Michigan Taking Action on PFAS

CAROL ISAACS JD

DIRECTOR, MPART

STATE OF MICHIGAN

GOVERNOR RICK SNYDER

PFAS

What are PFAS?

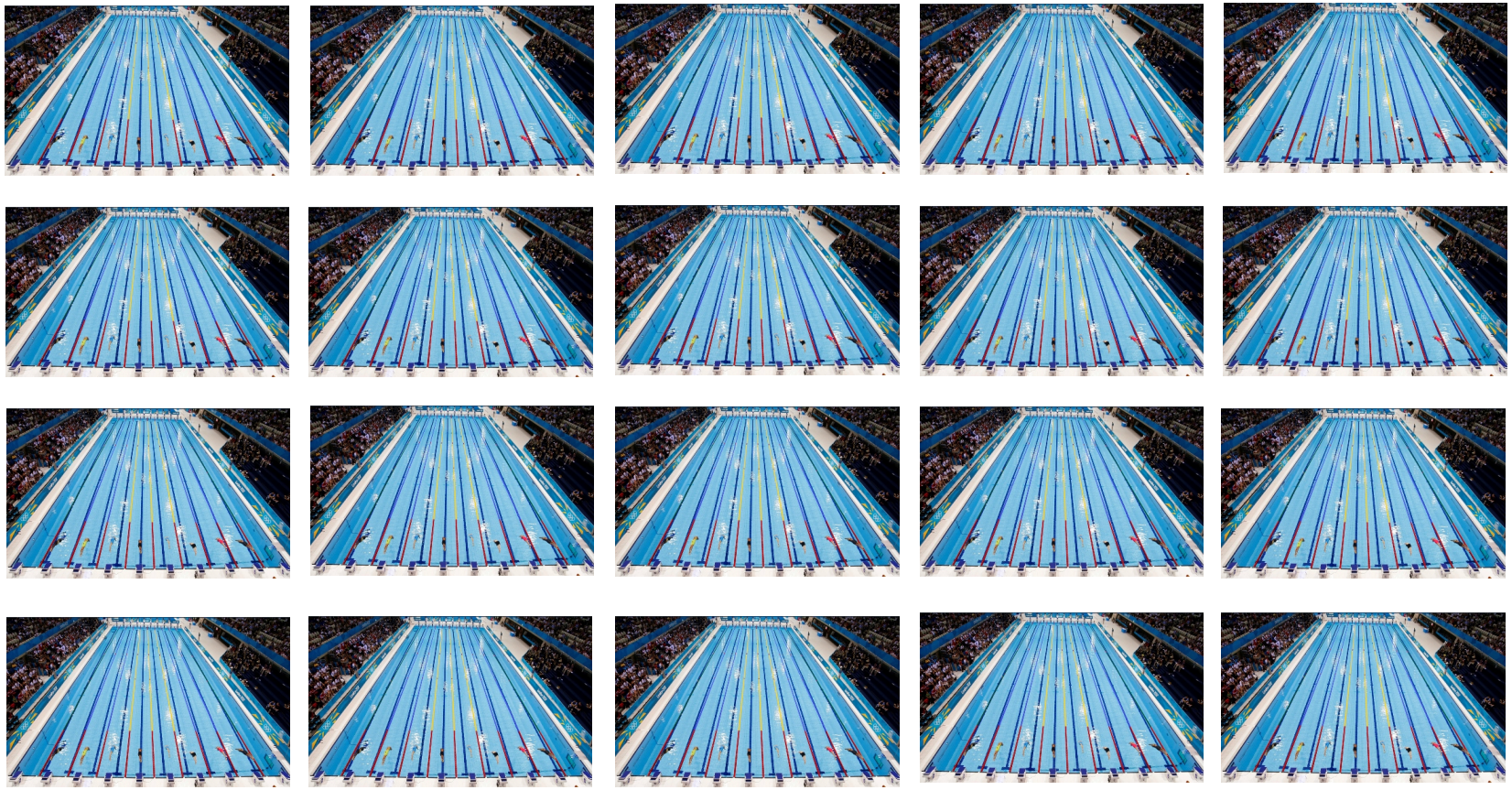
- Poly and perfluoroalkyl substances (PFAS)
- More than 4,000
- Long chain and shorter chain

Why are we concerned about PFAS

- Ubiquitous
- Persistence in the environment and human body
- Associated with disease and disorder

Dealing with Part Per Trillion Levels

1 ppt = 1 drop (.05mL) in 20 Olympic Swimming Pools



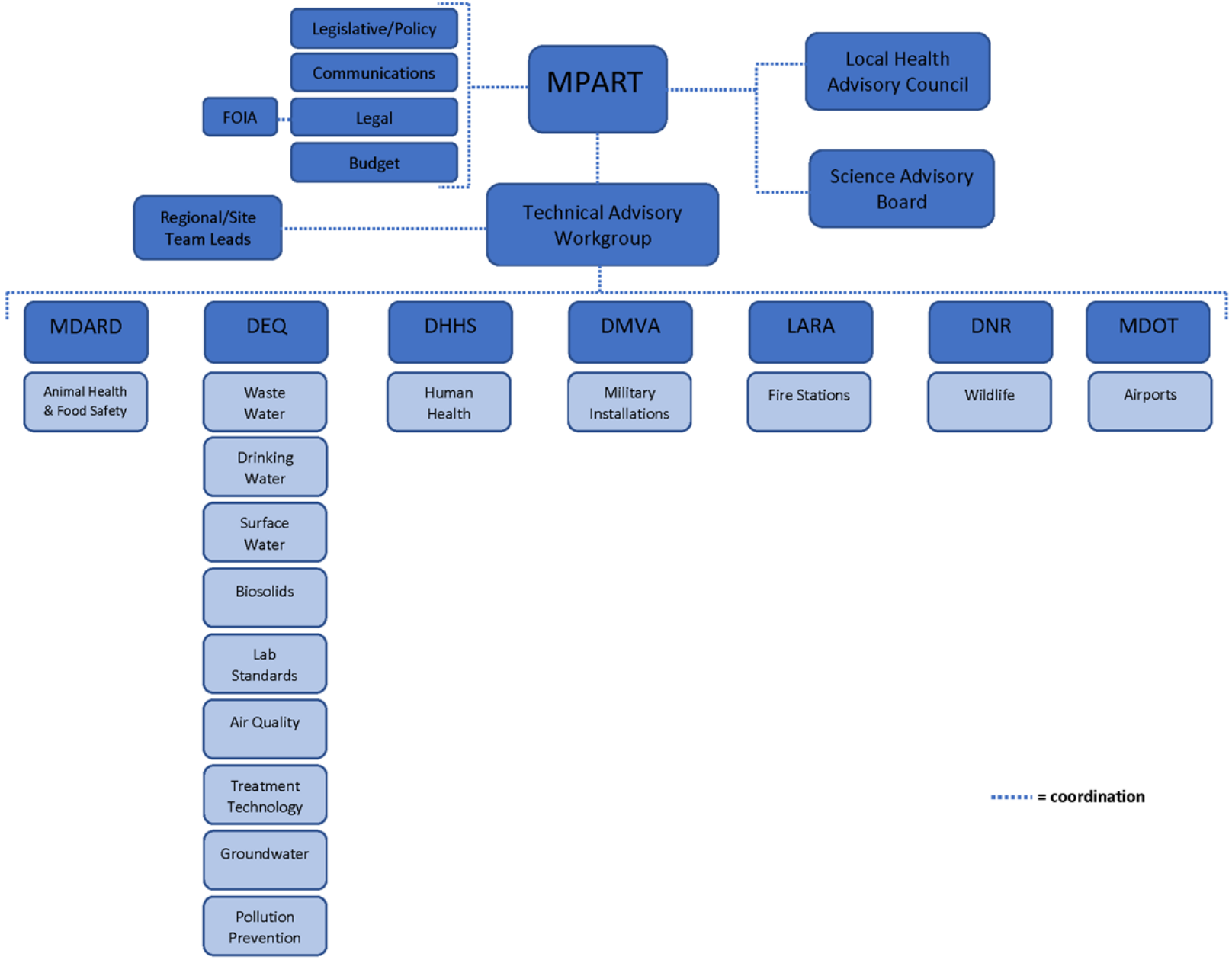
Note: 1 Olympic Pool = 660,000 gallons

Michigan PFAS Action Response Team (MPART)

Governor Rick Snyder's Executive Directive

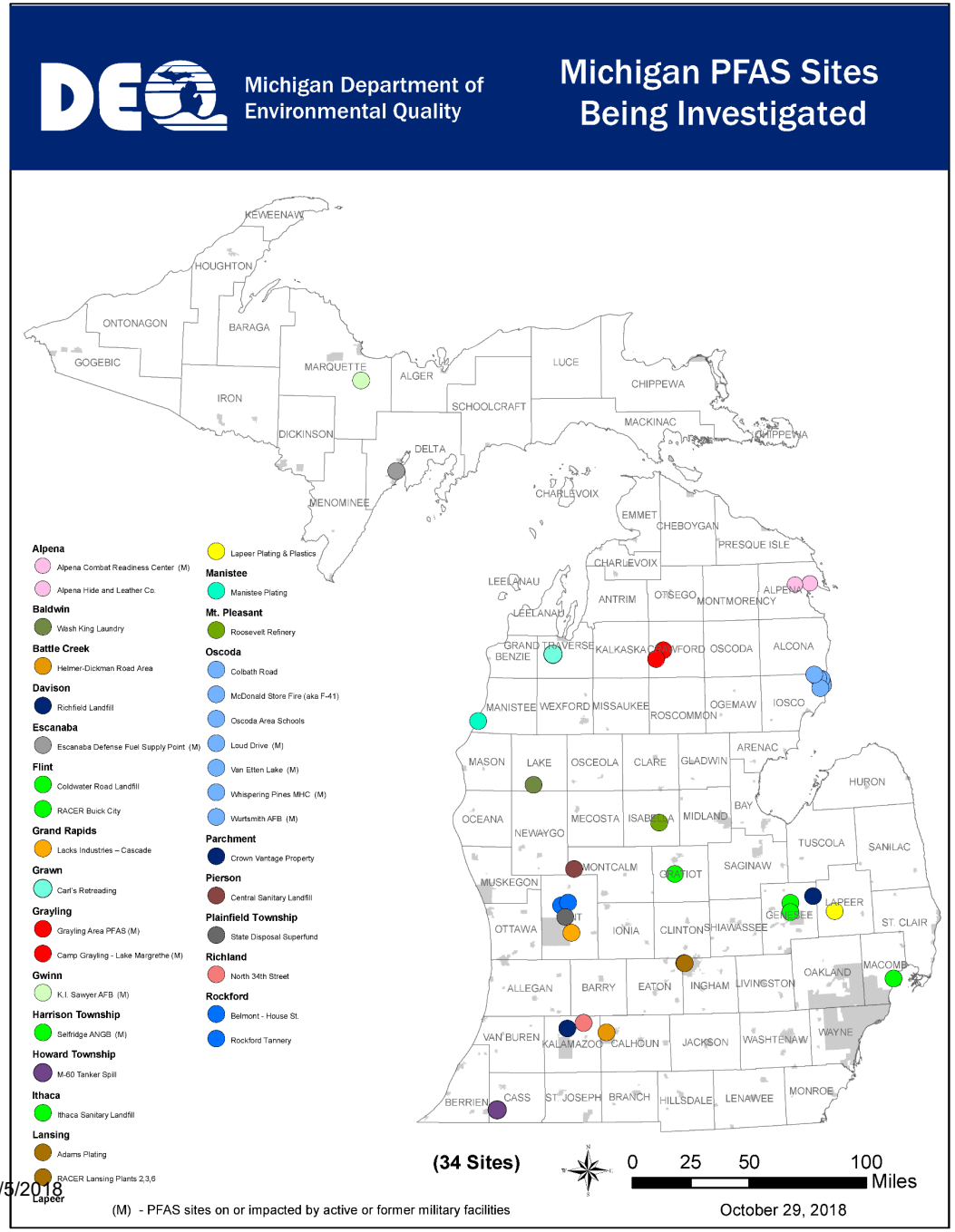
- November 2017
- Cooperation and coordination among all levels of government
- Directs implementation of state's action strategy

MPART Organizational Chart



PFAS in Michigan

- Multi-agency project teams
- Investigation
- Alternate drinking water
- Community engagement



PFAS STATE DEPARTMENTS

Department of Environmental Quality

- Investigation, geological survey, testing
- Central PFAS communications

Department of Health and Human Services

- Protection of public health, water and filter distribution, exposure assessments, cancer survey
- Testing of fish, deer, future blood serum

Department of Licensing and Regulatory Affairs

- Fire Marshall, state survey fire stations, disposal of fire fighting foam, safety and best practice protocols

Department of Natural Resources

- Collection of deer and fish for PFAS

PFAS STATE DEPARTMENTS CONT.

Department of Agriculture and Rural Development

- Biosolids, plant update, farms

Department of Transportation

- Airports and fire fighting foam. FAA testing regulations

Department of State Police

- Emergency responses and readiness

Military and Veterans Affairs

- Michigan bases and veterans Issues – federal, potential exposure surveys through ATSDR – federal funding

Technology and Management and Budget

- Supplemental funding

Education

- School testing

MPART DEFINED

1. Unique management structure – centralized, organized, all state department response.

2. Raising awareness
   - Federal Partners – EPA, ATSDR, FAA, FDA, DOD
   - Coordinate with other states, organizations
   - Congress and state Legislature

3. Communication – all levels – high level of importance
   - Web Site, community meeting, 1 on 1 with residents
   - Communication with Legislature and Congress
   - Communication with stakeholders

4. Protecting Health is the priority
   - PFAS Science Board, LPH Advisory Board, state scientists

MPART

Proactive Approach - Active investigations to discover elevated levels of PFAS

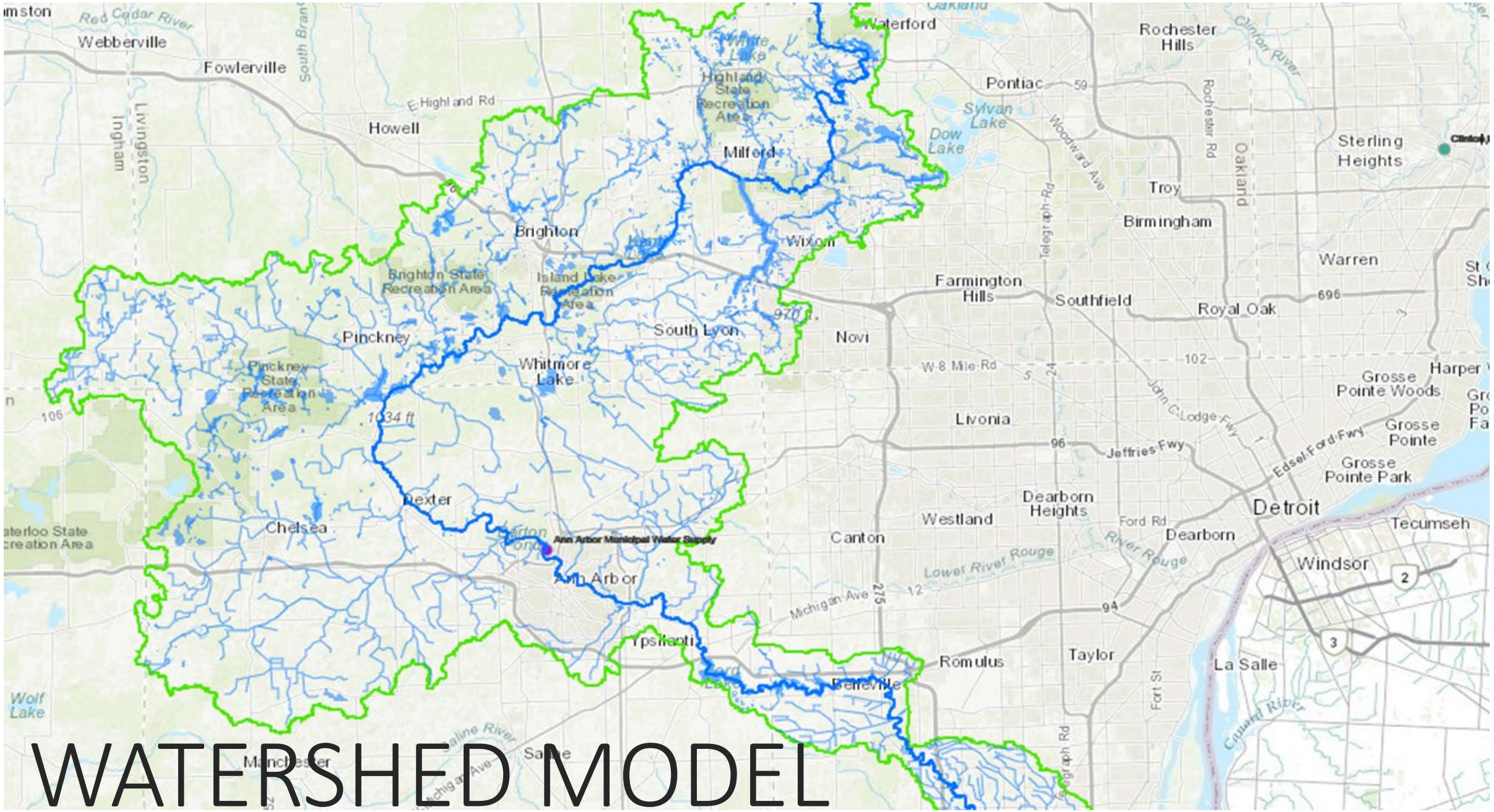
- Investigation – Targeted and broad based – 34 sites, all public water suppliers and all schools on wells and day care centers, private wells
- Mitigation – Water, filters on private homes, GAC filters on public water systems
- Prevention – IPP program, WWTP, landfills, surface water testing
- Remediation – Pump and treat, GAC, public water hook ups

Standards – where does drinking water come from? Well fields, rivers, lakes.

- 70 PPT EPA Lifetime Health Advisory
- 70 PPT Michigan state groundwater clean up criteria
- Michigan State surface water standard 11-12
- Future Standards – drinking water – Science Advisory Board

Legal Action

- State water violation notices
- Dispute resolution
- Litigation
- Responsible party



WATERSHED MODEL

City of Parchment, Michigan

Kalamazoo will extend water system to Parchment in wake of PFAS contamination

By BRYCE HUFFMAN • AUG 6, 2018

Tweet Share Google+ Email

FUTURE ACTIONS

- PFAS is an emerging contaminant. Additional PFAS compounds may need to be regulated. Research is continuing in toxicological and epidemiological areas
- Incorporate PFAS into larger initiative with all other water contaminants that threaten public health – know how to remove different PFAS from drinking water
- Insure comprehensive planning for drinking water, wastewater, landfill and stormwater management
- Continued funding is necessary - emergency response funds, infrastructure reform, etc.
- Long term remediation requires systems of affordability - grants, loans, etc. Municipal systems, new wells, GAC filters and other mechanisms to remove PFAS

FUTURE ACTIONS CONT.

- Develop methods for the best technology to eliminate PFAS from our industrial processes and landfills. This is a new area of development.
- Develop policies – state and local for private drinking wells. It may not be possible to test approximately 1m private wells but the testing of targeted areas should continue.
- New standards for PFAS compounds will need to be established for drinking water. Science Board Report will be released before the end of 2018.
- Full Transparency – establish stakeholder view committee to address:
  - Recommendations of PFAS Science Board
  - Create science based standard numbers for PFAS compounds
  - Understand the application of the standards and best mechanism to implement

OUTSTANDING QUESTIONS AND KNOWLEDGE GAPS

- The burden of determining the exposure of residents to harmful chemicals in their drinking water falls to the states. System needs improvements
- We lack federal EPA standards. EPA is assisting with new lab methodology research
- We lack sufficient knowledge required to understand the toxicity of all PFAS chemicals. EPA and ATSDR are helping but this takes time.
- Federal Agencies can not assure newer shorter chain PFAS chemical are safer.
- We lack sufficient knowledge concerning the association between PFAS and soil and plant uptake.

MDEQ's PFAS RESPONSE

C. HEIDI GRETHER

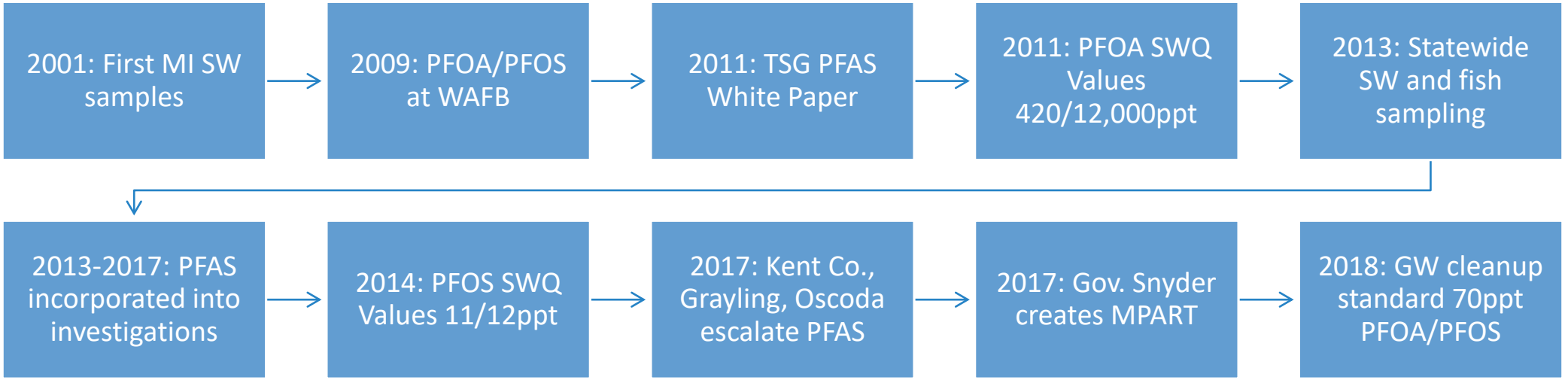
MDEQ DIRECTOR

PFAS BACKGROUND

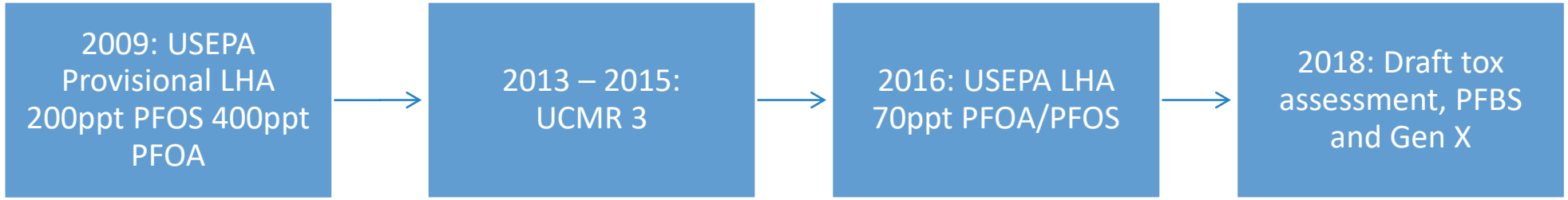
- Developed as early as the 1930's when Teflon accidentally discovered
  - Usage in the 1950's began in consumer and industrial products
- Aqueous Film Forming Foam (AFFF) developed in 1960's
- Usage in different industries significantly expanded in 1970's
- 2000's: PFAS distributed globally in the environment, phase out of some PFAS begins
- Current: Increased public awareness, increased investigation, development and usage of new PFAS

BRIEF PFAS REGULATORY TIMELINE

Michigan



Federal/USEPA



Brief PFAS Regulatory Timeline Details

Michigan:

- 2001: First surface water sampling for PFOA and PFOS in Michigan
    - DEQ collects samples for a researcher developing an analytical method for those compounds. Results take years to receive.
- 2009: DEQ asks the United States Air Force to sample for PFOS and PFOA at WAFB.
    - PFAS investigation is ongoing to this day.
- 2011: DEQ's Toxics Steering Group directed to form a PFAS workgroup and develop a PFAS White Paper.
- 2011: DEQ derives Rule 57 human health surface water quality values for PFOA
    - 420ppt for surface water used as drinking water source
    - 12,000ppt if not used as drinking water
- 2013: DEQ begins intensive statewide PFAS sampling in fish and surface water
    - In partnership w/ DHHS
    - A recommendation from the Toxics Steering Group's 2011 White Paper.
- 2013-2017: PFAS incorporated into environmental investigations at locations throughout the state
    - Military sites with likely AFFF usage:
        - Battle Creek ANGB
        - K.I. Sawyer Air Force Base
        - Escanaba Defense Fuel Supply Point
        - Alpena Combat Readiness Training Center
        - Grayling Army Air Field
    - Industrial sites and sites of other contamination:
        - State Disposal Superfund site (landfill)
        - Adams Plating Superfund site
        - RACER Lansing Plant 3
        - Flint River
        - a tanker fire near Niles
        - and others
- 2014: DEQ derives Rule 57 human health surface water quality values for PFOS

    - 11ppt for surface water used as drinking water source
    - 12ppt if not used for drinking water
- 2017: Investigations in Grayling, Northern Kent County, and Oscoda escalate PFAS issue.
- 2017: Governor Snyder creates MPART.
- 2018: DEQ promulgates groundwater cleanup standard of 70ppt for PFOA and PFOS,
    - Creates legally enforceable standard to require cleanup of those compounds.

Federal:

- 2009: USEPA publishes short-term provisional LHA of 200ppt for PFOS and 400ppt for PFOA.
- 2013 – 2015: Unregulated Contaminant Monitoring Round 3
    - Sampling at water supplies serving 10,000 or more for a list of unregulated contaminants included PFOA, PFOS, and several other PFAS compounds.
    - In Michigan, only Ann Arbor and Plainfield Township showed detections.
        - Ann Arbor highest PFOA + PFOS since detection: 43ppt
        - Plainfield Township: <70ppt result. Driven by one well field which was shut down after detection.
- 2016: USEPA publishes the LHA for PFOA and PFOS at 70ppt individually or combined.
- 2018: USEPA publishes draft toxicity assessments for PFBS and Gen X compounds

PFAS RESPONSE

- MPART created
- Incorporating known site into the MPART framework
- Need for robust, proactive PFAS investigation system
- Continuum of investigation

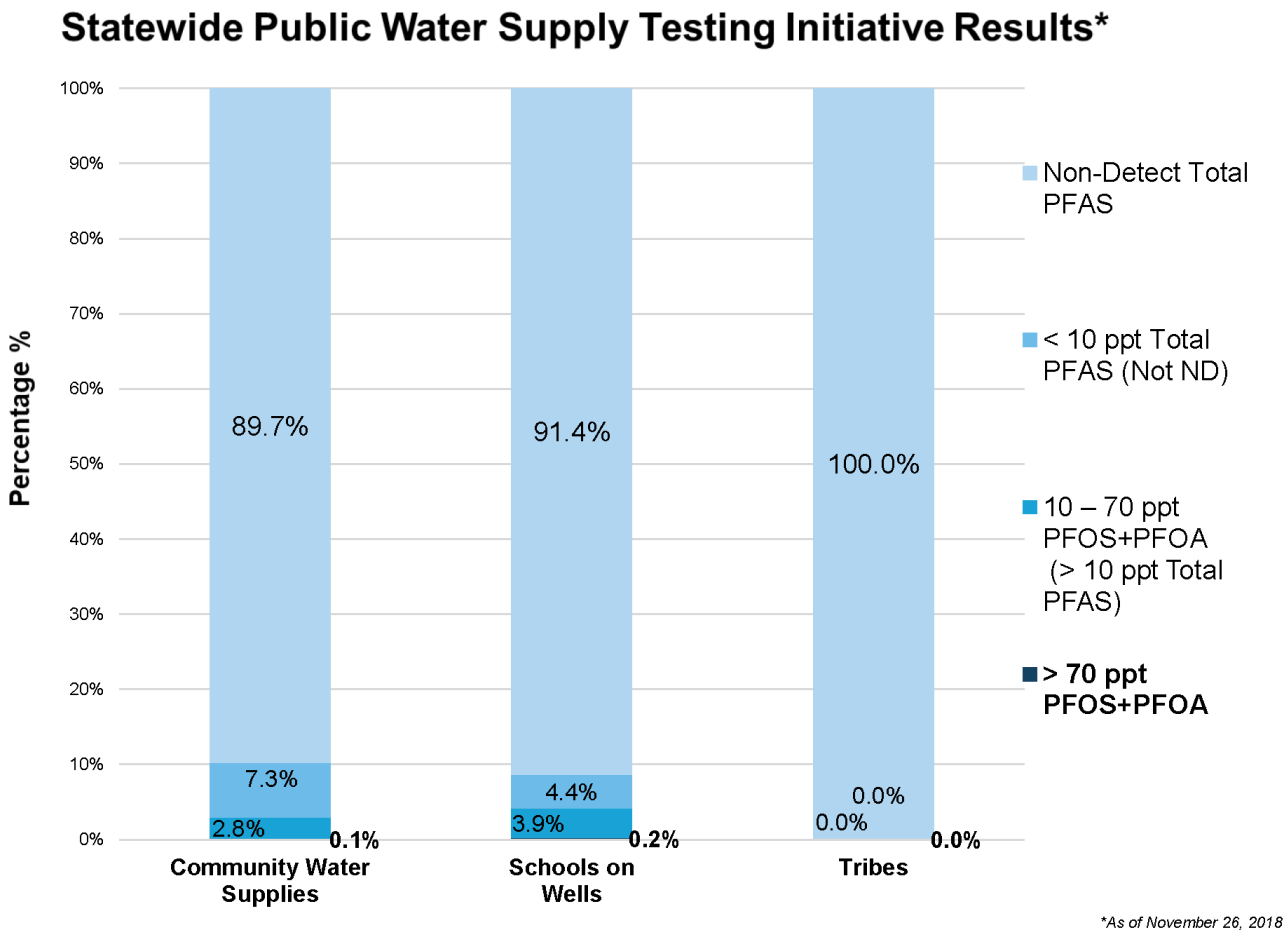
PROACTIVE

PUBLIC WATER SUPPLY SAMPLING

AMBIENT SURFACE WATER AND FISH SAMPLING

WASTEWATER AND INDUSTRIAL PRETREATMENT

INCORPORATING PFAS INTO INVESTIGATIONS AT EXISTING SITES



*As of November 26, 2018

PROACTIVE: PUBLIC WATER SUPPLY SAMPLING

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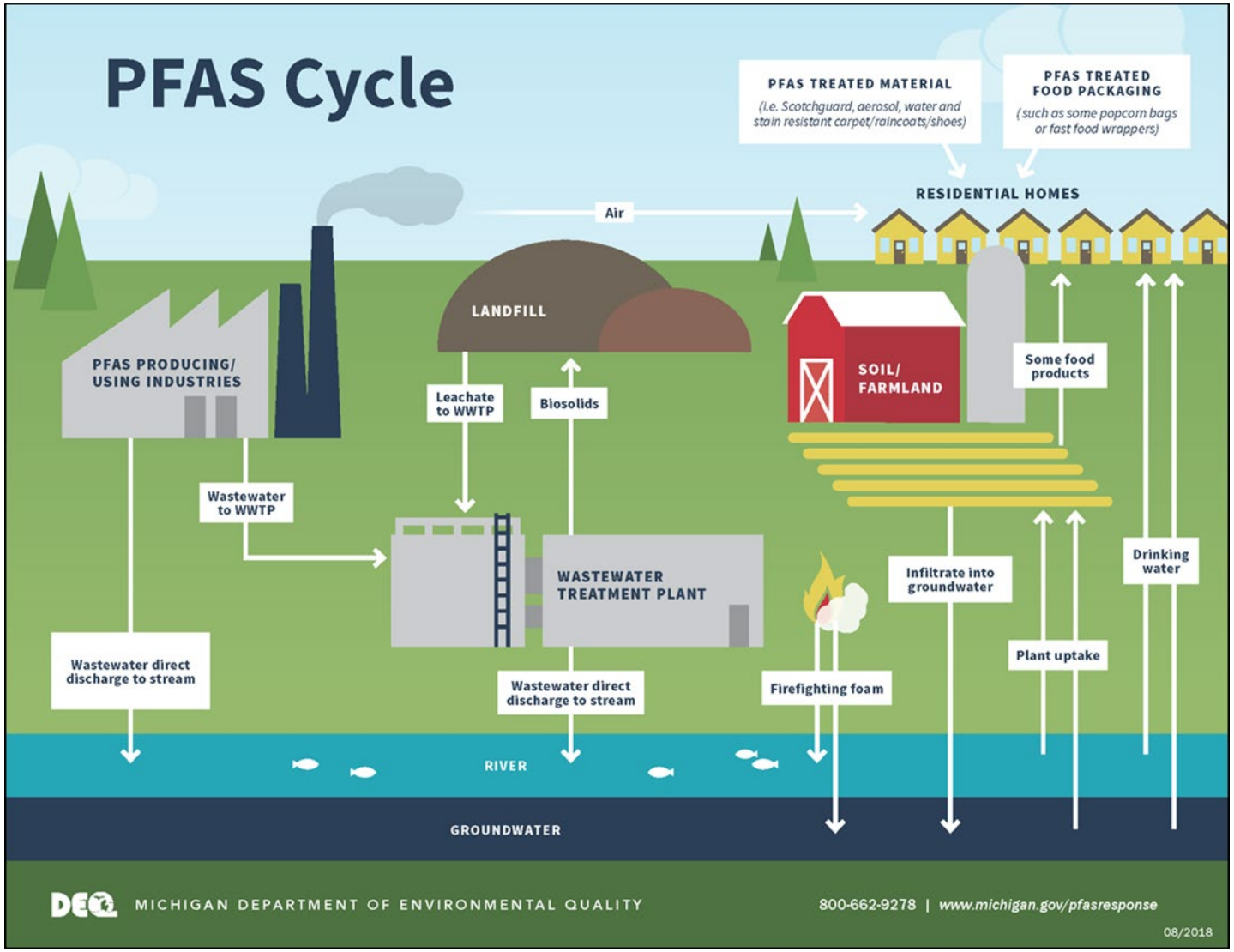
INCORPORATING PFAS INTO INVESTIGATIONS AT EXISTING SITES

PREVENTION

- Breaking the “cycle”
- Exploring of treatment technologies
- AFFF usage – cooperation with State Fire Marshal
- Working with industry

CHALLENGES OF THE CYCLE

- Agriculture
- Disposal
- Wastewater



LEGISLATIVE FISCAL YEAR 2018 SUPPLEMENTAL APPROPRIATION

- Public Water Supply Sampling
- Investigation and remediation
  - 5,600+ residential well and groundwater samples
- Surface water
  - 400+ SW samples and 600+ fish tested
- Lab capacity
- More to be done

MDHHS PFAS RESPONSE

PFAS Toxicology and Health Effects

EDEN V. WELLS, MD, MPH, FACPM

CHIEF MEDICAL OFFICER

Putting people first, with the goal of helping all Michiganders lead healthier and more productive lives, no matter their stage in life.

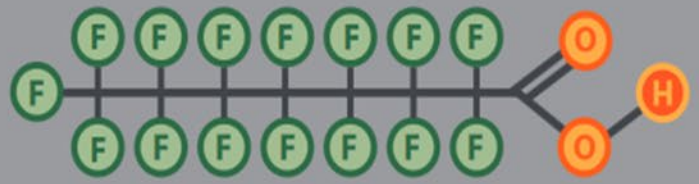
PFAS WHAT YOU NEED TO KNOW

WHAT ARE PFAS CHEMICALS?

Per- and polyfluoroalkyl substances (PFAS) are a group of man-made chemicals that includes PFOA, PFOS and GenX chemicals. Since the 1940s, PFAS have been manufactured and used in a variety of industries around the globe, including in the United States. PFOA and PFOS have been the most extensively produced and studied of these chemicals. Both are very persistent in the environment and in the human body. Exposure to certain PFAS can lead to adverse human health effects.

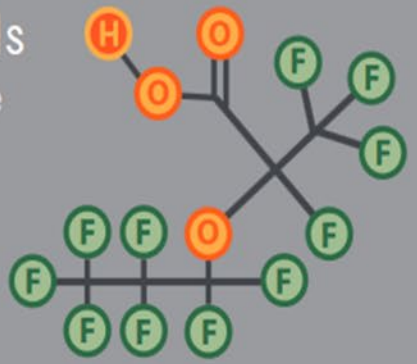
PFOA & PFOS

U.S. manufacturers voluntarily phased out PFOA and PFOS, two specific PFAS chemicals.



GenX Chemicals

GenX chemicals are a replacement for PFOA.



https://www.epa.gov/sites/production/files/2018-03/documents/pfasv15_2pg_0.pdf

SOURCES OF PFAS

Drinking water, typically localized and associated with a specific facility (e.g., manufacturer, landfill, wastewater treatment plant, firefighter training facility).

Food packaged in PFAS-containing materials, processed with equipment that used PFAS, or grown in PFAS-contaminated soil or water.

Commercial household products, including stain- and water-repellent fabrics, nonstick products (e.g., Teflon), polishes, waxes, paints, cleaning products, and fire-fighting foams (a major source of groundwater contamination at airports and military bases where firefighting training occurs).

Workplace, including production facilities or industries (e.g., chrome plating, electronics manufacturing or oil recovery) that use PFAS.

Living organisms, including fish, animals and humans, where PFAS have the ability to build up and persist over time.

CHEMICALS EVERYWHERE

Environmental chemicals in pregnant women in the United States:
NHANES 2003-2004. Woodruff TJ, Zota AR, Schwartz JM. Environ Health Perspect. 2011 Jun;119(6):878-85

- 163 chemicals, 268 pregnant women
- "Certain polychlorinated biphenyls, organochlorine pesticides, PFCs, phenols, PBDEs, phthalates, polycyclic aromatic hydrocarbons, and perchlorate were detected in 99-100% of pregnant women."

Slide information courtesy of:
Susan Buchanan, MD, MPH
Great Lakes Center for Children's Environmental Health
Region 5 Pediatric Environmental Health Specialty Unit
University of Illinois at Chicago School of Public Health

HUMAN EXPOSURE

Ingestion is main pathway

- Drinking contaminated water
- Ingesting food contaminated with PFAS, such as certain types of fish and shellfish
- Eating food packaged in materials containing PFAS (e.g., popcorn bags, fast food containers, etc.)
  - Until recently- PFAS now largely phased out of food packaging
- Hand-to-mouth transfer from surfaces treated with PFAS-containing chemicals

HEATH OUTCOMES (PFOA & PFOS)

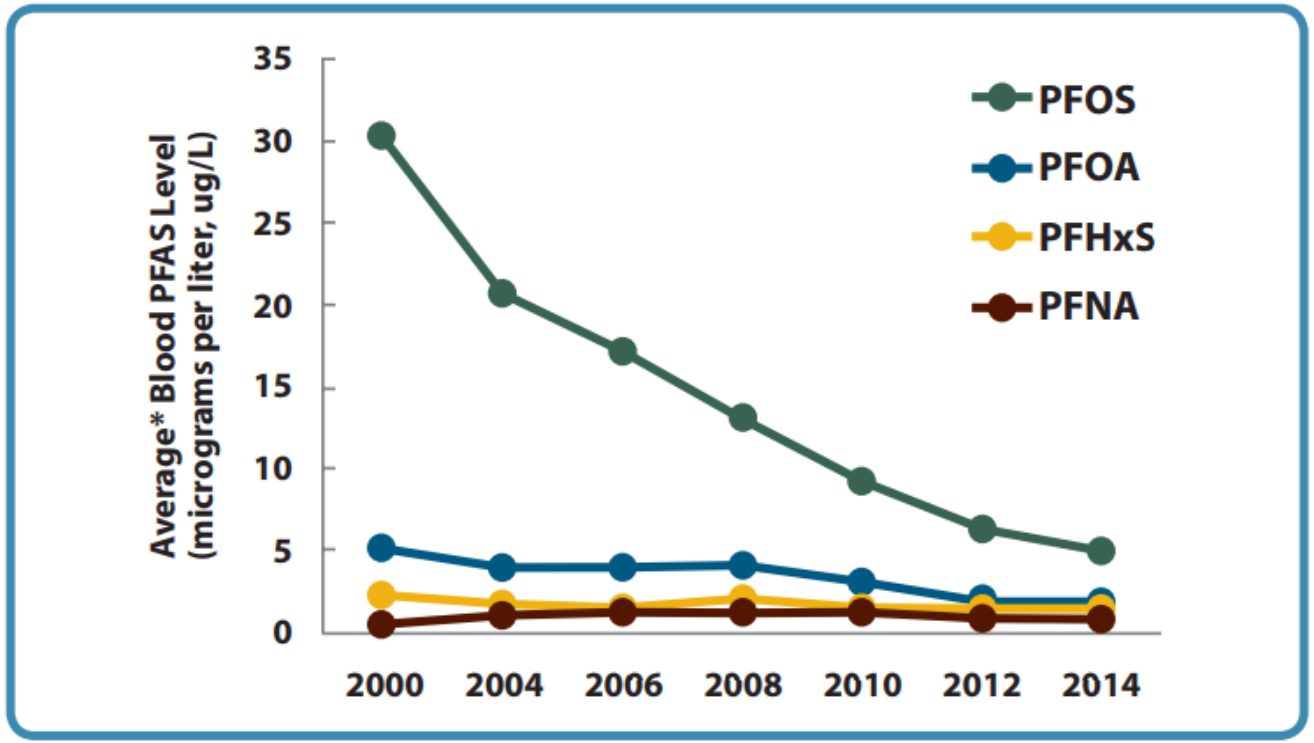
In People:

- Alter cholesterol
- Thyroid disease (PFOA)
- Ulcerative colitis (PFOA)
- Testicular and kidney cancer (PFOA)
- Alter immune system function

In Laboratory Animals:

- Developmental effects
  - Reduce ossification of the proximal phalanges
  - Decrease pup birth weight
  - Accelerated puberty in male pups
- Immune system dysfunction
- Alter liver and kidney weight

Blood Levels of the Most Common PFAS in People in the United States from 2000-2014



* Average = geometric mean

Data Source: Centers for Disease Control and Prevention. Fourth Report on Human Exposure to Environmental Chemicals, Updated Tables, (January 2017). Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.

PFAS BLOOD TESTING

98% US population have some level of PFAS (PFOA or PFOS) in their blood

Blood testing:

- **CAN** tell you the concentration in your blood at time of test
- **CANNOT** tell you if current or future health conditions are due to PFAS or how you were exposed (where the PFAS came from)

PFAS BLOOD TESTING – COMMUNITY

Blood tests for PFAS are most useful when they are part of a scientific investigation or a health study

- ATSDR (Jan 2018 website) https://www.atsdr.cdc.gov/pfas/pfas-blood-testing.html

PFAS Exposure Assessment Framework

Using Serum Testing as a Component for Assessing Exposure in Communities with Drinking Water Contaminated with Per- or Polyfluoroalkyl Substances (PFAS)

This framework document is designed to help state health departments when measuring and evaluating community exposures to per- or polyfluoroalkyl substances (PFAS) in drinking water.

In this framework, a statistically based approach to recruit, measure, and evaluate community exposures to PFAS includes:

- Biomonitoring (serum testing),
- Identifying exposure source(s), and
- Administering questionnaires to provide an assessment of exposure source(s) along with the magnitude and distribution of exposure in the community.

CDC PEATT May 2017

PUBLIC HEALTH ASSESSMENT

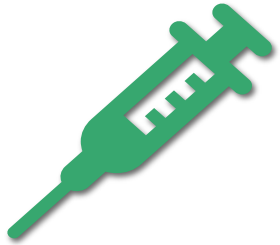
- Evaluate levels in environmental media (e.g., air, drinking water, fish, groundwater, surface water, soil).
  - Compare to screening levels
  - If above screening levels, site-specific evaluation
- Make recommendations to impacted people on how to minimize or eliminate exposure
- May include evaluation of available public health surveillance data (e.g., cancer incidence data).
- If enough people impacted, may conduct an exposure assessment.
- If enough people with high exposure confirmed, may conduct a health study.

EXPOSURE ASSESSMENTS

- Exposure Assessments assesses community exposure to PFAS from affected drinking water.
- Recruits individuals from exposed community
- Water and blood tests conducted to establish association between the suspected source
  (drinking water) to person's blood level
- Survey to assess other potential exposures person has had to PFAS in their environment.
- May take 1-2 years to conduct

ATSDR PEATT 2017

Comparison of serum levels to the current national PFAS serum averages-indication of extent which exposure from affected drinking water in a community may have contributed to any community blood levels above that national average



May assist in predicting serum PFAS levels for persons who have water PFAS measurements, but have not had their blood tested.

What An Exposure Assessment CAN DO

Exposure Assessments are NOT Health Studies

- A Health Study is an epidemiologic study

- "…may include a comparison group, an expanded health effects questionnaire, additional laboratory data relating to potential health effects and, potentially, a medical records review."

- Can take several years to conduct

ATSDR PEATT, 2017

NORTH KENT COUNTY EXPOSURE ASSESSMENT

Launch November 27, 2018

Recruitment letters begin week November 26, 2018

Assess exposures from PFAS to clients exposed to ≥70 ppt (n=400) and those < 70 ppt) (n= 400)

Study to assess population exposed and magnitude of exposure

Health Study May be conducted if Exposure Assessment identifies elevated exposure in study population due to environmental source.

MDHHS AND PFAS

MDHHS supports communities impacted by PFAS by:

- Following federal guidance to evaluate PFAS data, identify hazards, and initiate public health protective actions (Fish and Deer consumption advisories, Provide filters, avoid foam ingestion
- Technical assistance to local public health, regulatory agencies, and residents regarding interpreting toxicological and epidemiologic data
- Public health assessments that document public health actions
- Surveillance data review – example, cancer incidence report
- Exposure Assessments and Biomonitoring – example North Kent County
- Community engagement and Health Education – example, town hall meetings

CLINICAL RESOURCES

- Regional Pediatric Environmental Health Specialty Unit (PEHSU)
  - Great Lakes Center for Children's Environmental Health
  - University of Illinois at Chicago
- Agency for Toxic Substances and Disease Registry https://www.atsdr.cdc.gov/pfas/

MDNR PFAS RESPONSE

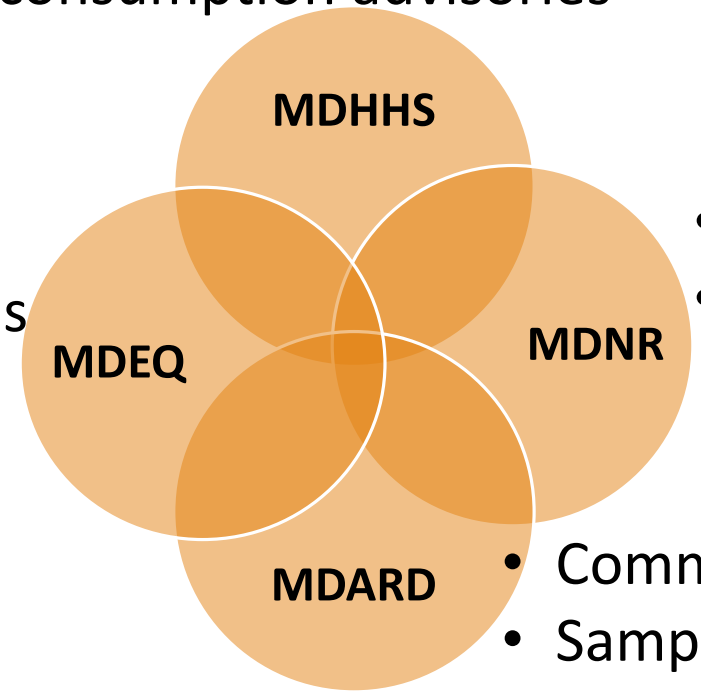
PFAS in Fish and Game

TAMMY J. NEWCOMB, PH.D.
SENIOR WATER POLICY ADVISOR
MICHIGAN DEPARTMENT OF NATURAL RESOURCES

PFAS In Fish and Game

FISH AND WILDLIFE CONSUMPTION ADVISORY COMMITTEE (FAWCAC)

- Evaluation of data for human health
- Set consumption advisories



- Environmental protection programs
- Sampling
- Caged organisms

- Management
- Sampling

- Commercially sold or raised
- Sampling commercial products

GENERAL PROCESS FOR CONSUMPTION GUIDELINE DEVELOPMENT

Sampling & Analyses → **Data Evaluation** → **Issuing a Guideline**

- Fish collection
- Processing
- Analysis for the Eat Safe Fish Guides (MDHHS Lab)

MDNR, MDEQ, MDARD

- Comparing fish tissue chemical levels to screening levels
- Additional considerations

MDEQ & MDHHS

- Outreach products- Eat Safe Fish Guides & others
- Michigan Public Health Code – Act 368

MDHHS

PFAS IN DEER

- Hunters asked, “What about PFAS in deer?”
- Agency Roles and Responsibilities in consumption advisories
- What deer were tested and how?
- Results from those deer
- Conclusions
- Next steps

WHAT DEER WERE TESTED AND HOW?

Background and targeted samples (min 20 each)

- Volunteer program for disease testing
- Targeted: Alpena, Oscoda, Northern Kent County, Grayling

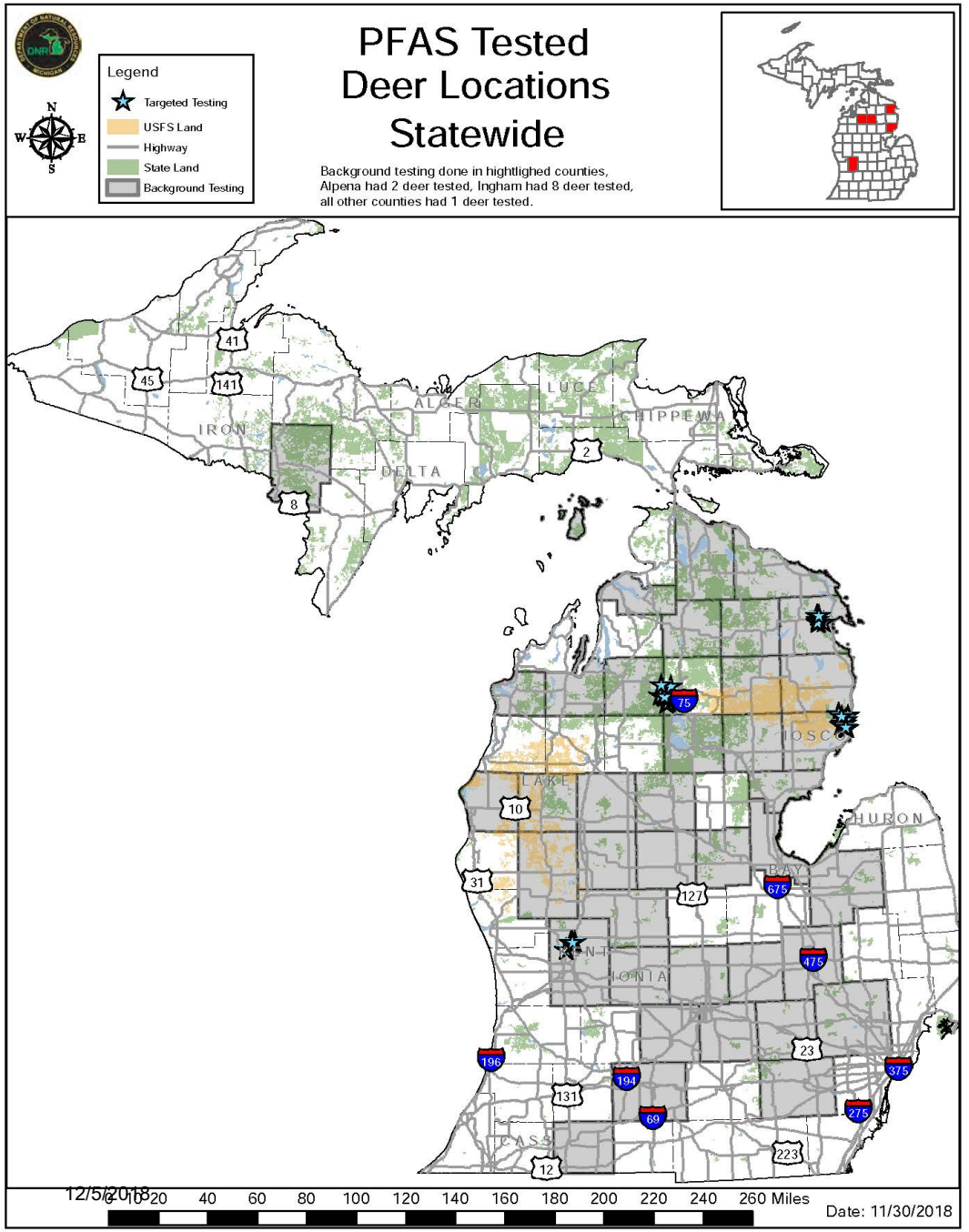
Collection of muscle, liver, kidney, fat

USDA APHIS collection –Complete September 1, 2018

- FIRST - all tested first for Chronic Wasting Disease and Bovine Tuberculosis

Laboratory analysis for PFAS included 16 different types of PFAS

Results: Only a single deer had results that were concerning. The rest are telling a story.



Conclusions for Deer

Some deer in Michigan are shown to be exposed to PFAS - most do not appear to have PFAS exposures that will lead to elevated levels in muscle tissue.

The ‘Do Not Eat’ advisory for deer taken within five miles of Clark’s Marsh in Oscoda Township is due to one deer having very high PFOS levels in the muscle, liver, and kidney.

Deer organs (liver and kidney) have higher levels of PFAS than muscle tissue

Fish filets tend to have more PFAS detected than deer from the same areas. This may be due to: fish live in the water, differences in PFAS processing, or a combination of factors.

PFAS in Fish

PFOS is the chemical that shows up the most in fish

Some places, PCBs, dioxins, and mercury are high than PFOS

Species include bluegill, sunfish, largemouth bass, smallmouth bass, suckers, crappie

Range from Do Not Eat to limited portions of meals

DO NOT EAT: Huron River below Wixom to Lake Erie, Clark's Marsh in Oscoda, Allen Lake in Iosco County, Au Sable below Foot Dam (nonmigratory fish), Kent County Freska Lake, ponds

Eat Safe Fish guidelines and MPART website

Next Steps

Deer in Oscoda –

- Evaluate circumstances of deer with high levels
- Develop a model to help explain those circumstances and use it as a tool to determine next steps
- Also use this information to determine if other locations in Michigan require targeted deer sampling.

Other Wildlife

- In January, begin interagency discussions related to risk in other wildlife such as turkey and waterfowl.

For Fish

- Look to Clark's Marsh and Huron River – ecosystem approach

PFAS in Firefighting

KEVIN SEHLMEYER

STATE FIRE MARSHAL

Bureau of Fire Services

Actively participated in MPART since April 2018

Survey of 1035 fire departments statewide to determine who has Class B AFFF foam with PFOS; First In nation to survey.

Currently over 736 fire departments have responded to the survey. 34,142 gallons statewide including rural, suburban and urban departments.

AFFF used to save Life / Limb only.

Updated PEAS (DEQ) phone protocol to identify when Class B AFFF foam has been used; Reducing potential for future AFFF legacy issues.

Stakeholder meetings with Fire Chiefs; All desire to properly dispose of old Class B foam in a coordinated, cost effective and safe way. National interest.

MDARD PFAS RESPONSE

PFAS IN FOOD AND ANIMALS

BRAD DEACON

MICHIGAN DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT

PFAS in Food and Animals

There are no federal standards for safe levels in food. Best practice is to reduce exposure wherever possible.

Pets and other animals should drink the same water you do. If you need filtered water, so do the animals.

Gardens- Tips for minimizing exposure

- Use rain water or filtered water for irrigation
- Use raised beds with new, clean soil
- Peel root crops