the next 5 years. Wells will be chosen from areas in Barnstable County that may be impacted by PFASs. The benefit to Cape Cod residents is a better understanding of PFAS exposure and contamination.

Who is doing the study?
The STEER project is part of a National Institutes of Health Superfund Research Project led by the University of Rhode Island. URI and Silent Spring Institute will collect well water samples and Harvard University will analyze them.

Will I receive the test results?
We will report individual results and interpret them for each participant. We will share summaries of our findings with Cape residents in reports and public meetings. Names and addresses of participants will be kept confidential.

For more info, or to apply, contact either:

Laurel Schaidler, Ph.D. Research Scientist Silent Spring Institute schaidler@silentspring.org (617) 332-4288 x224	Alyson McCann Water Quality Program Coordinator University of Rhode Island alyson@uri.edu (401) 874-5398
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www.uri.edu/steep



THE UNIVERSITY OF RHODE ISLAND | HARVARD T.H. CHAN SCHOOL OF PUBLIC HEALTH | SILENT SPRING INSTITUTE Researching the Environment and Women's Health

NIH STEER is funded by the Superfund Research Program, National Institute of Environmental Health Sciences under award number P42E5027726. This is URI research approved by URI's Institutional Review Board.

Collaborators

Harvard University:

- Elsie Sunderland, Heidi Pickard, Prentiss Balcom

Silent Spring Institute:

- Amanda Hernandez, Katie Boronow, Erik Haugsjaa

University of Rhode Island:

- Amy Wengefeld

And assistance with field sampling by:

- Lauren Richter, Matt Dunn, Mike Federenko, Christine Gardiner



Media Coverage

The Barnstable Patriot

Cape Cod study offers free private well testing

By Bronwen Howells Walsh bwalsh@barnstablepatriot.com

Posted Apr 25, 2018 at 3:18 PM

Updated Apr 25, 2018 at 3:40 PM

Private well owners in Barnstable County may sign up to have their well water tested for the presence of harmful chemicals through a federally-funded research study of drinking water contaminants.

 CAPE COD TIMES

Free Cape well testing program launched

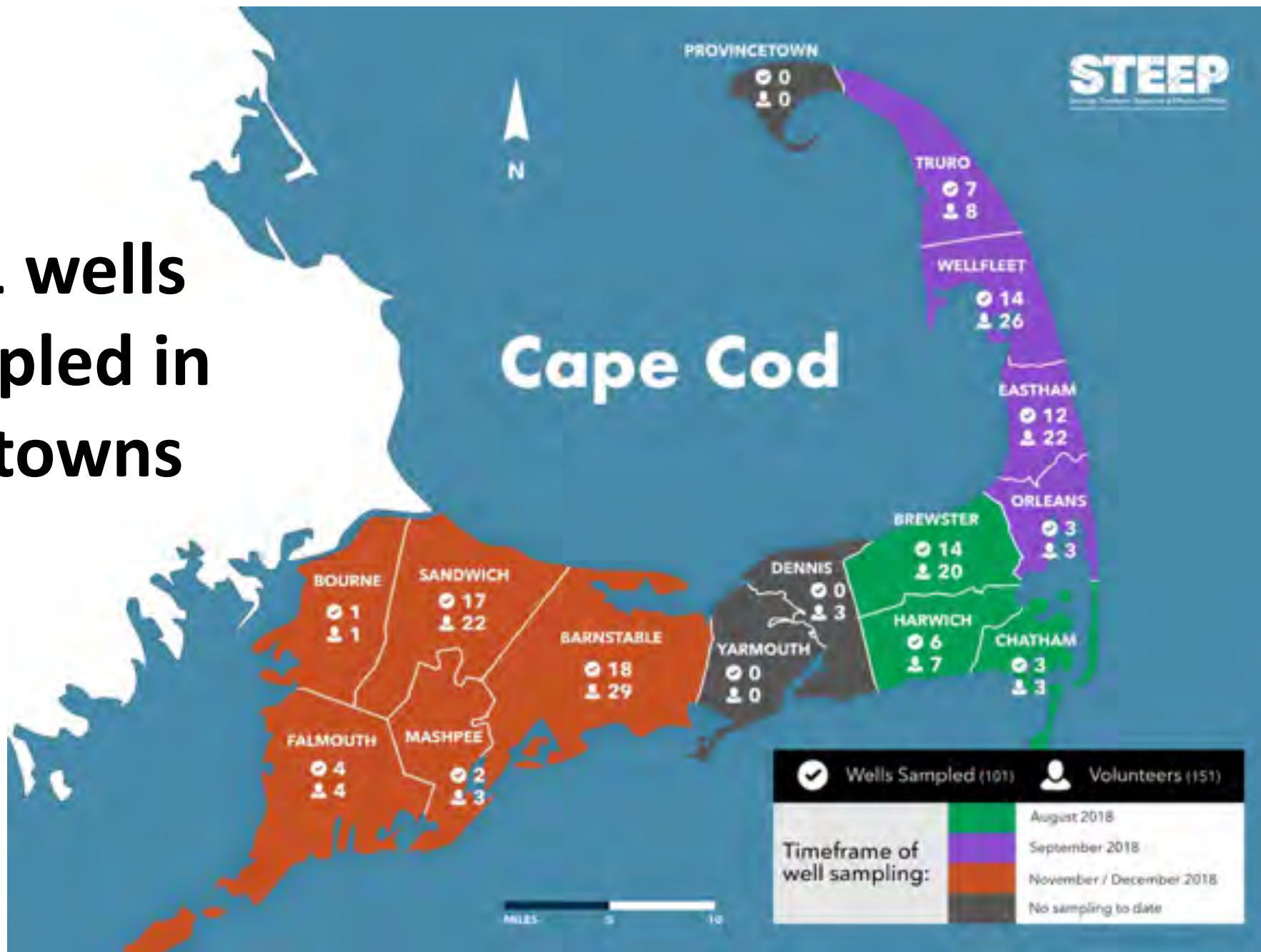
By [Geoff Spillane](#)

Posted Apr 25, 2018 at 7:10 PM

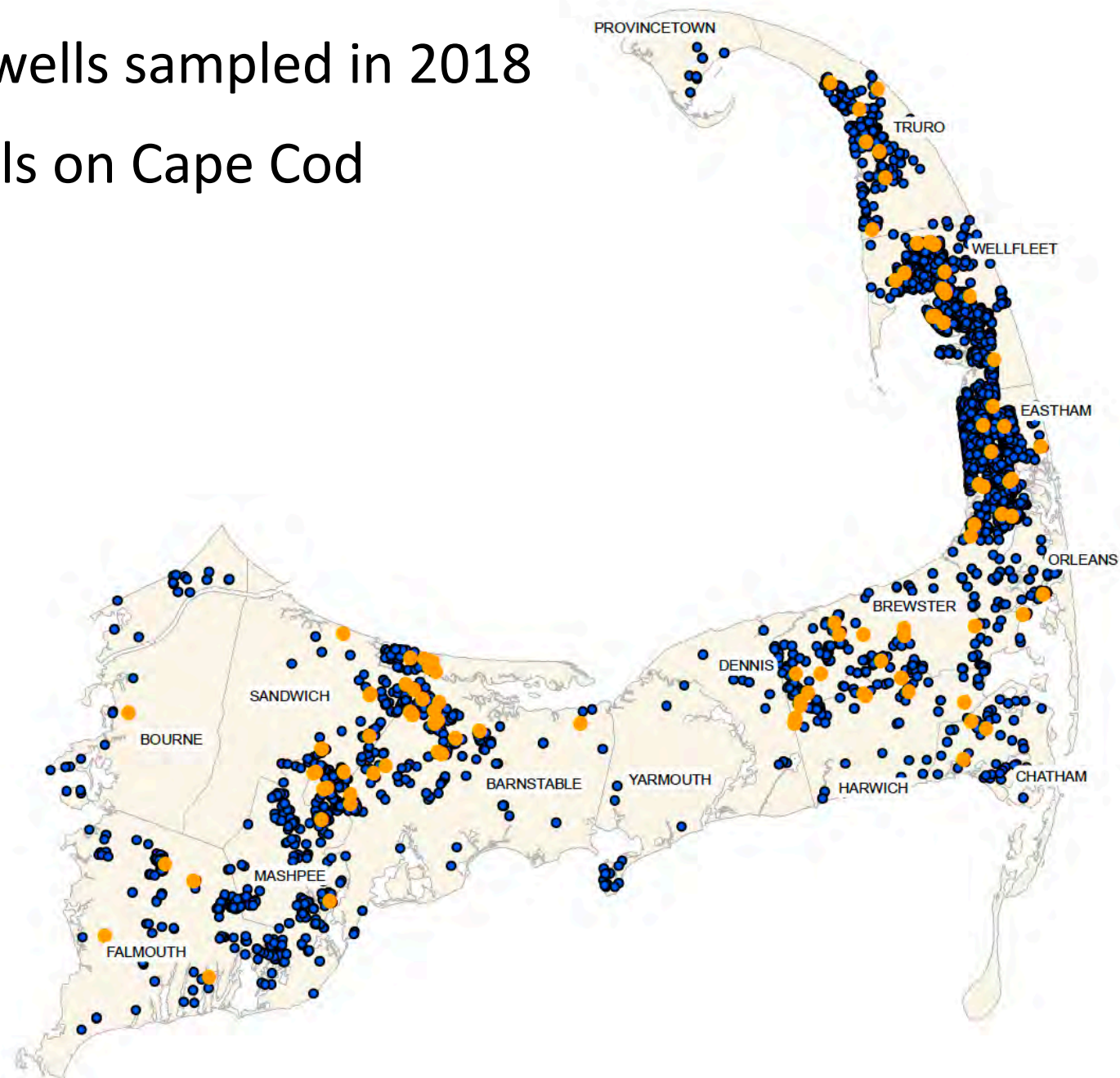
Updated Apr 26, 2018 at 6:27 AM

HYANNIS — Cape Cod residents with private wells may be eligible for free testing to determine if potentially harmful substances found in items ranging from firefighting foams to nonstick cookware are present in their drinking water.

101 wells
sampled in
12 towns



- Volunteer wells sampled in 2018
- Private wells on Cape Cod



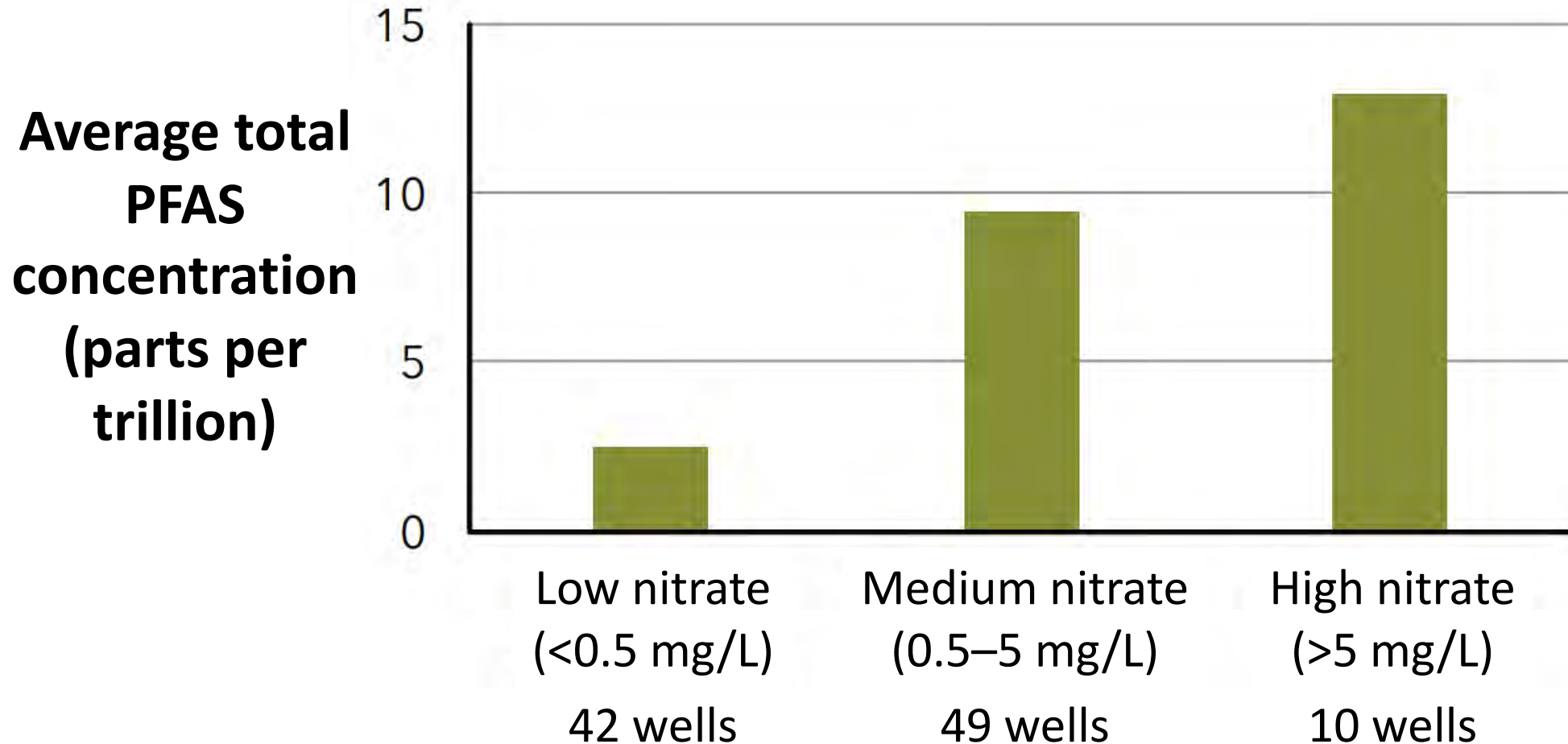
Preliminary findings

- PFAS chemicals were detected in 46% of wells tested
- 28% of wells had 2 or more PFAS detected
- Both legacy and newer alternative PFAS chemicals
- Some included in MassDEP guideline, others lack guidelines
- No wells exceeded current MassDEP or EPA guidelines, and 3% exceeded proposed DEP guideline of 20 ppt for 6 PFAS

	Chemical	Percent of wells	Maximum level (ppt)	Method detection limit (ppt)
Included in current Mass. guideline	PFOA	19%	25	3.9
	PFOS	17%	10	3.0
	PFHxS	7%	8.7	3.1
	PFHpA	4%	11	2.6
	PFNA	0%	--	6.0
Not included in Mass. guideline	PFPeA	24%	15	1.3
	PFBS	13%	43	2.2
	PFHxA	13%	13	3.3
	4:2 FtS	11%	16	3.4
	PFBA	3%	8.0	3.3

Summary of preliminary PFAS results

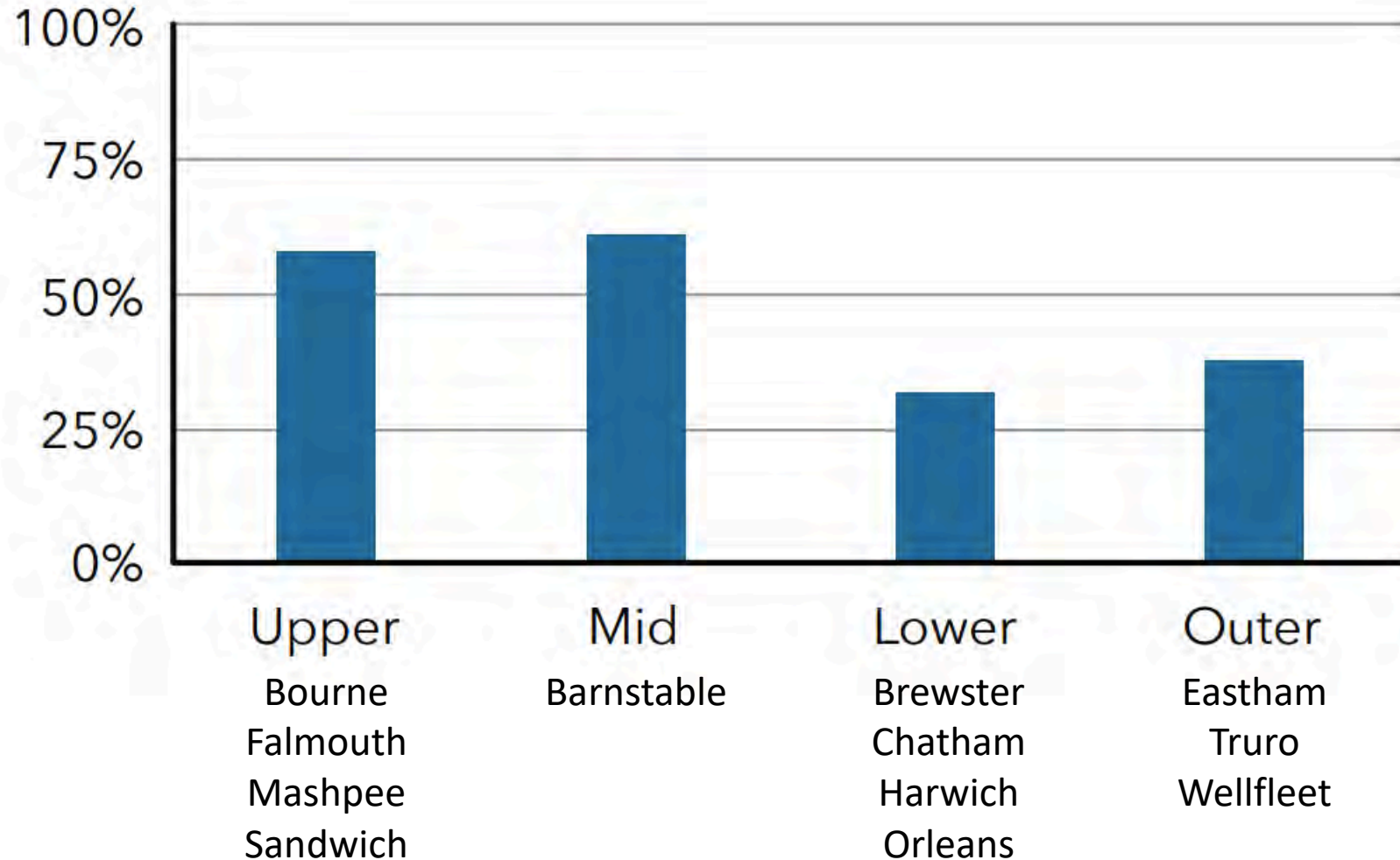
Wells with higher nitrate had higher PFAS

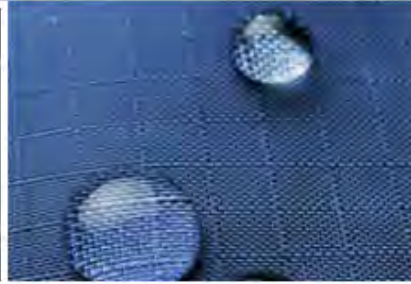


Note:
EPA's standard for nitrate is 10 mg/L.
2% of wells exceeded this standard.

PFAS detections by region

Percent of wells with detectable PFAS





Home

Your Results

- **PFAS**
- Indicators of septic influence
- Metals from plumbing
- Other metals

Overall Study Results

What You Can Do

- In Your Home
- In Your Community
- Treat Your Water

Common Questions

About STEEP

Methods

Contact Us

Your Results: PFAS



Your sample had one of the highest levels in the study of PFBS. [Scroll down to see your results.](#)

[Click here to jump to your results](#)

Where do these chemicals come from?

PFAS (per- and polyfluoroalkyl substances) are water-, heat-, and oil-resistant chemicals found in a wide range of consumer products such as stain-resistant carpets and upholstery, waterproof clothing, floor waxes, nonstick cookware, grease-proof food packaging, and even some dental floss. They are also added to certain firefighting foams that are commonly used at military bases, airports, and fire training areas. Potential sources of PFAS contamination in Cape Cod groundwater include runoff from landfills and wastewater from homes and businesses, as well as firefighting foams.

How are PFAS regulated in drinking water?

Currently, there are no federal standards regulating PFAS in drinking water. The U.S. Environmental Protection Agency (EPA) has issued non-enforceable guidelines for two PFAS chemicals, PFOS and PFOA. In 2018, the Massachusetts Department of Environmental Protection (MassDEP) issued a health guideline of 70 parts per trillion (ppt or ng/L) for the total amount of five PFAS chemicals (PFOA, PFOS, PFNA, PFHpA, and PFHxS) in public water supplies. MassDEP is in the process of revising this guideline.

Sample report

Common Questions

- [How can I reduce my exposure to each of these chemicals?](#)
- [How do I get my water tested again?](#)
- [I already have water treatment, why am I still high in some chemicals?](#)
- [Is there a safe level of exposure for PFAS chemicals?](#)
- [Was my cancer or other illness caused by my chemical exposures?](#)
- [What does "not detected" mean?](#)
- [What do the units "ng/L" mean for PFAS levels?](#)
- [Which chemicals did you test for?](#)
- [Why did you select these chemicals to study?](#)

Your Results

Graph legend

● your chemical level

○ participants' chemical levels

* study median

■ participants for whom the chemical was not detected

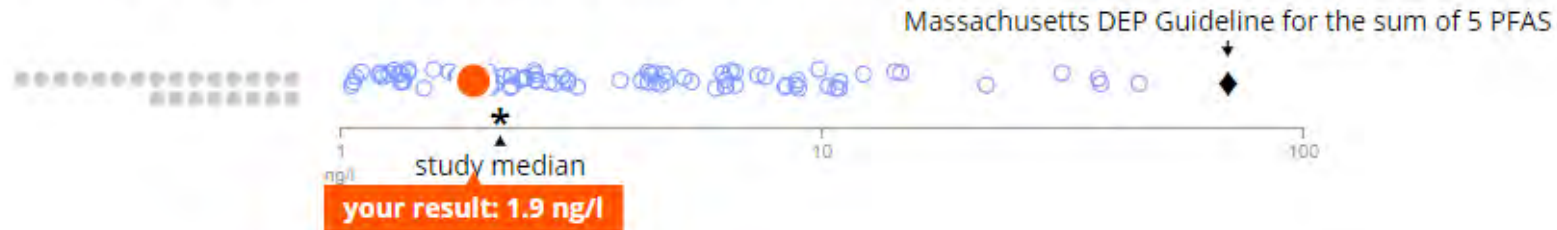
◆ State or federal drinking water guideline (when available)

Sample report

Tip: Mouse over your graphs to learn how to read them.

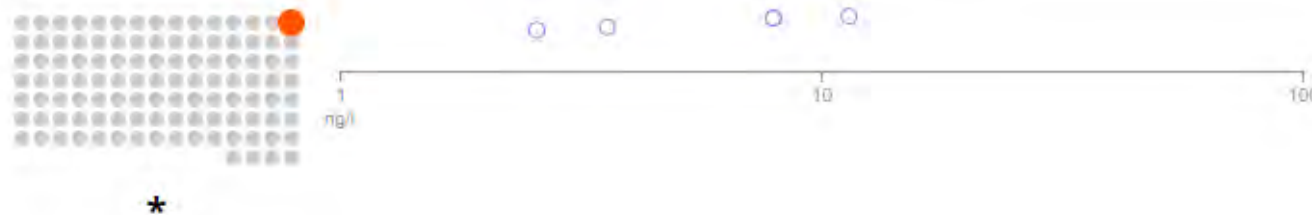
Sum of 5 PFAS chemicals in Massachusetts DEP guideline

In 2018, the Massachusetts Department of Environmental Protection (MassDEP) issued a health guideline of 70 parts per trillion (ppt) for the total amount of five PFAS chemicals (PFOA, PFOS, PFNA, PFHpA, and PFHxS) in public water supplies.



PFHpA

This chemical is included in MassDEP's drinking water guideline for the sum of five PFAS



PFAS water treatment options

- Activated carbon
 - Solid carbon block or filter pitcher
 - Very effective for PFOS, PFOA, and other long-chain PFAS
 - Short-chain PFAS not as well removed
- Reverse osmosis (RO)
 - Very effective for long-chain and short-chain PFAS
 - More expensive and generates stream of waste water
- Look for filters that meet NSF P473 certification, and NSF/ANSI 53 standard for activated carbon filters and NSF/ANSI 58 standard for RO

Overview

- Drinking water guidelines
- PFAS in Cape Cod drinking water
- STEEP private wells study
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Summary and implications

- PFAS chemicals were found in nearly half of wells tested
- Higher nitrate wells had higher PFAS levels, suggesting that septic systems are one source of PFAS
- Presence of phased-out PFAS reflect their extreme persistence
- No wells exceeded current state or federal guidelines, but MassDEP and other states are developing stricter standards

Next steps

- Continue collecting samples from additional wells
- Evaluate associations between PFAS levels and proximity to:
 - Wastewater discharges
 - Landfills
 - Fire stations and fire training areas
 - JBCC
 - Airports
 - Commercial areas – laundromats, car washes, car dealerships



STEPP's Research Translation Core has developed resources for a variety of audiences on PFASs, their health effects, and tips to minimize exposures

HOW AM I EXPOSED TO PFASs?

98% of Americans have PFASs – human-made chemicals common in water resistant and non-stick products – in their blood. One source of exposure can be drinking water. The U.S. EPA and some states have set guidelines; however, there are no enforceable federal standards for PFAS levels in drinking water. But you, as a private well owner, can take steps to protect your family's health. Determine if there is known contamination to the water in your area. If so, explore available treatment options.

ARE THERE PFASs IN MY WELL WATER?

As a homeowner or renter, you are rarely required to test your well water and likely have never tested for PFASs. If you live near PFAS-producing industrial plants, military bases, firefighting training areas, or municipal airports that use PFAS containing firefighting foam, testing is warranted. Contact your local, county, or state health officials. Seek guidance on which labs are certified to test for PFASs. Ask what the cost might be and if funding assistance is available.*

WHAT IF THERE ARE PFASs IN MY WELL WATER?

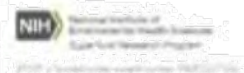
If your water exceeds a state or federal guideline, the short term solution is to switch to drinking bottled water. Check online for PFAS-free brands. Boiling does not remove PFASs and can instead concentrate the chemicals. The long-term solution is a home water treatment system. The most common PFAS chemicals, PFOs and PFOA, can be removed by either activated carbon filters or reverse osmosis systems. NSF International (www.nsf.org) certifies treatment systems for PFOs and PFOA removal under its protocol F473. But remember: your treatment system will only be as effective as your regular maintenance.

SHOULD I TREAT MORE THAN DRINKING WATER?

If your well has PFAS contamination, you can treat all the water coming into your home, or just treat water used for drinking and cooking, which are the largest sources of exposure. For example, there is less exposure from eating backyard garden produce grown with PFAS-contaminated water and low to no exposure from showering, laundering, and dishwashing. Consider the potential impacts of PFAS exposure as you choose the best well water treatment option for your family's protection.

PLAY IT SAFE. LEARN MORE ABOUT EXPOSURE AND PROTECTION AT URL.EDU/STEPP.

*Cape Cod resident well water testing information: un.edu/stepp/wellwater



Thank you!
web.uri.edu/steep

**To sign up for our private wells study,
visit: web.uri.edu/wellwater**

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More information about STEEP is available at: <https://web.uri.edu/steep/>

