HURON RIVER WATERSHED PERFLUOROALKYL AND POLYFLUOROALKYL SUBSTANCES (PFAS) - SURFACE WATER SAMPLING AND GENERAL UPDATE

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Michigan Department of Environmental Quality (MDEQ)

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Introductions

Gerald Tiernan – DEQ, Remediation and Redevelopment Division, Jackson District, PFAS Regional Team Lead

Sarah R. Bowman, Ph.D. – DEQ, Water Resources Division, Surface Water Assessment Section

Steven Crider – MI Department of Health and Human Services, Toxicology and Response Section

Goals for this Webinar

- Provide update on overall status of PFAS within Michigan
- Provide information on current health advisory levels for PFAS
- Provide specific information on planned surface water and fish sampling to be conducted this summer.
- Provide update as to what additional work the DEQ is currently working on with respect to detected PFAS contamination within the Huron River Watershed

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Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS)

- Persistent and in a wide variety of household and industrial products
- Present in sanitary wastewater from multiple sources
- Conventional wastewater treatment not designed to treat PFAS
- Partitioning of PFOA and PFOS
  - Fate through a facility is not well understood; likely depends on the type of treatment process(es)
  - PFOS appears to better associate with solids; PFOA with water

PFAS Uses

Aerospace

Apparel

Building and Construction

Chemicals and Pharmaceuticals

Electronics

Oil & Gas

Energy

Healthcare and Hospitals

Aqueous Film Forming Foam

Semiconductors

Michigan PFAS Action Response Team (MPART)

Launched in 2017, the Michigan PFAS Action Response Team (MPART) is the first multi-agency action team of its kind in the nation. Agencies representing health, environment and other branches of state government have joined together to investigate sources and locations of PFAS contamination in the state, to take action to protect people's drinking water, and to keep the public informed as we learn more about this emerging contaminant.

Criteria

- Lack of federal standards
  - Primary drinking water criteria, Hazardous substances, biosolids
  - EPA Lifetime Health Advisory Level of 70 ppt PFOA and PFOS combined or individually not enforceable

- Michigan standards
  - Groundwater for drinking water clean-up standard (effect January 10, 2018)
    - 70 ppt PFOA and PFOS combined or individually

  - Surface Water - Rule 57 Water Quality Standards
    - PFOS:
      - 11ppt (drinking water source)
      - 12 ppt (non-drinking water source)
    - PFOA:
      - 420 ppt (drinking water source)
      - 12,000 ppt (non-drinking water source)

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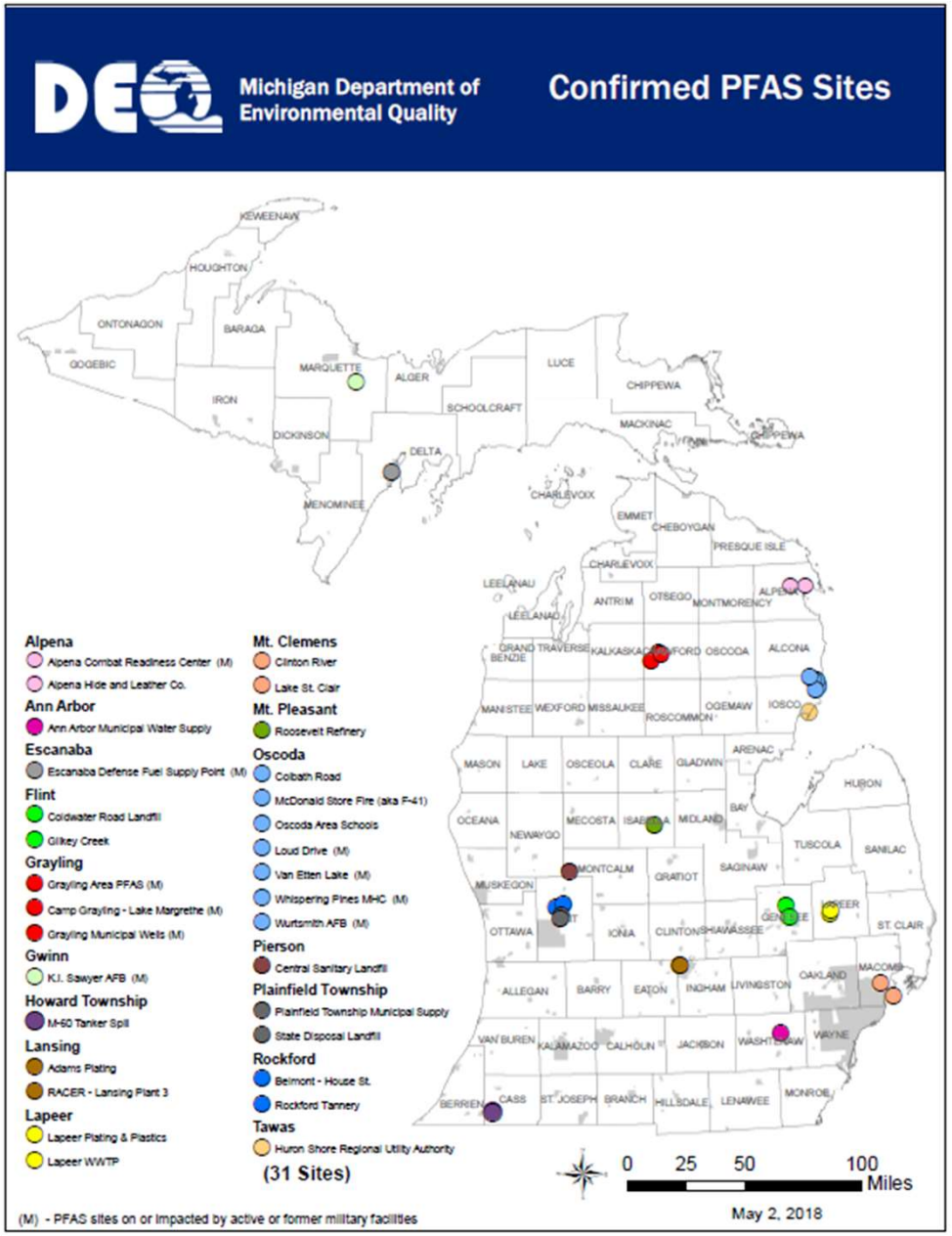
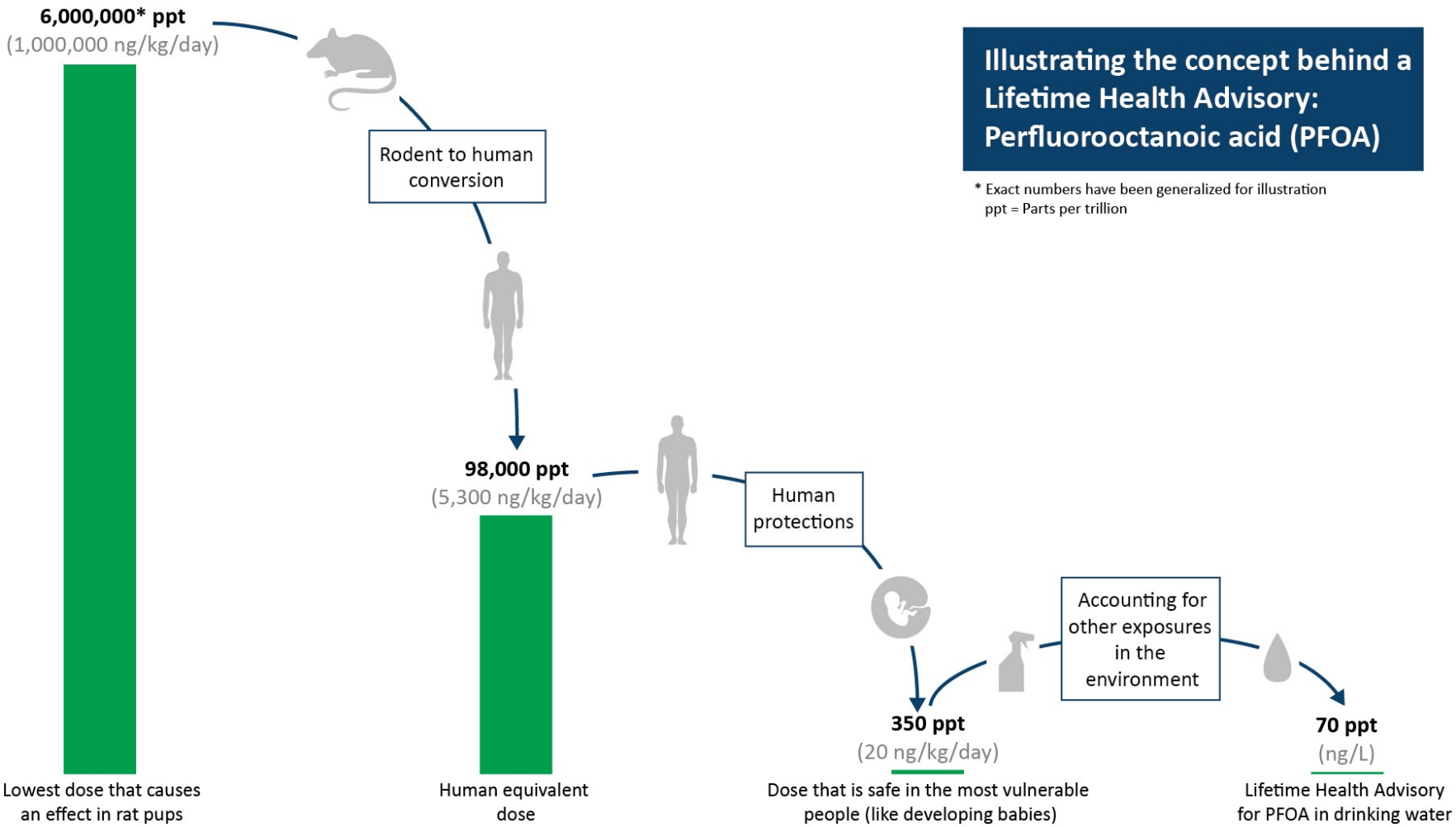

Michigan Department of Environmental Quality
Confirmed PFAS Sites
Alpena
Alpena Combat Readiness Center (M)
Alpena Hide and Leather Co.
Ann Arbor
Ann Arbor Municipal Water Supply
Escanaba
Escanaba Defense Fuel Supply Point (M)
Flint
Coldwater Road Landfill
Gilkey Creek
Grayling
Grayling Area PFAS (M)
Camp Grayling - Lake Margrethe (M)
Grayling Municipal Wells (M)
Gwinn
K.I. Sawyer AFB (M)
Howard Township
M-60 Tanker Spill
Lansing
Adams Plating
RACER - Lansing Plant 3
Lapeer
Lapeer Plating & Plastics
Lapeer WWTP
Mt. Clemens
Clinton River
Lake St. Clair
Mt. Pleasant
Roosevelt Refinery
Oscoda
Colbath Road
McDonald Store Fire (aka F-41)
Oscoda Area Schools
Loud Drive (M)
Van Etten Lake (M)
Whispering Pines MHC (M)
Wurtsmith AFB (M)
Pierson
Central Sanitary Landfill
Plainfield Township
Plainfield Township Municipal Supply
State Disposal Landfill
Rockford
Belmont - House St.
Rockford Tannery
Tawas
Huron Shore Regional Utility Authority
(31 Sites)
0 25 50 100 Miles
(M) - PFAS sites on or impacted by active or former military facilities
May 2, 2018

The Role of MDHHS

- Evaluate potential exposure to chemicals in the environment
- Determine if harm may occur
- Provide recommendations
- Provide technical support to the local health department
- Outreach to public, healthcare, others

EPA's Health Advisory Levels

- Based on reference doses (RfD) derived from developmental toxicity study in rodents
- Lifetime Health Advisory
  - PFOA + PFOS = 70 ppt (ng/L)
  - Short-term and long-term exposure
- Protects fetus and others against noncancer health issues (also protective against development of cancer)


Illustrating the concept behind a Lifetime Health Advisory: Perfluorooctanoic acid (PFOA)
* Exact numbers have been generalized for illustration
ppt = Parts per trillion
6,000,000* ppt
(1,000,000 ng/kg/day)
Lowest dose that causes an effect in rat pups
Rodent to human conversion
98,000 ppt
(5,300 ng/kg/day)
Human equivalent dose
Human protections
350 ppt
(20 ng/kg/day)
Dose that is safe in the most vulnerable people (like developing babies)
Accounting for other exposures in the environment
70 ppt
(ng/L)
Lifetime Health Advisory for PFOA in drinking water

Associated Health Issues (PFOS and PFOA)

- High-dose exposure in people are linked to:
  - Higher cholesterol
  - Thyroid disease (PFOA)
  - Ulcerative colitis (PFOA)
  - Testicular and kidney cancer (PFOA)
  - Changes to the immune system
  - Preeclampsia (PFOA)
- High-dose studies in laboratory animals have shown:
  - Developmental effects
    - Changed bones in the paw
    - Lower pup birth weight
    - Sooner puberty in male pups
  - Immune system dysfunction
  - Changes in liver and kidney weight

Ann Arbor Municipal Water Supply

- The City has been proactive in conducting regular water sampling of PFAS since early 2016.
  - Water samples are collected monthly from the Main Water Reservoir (treated water) and from the Raw River Intake (untreated water)
    - 27 samples have been collected from the Main Reservoir (treated water)
    - 23 samples have been collected from the Raw River (untreated intake)
  - Additional water samples have been collected within other locations including:
    - Two raw water production wells (untreated groundwater) – 2 samples
    - Within the Huron River, Barton Pond, and Honey Creek (upstream of intake, untreated surface water) – 5 total samples
- System operators are currently conducting a filter study to determine the efficacy of granular activated carbon in removing PFAS

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Ann Arbor Municipal Water Supply Sampling Results

Location	Range of Results PFOS	Range of Results PFOA	Range of Total Sum of all PFAS	Number of Non-detect	Number Detected Below Criteria *	Number Detected Above Criteria *
Main Reservoir (treated)	<0.45 to 43	<0.41 to 3.6	0 to 43	6	21	0
Raw River Intake (untreated)	2.6 to <39 **	<0.41 to 5.1	2.1 to 32.5	0	23	0
Surface Water Various (untreated)	<4.0 to 38	<2.0 to 5.2	0 to 49.4	1	0	4
Raw Groundwater (untreated)	<4.0	<2.0	0	2	0	0

* Untreated water results are compared to Rule 57 surface water quality values of 11 ppt for PFOS and 420 ppt for PFOA. Treated water results are compared to the State of Michigan Groundwater for drinking water clean up standard and EPA Lifetime Health Advisory level of 70 ppt

** Some samples were analyzed using PFOS detection limits between 37-39 ppt which is much higher than the detection limits set by most laboratories. In these cases PFOS may be present at levels up to the detection limit of 37-41 ppt but still reported as a non-detect. The city of Ann Arbor has since switched to a laboratory that uses a more standard detection limit for PFOS.

All levels reported as parts per trillion (PPT)

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R57 Water Quality Values

PFOS	PFOA
11 ppt	420 ppt

Includes exposure through the following:

- **Drinking Water**
- **Consumption of fish from the water**
- **Water-related recreation activities (swallowing)**

Since PFOS builds up in fish tissue, more exposure would occur via the consumption of fish which is why the PFOS value of 11 ppt is lower than the EPA lifetime health advisory of 70 ppt for drinking water.

Derived using R 323.1057 methodology

Surface Water and Fish Sampling

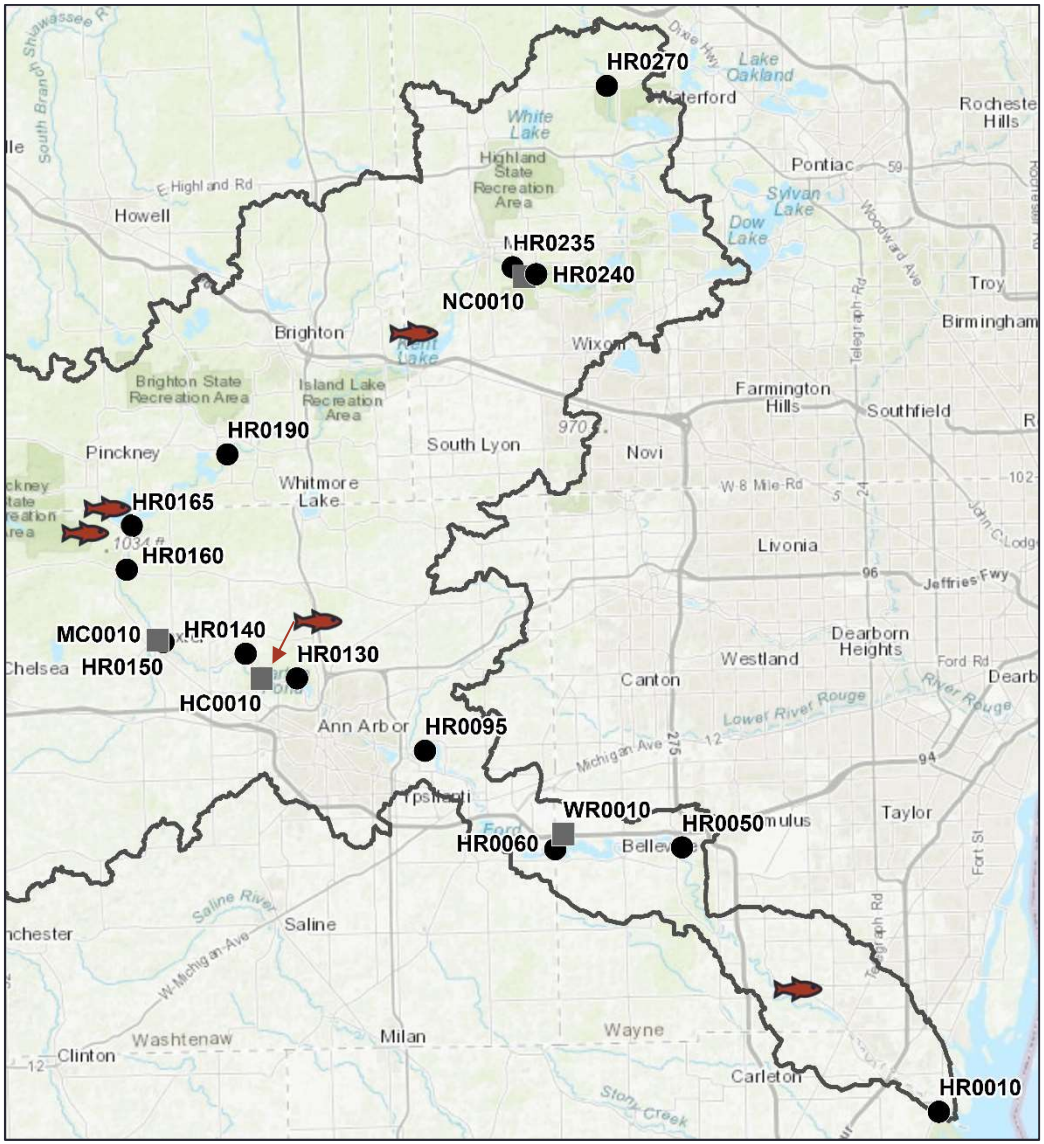
Surface water grab samples

- 13 locations that span the length of Huron River
- 4 tributaries where they meet the Huron River

Fish samples

- Kent, Baseline, Portage Lakes
- Barton Pond
- Flat Rock

Additional, focused sampling may be necessary depending on these sampling results.



Other DEQ Divisions

- Air Quality Division – has committed to inspecting hard chrome plating operations this year – as this industry is subject to federal regulation prohibiting the use of certain PFAS materials. Additional inspections of other metal finishing, book binding, and cardboard/paper manufacturers.

- Waste Management and Radiological Protection Division – is working with landfill operators to sample leachate from currently operating landfills.

- Water Resources Division – Industrial Pretreatment Program – is working to identify operations which may currently be using PFAS and work with operators to further investigate any potential PFAS discharges.

- Remediation and Redevelopment Division – continues to work with facility owners and/or operators where the potential for historical use of PFAS has been identified. Groundwater and soil samples from individual Part 201 sites are being collected as needed to complete investigations of historical releases.

What's Next?

- Continued investigations of sources and locations of PFAS contamination in the state
- August 2018 – Complete collection of surface water and fish samples.
  - Water samples take about 4-6 weeks
  - Fish samples turnaround time is tough to gauge
- If a PFAS site is found local units of government will be contacted directly to discuss and coordinate.
- Continued public engagement of issues surrounding PFAS
- DEQ and DHHS are always available for discussions on this issue or any issues related to public health and the environment.

Contact Information and Questions

Gerald Tiernan – 517-582-0520 - tiernang@michigan.gov – any issues related to the MPART Response

Sarah R. Bowman, Ph.D. – 517-284-5528 - BowmanS4@michigan.gov – direct questions related to the surface water and fish sampling event.

Steven Crider – 517-284-9012 - CriderS1@michigan.gov – any questions related to PFAS and its public heath consequences

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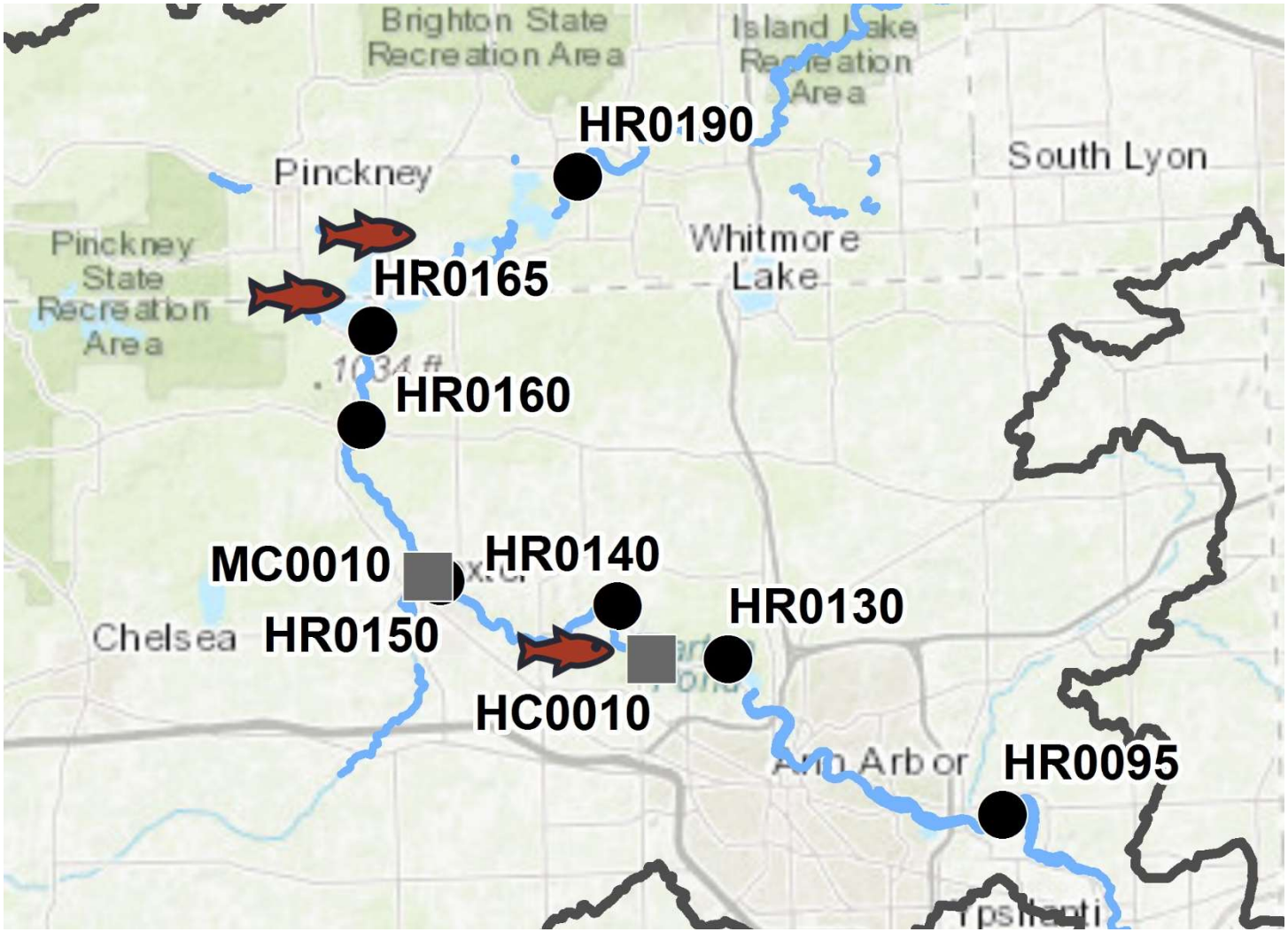
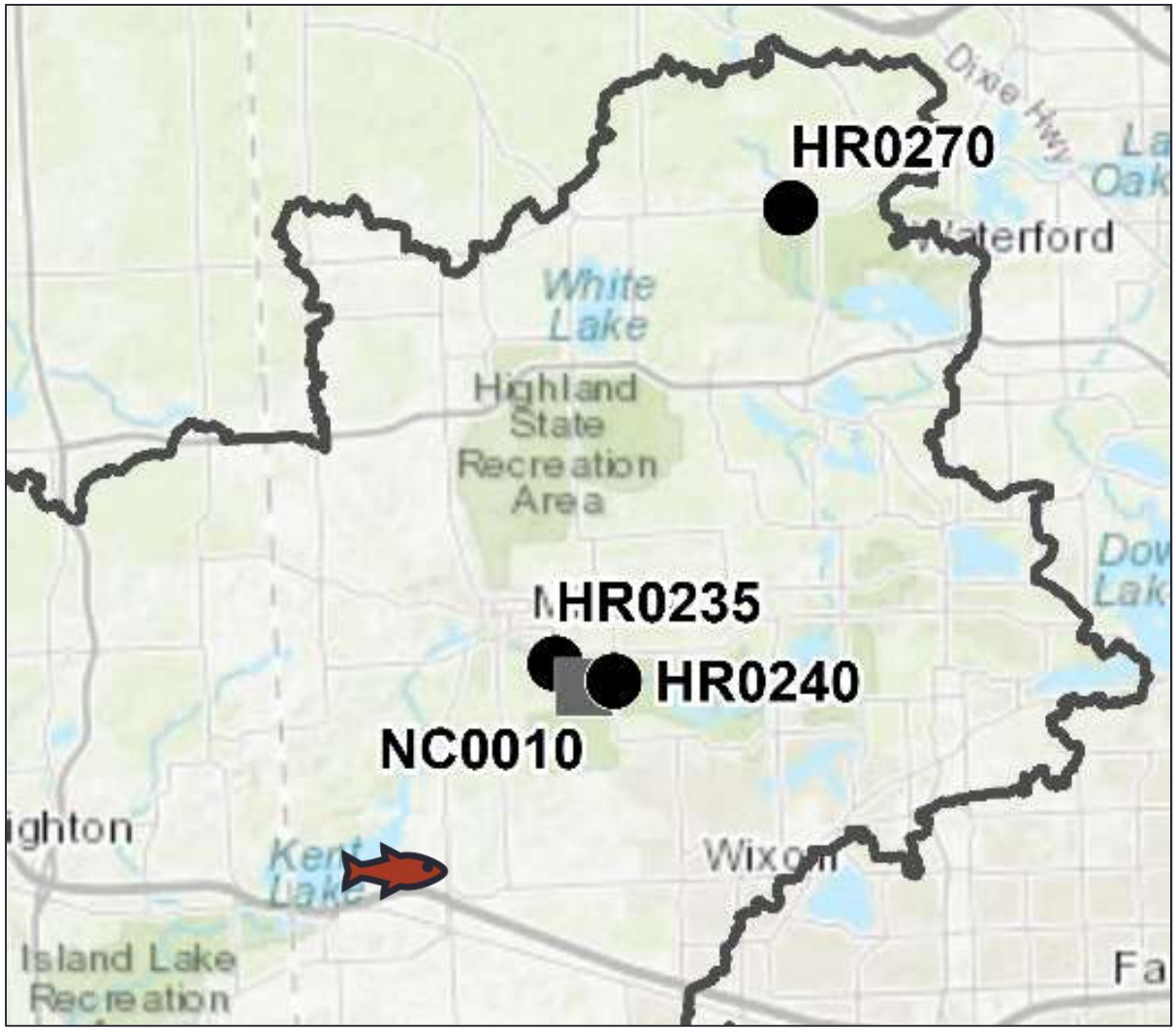
Surface Water and Fish Sampling



Surface Water and Fish Sampling



Surface Water and Fish Sampling