Working with communities to understand and address PFAS exposures

Phil Brown, PhD, Northeastern University

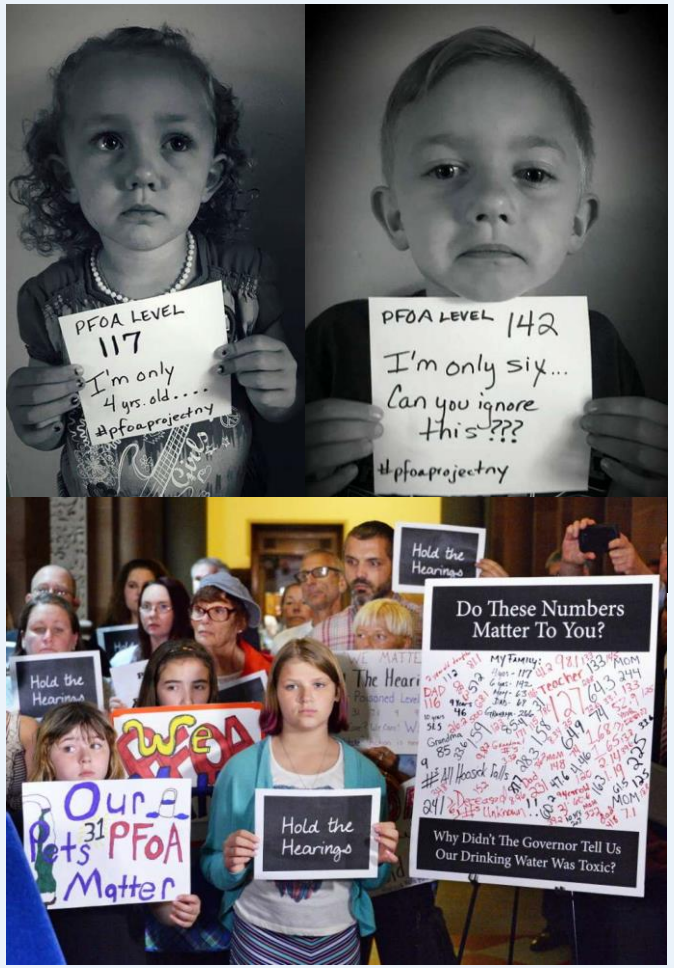
Laurel Schaider, PhD, Silent Spring Institute

March 25, 2020

PEPH Webinar

What are communities seeking?

- PFAS biomonitoring
- Medical monitoring
- Environmental measurements
- Health studies
- State drinking water standards
- Water monitoring



Hoosick Falls, NY, 2016

timesunion.com

Challenges faced by communities

- Blood testing often unavailable and expensive
- Medical professionals unfamiliar with PFAS health concerns
- US EPA and many states have not set drinking water standards
- Some states not testing drinking water or only testing for limited number of compounds
- Fish and other local foods often not tested
- Few opportunities for health studies

"Despite the significant impacts this contamination has on many areas of our life, impacted communities struggle to be seen as critical stakeholders."

- Andrea Amico, co-founder, Testing for Pease

Responses by communities

- Advocating at the state level for drinking water standards and more water testing
- Advocating for blood testing and health studies
- Advocating at the federal level
- Working together through the National PFAS Contamination Coalition formed in 2017
- Collaborating with researchers

Media coverage highlights communities


LA Progressive

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Pentagon Reports 250 New Sites Are Contaminated with PFAS

They're making us sick.

Task Force report contains inaccuracies and contradictions unreported by the media.


The Intercept_

DONATE

TOXIC DRINKING WATER BECOMES TOP CAMPAIGN ISSUE FOR MIDTERM CANDIDATES ACROSS THE U.S.

Sharon Lerner

June 4 2018, 12:32 p.m.


Water tests show toxins near Rensselaer landfill, environmental groups say

Michael Williams | March 14, 2020 | Updated: March 16, 2020 4:48 p.m.

A truck heads up Partition Street after leaving the Dunn Landfill on Wednesday, Feb.19, 2020, in Rensselaer, N.Y. (Will Waldron/Times Union)


Connecticut must require its large drinking water supply companies to test for PFAS

CT VIEWPOINTS :: by NANCY ALDERMAN | MARCH 12, 2020 | VIEW AS "CLEAN READ"

Environment and Human Health, Inc. (EHHI) called the South Central Regional Water Authority (RWA) a month ago to determine whether they were testing the region's water for PFAS. The RWA serves Ansonia, Bethany, Branford, Cheshire, Derby, East Haven, Hamden, Milford, New Haven, North Branford, North Haven, Orange, West Haven and Woodbridge. RWA assured us they were.

EHHI called the Metropolitan District

CONNECTICUT DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION

Firefighting foam that spilled into the Farmington River in June.

RELATED OPINIONS

The COVID-19 response poses dire consequences for our most vulnerable children

America's insurance capital to the (financial) rescue?

Your owner's manual: A psychiatrist's guide to weathering… anything

Burial in the age of COVID-19


$20 billion bill proposed to clean up PFAS water contamination nationally

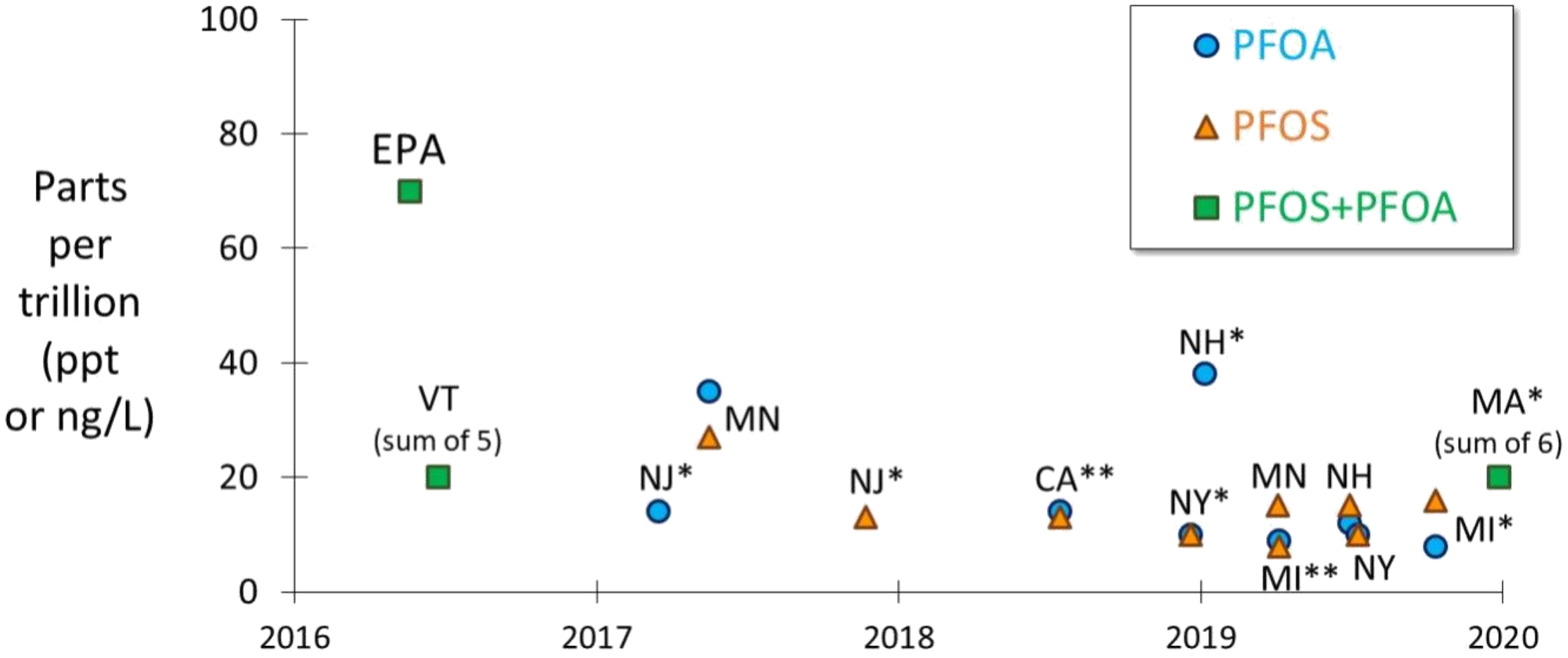
Sign at Pease International Tradeport, formerly Pease Air Force Base. (Photo: Courtesy U.S. Air Force)

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

In 2016, the EPA issued a Lifetime Health Advisory of 70 parts per trillion for PFOS and PFOA.

Some states have proposed or adopted stricter guidelines and standards.

Recent guidelines are mostly in 10-20 parts per trillion range



** = proposed, ** = notification or screening level*

Journal of Exposure Science & Environmental Epidemiology
https://doi.org/10.1038/s41370-018-0099-9

ARTICLE

Guideline levels for PFOA and PFOS in drinking water: the role of scientific uncertainty, risk assessment decisions, and social factors

Alissa Cordner[1] · Vanessa Y. De La Rosa[2,3] · Laurel A. Schaider[2] · Ruthann A. Rudel[2] · Lauren Richter[3] · Phil Brown[3,4]

Available Open Access from *Journal of Exposure Science & Environmental Epidemiology*

https://www.nature.com/articles/s41370-018-0099-9

States taking lead on regulation and monitoring

Just since mid-December 2019:

- New York – ban AFFF for training and prohibit manufacture, sale, distribution
- New Hampshire – bill to affirm agency MCLs that are held up due to 3M litigation
- Michigan – state sues 17 companies
- Wisconsin – restricts AFFF to emergencies and situations where cleanup available

Our collaborations with communities

- National PFAS Conferences
- PFAS Project
- Drinking water testing
- PFAS-REACH
- PFAS Exchange
- STEEP Superfund Research Program
- ATSDR/CDC health study in Massachusetts

National PFAS Conferences

- Innovative, multidisciplinary and multisector approach
- Focus on community concerns, with community members contributing to each panel
- Attendees also included scientists, government officials, NGOs, water utilities, journalists, lawyers, students and others

Attendees at 2nd National Conference in 2019

June 2017 Conference:
Highly Fluorinated Compounds – Social and Scientific Discovery
Northeastern University

- **Support**: National Institute of Environmental Health Sciences, SSEHRI, Northeastern's Humanities Center, Northeastern's PROTECT Superfund Research Program, Toxics Action Center, and Testing for Pease
- **Steering Committee members** from Northeastern University, Whitman College, Harvard University, Silent Spring Institute, Testing for Pease, and Toxics Action Center

June 2017 conference

- Lead addresses by
  - Dr. Linda Birnbaum (NIEHS)
  - Rob Bilott (Taft Law)
  - Ken Cook (Environmental Working Group)

Linda Birnbaum, former Director of National Institute of Environmental Health Sciences

June 2017 conference

Around 140 attendees, including:

- Advocates and community leaders from over a dozen communities
- Representatives of environmental and health nonprofits
- Regulators from the EPA, NIEHS, CDC, and city, state, and municipal government offices
- Academics from over a dozen institutions
- Industry representatives
- Lawyers
- Journalists and filmmakers
- Physicians and health care practitioners

Impact of 2017 conference

- **Building networks and sparking new collaborations**
- **National PFAS Contamination Coalition formed**
- **Increased media and regulatory attention to short-chain PFAS**

The Intercept_

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Illustration: The Intercept

NEW TEFLON TOXIN FOUND IN NORTH CAROLINA DRINKING WATER

Sharon Lerner

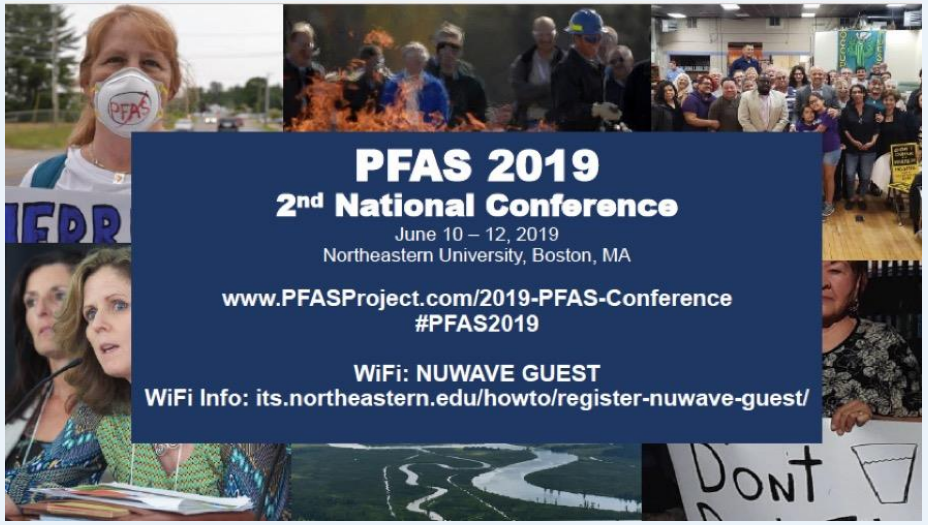
June 17 2017, 5:16 a.m.

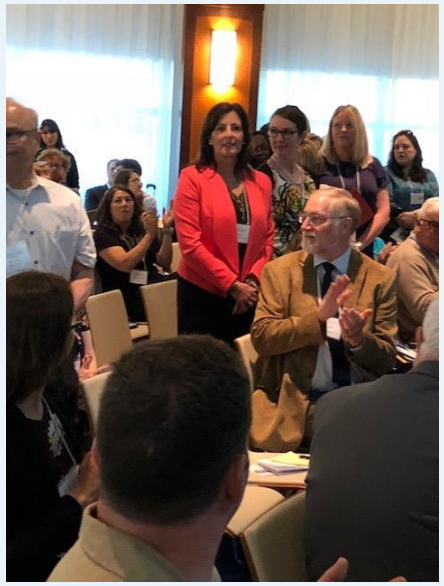
The Teflon Toxin Part 12

A toxic chemical used to make Teflon has been detected in the drinking water in Wilmington, North Carolina, and in surface waters in Ohio...

Per- and Polyfluoroalkyl Substances: Second National Conference June 10-12, 2019, Northeastern University

- URI/Harvard STEEP Superfund Research Program is added to sponsorship
- Linda Birnbaum, NIEHS Director – keynote on day 1
- Gina McCarthy, former EPA Administrator – keynote on day 3
- Days 1-2 – mix of science, policy, activism, litigation, media, remediation, regulation
- Day 3 – 3 science sessions and 7 afternoon workshops
- https://pfasproject.com/2019/02/05/2019-pfas-conference/

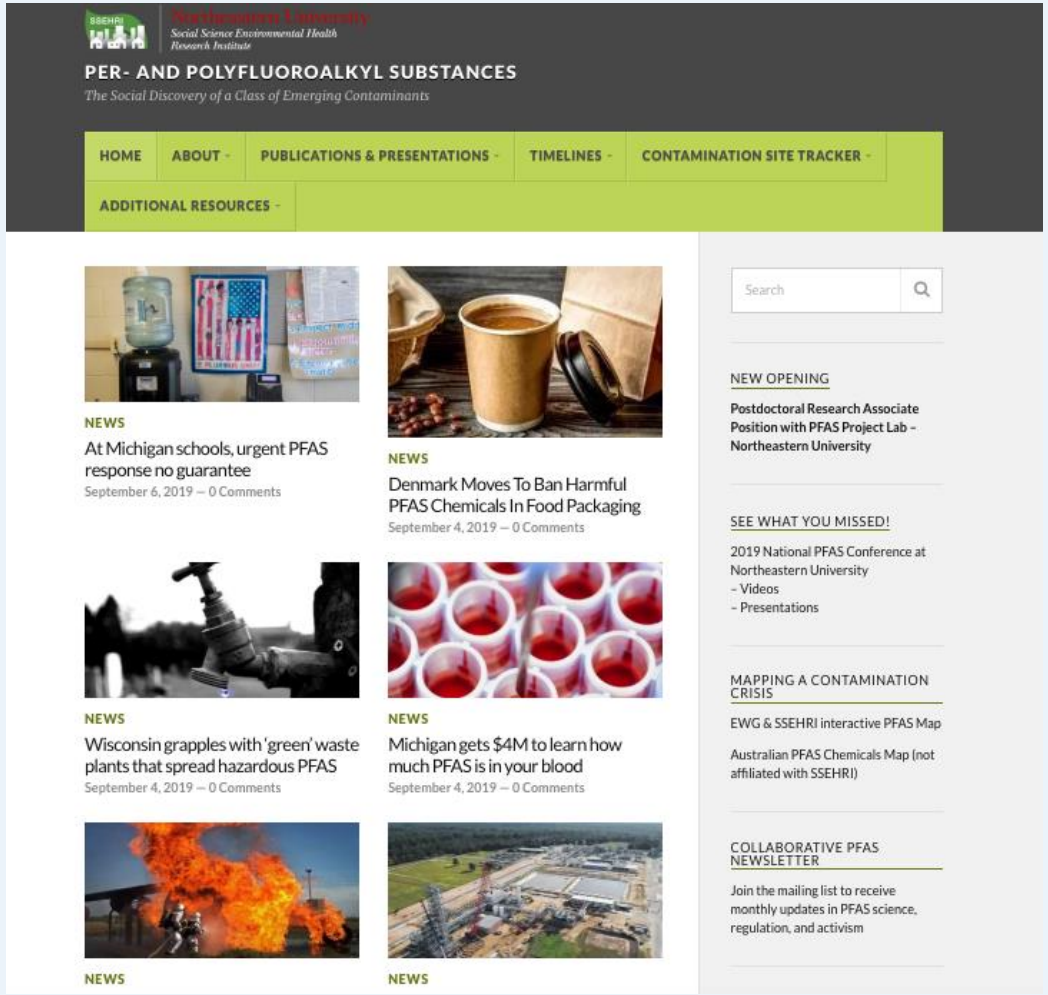

PFAS 2019
2nd National Conference
June 10 – 12, 2019
Northeastern University, Boston, MA
www.PFASProject.com/2019-PFAS-Conference
#PFAS2019
WiFi: NUWAVE GUEST
WiFi Info: its.northeastern.edu/howto/register-nuwave-guest/



PFAS PROJECT LAB, Part of Social Science Environmental Health Research Institute

Northeastern University
Social Science Environmental Health Research Institute

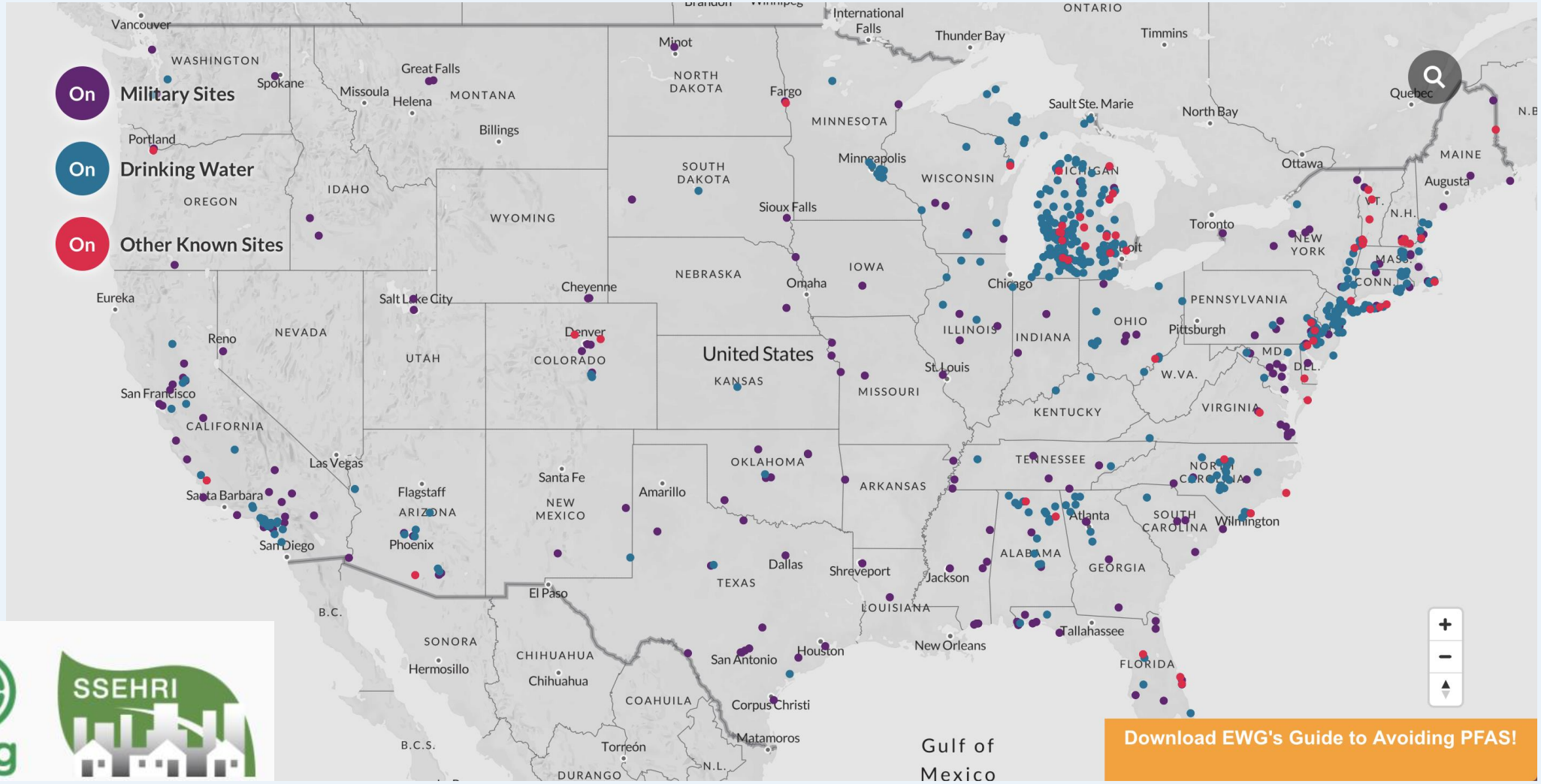
- Document social and scientific discovery of PFAS: Why did it take so long for the level of concern and action we now see?
- Contamination Site Tracker
- Study activism – when and where it occurs
- Website valuable resource with 1000s of visitors
- Includes almost daily news updates
- E-newsletter
- Provide DuPont case documents to ToxicDocs.org
- Organized 2017 and 2019 national conferences
- Assist community groups with resources
- www.pfasproject.com



Testing for Pease and Toxics Action Center asked for help on water monitoring

- Seacoast Women's Giving Circle supported testing of efficacy of Pease Tradeport granular activated carbon (GAC) filters
- Targeted and non-targeted PFAS analyses conducted by Chris Higgins (CO School of Mines)
- NSF grant supported additional testing in Portsmouth municipal water system

610 contaminated sites in 43 states
110 million Americans with PFAS in drinking water

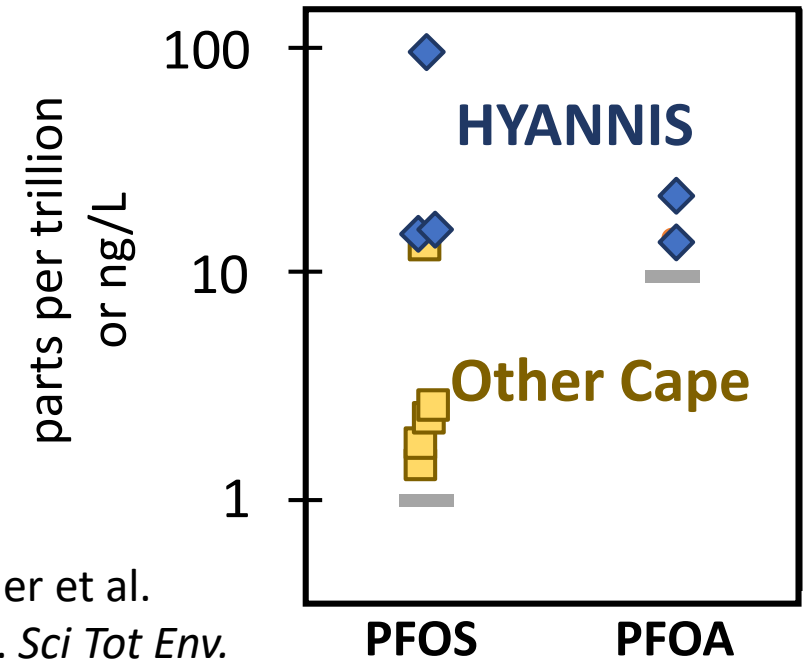


https://www.ewg.org/interactive-maps/2019_pfas_contamination/map/

Silent Spring Institute first to find PFAS in Cape Cod, Massachusetts drinking water

Public wells (2010)

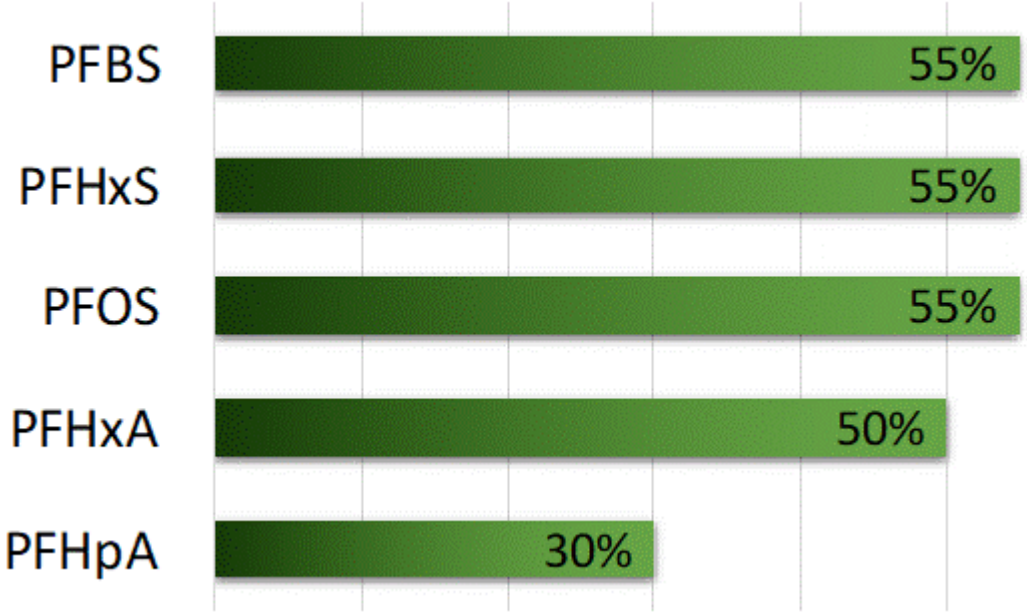
PFOS & PFOA in Cape public wells, highest levels in Hyannis



Schaider et al. 2014. *Sci Tot Env.*

Private wells (2011)

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



Schaider et al. 2016. *Sci Tot Env.*

PFAS-REACH: Research, Education, and Action for Community Health

Effects on children's immune systems

PFAS Exchange: Online resource center

Experiences of affected communities

Research and Community Partners

- Core scientific partners
  - Laurel Schaider, PI, Silent Spring Institute
  - Phil Brown, PI, Northeastern University
  - Courtney Carignan, co-I, Michigan State Univ.
- Core community partners
  - Testing for Pease
  - Massachusetts Breast Cancer Coalition
  - Toxics Action Center
- Other affiliated researchers
  - Farzad Noubary, Martha Powers, Northeastern University
  - Maia Fitzstevens, Vincent Bessonneau, Ruthann Rudel, Julia Brody, Silent Spring

PFAS-REACH is supported by NIEHS under grant R01ES028311

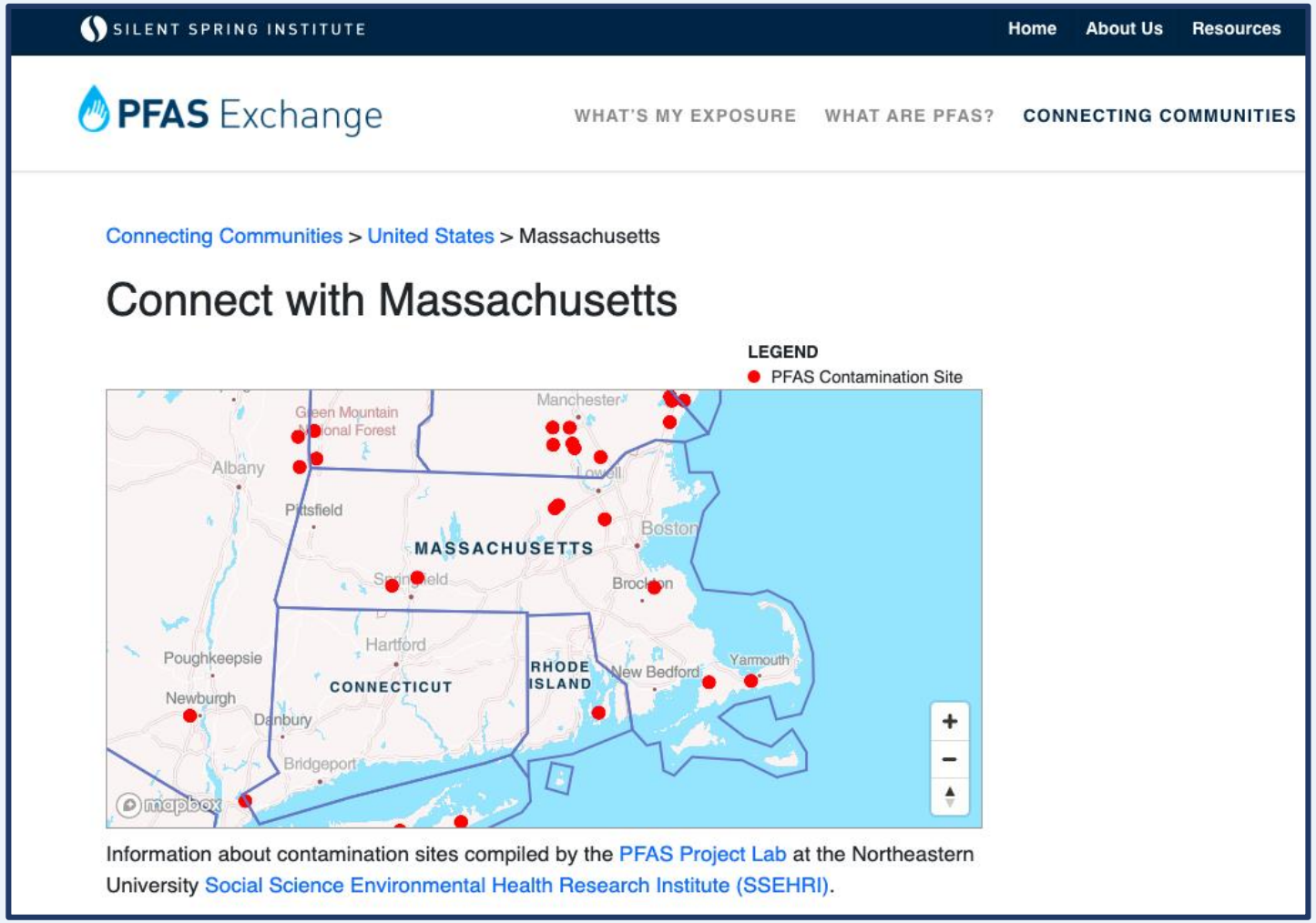
PFAS Exchange

- Resources for residents, water and health officials, medical professionals, firefighters
- Supporting connections and knowledge sharing among communities
- Data interpretation for blood and water test results

www.pfas-exchange.org

Connecting communities

- CONTAMINATION AREAS
- COMMUNITY GROUPS
- PFAS EXPOSURE AND HEALTH STUDIES
- STATE AGENCY WEBSITES
- OTHER RESOURCES

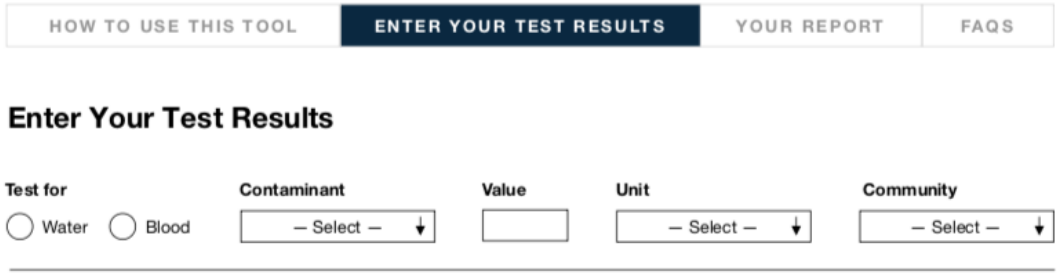


Data interpretation tool (coming soon)

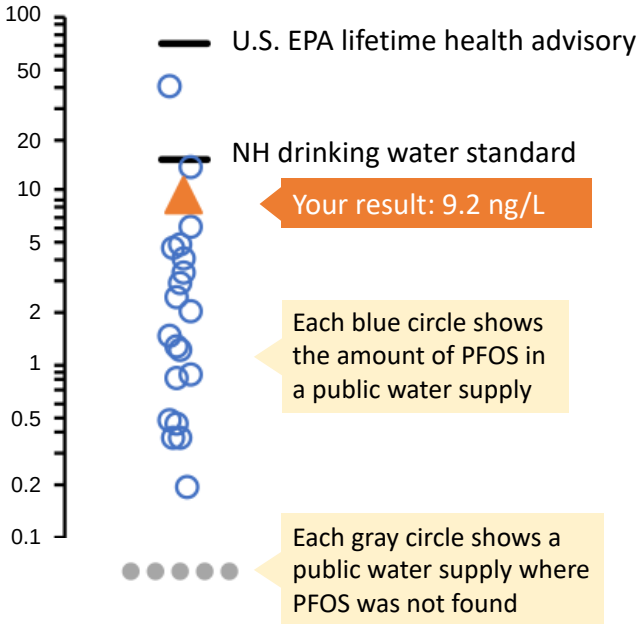
What's My Exposure?

Have you had your drinking water or blood tested for PFAS? Do you need help interpreting your results? Use *What's My Exposure* to better understand what your results mean. Our online tool will create a personalized report that shows how your levels compare with state and federal health guidelines, provides information on health effects, and shares tips for reducing your exposures.

1. Users enter blood or water test results through online interface



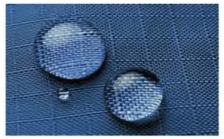
2. Tool generates headlines and graphs to compare results to drinking water guidelines, public water supplies, or population blood levels



PFAS Exchange fact sheets

How to Reduce Your Exposure to PFAS

PFAS-REACH
PFAS Research, Education, and Action for Community Health


PFAS (per- and polyfluoroalkyl substances) are a class of chemicals that companies add to consumer products to make them nonstick, waterproof, and stain-resistant. They are found in carpets and upholstery, waterproof apparel, non-stick cookware, grease-proof food packaging, and even dental floss. They are also used in firefighting foams for putting out fuel fires.

Unfortunately, studies have linked these chemicals with a range of health problems including thyroid disease, cancer, high cholesterol, obesity, and effects on the immune system. Luckily, there are simple steps you can take to reduce your everyday exposure to PFAS and create a healthier environment for you and your loved ones.

In your personal life:

- ✓ Avoid stain-resistant carpets and upholstery, as well as stain-resistant treatments and waterproofing sprays.
- ✓ Avoid products with the ingredient PTFE or other "fluoro" ingredients listed on the label.
- ✓ Choose cookware made of cast iron, stainless steel, glass, or enamel instead of Teflon.
- ✓ Filter your drinking water with an activated carbon or reverse osmosis filtration system.
- ✓ Eat more fresh foods to avoid take-out containers and other food packaging.
- ✓ Avoid microwave popcorn and greasy foods wrapped in paper.
- ✓ Look for nylon or silk dental floss that is uncoated or coated in natural wax.

In your community:

- ✓ Tell retailers and manufacturers you want products made without PFAS.
- ✓ Urge your local water utility to test for PFAS.
- ✓ Ask your state legislators to set up a statewide water and blood testing program.
- ✓ Encourage your state to follow the lead of other states in creating more health protective drinking water limits.
- ✓ Ask your elected officials to support restrictions on PFAS in consumer products and remediation of contaminated sites.
- ✓ Find out about local groups working to protect water quality by visiting:

www.pfas-exchange.org

NIH NIEHS PFAS-REACH is a five-year project funded by the National Institute of Environmental Health Sciences (NIEHS) under grant R01ES028311.

PFAS-REACH is led by Silent Spring Institute in collaboration with Northeastern University and Michigan State University. Community partners include Testing for Pease, Massachusetts Breast Cancer Coalition, and Toxics Action Center.

How Can PFAS Affect Your Health?

PFAS-REACH
PFAS Research, Education, and Action for Community Health

PFAS (per- and polyfluoroalkyl substances) are among the most ubiquitous synthetic chemicals in the world. Approximately 98 percent of Americans have PFAS in their bodies. People can be exposed to these chemicals in many different ways—through the water they drink, the products they use, the air they breathe, and the food they eat. During pregnancy, PFAS can pass from the mother to the fetus through the umbilical cord, and babies can be exposed through breast milk or formula made with contaminated water.

Their strong chemical bonds and unique structures make them very effective at repelling water and oil even at high temperatures. These same characteristics also make PFAS extremely persistent, meaning they don't break down in the environment. Even more concerning, some PFAS can remain in the body for years, and people continue to be exposed to the chemicals.

Because of their persistence and because exposures are so widespread, scientists are concerned about the potential health impacts. Most health studies have looked at PFOA and PFOS, the two most commonly found PFAS. However, new research suggests other types of PFAS have similar health effects.

Learn more: www.pfas-exchange.org

Although the science on health effects is still evolving, scientists are increasingly concerned about low-dose exposures, as they continue to find health effects at lower and lower levels. More research is needed on other PFAS chemicals, in particular ones that companies have developed to replace PFOA and PFOS. Because people are exposed to multiple PFAS from multiple sources, researchers are beginning to investigate the effects of mixtures of PFAS on human health.

Scientific studies have linked exposure to PFAS with:

Human studies

- High cholesterol
- Ulcerative colitis
- Cancer (testicular, kidney)
- Preeclampsia
- Liver damage
- Thyroid disease
- Decreased vaccine response
- Asthma
- Decreased fertility
- Lower birth weight

Animal studies

- Cancer (testicular, liver, pancreatic)
- Liver damage
- Delayed mammary gland development
- Developmental problems
- Effects on brain development
- Immune system effects
- Changes in cholesterol levels
- Changes in thyroid hormones
- Low birth weight

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PFAS: A Word About Drinking Water Guidelines

PFAS-REACH
PFAS Research, Education, and Action for Community Health

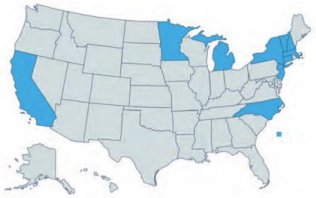
Are PFAS regulated in drinking water?

PFAS (per- and polyfluoroalkyl substances) are currently not regulated under the Safe Drinking Water Act. This means there are no federal drinking water standards and public water supplies do not have to test or treat their water for PFAS under federal law.

The U.S. Environmental Protection Agency (EPA) has set a non-enforceable health-based guideline level of 70 parts per trillion (ppt) for PFOA and PFOS, individually or combined.

However, many scientists and regulators believe this guideline is not protective enough of human health. As a result, some states have developed their own guideline levels for PFAS that are stricter than EPA's, and some have set, or are in the process of setting, enforceable standards.

Although guideline levels are not enforceable, meaning water utilities are not required to test or treat the water, they do offer some protection.



10 states with drinking water guidelines that are more restrictive than EPA's.

Why do guidelines vary?

Guideline levels are created when regulators, after reviewing the science, calculate a level of exposure below which health effects are not expected to occur. Regulators consider different types of evidence and factors when developing guideline levels:

- Studies linking exposure to PFAS with various health effects (for instance, effects on the immune system, liver, or mammary gland development).
- The impact on vulnerable populations such as infants or pregnant women.
- How much water people drink in a day.
- How much exposure likely comes from drinking water versus diet and consumer products.
- Molecular studies that show what happens to PFAS after the chemicals enter the body.

Although some variation is expected among the different state guideline levels, more recent guidelines are being set at similarly lower levels.

Learn more: www.pfas-exchange.org

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Guidance for medical professionals

- Our PFAS-REACH team is collaborating with physicians and others from several PEHSUs, as well as community leaders
- We will provide information for medical professionals, as well information sheets for them to provide to patients
- We will circulate these materials widely across the U.S.

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.

PFAS levels exceeding the EPA health guideline were found in the Hyannis drinking water supply prior to July 2016 and in the Pease drinking water supply prior to May 2014. The contamination at both sites came from the use of firefighting foams for training activities. Although the communities' water systems are currently being treated to filter out PFAS, we want to learn about the effects of past exposures on children's health.

Children’s immunotoxicity study

- Aim to include 120 preschool age children
  - 60 children in Hyannis and 60 children at Pease Tradeport
- Analysis of blood samples from preschool age children
  - PFAS
  - Antibodies (diphtheria, tetanus, measles)
  - Metabolomic markers of inflammation
- Evaluate whether PFAS levels are associated with lower levels of antibodies or with markers of inflammation

Analyzing community experiences

- Guiding questions:
  - How do individuals and communities respond to water contamination?
  - How do parents navigate concerns for their children?
  - How do people learn from the research project?
  - How do people change actions in response to the research?
- Our social science analysis will include:
  - Interviews of participants and other community members
  - Analysis of media coverage
  - Observations of community and government meetings

Sources, Transport, Exposure & Effects of PFASs

RESEARCH PARTNERS

- University of Rhode Island
- Harvard T.H. Chan School of Public Health
- Silent Spring Institute

COMMUNITY PARTNERS ON CAPE COD

- Mass. Breast Cancer Coalition
- Sierra Club Cape Cod Group

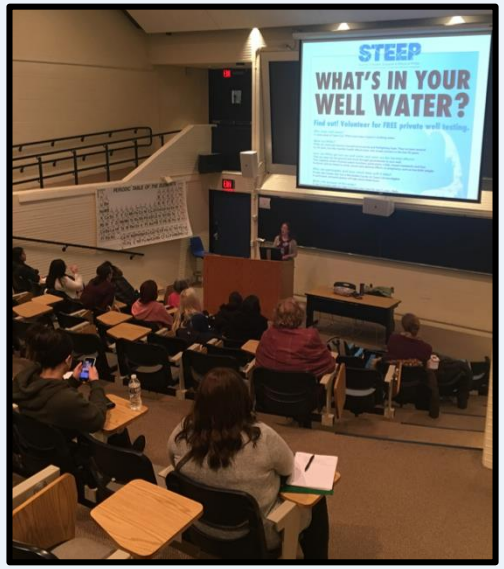
Community Engagement

Project leaders:

- Laurel Schaider, PhD, Silent Spring Institute
- Alyson McCann, University of Rhode Island

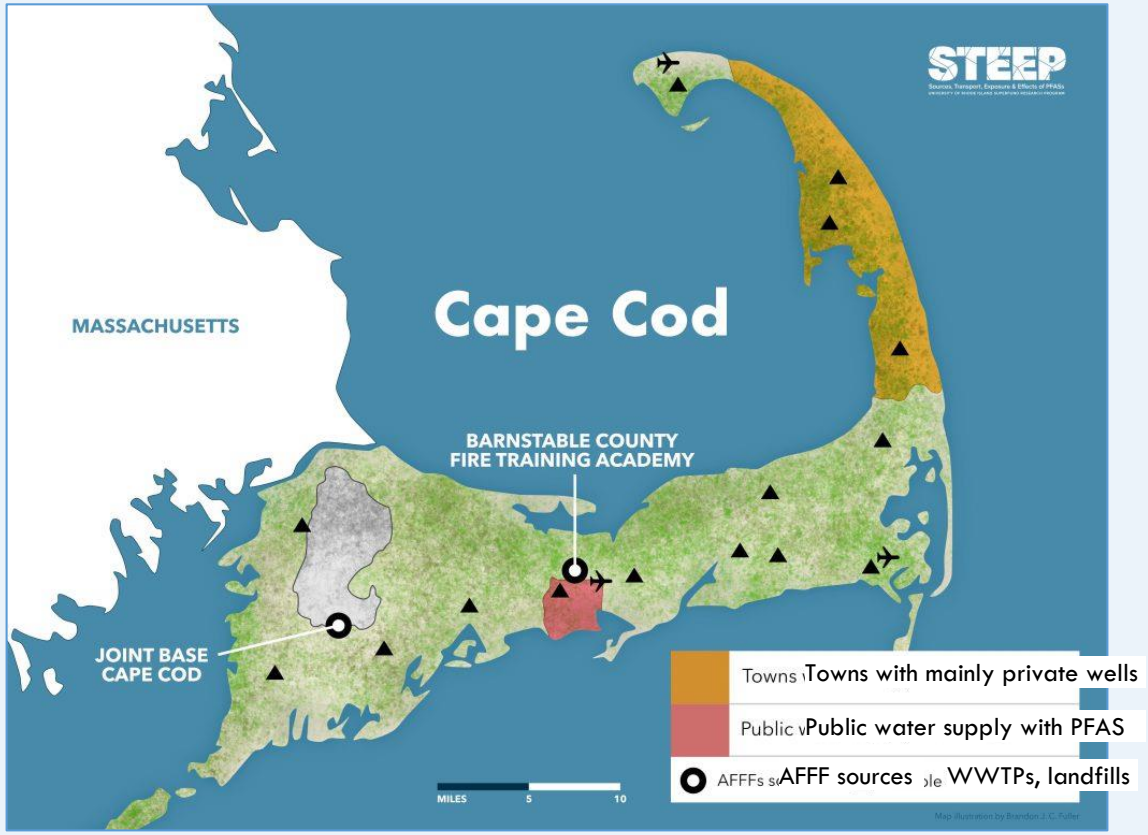
Objectives:

- Study PFAS in Cape Cod private wells
- Host annual Science Day on Cape Cod
- Participate in community events
- Promote exposure reduction



Why study private wells on Cape Cod?

- Vulnerable sole-source aquifer
- AFFF contamination of public and private drinking water wells
- 85% of residents on septic systems
- Prior research found PFAS in Cape Cod private wells
- Community concerns about water quality and health

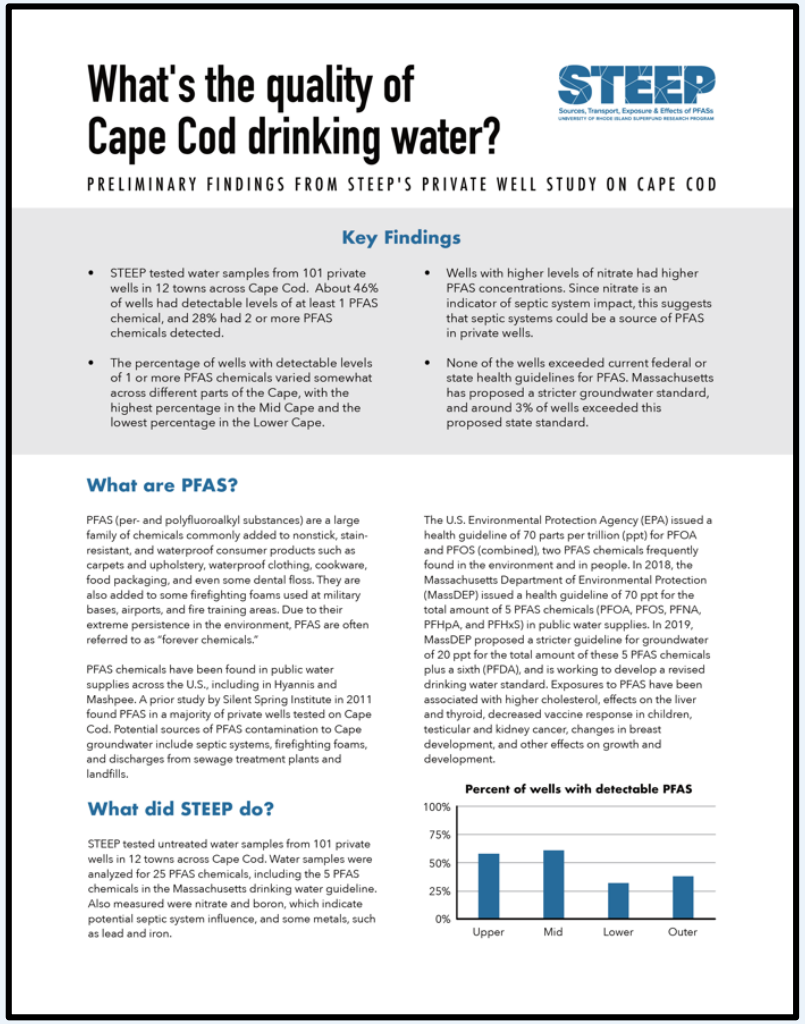


Collaborators: Elsie Sunderland, Heidi Pickard, Prentiss Balcom at Harvard University

Overall findings

- 46% of wells had at least one PFAS detected and 28% had ≥2 PFAS detected
- 9 PFAS compounds detected, mostly PFCAs and PFSAs, both long-chain and short-chain
- No wells exceeded EPA LHA, 3% exceeded proposed MA standard of 20 ng/L (sum of 6 PFAS)
- Wells with higher nitrate had higher PFAS, suggesting septic systems are a potential source

Community report-back



What's the quality of Cape Cod drinking water?

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

PRELIMINARY FINDINGS FROM STEEP'S PRIVATE WELL STUDY ON CAPE COD

Key Findings

- STEEP tested water samples from 101 private wells in 12 towns across Cape Cod. About 46% of wells had detectable levels of at least 1 PFAS chemical, and 28% had 2 or more PFAS chemicals detected.
- The percentage of wells with detectable levels of 1 or more PFAS chemicals varied somewhat across different parts of the Cape, with the highest percentage in the Mid Cape and the lowest percentage in the Lower Cape.
- Wells with higher levels of nitrate had higher PFAS concentrations. Since nitrate is an indicator of septic system impact, this suggests that septic systems could be a source of PFAS in private wells.
- None of the wells exceeded current federal or state health guidelines for PFAS. Massachusetts has proposed a stricter groundwater standard, and around 3% of wells exceeded this proposed state standard.

What are PFAS?

PFAS (per- and polyfluoroalkyl substances) are a large family of chemicals commonly added to nonstick, stain-resistant, and waterproof consumer products such as carpets and upholstery, waterproof clothing, cookware, food packaging, and even some dental floss. They are also added to some firefighting foams used at military bases, airports, and fire training areas. Due to their extreme persistence in the environment, PFAS are often referred to as "forever chemicals."

PFAS chemicals have been found in public water supplies across the U.S., including in Hyannis and Mashpee. A prior study by Silent Spring Institute in 2011 found PFAS in a majority of private wells tested on Cape Cod. Potential sources of PFAS contamination to Cape groundwater include septic systems, firefighting foams, and discharges from sewage treatment plants and landfills.

What did STEEP do?

STEEP tested untreated water samples from 101 private wells in 12 towns across Cape Cod. Water samples were analyzed for 25 PFAS chemicals, including the 5 PFAS chemicals in the Massachusetts drinking water guideline. Also measured were nitrate and boron, which indicate potential septic system influence, and some metals, such as lead and iron.

The U.S. Environmental Protection Agency (EPA) issued a health guideline of 70 parts per trillion (ppt) for PFOA and PFOS (combined), two PFAS chemicals frequently found in the environment and in people. In 2018, the Massachusetts Department of Environmental Protection (MassDEP) issued a health guideline of 70 ppt for the total amount of 5 PFAS chemicals (PFOA, PFOS, PFNA, PFHpA, and PFHxS) in public water supplies. In 2019, MassDEP proposed a stricter guideline for groundwater of 20 ppt for the total amount of these 5 PFAS chemicals plus a sixth (PFDA), and is working to develop a revised drinking water standard. Exposures to PFAS have been associated with higher cholesterol, effects on the liver and thyroid, decreased vaccine response in children, testicular and kidney cancer, changes in breast development, and other effects on growth and development.

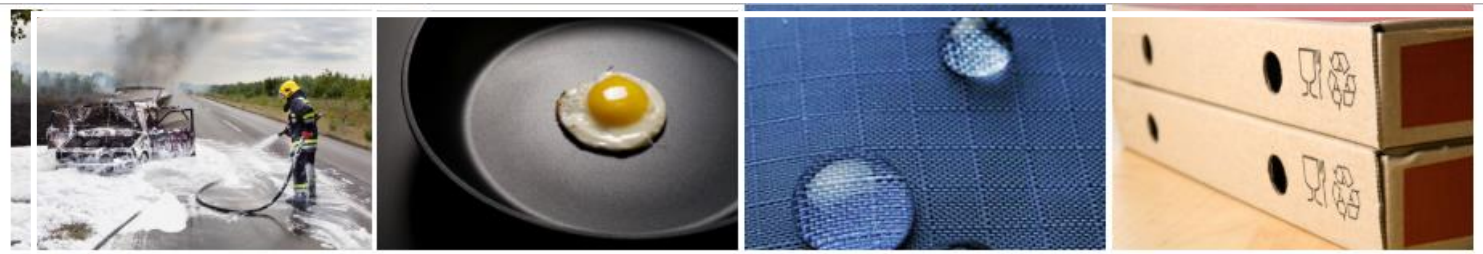
Percent of wells with detectable PFAS

Fact sheet with key findings

Participant report-back

- Silent Spring Institute's DERBI (Digital Exposure Report-back Interface)

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



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.

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?

Participant report-back

- Headlines
- Chemical-specific info
- Info on water treatment
- Household tips

Your Results

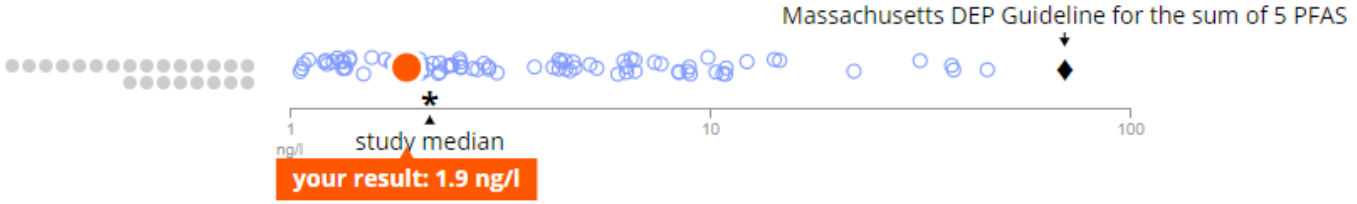
Graph legend

- your chemical level
- participants' chemical levels
- participants for whom the chemical was not detected
- * study median
- ♦ State or federal drinking water guideline (when available)

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

Participant report-back

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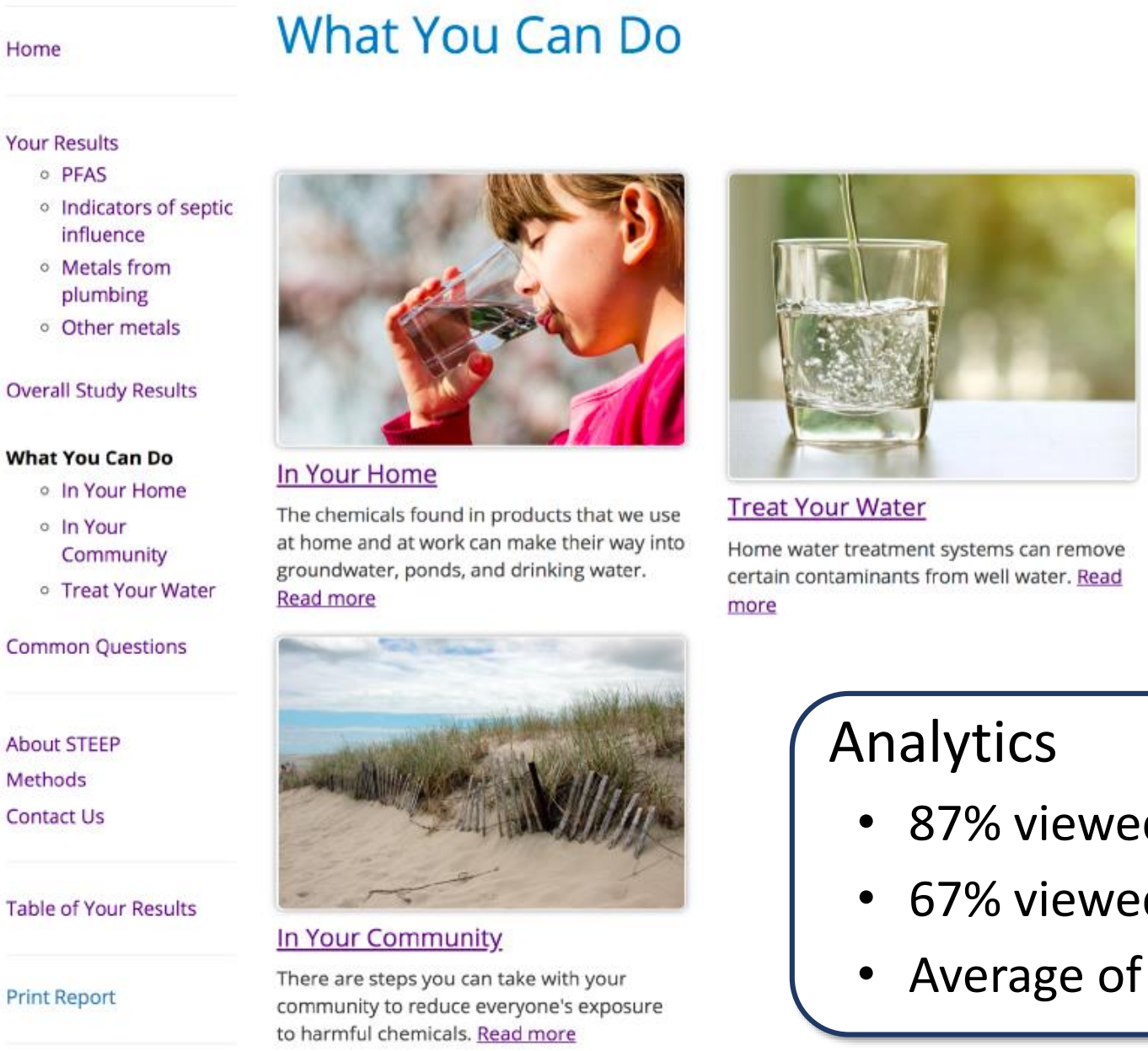


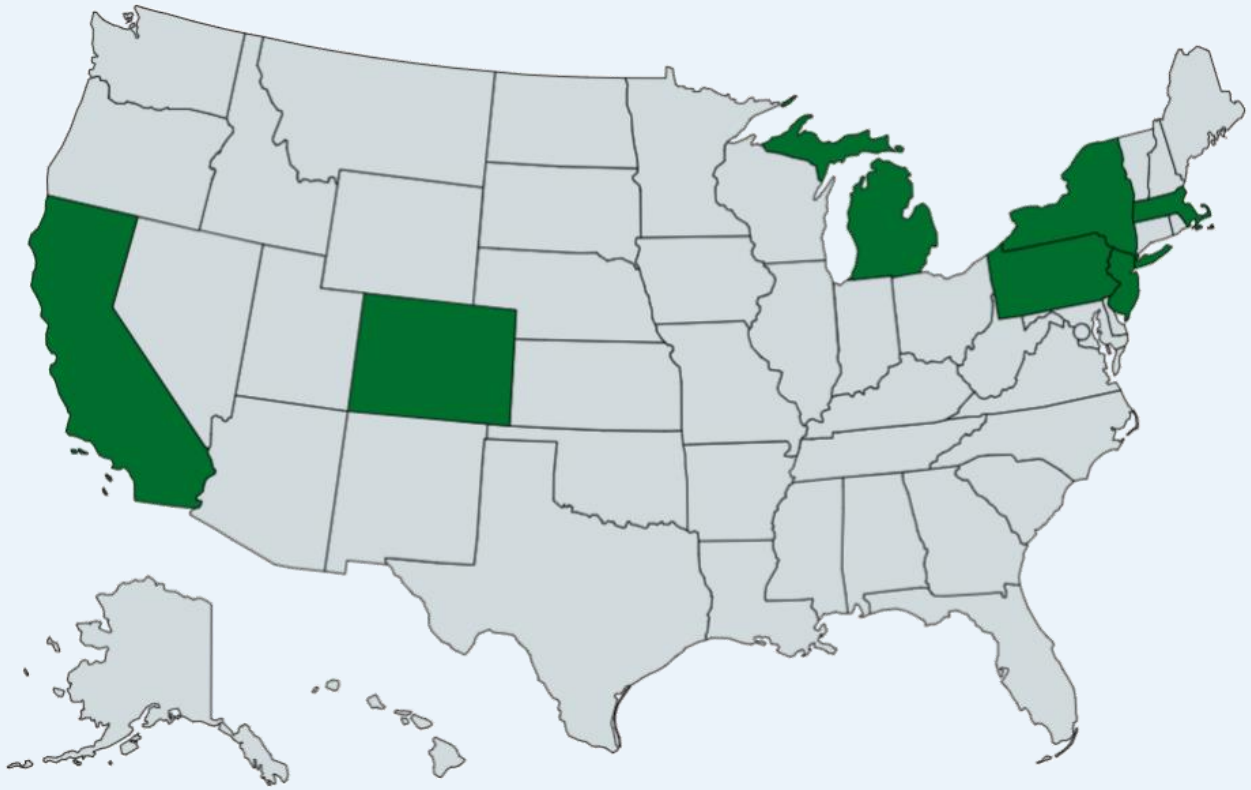
Analytics

- 87% viewed online report
- 67% viewed on first day
- Average of 5.4 page views

ATSDR/CDC Multi-Site PFAS Health Study

- Funded and coordinated by Agency for Toxic Substances and Disease Registry (ATSDR) and the Centers for Disease Control and Prevention (CDC)
- 7 funded studies nationwide to look at health effects of PFAS exposure across different communities

Communities in 7 states included in ATSDR study



ATSDR PFAS health study in Hyannis and Ayer

- Silent Spring Institute leading 1 of 7 projects to study health effects of PFAS in drinking water in Hyannis and Ayer, MA
- Partners: Harvard T.H. Chan School of Public Health, Eastern Research Group, Mass. Breast Cancer Coalition, People of Ayer Concerned about the Environment
- Each project will aim to recruit 1,000 adults and 300 children
- Protocols currently under review

Key points

- Like so many environmental health contamination crises, communities led the way, starting with initial identification of DuPont contamination in WV and in dozens of other sites
- Affected communities and NGOs have led efforts to promote state regulations and changes in corporate chemical policies
- NIEHS and many EH scientists following lead and collaborating with communities to develop community-engaged research
- Media coverage has played crucial role

Resources

- PFAS Exchange: www.pfas-exchange.org
- Silent Spring Institute: www.silentspring.org
- Northeastern University SSEHRI: www.pfasproject.com
- STEEP Superfund Research Program: web.uri.edu/steep
- Green Science Policy Institute: www.pfascentral.org
- National PFAS Contamination Coalition: www.pfasproject.net

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