



*Man is a complex being: he makes deserts bloom - and lakes die.*  
-Gil Scott-Heron, Composer



# Translating A Scientific Problem Into A Public Health Intervention: Industrial Chemical Exposure and the Fishing Culture In Detroit

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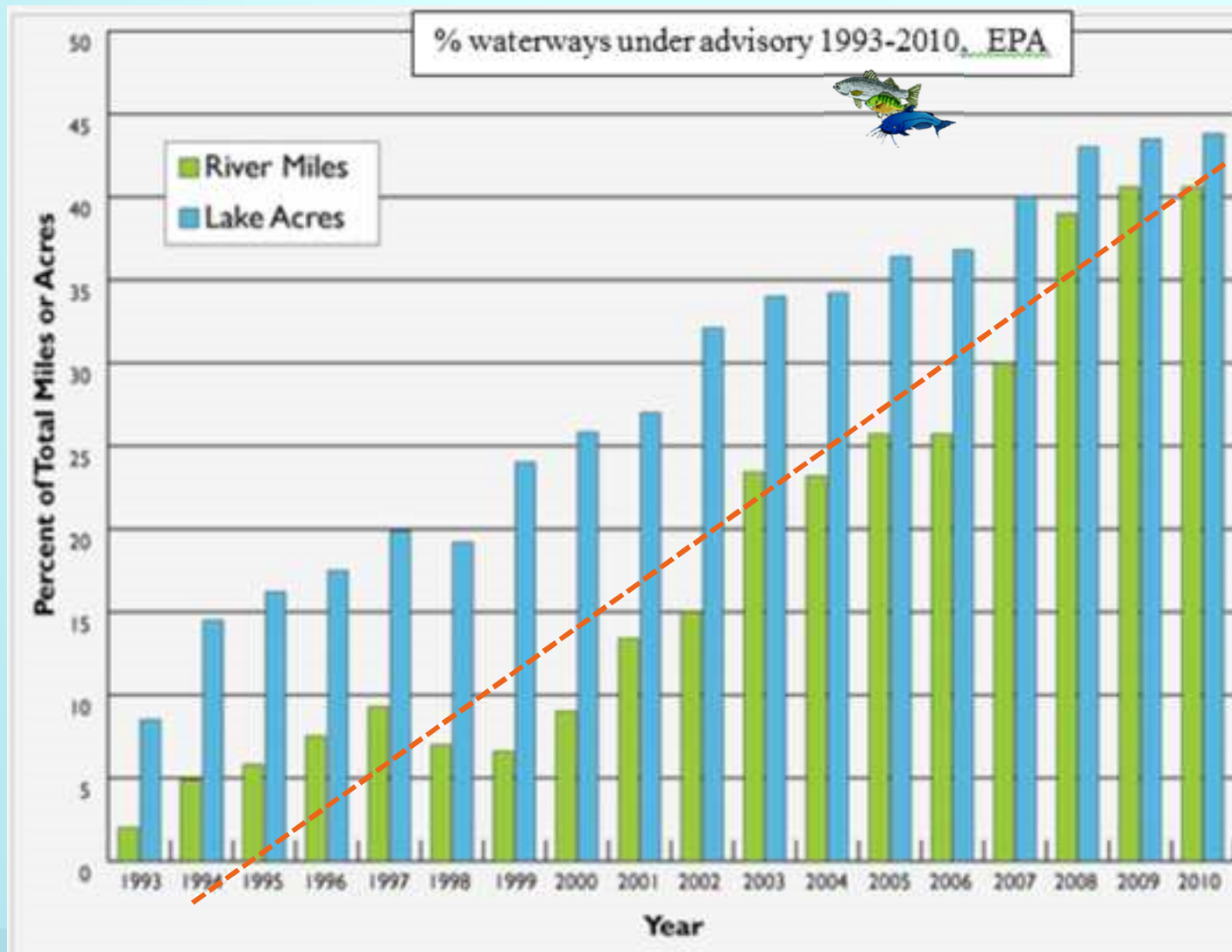


# Industrial Legacy: Shared Responsibility, Unequal Benefits and Harms



# Concern: legacy of industrial progress ... persistent bio-accumulative toxic chemicals

States Increase monitoring; not rising contaminant levels in fish (mercury, PCBS, dioxin, DDT)



## Our Challenge: Observed on the Detroit Riverside

*Young Angler:* I see your big blue coolers ready in the truck bed.

*Older Angler:* Yes, Walleye fishing derby time! Load up and freeze them now. My niece and her mom, my daughter, and dad already asking when I'll be by. Rest of the fish, I sell them over at the park



## No Data, No Problem

Without evidence meeting robust high standards  
policy and community weak support for change

keeping us hooked on deepening  
disparities

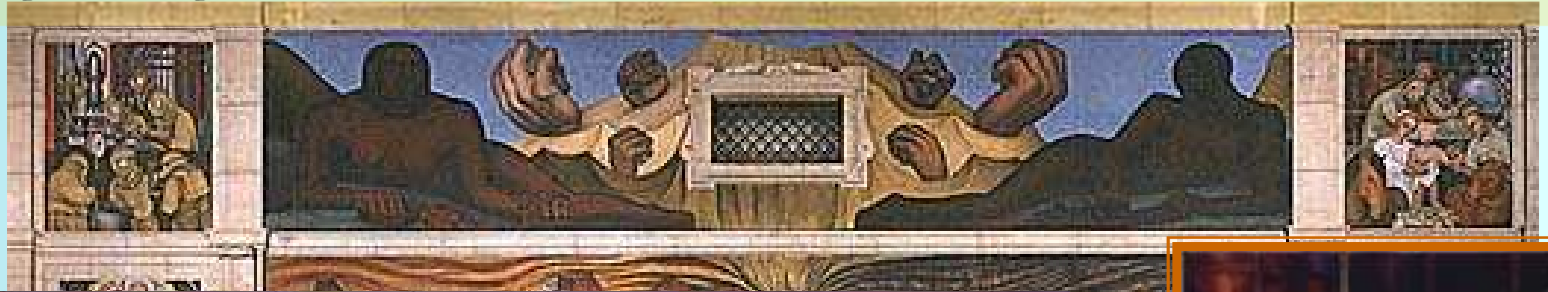
What to do?

Create units of analysis for description  
salient to the phenomena



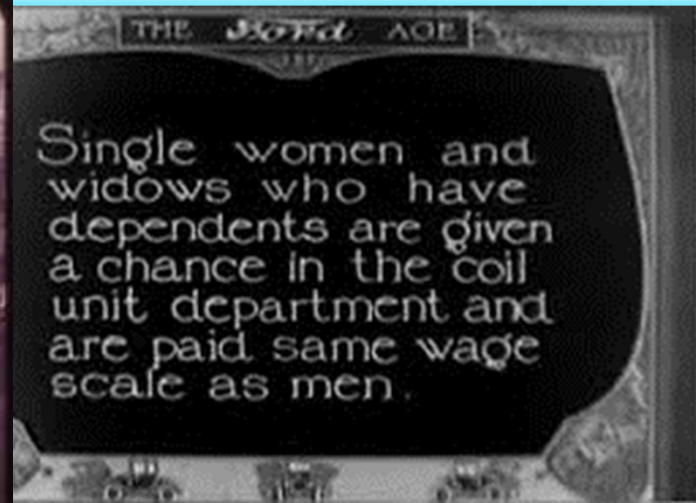
# Grand Designs: Detroit's Modern Narrative

Industry, science, lives in labor ~ but not all benefit equally



**Inoculation,  
science, industry**





River Rouge Ford plant - built 1917 Dearborn, Michigan.

Employed 1,000,00 people

Unique factory: *vertical integration* production cycle. From raw iron ore to rubber & glass all raw materials were processed there and transformed into finished cars in less than 50 hours.

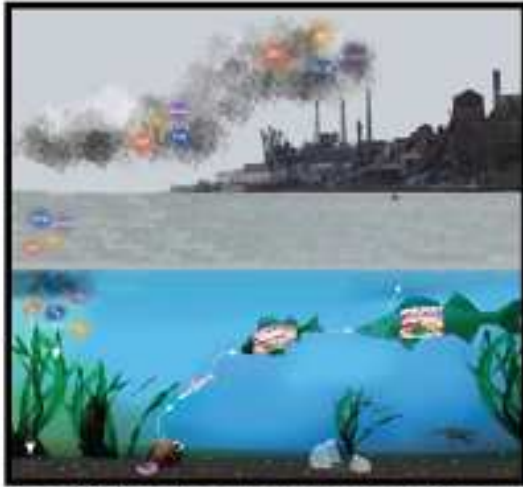
--- and manufacturing industrial chemicals remained onsite too....



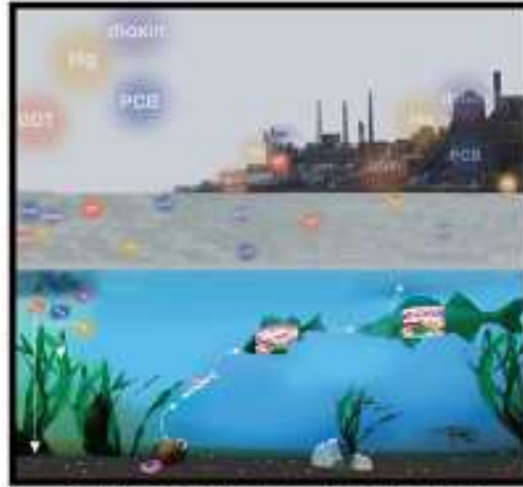


# Designs in Ecology: Humans Create Built Environments Which Shape Our Daily Experience and Health

## Persistent Chemicals in Action

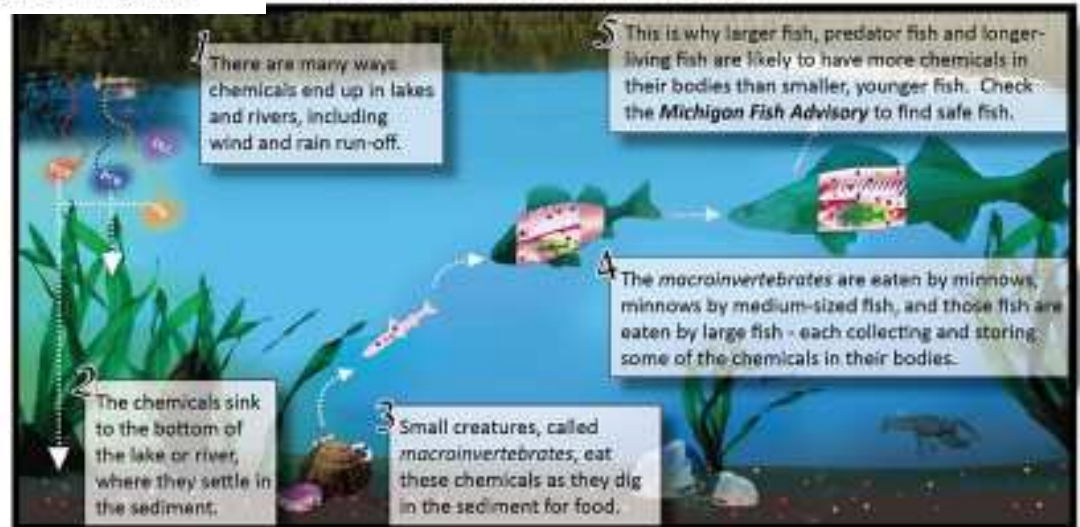


In 1970, a factory puts out a lot of persistent chemicals through its smoke stacks.



In 2011, the factory has pollution control devices on its smoke stacks, but the chemicals put out in past years still remain behind.

## Bioaccumulation in Action



# Societal Design: Where is accumulating harm concentrated in the social body....

Harms are **non-randomly** distributed by:

- ▶ **Lifespan 'age' vulnerable:** situated in developmental life, children and pregnant women warned to avoid eating fish from affected waterways; elderly
- ▶ **Differential exposure by social location:**
  - **social position:** low education, low income,
  - **geopolitical locale:** economically and environmentally distressed urban habitats
  - **economic resources:** riverside vs offshore fishing
- ▶ Harm aligns with existing fault lines in provision of equitable just social life



# Design of Collective Life Narratives – Peoples of Detroit





## TODAY "Life as Such" (Fassin) Exposed on the Margins: High Surveillance

- Detroit Police
- US Custom Border Patrol (international border)
- State DNR (fishing license, compliance)
- Coast Guard



# Fishing Practices Are Morally Generative – Nourishing Continuity of Family, Building Certainty in Disempowered Communities

Fishing with gran or grandad

Fishing is how I learned to be a man

fishing gives you something to pass down. You can take pride that you don't just take, take, take, take, but also to give

I have been fishing ever since I was a little kid. My daddy taught me, and I am teaching my 6 year old son



Multiple life courses of groups, families, neighborhoods, individuals in historical, political, economic, environmental view, locale vulnerability in daily life today and shared heritage

## Fishing Practices Are Morally Generative – Nourishing Continuity of Family, Building Certainty in Disempowered Communities

We all have competition down here, friendly competition. So we can leave the fishing and say today I am the top dog --- but tomorrow it might be someone else. *38 yr old man.*



Slipping awake, 2am, age 6, sleeping in the back of dad's Chevy Wagon, low voices, sitting on campstools at a fire, smell cigarette smoke, wood, damp river air.. All is well in my world. *63 yr old woman*

When you fish with other people, especially in close you have to consider others. You have to know where to cast your line and avoid getting tangled up.

*68 yr old man*



# Substantial scientific evidence exists, and fish advisories are posted, yet....

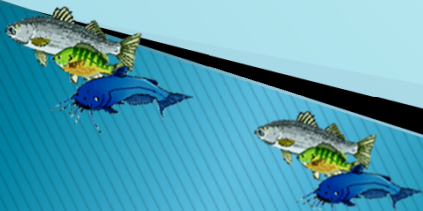
What's at stake? We know warnings about safe eating of fish may reach hungry people most at risk –poor and minority.

Only low to moderate behavior change.

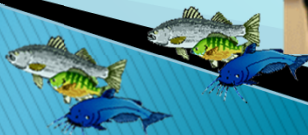
Group-specific knowledge and regional preferences



- ▶ I can see by looking at their body,
- ▶ You would taste the chemicals
- ▶ Experience: eating for years, never sick, never saw anyone else get sick.
- ▶ I like catfish, walleye, bass.
- ▶ Poor conditions of life: food provisioning, scarcity
- ▶ Preparation: more “cleaning,” less proper “cook” (fried)
- ▶ Mistrust government, “don’t believe in the science”



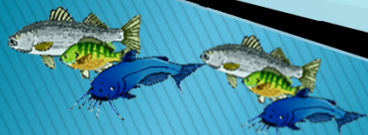
# Bio-monitoring of Persistent Toxic Substances in Michigan Urban Riverside Anglers and River Walkers Partnership: Promoting Safe Eating of Fish from Michigan Shoreline Anglers





# Project Partners

- ▶ Fred A. and Barbara Erb Foundation
- ▶ Community members and anglers
- ▶ Youth on Patrol Against Pollution (YOPAP)
- ▶ Healthy Black Elders Center/ WSU
- ▶ Detroiters Working for Environmental Justice
- ▶ Friends of the Detroit River
- ▶ DTE
- ▶ Institute for Population Health / Detroit Dept Health
- ▶ Belle Isle Nature Zoo
- ▶ Michigan Department of Natural Resources – Fisheries
- ▶ Agency for Toxic Substances and Disease Registry (ATSDR)
- ▶ Environmental Protection Agency (EPA)
- ▶ Michigan Dept. Community Health Division Environmental Health (MDCH)
- ▶ Michigan Dept. of Community Health Bureau of Laboratories
- ▶ National Center for Environmental Health
- ▶ Wayne State University (OVPR, CLAS)
- ▶ Detroiters Working for Environmental Justice
- ▶ Bay County Health Department
- ▶ Saginaw County Dept of Public Health
- ▶ Michigan State University



# Detroit River Area of Concern (AOC) -- 28 miles



If only it were so easy to reach anglers- where are the anglers?

Detroit River



# Challenges To Traditional Probability Sampling

Phenomena does not conform analytic requirements...

- ❖ home **residence** (mailing lists) not co-located with behavior
- ❖ not in existing **registries** (licenses don't tell place where fish)
- ❖ not possess **license** regularly
- ❖ not **constantly** present (anglers seasonal and daylight hours)
- ❖ not **person-based** but **behaviors** (catch and consumption)
- ❖ not evenly or randomly distributed in space, but **clustered** by **geography** (along riverbanks) “venues”
- ❖ anglers are **mobile**, moving across sites in pursuit of fish

*Limits customary methods relying on fixed residence (household, block, census track, zip); membership or licenses (fish license) etc*



# Venue Based Sampling

Analytic Units For Sampling Must be Meaningful  
Human Activity ~ Where and When It Naturally  
Occurs



# Our refined model of VBS

- **Define sample universe** by constructing a sample frame comprised of **discovered venue day-time units (VDTs)** **specific** to target activity and **unique site features** ; formative methods find the action
- **Enumeration in two waves**
- **Primary enumeration.** Discover and demarcate Venues, Create randomized schedule of VDTs; conduct scheduled VDTs visits to enumerate members of the target population
- **Secondary enumeration.** Use randomized venue-day schedule systematic intercepts to collect information, perhaps recruit for further study



# Phase I: Primary Enumeration – “Discover Where Activity Occurs”

- ▶ **Goal: identify target venues, define sample frame, assess venue activity**



- ▶ **Step A: Preparation**

- MDCH contact WSU for medical anthropology expertise in community sampling; project design
- Extensive outreach to inform community, groups and organizations about project

- ▶ **Step B: Venue specification**

- Formative methods, to identify, evaluate nominated venues (e.g., public safety, ownership)
- Go to each venue to demarcate boundaries (site visits to review and gain consensus), and map venues
- Refine candidate venues and refine surveymap



# Phase I: Primary Enumeration (con't)

## ▶ Step C: Staff and Site Development

- Recruitment, screening, orientation, Extensive training, didactic mock events, peer evaluation; SOP manual compliance
- Visit venues to acquaint staff, but also review and clarify venue boundaries, refine SOP descriptors, (add venues).

## ▶ Step D: Enumerate venue activity

- Construct randomization frame: venue/day/time
- Conduct count using randomization schedule
- Refine staff guidelines while “counting” to reduce suspicion (police, CBP, INS)
- Record findings, maintain records, data management

1. Intermittent Harbor	26. D 04 Alfred Brush State park & Harbor	51. D 20 Riverfront near Wiskotte Municipal Boat Launch	76. D 11 Belle Shelter 20
2. D 02 M... Park	27. D 01 Bishop Park	52. D 18 Belanger Park	77. D 18 Belanger
3. D 18 Belanger Park	28. D 21 Bishop Park	53. D 07 Owen Park	78. D 12 Elizabeth
4. D 08 Gabriel Richard Park	29. D 06 Erma Henderson Park	54. D 11 Belle Shelter 20	79. D 17 Delray Fishing Site
5. D 21 Bishop Park	30. D 13 Intermittent State park & Harbor	55. D 05 Maharat-Gentry Park	80. D 02 Marmer's Shelter 9
6. D 20 Riverfront near Wiskotte Municipal Boat Launch	31. D 10 Belle Isle-South Fishing Pier	56. D 19 John Dingell Park	81. D 21 Bishop Park Shelter 9
7. D 17 Delray Fishing Site	32. D 20 Riverfront near Wiskotte Municipal Boat Launch	57. D 21 Bishop Park State park & Harbor	82. D 09 Belle Shelter 9
8. D 10 Belle Isle-South Fishing Pier	33. D 07 Owen Park	58. D 13 Intermittent State park & Harbor	83. D 22 Elizabeth park
9. D 07 Owen Park	34. D 22 Elizabeth park	59. D 10 Belle Isle-South Fishing Pier	84. D 06 Erma Henderson Park
10. D 14 Shoreline South of West Jefferson & Rosa Parks Boulevard	35. D 15 Riverside Park	60. D 15 Riverside Park	85. D 11 Belle Shelter 20
11. D 11 Belle Shelter 20	36. D 05 Maharat-Gentry Park	61. D 08 Gabriel Richard Park	86. D 19 John Dingell Park
12. D 09 Belle Shelter 9	37. D 09 Belle Shelter 9	62. D 13 Intermittent State park & Harbor	87. D 15 Riverside Park
13. D 04 Alfred Brush Ford Park	38. D 03 Riverfront-Lakewood Park	63. D 07 Owen Park	88. D 04 Alfred Brush Ford Park
14. D 22 Elizabeth park	39. D 08 Gabriel Richard Park	64. D 19 John Dingell Park	89. D 07 Owen Park
15. D 06 Erma Henderson Park	40. D 18 Belanger Park	65. D 03 Riverfront-Lakewood Park	90. D 03 Riverfront-Lakewood Park
16. D 15 Riverside Park	41. D 22 Elizabeth park	66. D 21 Bishop Park	91. D 08 Gabriel Richard Park
17. D 19 John Dingell Park	42. D 13 Belle North Fishing Pier	67. D 04 Alfred Brush Ford Park	92. D 10 Belle Shelter 20
18. D 03 Riverfront-Lakewood Park	43. D 14 Shoreline South of West Jefferson & Rosa Parks Boulevard	68. D 04 Alfred Brush Ford Park	93. D 05 Maharat-Gentry Park
19. D 05 Maharat-Gentry Park	44. D 17 Delray Fishing Site	69. D 20 Riverfront near Wiskotte Municipal Boat Launch	94. D 14 Shoreline South of West Jefferson & Rosa Parks Boulevard
20. D 14 Shoreline South of West Jefferson & Rosa Parks Boulevard	45. D 09 Belle Shelter 9	70. D 12 Belle North Fishing Pier	95. D 20 Riverfront near Wiskotte Municipal Boat Launch
21. D 19 John Dingell Park	46. D 10 Belle Shelter 9	71. D 14 Shoreline South of West Jefferson & Rosa Parks Boulevard	96. D 18 Belanger Park
22. D 09 Belle Shelter 9	47. D 08 Gabriel Richard Park	72. D 12 Belle North Fishing Pier	97. D 12 Belle Shelter 20
23. D 17 Delray Fishing Site	48. D 04 Alfred Brush Ford Park	73. D 06 Erma Henderson Park	98. D 17 Delray Fishing Site
24. D 07 Owen Park	49. D 05 Maharat-Gentry Park	74. D 05 Maharat-Gentry Park	99. D 13 Intermittent State park & Harbor
25. D 11 Belle Shelter 20	50. D 02 Marmer's Park	75. D 06 Erma Henderson Park	100. D 02 Marmer's Park





## Phase II: Secondary Enumeration (yr 2)

- ▶ ***Goal: Use VBS frame to recruit anglers for biomonitoring***
- ▶ **Step A: Preparation**
  - Extensive outreach to inform local community, groups and organizations about project
- ▶ **Step B: VBS frame refinement**
  - ReConfirmatory survey of venues (primary) to affirm viability (construction; site closure)
  - Refine, based on primary enumeration data:
    - Drop low yield: venues: <5% of enumeration total. (Saginaw, 2; Detroit, 6); time periods: <10 % of total (Saginaw, early a.m; Detroit, none)
    - Refine time periods for data collection allow 20 minutes per person for recruiting Collapse or remove some [see above]



## Phase II: Secondary Enumeration (con't)



- ▶ Step C: Staff hire and (re)training
- ▶ **Step D: Conduct Recruitment for biomonitoring**
  - **Recruit** following Venue/Day/Time randomization table
  - **Wait What??**
  - **Who/when?** Recruit by '*moving transect*', staff walk length of each venue, contacting anglers encountered.
  - **"? Angler ?"** = holding gear; within 10' of gear, or (for special annual days, "Walleye derby" "Silver Bass" derby) those with gear going to/from shoreline.
- ▶ **Step E: Endure – its public health fieldwork**
  - Weather halts: official "severe weather" advisory
  - Ongoing staff schedule refinement: burnout,
  - Cold spring: mythic fishing starts "Ides of March"



A stylized white tree-like structure with several branches is positioned on the left side of a dark blue background. A thin white line extends from the right side of the tree, ending in a small, wavy, handwritten-style mark. Below this mark is a light blue speech bubble with a dark blue border, containing the text "What did we discover?".

What did we discover?

# Burdens and Harms in Body Politic of Urban Shoreline Anglers

## How and Who –

- Bio samples taken at 21 clinics (eg, Hope Community Church, Christ Church, River Rouge Sr Ctr, Lincoln Pk, Knights Columbus); cabs provided; \$75
- MDHHS and CDC lab analyses. Results mailed to all participants
- Sample: n=287; All adults 18<sub>≥</sub>, > 2+ meals river fish/month,
- Demog:
  - ❑ 84% AA, 11%, white
  - ❑ Household income: 40% <25k; 40% 25-74k, 10% 75k+
  - ❑ Educ: 20% <HS; 35% HS, 29% some college -no degree., 18% college

# Chemical Levels in Detroit River Fish Consumers Compared to USA Population

**Mercury** = 2x to 3x higher ( at 50% and 95% percentiles )

*harms: fetus, children, cancer, diabetes, immunology, cognition*

**PCBs** = 2x to 4x higher ( at 50% and 95% percentiles )

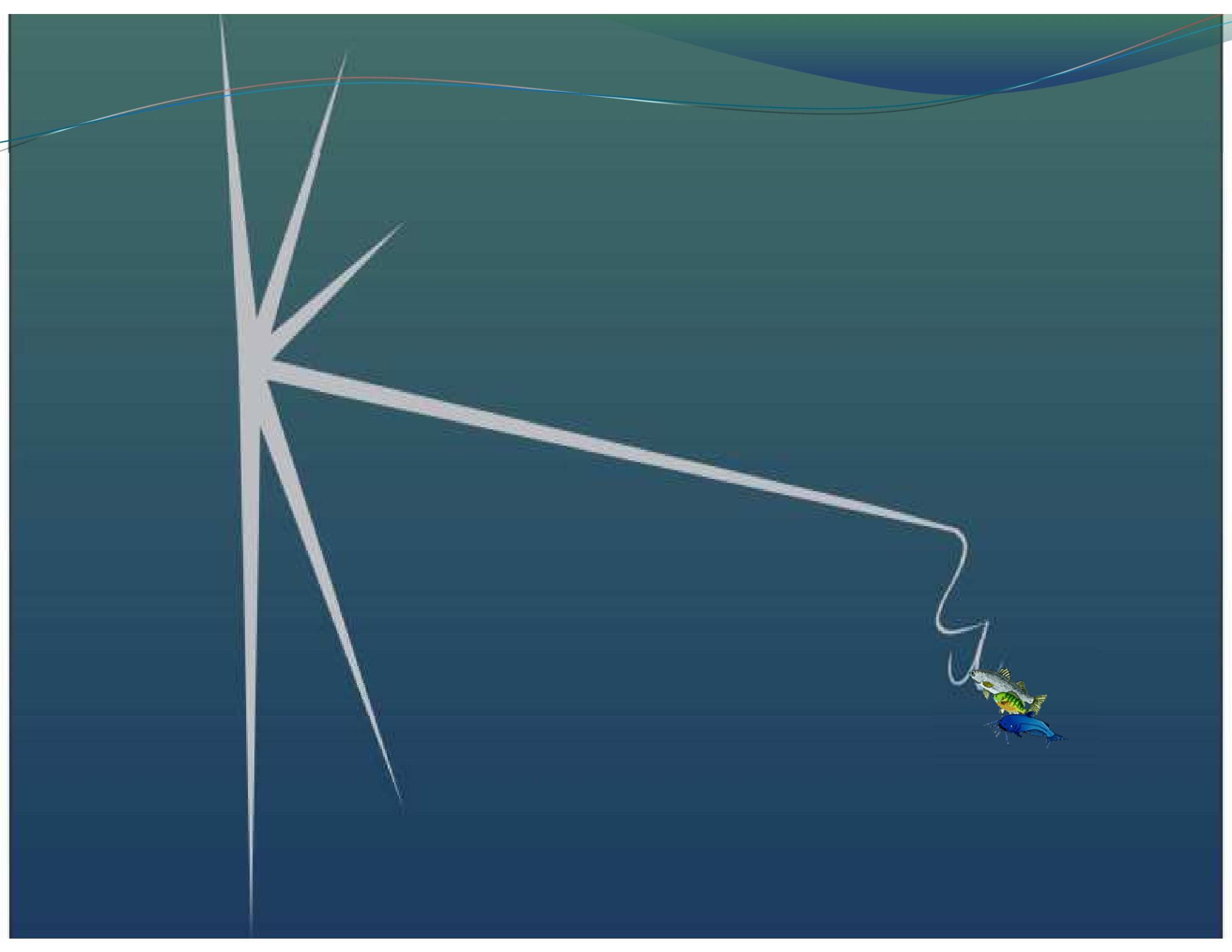
*harms: brain development, immune, heart in older persons*

**Dioxins** = similar to NHANES; > dioxin level eat more fish

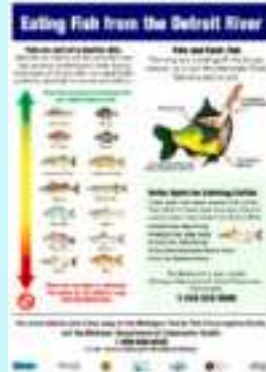
*harms: cancer, fertility, thyroid*

In brief: an exposed population to methylmercury & PCBS from eating fish

*[CDC NHANES mean average; percentiles: 50% ; and 95% lower and 5% higher]*



# 3 Modalities of Behavior Change Evaluated



- ▶ Venues: Posted signs at the fishing venue sites
- ▶ Community face-to-face contact, River Walkers
- ▶ Point of sale (DNR license shops) and public media ads, tv ads, newspapers,
- ▶ Interactive multimedia educational museum exhibit WSU





Detroit “Riverwalkers” Community-based Participatory Intervention

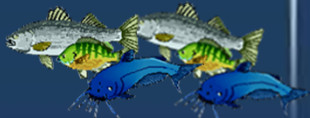




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- Wayne State University Department of Anthropology
- Michigan State University Department of Epidemiology and Biostatistics



# EATING FISH FROM THE DETROIT RIVER

Michigan guidelines for eating Detroit River fish say consumers may safely double the number of servings eaten per month by choosing recommended types of fish, cleaning the fat, skin and organs from fish and grilling it to drain away fat.



TYPE OF FISH	CHEMICALS OF CONCERN	SIZE OF FISH	SERVINGS PER MONTH
<b>Bullhead</b>	PCBs	Any	2*
<b>Carp</b>	PCBs and dioxins	Any	Limited (not recommended)
<b>Catfish</b>	PCBs and dioxins	Any	Limited
<b>Sheepshead</b> (freshwater drum)	PCBs	Any	Limited
<b>Largemouth bass</b>	PCBs	Any	Limited
<b>Northern pike</b>	Mercury	Any	1
<b>Rock bass</b>	PCBs and mercury	Any	4
<b>Smallmouth bass</b>	PCBs	Any	Limited
<b>Suckers</b>		Under 14"	2*
		14" to 18"	6 per year*
		Over 18"	Limited
<b>Walleye</b>	PCBs and dioxins	Any	6 per year*
<b>White (silver) bass</b>	PCBs and dioxins	Any	Limited
<b>Yellow perch</b>	PCBs and dioxins	Any	4*

\*Servings per month may be doubled when prepared according to guidelines.

See [www.michigan.gov/eatsafefish](http://www.michigan.gov/eatsafefish) for more information on safe

SOURCE: State of Michigan

MARTHA TH

## My Michigan, MI Serving Size



- 8 ounces of fish = size of an adult's hand (large oval)
- 4 ounces of fish = size of the palm of an adult's hand (small circle)
- 2 ounces of fish = size of half a palm of an adult's hand (rectangle)

**Choose Wisely, Eat Safely!**

Yellow Perch, Bullhead, Largemouth Bass, Silver Bass (white bass), Carp, Crappie, Northern Pike, Sucker, Bluegill, Rock Bass, Walleye, Smallmouth Bass, White Perch, Sheepshead (freshwater drum), Catfish

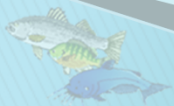
← These fish have less chemicals. | These fish have more chemicals. →

# Challenges to VBS



## Require Flexibility & “Foresight” / Hindsight

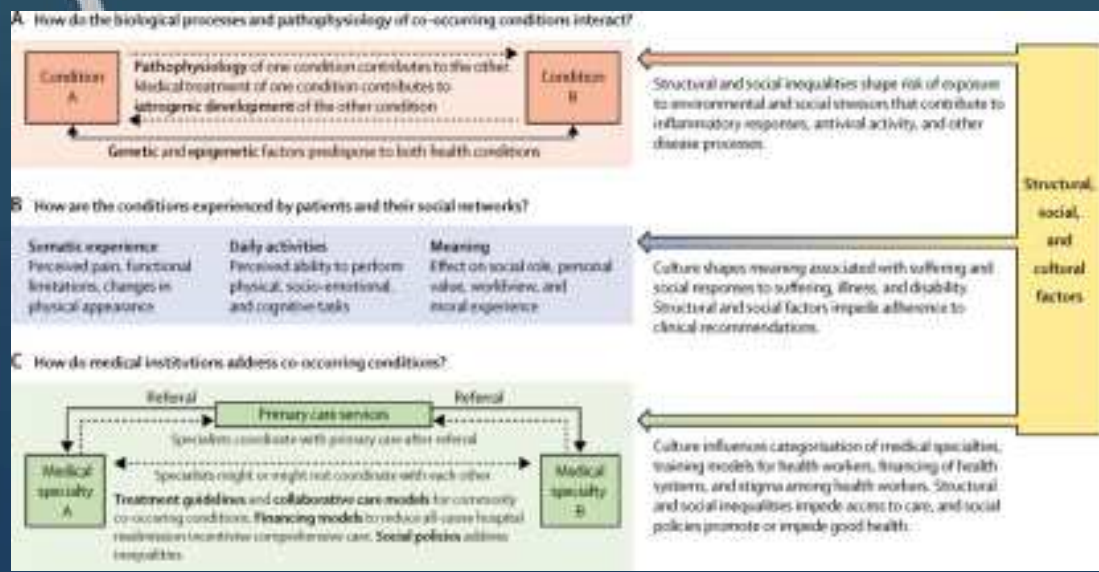
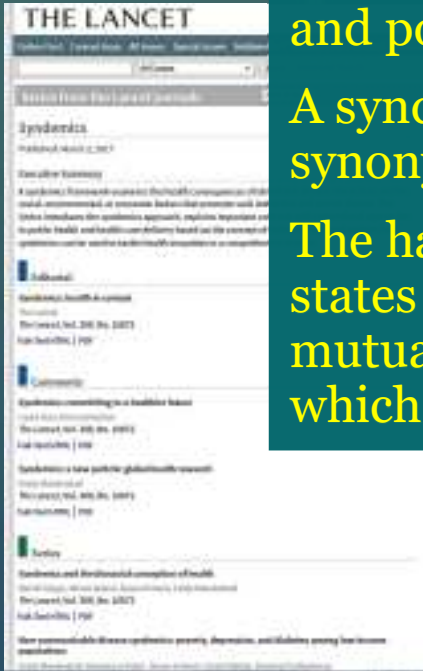
- ▶ **Formative phase is irreducible**; venue universe construction requires multiple-methods **protracted** time
- ▶ **Social perception** and image management at venue when “counting” and recording
- ▶ **Unpredictability** of weather on fish movement
- ▶ Employer **institutional structures** and **field-based project practicalities**: mileage, hours,
- ▶ Requires **adept social skills** for staff
- ▶ Staff organization and **scheduling for variable** fieldwork
- ▶ Staff **strain** from (long days, full weeks) budget limits; add relief team. (Yr01 vs Yr02, rigid *vs* flex schedule)
- ▶ **SOP manual refinement** and fidelity oversight



**Syndemics.** A conceptual framework for understanding diseases or health conditions exacerbated by the social, economic, environmental, and political settings of a population.

A syndemic, or synergistic epidemic, is more than a convenient synonym for comorbidity.

The hallmark of a syndemic is the presence of two or more disease states that adversely interact with each other, negatively affecting the mutual course of each disease trajectory, enhancing vulnerability, and which are made more deleterious by experienced inequities.



# Other hard-to-reach population sampling methods

- Non-probability (eg, street-intercept, convenience, purposeful), leaves unclear: representativeness, selection biases, replication
- Respondent-drive (RDS). Chain referral can capture populations with strong interconnections, however robustness fails in more isolated or low connection groups; with some exceptions

Kendall 2008 et al, AIDS & Beh. Empirical comparative evaluation RDS, VBS & Convenience

- Random digit dialing, mail, and other probability methods known to miss large portions of dispersed, hard-to-reach, stigmatized, distrustful populations



## Venue Based Sampling (a mixed methods strategy)

1. **Create** (invent!) a technique to provide a valid, population-based sample – one that is socially *compelling* to epidemiology and medicine
2. **Go to people** doing daily activities they value, ask their thoughts, desires, concerns – what does fishing, providing food mean?
3. **Follow** them around the river, see what fish they catch & keep, cleaning fish, go see them cook in their kitchens
4. **Hangout** to see fish activities daily, weekly, seasonally
5. **Design and implement shared ideas** of how to respect and conserve valued personal and community ideals *and* eat fish safely

# Refinements over existing probability strategies

- Vastly different “venue” location vs nightclubs, bars, alleys.
- Riverside anglers hard to recruit and retain in adequate numbers
- Venues within and between sites far less distinct and fixed
- Requires stepwise approach to
  - ❑ Venue/site discovery, definition of boundaries, definition of target population within sites
  - ❑ Days, weeks, seasons, weather (tornados/rain)
  - ❑ Times diff Saginaw, Detroit
- Distributed by social activity not random,