Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) in Fish and Wildlife

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Overview

1. What is PFAS?
2. What is the status with state actions?
3. DNR's role in Eat Safe Fish guidelines
4. What is known about PFAS effects in fish and wildlife
5. What is unknown – process to further information

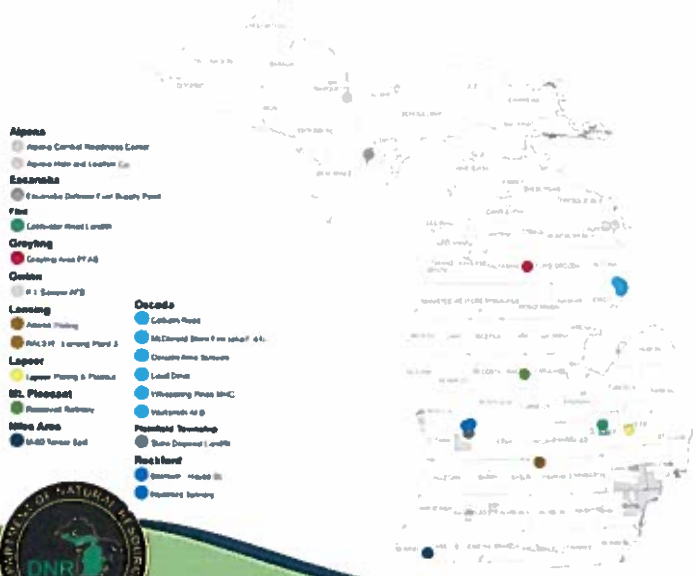
PFAS – What is it?

- Manmade compound that breaks down slowly
- Used in waterproofing, firefighting foams, household cleaning products, and many more items
- High concentrations and high exposure levels may result in public health risks
- Hear most about PFOS/PFOA

PFAS National Issue

Blades, Delaware - February 2018
Public Water Supply Greater Than EPA Lifetime Health Advisory of 70 ppt

Confirmed PFAS Groundwater Locations



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Michigan PFAS Action Response Team (MPART) & Interagency Coordination Team

- Governor's executive directive 2017-4
- To ensure comprehensive, cohesive, timely response to continued mitigation of PFAS substances across Michigan
- Goal is to provide cooperation & coordination among all levels of government
- Interagency coordination team works on technical issues across departments

www.michigan.gov/pfasresponse

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PFAS Criteria for Human Exposure

- 70 ppt PFOA and PFOS combined
- Based on EPA health advisory levels
- Effective January 10, 2018
- Allows state to mandate responsible parties conduct response activities and take legal action for those not complying

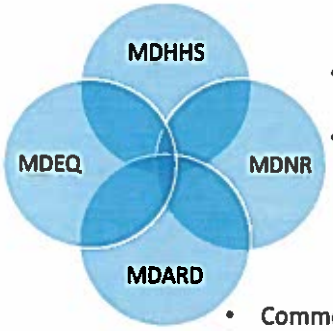
The Michigan Fish and Wild Game Consumption Advisory Program

History of the Michigan Fish Consumption Advisory Program

- 1970 Mercury
- 1977 PCBs & DDT
- 1979 Dioxin & PBB
- 1984 Dieldrin, Chlordane, & Toxaphene
- 1989 Statewide Mercury Advisory for Inland Lakes
- 1990 Great Lakes Consortium
- 2011 Selenium
- 2012 PFOS

Fish and Wildlife Consumption Advisory Committee (FAWCAC)

- Evaluation of data for human health
- Set fish and wildlife consumption advisories

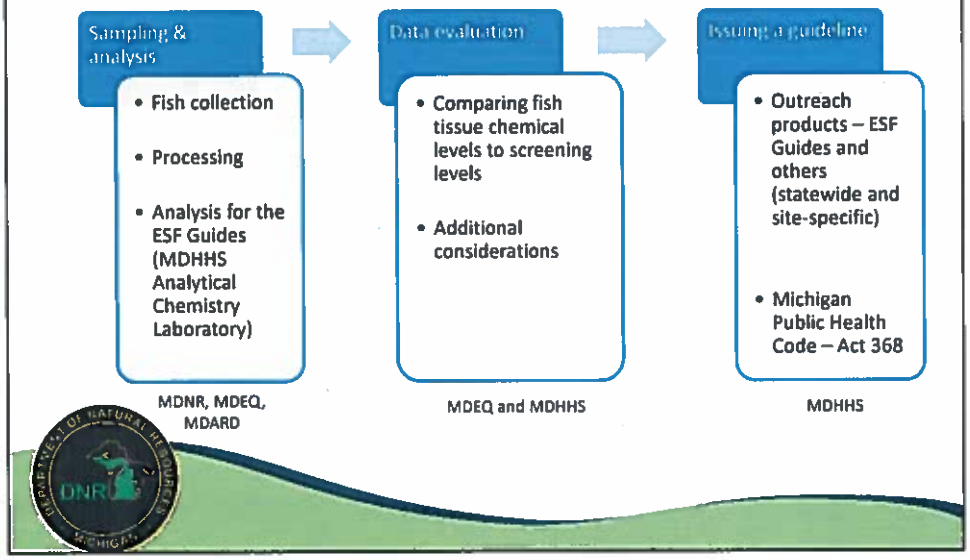


- Environmental protection programs
- Fish and wildlife sampling, including caged organisms to measure uptake of contaminants

- Management of fish and wildlife
- Fish and wildlife sampling

- Commercially sold or raised fish and wildlife
- Fish and wildlife sampling (commercial products)

General Process for Consumption Guideline Development



Example of Eat Safe Fish Guidelines

Au Sable River

(downstream of Foote Dam; includes Van Etten Creek)

Type of Fish	Chemicals of Concern	Size of Fish (length in inches)	MI Servings per Month*
Brown Trout	PCBs	Any	6 Per Year[2]
Carp	PFOS	Any	Do Not Eat[4]
Chinook Salmon	PCBs	Any	6 Per Year[2]
Coho Salmon	PCBs	Any	6 Per Year[2]
Largemouth Bass	PFOS	Any	Do Not Eat[4]
Rainbow Trout	PCBs	Any	6 Per Year[2]
Rock Bass	Mercury & PFOS	Any	Do Not Eat[4]
Smallmouth Bass	PFOS	Any	Do Not Eat[4]
Steelhead	PCBs	Any	6 Per Year[2]
Suckers	PFOS	Any	Do Not Eat[4]
Walleye	Dioxins	Any	6 Per Year[2]
All Other Species	PFOS	Any	Do Not Eat[4]

PFOS can't be reduced by trimming and cooking. Do not double MI Servings.

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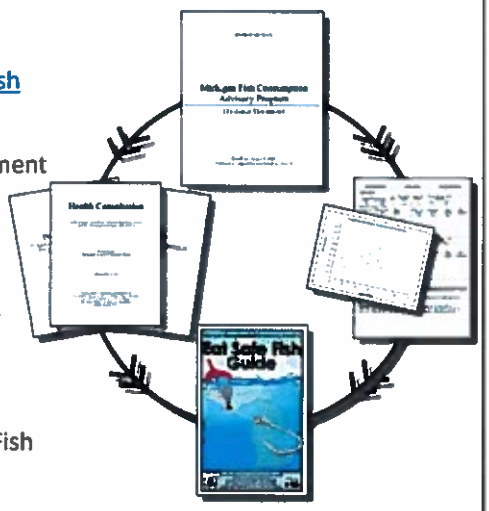
Eat Safe Fish Program Attributes

- **Transparent**
  - Documentation online www.michigan.gov/eatsafefish
- **Consistent**
  - US EPA & ATSDR Risk Assessment Methodologies
  - One set of guidance
- **Current Science**
  - Toxicology and Epidemiology
  - Update with new science
- **Building Consensus**
  - Great Lakes Consortium for Fish Consumption Advisories



PFAS Impacts on Fish and Wildlife

- Developmental effects on exposed organisms and offspring
- Adverse effects on embryo development
- Decreased survival
- Altered lipid metabolism and liver cell development
- Disrupts intracellular communication and mitochondrial function
- Causes neural and endocrine disruption
- Liver, testicular, pancreatic tumors
- Immunotoxicity
- Wasting syndrome
- ..... Affects a wide range of biological processes

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What is Unknown about PFAS in Fish and Wildlife

- Exposure pathways
- Biomagnification in foodweb
- Understanding of risk

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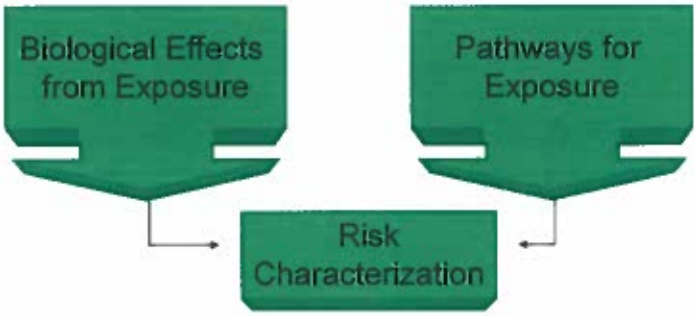
Assessing Risk to Fisheries and Wildlife Populations Through Ecological Risk Assessment



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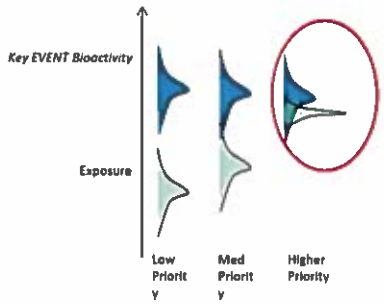
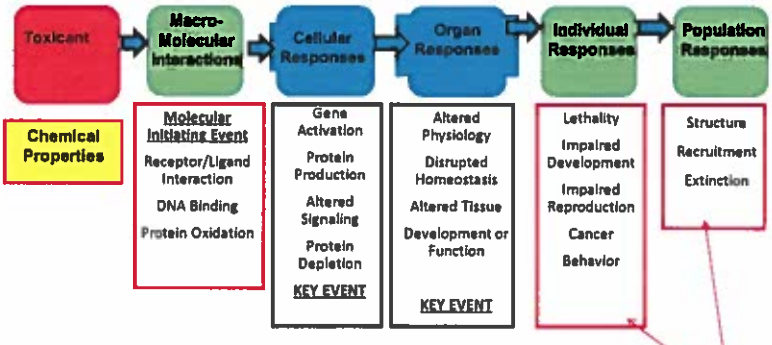
Ecological Risk Assessment

A combination of biological effects and exposure determines risk, and this risk can be used to prioritize monitoring and evaluation.



High Risk when exposure and bioactivity combine

Adverse Outcome Pathway Framework for Ecological Risk Assessment



ADVERSE OUTCOMES IMPORTANT FOR ECOLOGICAL RISK ASSESSMENT

Modified from Ankley et al (2010)

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Ecological Risk Assessments Inform.....

- Status of the issue for fish and wildlife
- Prioritization for monitoring and evaluation
- Better understanding of the potential for human health effects
- Understanding of potential population outcomes for key sport & commercial fisheries and other wildlife of interest

Questions