

# **Community-Based Assessment of Exposure to Substances in the Anacostia River Region (CAESARR)**

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# The Collaborative Team

## The University of Maryland:

1. Dr. Sacoby Wilson, Assistant Professor, Maryland Institute for Applied Environmental Health (MIAEH) and CEEJH Director
2. Dr. Vikki Chanse, Assistant Professor Dept. of Plant Science & Landscape Architecture (PSLA)
3. Rianna Murray, Graduate Assistant, MIAEH



## Anacostia Community Museum (ACM):

Mr. Tony Thomas, Education Coordinator

## DC Environmental Health Collaborative

Dr. Janet Phoenix, Assistant Professor, Department of Health Policy, George Washington University and Coordinator DC Environmental Health Collaborative



Smithsonian  
*Anacostia Community Museum*

## Anacostia Watershed Society

1. Dottie Yunger, Program Specialist
2. Lori Baranoff, Policy Associate





- Opening to the Atlantic Ocean and surrounded by Maryland and Virginia, the Chesapeake Bay is the largest estuary in the United States. Seafood populations prevalent in the Chesapeake Bay include: bluefish, rockfish, catfish and striped bass, among the finfish, and crabs and oysters among the shellfish.
- A wealth of research has been performed to assess levels of contamination in the Chesapeake Bay itself and in food organisms living in the bay and local waterways, including the Anacostia watershed.
- Unfortunately, very little work has been done to link the bay contamination and human exposure, particularly among vulnerable populations that are differentially and highly exposed, including Bay subsistence fishers.

# Contaminants of Concern

- The transport of mercury into the environment is primarily from atmospheric deposition and runoff from mining ores, coal burning and waste disposal, as well as from natural deposits and volcanic activity. Bacteria in water or soil can convert elemental mercury into the more toxic MeHg, which may then become bioaccumulated in larger organisms such as fish.
- People with high fish intake may be at risk from chronic, high exposure to MeHg. One study estimated that 7.8% to 15% of fetuses in the U.S are in jeopardy from mercury exposure. Effects of high mercury exposure in humans include neurodevelopmental deficits, behavioral deficits in infants, poorer cognitive test performance, promotion of cardiovascular disease and neurological and locomotory deficits.
- Even though they have been banned for over 30 years, PCBs are still released from poorly maintained hazardous waste sites, illegal dumping and improper disposal into municipal landfills.
- PCBs do not break down readily and can remain in the environment, being cycled between the water, air and soil for years. PCBs are lipophilic and thus readily bioaccumulate in lipid enriched tissues in fish and marine mammals and can reach levels that are thousands of times higher than the surrounding water.
- PCB exposure has been related to toxic effects in the liver, gastrointestinal system, skin, blood and endocrine system in animal studies. These organochlorides can be passed across the placenta, possibly affecting fetal development. Evidence exists that over 90% of human environmental exposure to PCBs comes from diet with fish and other seafood accounting for as much as 55% of the dietary exposure.
- Personal care products, phthalates, and endocrine disruption compounds (EDCs) are also of concern.

# Subsistence Fishing

- Subsistence fishers are often low-income individuals or persons of color who fish for personal consumption.
- Previous studies by members of this research team have shown that vulnerable populations with unique exposures (low income, people of color, Indian tribes and other indigenous populations) are often most susceptible to adverse health effects because of their differential exposure to multiple environmental contaminants, psychosocial stressors, socioeconomic disadvantage and lack of access to quality health care.
- Subsistence fishers have uniquely high fish consumption rates; the U.S. Environmental Protection Agency (EPA) assumes default fish consumption rates among subsistence fishers of 142.4 grams per day, 8 times the default assumption of 17.5 grams per day for the general population. But, even this higher default may underestimate consumption by some fisher groups.
- There are approximately 1.5 million saltwater fishers, including many subsistence fishers, among the 17 million people living in the Chesapeake Bay region.

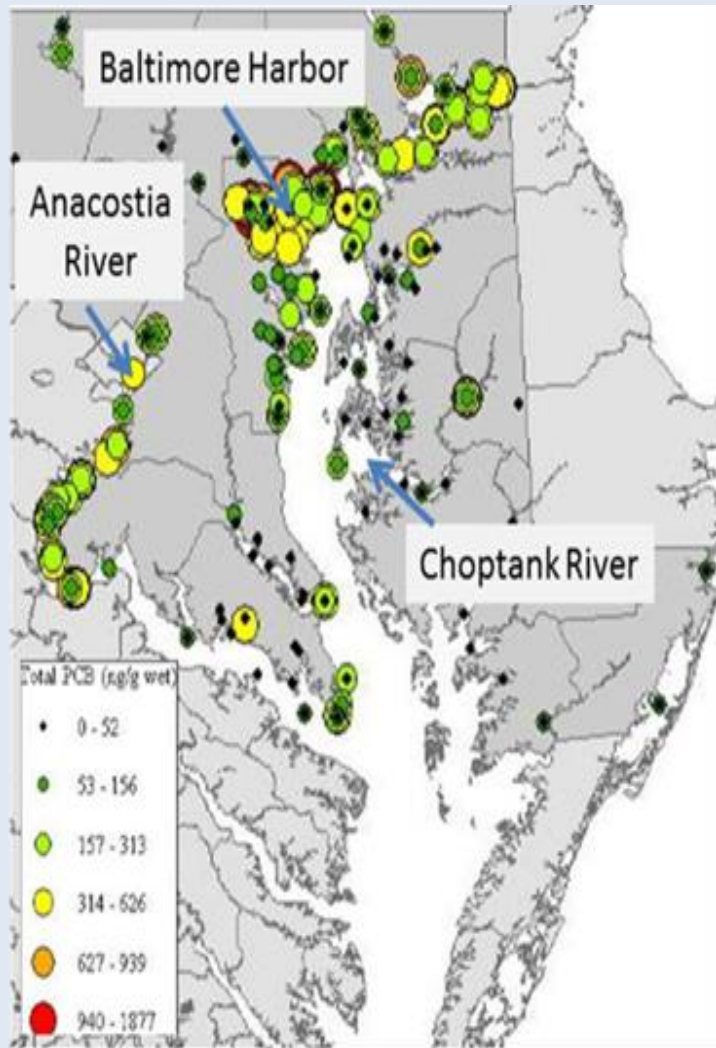


Fig. 1. Chesapeake Bay map. Shown on figure are total PCB concentrations in  $\text{ng g}^{-1}$  wet weight.

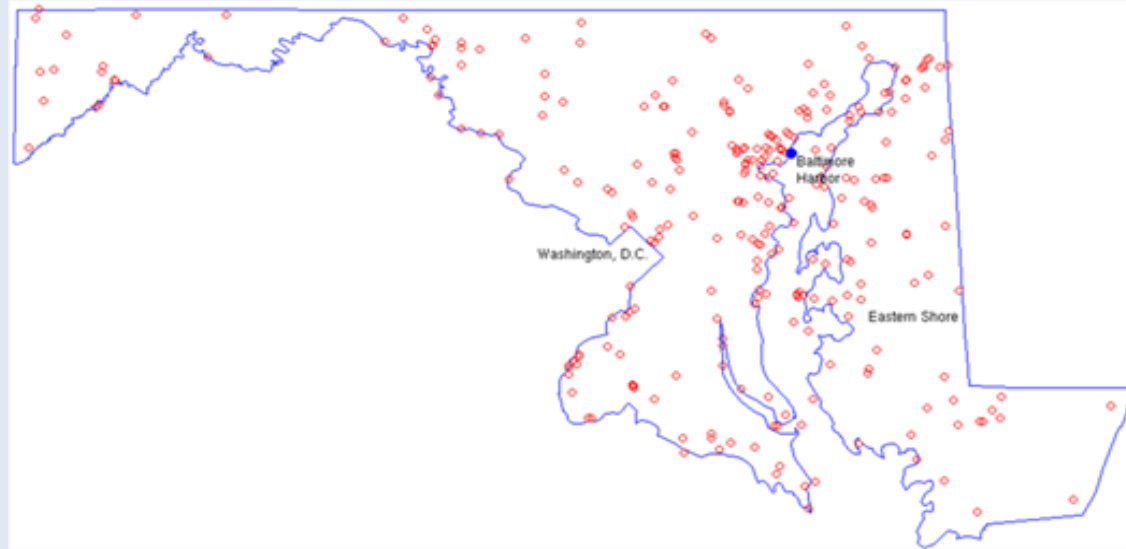
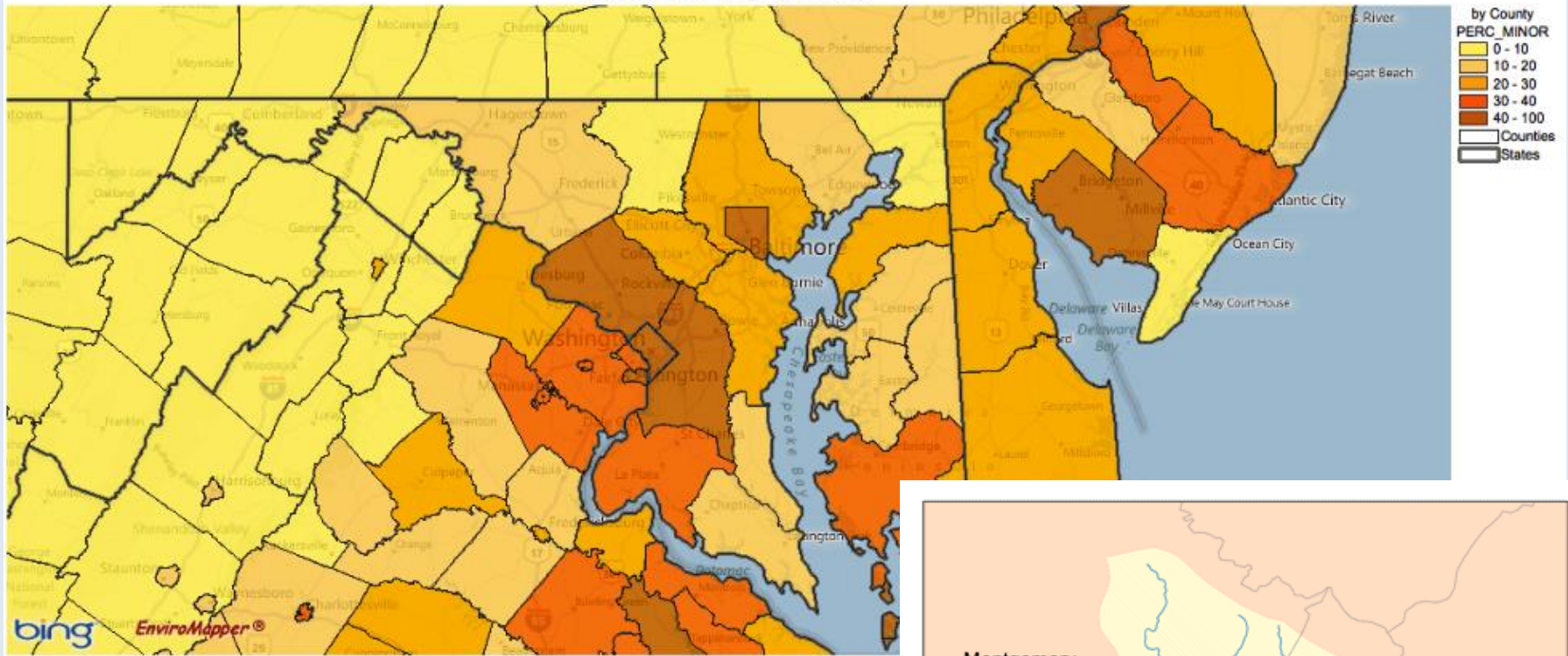


Fig. 2. Fishing Locations in the Chesapeake Bay Region



# Percent Minority by County









# CHALLENGES

## STORMWATER



## TRASH



## COMBINED SEWER OVERFLOW



## T O X I N S



Just because  
it looks clean  
on the outside,



DOESN'T MEAN IT'S CLEAN  
ON THE INSIDE

## ECOLOGICAL BURDEN





Parameters Used to Determine Grades

-  Dissolved Oxygen
-  Fecal Bacteria
-  Water Clarity
-  Chlorophyll (a)

Upper DC Anacostia

MD Anacostia

Bladensburg  
Road/Route 450

New York Avenue  
Bridge/Route 50

DCMD Border

FAIL

FAIL

Benning Road Bridge

East Capitol Street Bridge

Pennsylvania Avenue Bridge

11th Street Bridge

South Capitol Street Bridge

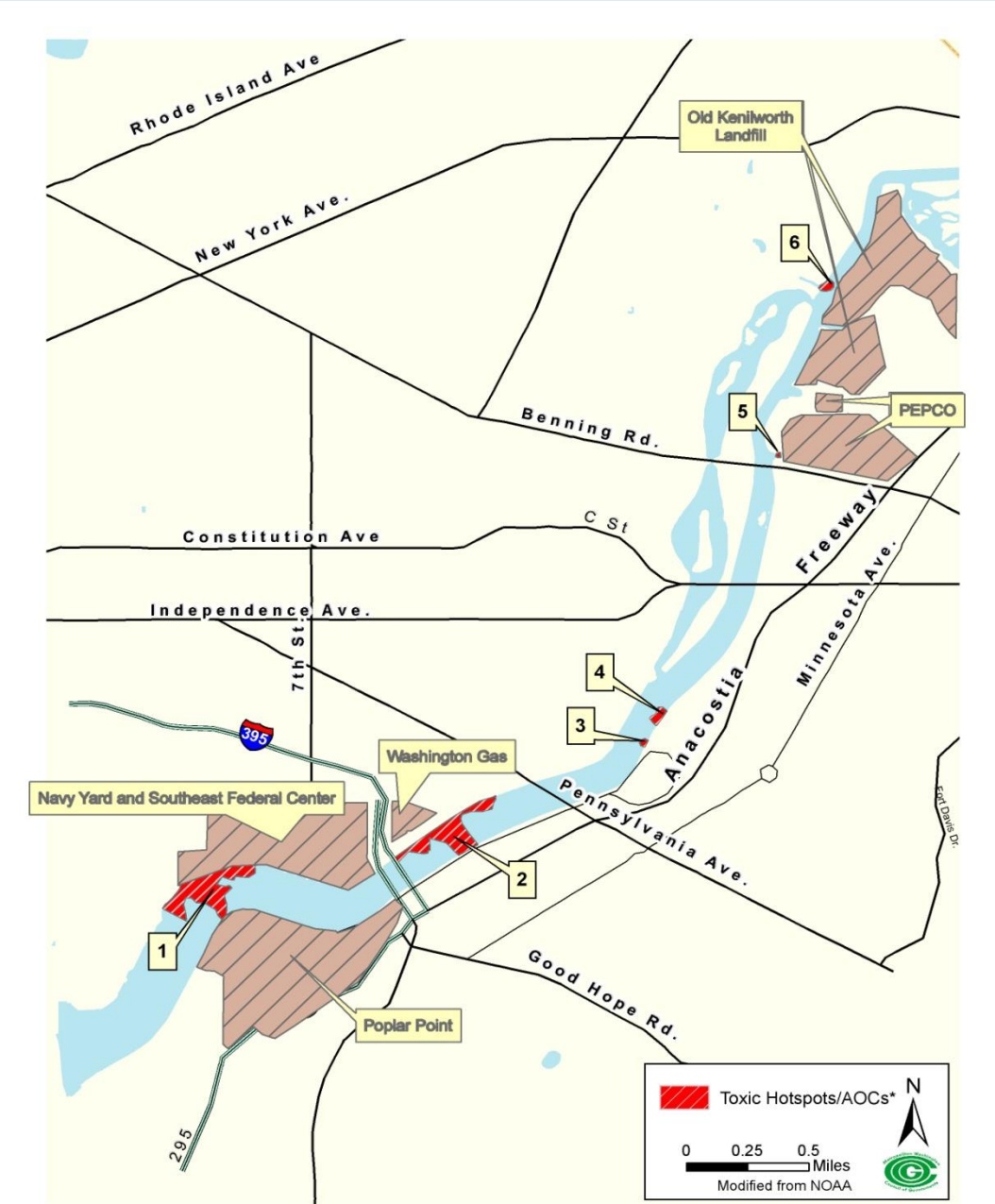
Lower DC  
Anacostia

FAIL





# Map of Toxic Sites along the Anacostia River- DC side






# Fishing and Health Hazards



## Choose Fish Low in MERCURY

**Mercury in fish can harm your family.** Even small amounts of mercury can damage a brain that is starting to form or grow. Pregnant women and children under 8 should only eat fish low in mercury.

Use this chart to quickly identify which fish are low and which fish are high in mercury. For detailed Safe Eating Guidelines you can download a brochure from our website at: [www.state.me.us/eha/etp/fca.htm](http://www.state.me.us/eha/etp/fca.htm)

Fish You Buy		Fish You Catch	
<b>Atlantic Salmon</b>  Low Mercury Level High	<b>Shellfish</b>  Low Mercury Level High	<b>Atlantic Mackerel</b>  Low Mercury Level High	<b>Brook Trout</b>  Low Mercury Level High
<b>Flatfish &amp; Flounder</b>  Low Mercury Level High	<b>Hake, Haddock, Pollock, Cod</b>  Low Mercury Level High	<b>Landlocked Salmon</b>  Low Mercury Level High	<b>Striped Bass</b>  Low Mercury Level High
<b>Canned 'Light' Tuna</b>  Low Mercury Level High	<b>Canned 'White' Tuna</b>  Low Mercury Level High	<b>Brown Trout</b>  Low Mercury Level High	<b>Lake Trout</b>  Low Mercury Level High
<b>Tuna</b>  Low Mercury Level High	<b>Hallbut</b>  Low Mercury Level High	<b>Largemouth Bass</b>  Low Mercury Level High	<b>White Perch</b>  Low Mercury Level High
<b>Swordfish</b>  Low Mercury Level High	<b>Shark</b>  Low Mercury Level High	<b>Smallmouth Bass</b>  Low Mercury Level High	<b>Pickrel</b>  Low Mercury Level High

**Fish is good for you - Eat fish low in mercury!**

Take this brochure for our Safe Eating Guidelines.

Bureau of Health  
Environmental Toxicology Program

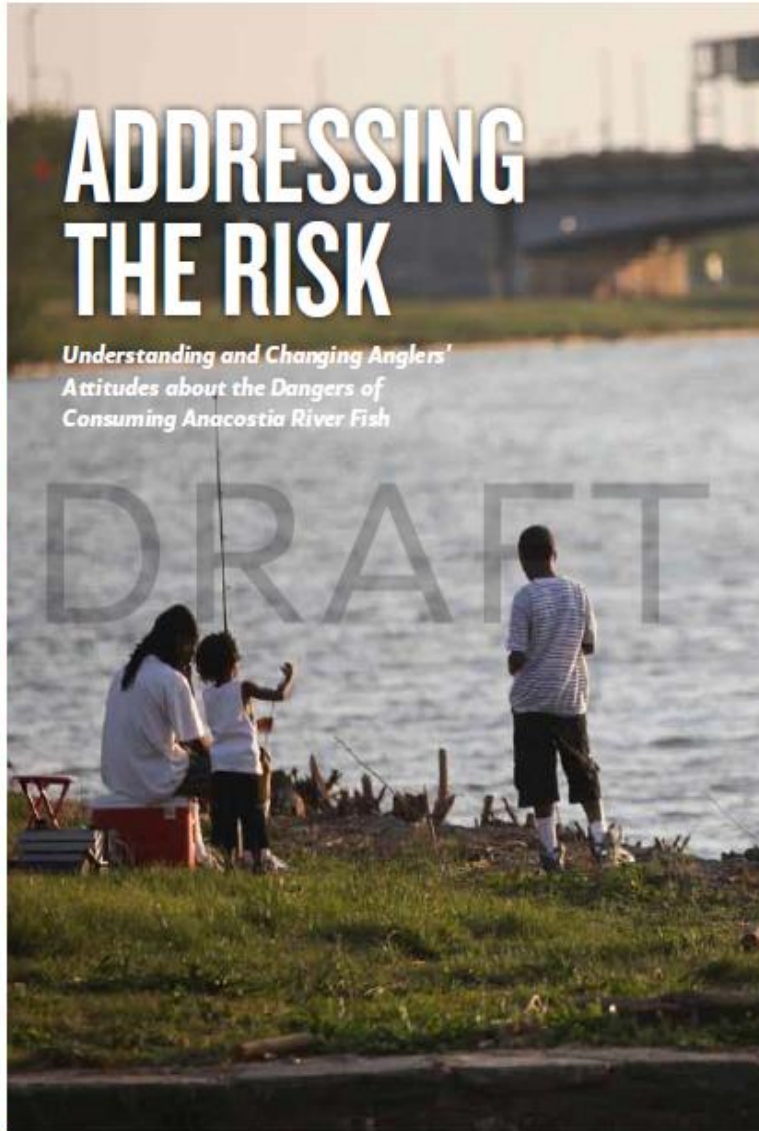


By James Forester / courtesy USFWS

- At least 17,000 people in the lower Anacostia watershed eat fish from the river every year. These fish spend years swimming in polluted water and resting and feeding amidst sediment contaminated with toxic chemicals.



# ADDRESSING THE RISK STUDY

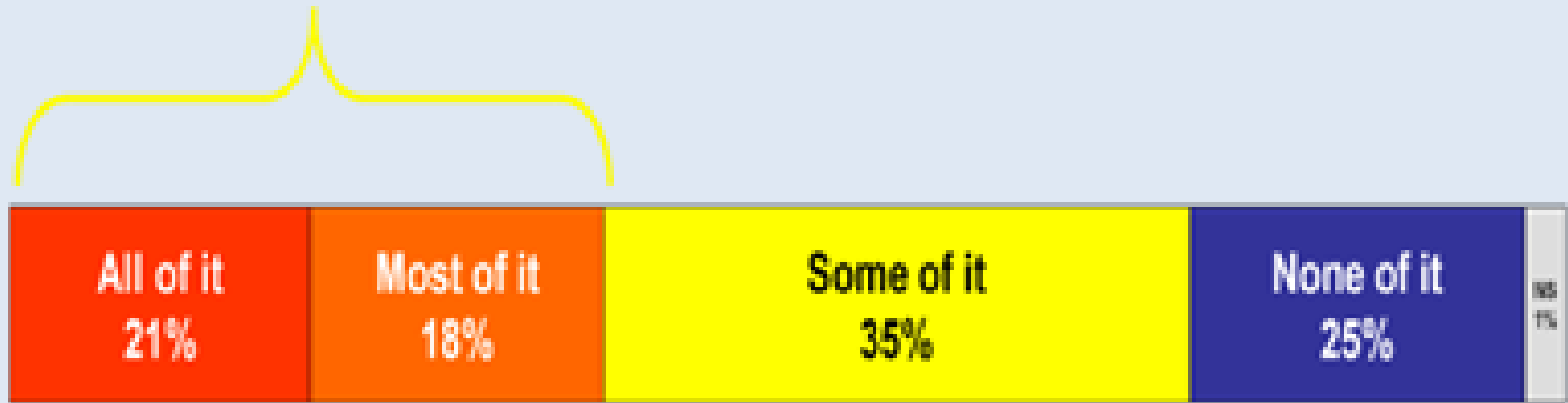


# ADDRESSING THE RISK STUDY

- The Opinionworks study team completed a survey of anglers in August-September 2011 at 10 interviewing sites (total=111 interviews).
- 86% of the participants were male, 62% had a high school diploma or less, median age was 48, and minimum age was 16.
- In addition, the anglers were 65% African-American, 11% Latino/Latino, 8% Asian, 3% Native American, and 5% Mixed Race. 18% were Hispanic. More than 25% spoke a non-English Language.
- 75% of respondents are consuming Anacostia fish.
- Of these respondents, 7% eat it every day, 8% 2-3 times/wk, 20% weekly, 20% 1-2 times/month, 35% less than monthly, and 10% not sure/refused.
- Of all 111 respondents, 78% have heard about health risks, 20% have not heard about health risks, and this lack of awareness rises to 53% among Spanish-speakers.

# How much of your catch do you eat or share?

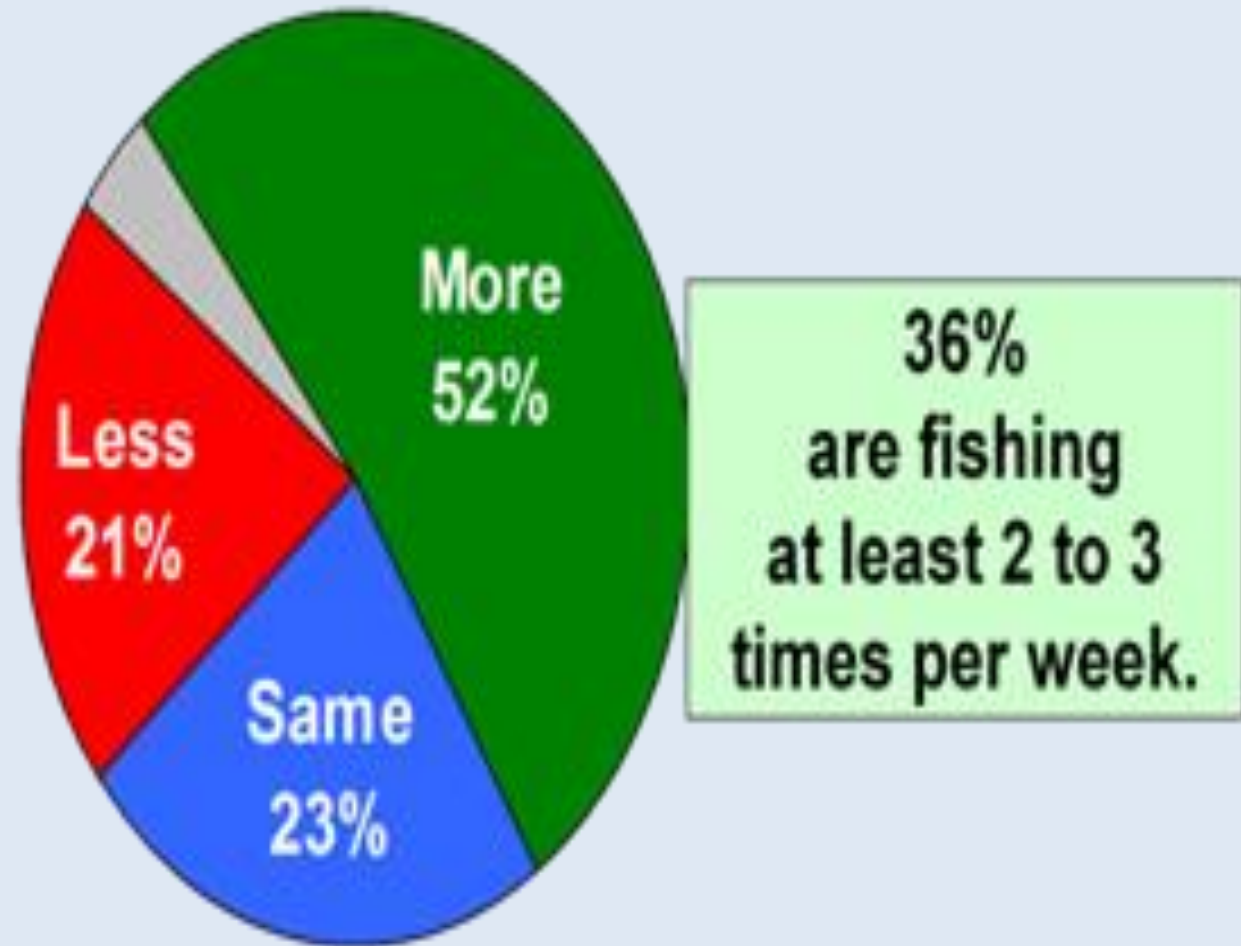
39% Heavy Consumption



Consumption highest among African-Americans.  
High consumption but more species selection among Hispanic  
and Asian anglers.



**Are you fishing more, less, or same amount as you were three or four years ago?**



# CAESARR Pilot Survey Results

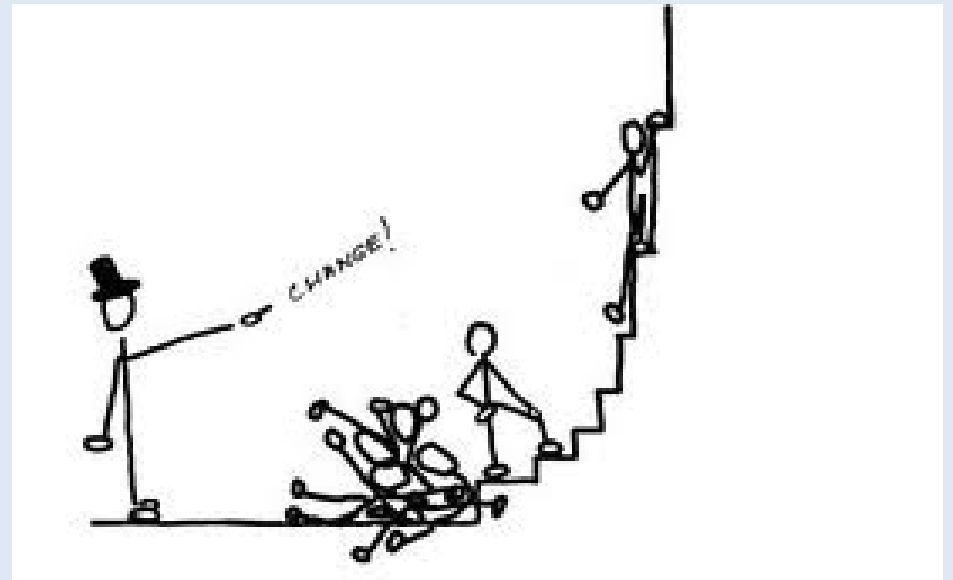
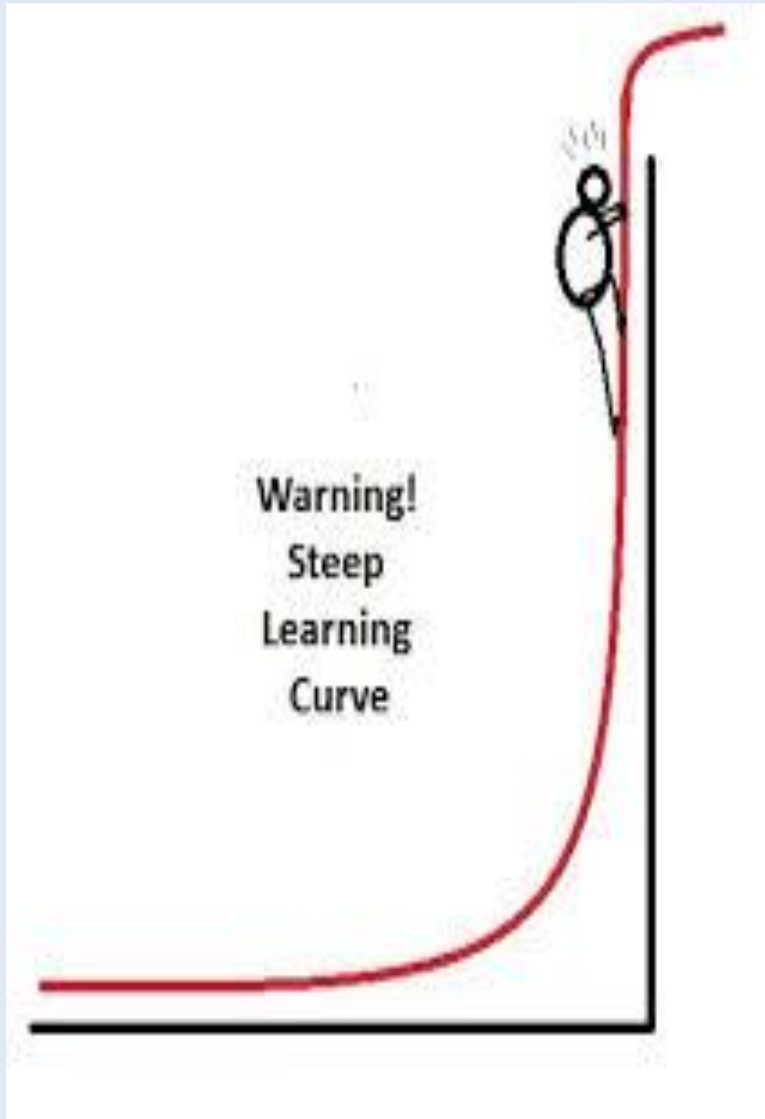
- A residential survey was developed specifically for use of determining residents' perception of their local environment in Ward 8, including ranked questions about environmental hazards and how these hazards could be mitigated.
- Personal and demographic information, including general residential location, occupation, lifestyle and household composition were also asked, along with general medical and disease history and medication use.
- A section on quality of life was also included to investigate the effect of pollution on the outlook of residents who live in close proximity to this pollution.
- Twenty-six (26) residents of Ward 8 completed the face-to-face survey at the annual Ward 8 Turkey Giveaway event held on November 22<sup>nd</sup>, 2012

# CAESARR Pilot Project Results

- Residents believe that they are burdened by environmental hazards. All responses regarding their level of concern about specific pollution sources in their area were “concerned” or above.
- Residents believe that pollution sources in their neighborhoods specified in the survey have affected their health, such as toxins in the Anacostia River and lead in their drinking water
- Residents believe that local social stressors specified in the survey have affected their health, such as crime, poverty and access to healthy food.
- Some residents of these neighborhoods believe they have a poor quality of life, agreeing with statements such as “I have little control over the things that happen to me” and “I often feel helpless in dealing with problems of life”.
- Most residents lived near (less than 2 miles away from) an air pollution source.
- Most residents indicated that cleaning up the Anacostia River would be the biggest contributor to reducing their environmental burden.



# Lessons Learned



# Limited Contact Water Recreation



# Limited Contact Recreation

- A large portion of the United States population participates in limited-contact water recreation activities. An estimated 71 million people participate in recreational fishing, 52 million in motor boating, 20.7 million in canoeing, 9.4 million in rowing, and 6.4 million in kayaking (Dorevitch et al. 2012).
- There are several water bodies across the US that have not attained the goal of the Clean Water Act (1972) to support “recreation in and on the water” and are used for limited-contact recreation (e.g., fishing and boating) but not full-contact recreation (e.g., swimming and water skiing).
- These waters typically do not support full-contact recreation because of high concentrations of bacteria which exceed the US EPA Recreational Water Quality Standards (USEPA, 2012).
- The Anacostia River, an important branch of the Chesapeake Bay watershed, has become severely contaminated due to several decades of poor waste and sewage management, littering and illegal dumping. However many people, both residents of the Anacostia watershed as well as others outside the DC/Maryland/Virginia area use this river and others on a regular basis for recreational purposes, including kayaking, canoeing, rowing and sport fishing.
- There is limited research on exposures and cumulative risks faced by recreational users of this watershed and how these risks can be reduced.
- While not safe for swimming, the Anacostia River, is deemed safe for limited-contact recreation and is a haven for paddlers, rowers, boaters, and fishermen (AWS 2013).
- DC law prohibits swimming in any river in the District and the water quality of the Anacostia is not assessed by any federal agency in Maryland to determine if it safe for swimming. The Anacostia Watershed Society (AWS) frequently performs its own assessments of river water quality and results consistently demonstrate violation of water quality standards (AWS, 2013).

# Limited Contact Recreation

- Large cohort studies (Colford et al. 2007; Wade et al. 2006) have evaluated the health risks of full-contact recreation, but little is known about the health risks of limited-contact recreation.
- It is generally assumed that risks of adverse health outcomes due to limited-contact water recreational activities such as boating, canoeing, fishing, kayaking, and rowing are relatively low, even on waters with high densities of microbial pollutants.
- The Chicago Health, Environmental Exposure, and Recreation Study (CHEERS), a prospective cohort study, was designed to estimate the risk of illness attributable to limited-contact water recreation (Dorevitch et al. 2012). The authors observed risks of gastrointestinal illness attributable to limited-contact water recreation that were comparable whether the recreation took place on effluent-dominated waters or general use waters (i.e., water bodies used for full-contact recreational activities) (Dorevitch et al. 2012).
- Studies that have conducted research into the risks associated with limited-contact water recreation have assessed the health effects associated with this recreation; however this work has not incorporated communication of these risks to the recreational users in order to reduce their exposure.
- Prior investigations of health risks from recreational water use (i.e., “The BEACHES Study”, (Fleisher et al. 2010; Aslan et al. 2011) have lacked a risk communication component.
- There is also a need for development of risk communication messages that clearly explain different health risks for limited-contact recreation (such as boating or kayaking) versus full-contact recreation (such as swimming), as these differential risks have only recently been documented (Dorevitch et al. 2012).



**OUR PROGRAMS**

**PUBLIC POLICY & ADVOCACY**

- Safe to Swim or Fish in the Anacostia River?
- River Report Card
- Stormwater
- Bacteria
- Toxics
- Trash
- **Project RECREATE**
- History of Advocacy

**EDUCATION**

**STEWARDSHIP**

**PROJECT RECREATE**

RECREATE stands for Risks of Exposure to Community Recreational Enthusiasts: Anacostia Toxics in the Environment

**Overview**

In February 2012, the Anacostia Watershed Society hosted the Anacostia River Health and Recreation Public Forum in partnership with the Anacostia Community Boathouse Association (ACBA) where public health and environmental expert panelists from University of Maryland School of Public Health, DC



Environmental Health Collaborative, District Department of the Environment (DDOE) Water Quality Division, and DC Water Clean Rivers Project discussed their knowledge on the topic. During the forum community members raised several concerns that addressed the lack of: warnings and information about the extent and duration of combined sewer overflows (CSOs), information about the extent and movement of toxic sediments in the river, and public health information regarding the exposure risks of recreational users of polluted waterways. While some actions to clean up legacy toxic locations in and along the Anacostia River (e.g., Washington Navy Yard, Washington Gas, Kenilworth Park/Landfill, Pepco Benning Road) have been taken, these processes take a lot of time and do not help answer questions about recreational health.

As a result of finding a huge void in scientific research on this topic as well as a deep concern from the recreational community, the Anacostia Watershed Society and University of Maryland School of Public Health teamed up to conduct a study that will hopefully help us better understand potential risks associated with recreational activity on the Anacostia River. We will develop and disseminate a public health survey, use Photovoice to capture

**UPCOMING EVENTS**



**Paddle Night**  
Every Thursday  
5:00-7:30 pm  
[More info](#)



## Risks of Exposure to Community Recreational Enthusiasts: Anacostia Toxics in the Environment (Project RECREATE)

### DO YOU RECREATE ON THE ANACOSTIA RIVER?

If you do, you may be eligible to participate in Project RECREATE, a study about recreational users of the Anacostia Watershed. This study is being conducted by the University of Maryland-College Park and the Anacostia Watershed Society.

If you:

- Are at least 18 years old AND
- Have participated in recreational activities in the Anacostia Watershed during the last year such as: rowing, canoeing, kayaking, paddling, boating, sailing, water skiing, swimming, wading, recreational/sport fishing or any other type of recreational activity that placed you in contact with the river

Then you are eligible to participate in a research study examining exposure to air and water contaminants in the Anacostia Watershed through recreational activities, including potential health risks and possible interventions.

You will be asked to complete an online survey consisting of questions on demographics, how you use the river for recreation, your frequency of use, location of activities, water quality opinions, and health status.

You can be entered in a drawing to win one (1) of three (3) gift cards valued at \$100 each for your participation.

Please visit this link to complete the survey: <http://bit.ly/7j1At3>

For more information please contact:

- Principal Investigator, Dr. Sacoby Wilson, (301)405-3136 or [swilson2@umd.edu](mailto:swilson2@umd.edu)
- Research Assistant, Rianna Murray, [rmurray@umd.edu](mailto:rmurray@umd.edu)
- CEEJH Associate, Laura Dalemarre (301)405-5706 or [ldalemar@umd.edu](mailto:ldalemar@umd.edu)
- Lori Baranoff, (301) 699-6204 x107 or [lbaranoff@anacostiaws.org](mailto:lbaranoff@anacostiaws.org)

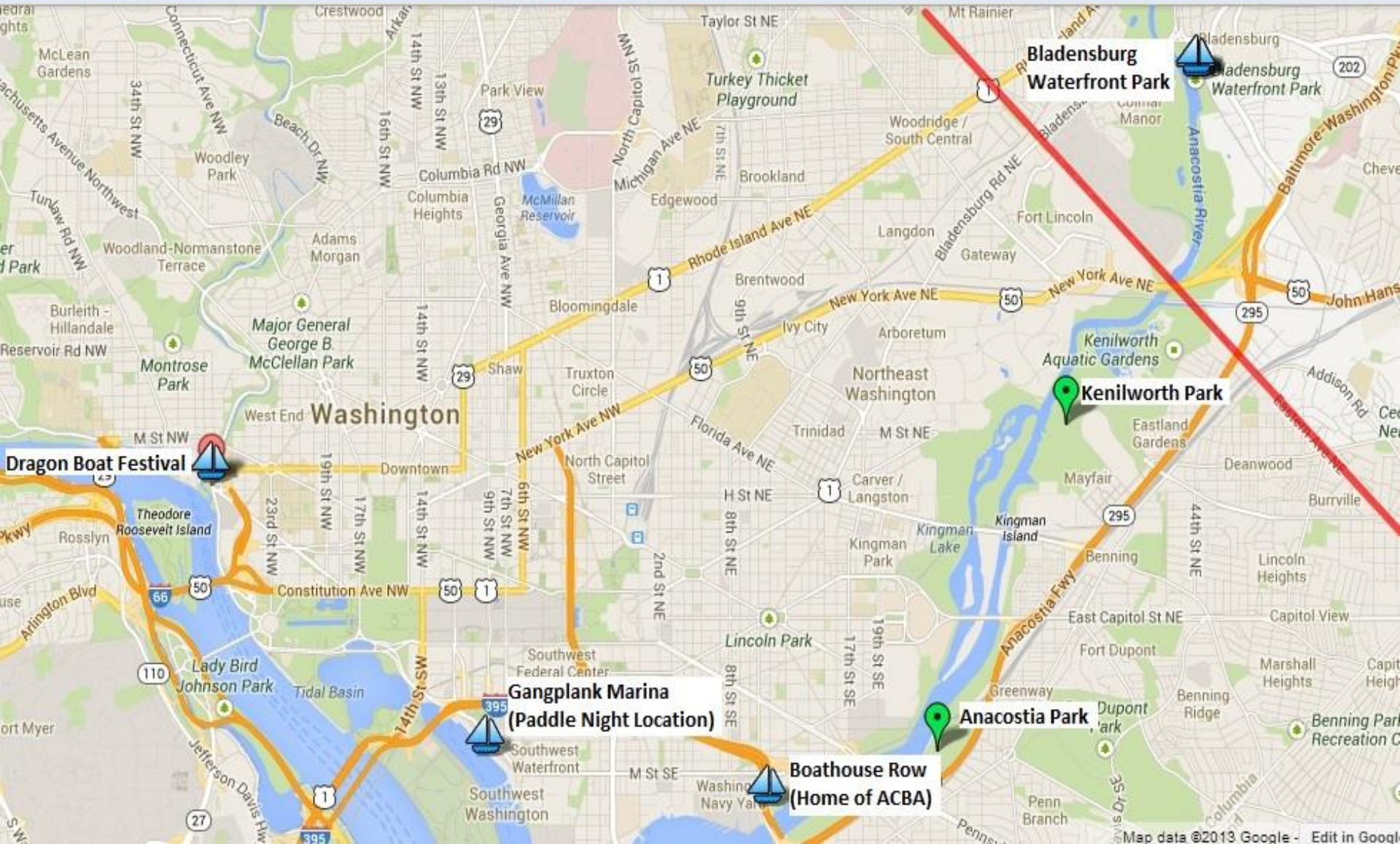








# Map of Survey Locations





## Degree of Being Exposed to Water Experienced by Project RECREATE Participants on Different Parts of Their Body During Their Most Recent Recreational Activity

Question/ Variable	Category	Canoe/kayak/ row/boat/raft /paddle (n=114) No. (% of n)	Boating and Sailing (n=54) No. (% of n)	Fishing on a Boat (n=9) No. (% of n)	Fishing on the pier/shore/ dock (n=13) No. (% of n)
Exposed to water on any part of body?	Yes	95 (84.07)	19 (37.25)	3 (37.5)	2 (15.38)
	No	18 (15.93)	32 (62.75)	5 (62.5)	11 (84.62)
Feet or legs	Sprinkle/few drops	16 (17.98)	5 (26.32)	0	0
	Splash	64 (71.91)	13 (68.42)	3 (100)	2 (100.0)
	Drenched	9 (10.11)	1 (5.26)	0	0
Hands or arms	Sprinkle/few drops	13 (14.13)	3 (17.64)	1 (25.0)	0
	Splash	49 (53.16)	9 (52.94)	3 (75.0)	1 (50.0)
	Drenched	30 (32.61)	5 (29.41)	0	1 (50.0)
Torso	Sprinkle/few drops	17 (25.37)	8 (53.3)	0	0
	Splash	42 (62.69)	6 (40.0)	0	1 (100.0)
	Drenched	8 (11.94)	1 (6.66)	0	0
Face or head	Sprinkle/few drops	31 (45.58)	6 (40.0)	1 (50.0)	1 (100.0)
	Splash	33 (48.52)	9 (60.0)	1 (50.0)	0
	Drenched	4 (5.88)	0	0	0
Water in mouth	Yes	28 (27.18)	4 (7.69)	0	0
	No	75 (72.82)	48 (92.31)	9	13 (100.0)
Amount of water swallowed	A drop or two	5 (4.85)	0	-	-
	A teaspoon	11 (10.68)	1 (25.0)	-	-
	One or more mouthfuls	1 (0.97)	0	-	-
	Did not swallow water	58 (56.31)	3 (75.0)	-	-
Rubbed eyes	Yes	36 (35.64)	9(18.37)	1 (14.29)	1 (10.0)
	No	65 (64.36)	40 (81.63)	6 (85.71)	9 (90.0)

# Prevalence of Symptoms Associated with GI Illness in Recreational Users vs. Non-Users of the Anacostia River

	Symptom	Recreational user vs. non-user Un-adjusted OR (95%CI)	Recreational user vs. non-user Adjusted OR (95%CI)
Experienced within the last 12 months	Diarrhea	2.27 (0.98, 5.22)	2.25 (0.936, 5.407)
	Vomiting	0.81 (0.34, 1.96)	1.18 (0.45, 3.14)
	Dizziness	1.02 (0.46, 2.27)	1.23 (0.50, 3.03)
	Nausea	1.39 (0.62, 3.14)	1.61 (0.66, 3.913)
	Skin Rash	1.48 (0.57, 3.83)	1.36 (0.52, 3.64)
	Lung Irritation	3.69 (0.47, 29.2)	3.06 (0.36, 25.60)

*Note: All symptoms investigated were adjusted for the following variables: Age, gender, race/ethnicity and education. Additionally, Lung irritation was also adjusted for smoking status*

# Public Health Implications

- Although high levels of contamination are known to be present in the Anacostia River recreation on the river is still very popular
- This study found that 60% of recreational users are women and 23% of users are over the age of 55 – these are vulnerable populations
- 57% of users do not feel well informed of the risks of recreating on the Anacostia – need for improved risk communication
  - Provide water quality information to users daily through a text messaging system- allow them to make informed decisions about their recreation
- Previous studies have found an increased risk of GI illness in individuals who engage in limited-contact water recreation
- Next steps – how to reduce exposure?

# Policy Implications

- Cleanup and restoration policies for the Anacostia Watershed
- Better allocation of Clean Water Act 319 restoration funds in urban settings due to disparities in resource allocation across race/ethnicity, socioeconomic status, and geography (rural vs urban)
- Fostering of new partnerships (environmental and public health advocates) to address environmental health and justice issues
- Use of best management practices to reduce stormwater runoff
- Waterfront development initiatives and policies that benefit local populations
- Focus on Environmental Justice and Public Health particularly for vulnerable populations in the Chesapeake Bay Agreement



# Recreational Fishing Days

- We are working with the Anacostia Watershed Society and the Anacostia Community Museum to organize a series of recreational fishing days to invite recreational fishers from across the Anacostia River Region to catch fish at Bladensburg Park, Anacostia Park, and Hains Point.
- We held our first recreational fishing day on October 26, 2013 at Bladensburg Park. We had several vendors including the Maryland Department of the Environment (MDE), DC Department of the Environment (MDE), and the Anacostia Watershed Society at this event.
- The event was fun opportunity for participants to learn how to fish, learn about the river and health issues, and catch fish for the project. We had about 40 individuals attend the event and approximately 20 fish were caught and processed for scientific research.
- We plan to have recreational fishing day events on a monthly basis from April 2014 to October 2015.









# Questions?

