Newtown Creek Superfund Site
Risk Assessment Data
CAG Meeting – December 16, 2015

Objectives

- Identify, quantify, and understand the distribution of site-related CERCLA hazardous substances and other stressors that may impact the ecology and quality of the Study Area sediment, water, and biota
- Understand the bioavailability of site-related CERCLA hazardous substances
- Identify potential current and future human health and ecological risks
- Evaluate the uncertainty of the risk estimates

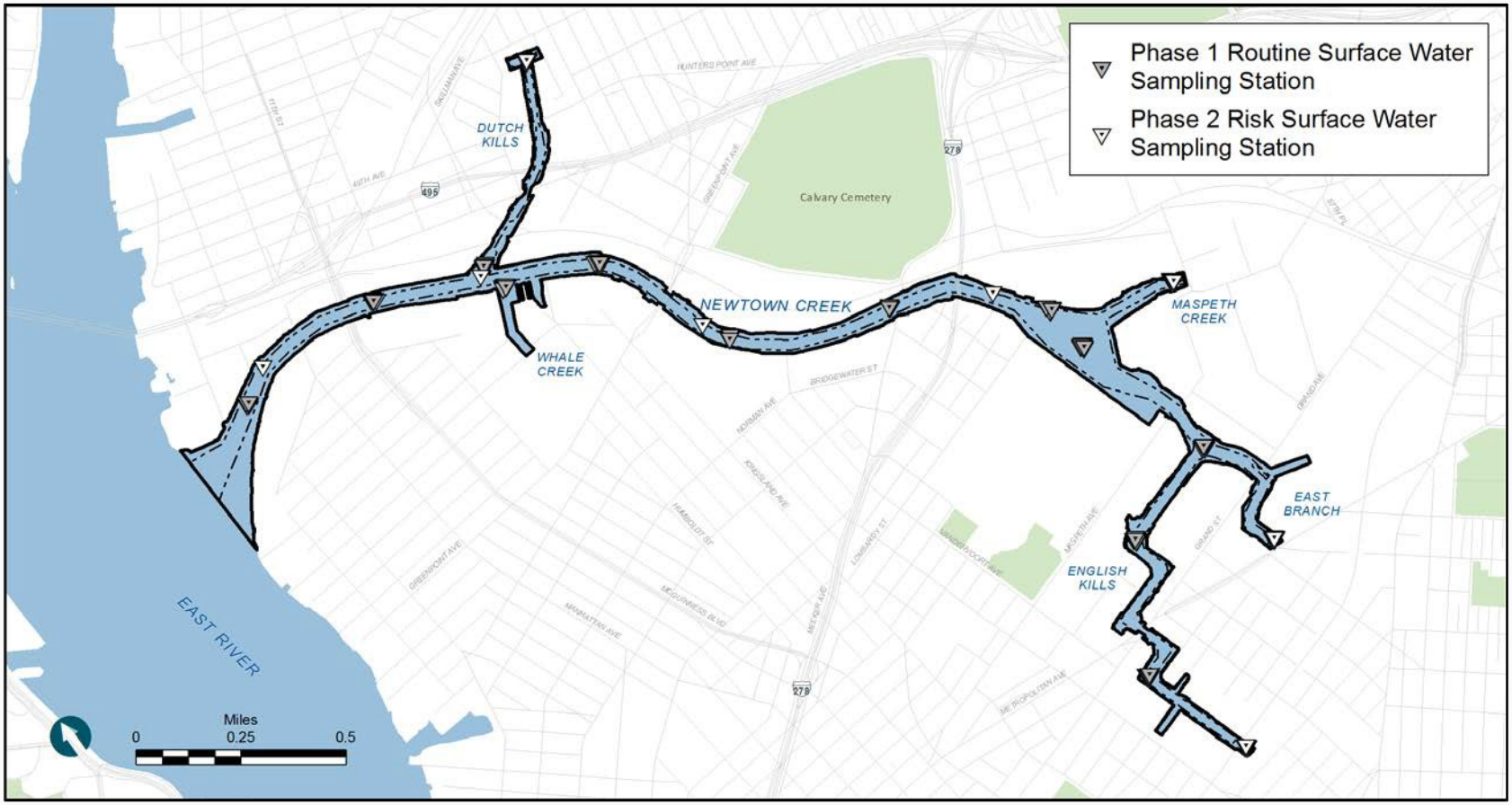
Risk Assessment Process

- Planning – Planning and Scoping Process: start the process with planning and research
- Step 1 – Hazard Identification: examine whether identified contaminants have the potential to cause harm to humans and environment, and if so, under what circumstances
- Step 2 – Exposure Assessment: Measure/estimate the magnitude, frequency, and duration of receptor exposure to contaminants
- Step 3 – Toxicity/Effect Assessment: Examine the relevant toxicity/effect information of contaminants
- Step 4 – Risk Characterization: Examine how well the data support conclusions about the nature and extent of the risk from exposure to contaminants

Media Sampled for Risk Assessments

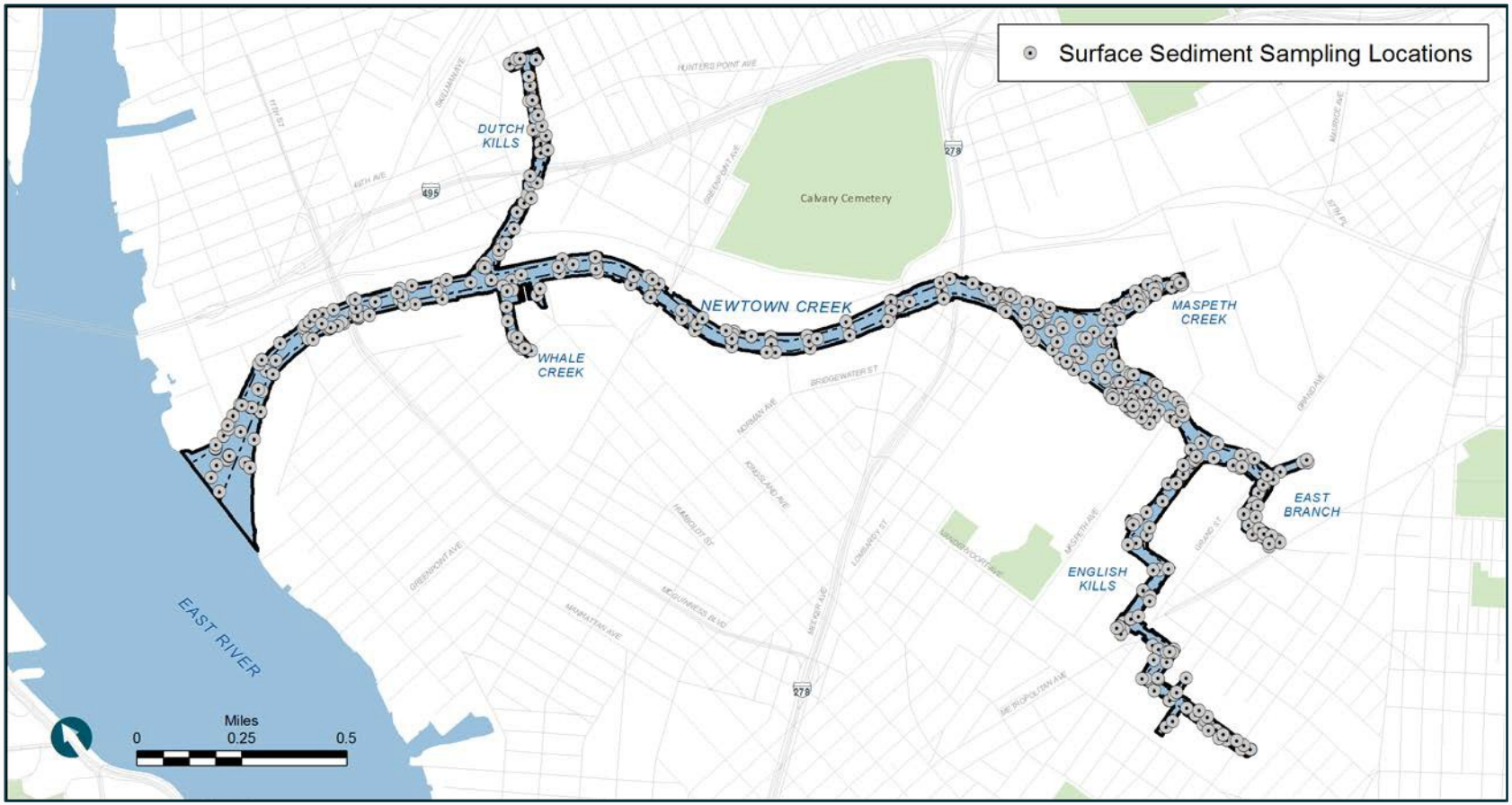
- Surface water (Ecological and Human Health)
- Surface sediment (Ecological and Human Health)
- Ambient air (Human Health)
- Fish tissue (Ecological and Human Health)
- Blue Crab tissue(Ecological and Human Health)
- Mussel tissue (Ecological)
- Invertebrate tissue (Ecological)
- Also conducted toxicity tests, wildlife surveys and invertebrate surveys (Ecological)

Study Area Surface Water Stations



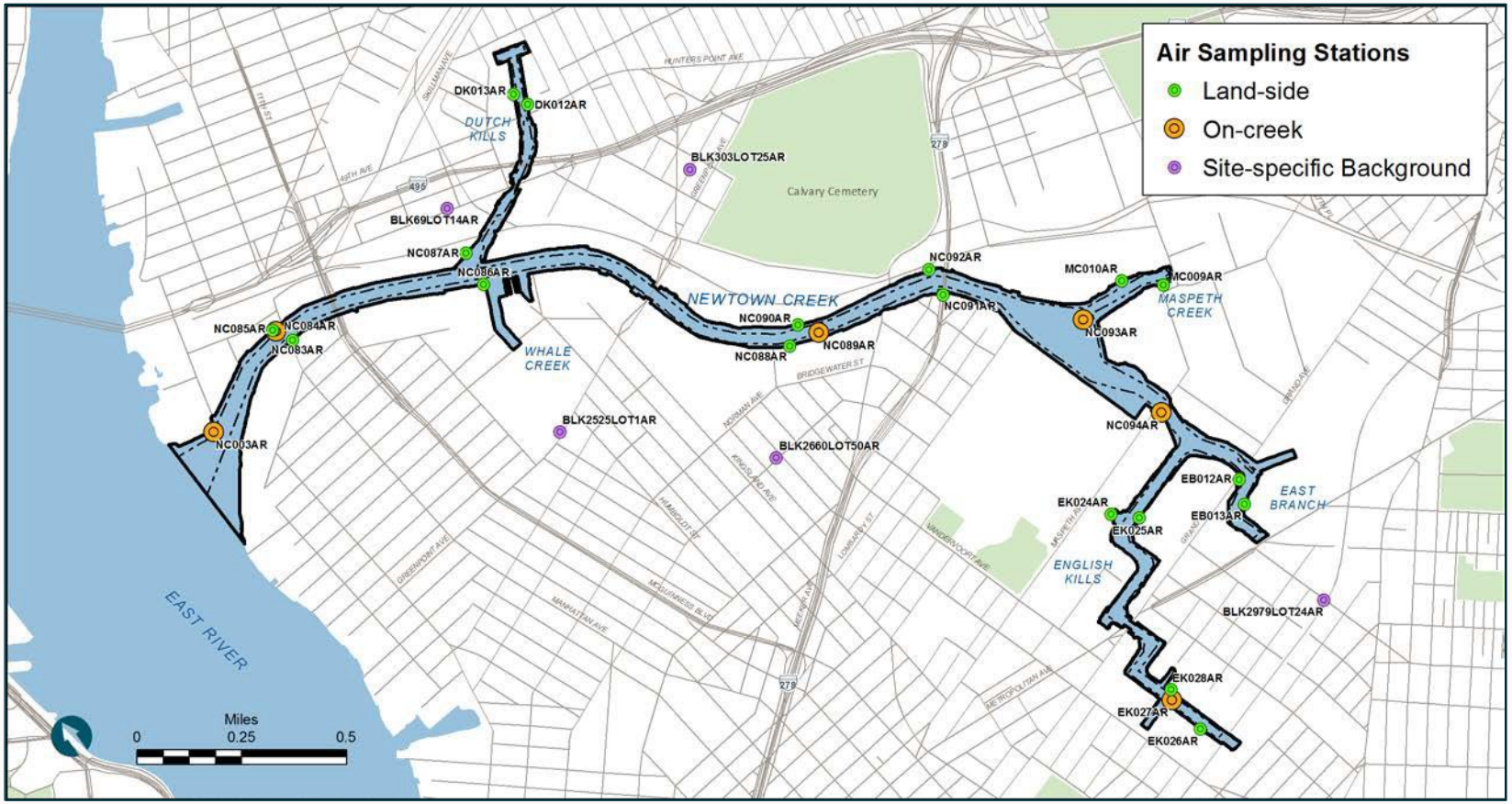
Total Surface Water Samples:
Study Area: 337
Reference Areas: 31

Study Area Surface Sediment Stations



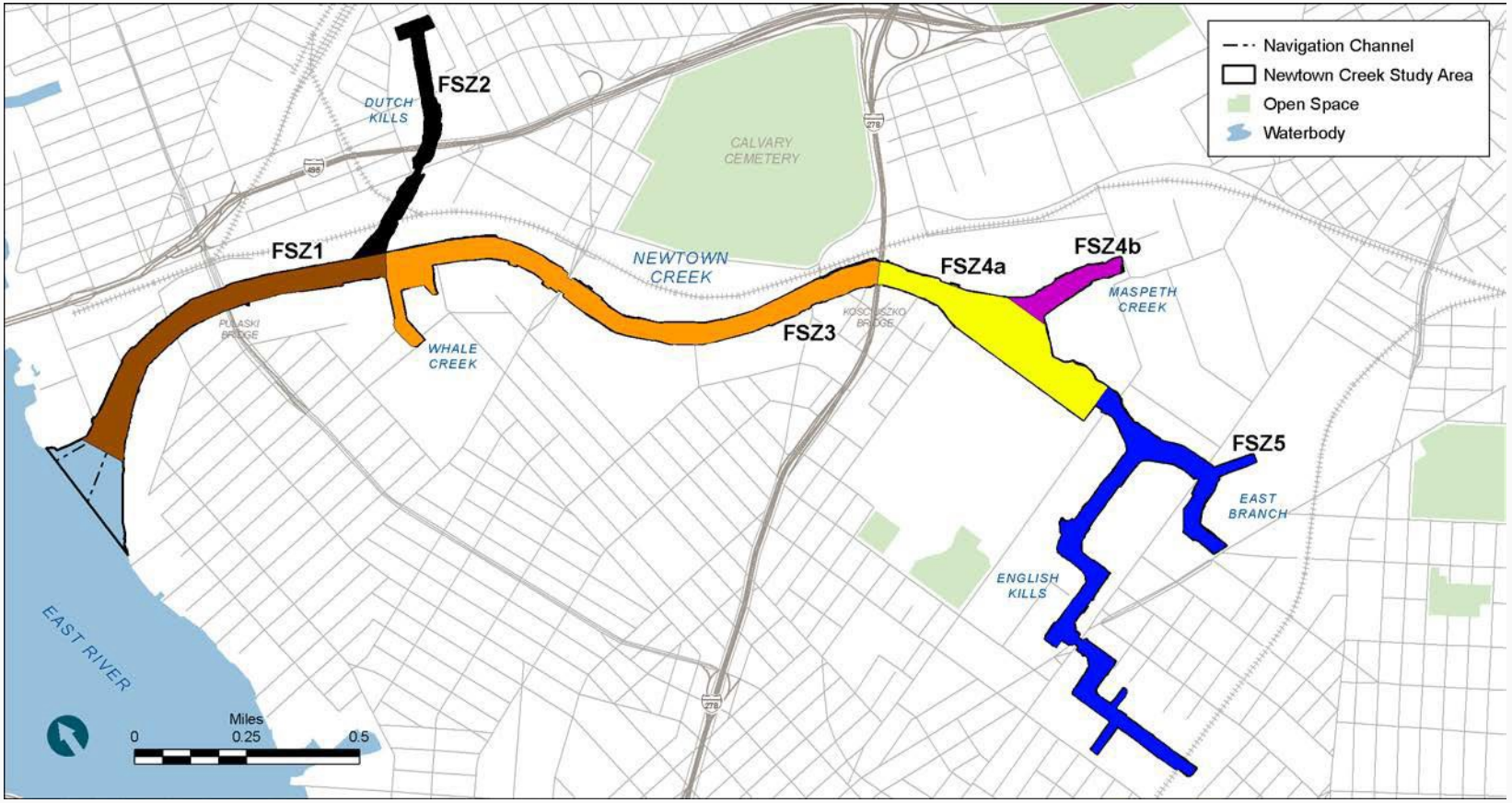
Total Surface Sediment Samples:
Study Area: 463
Reference Areas: 143

Study Area Ambient Air Sampling Locations



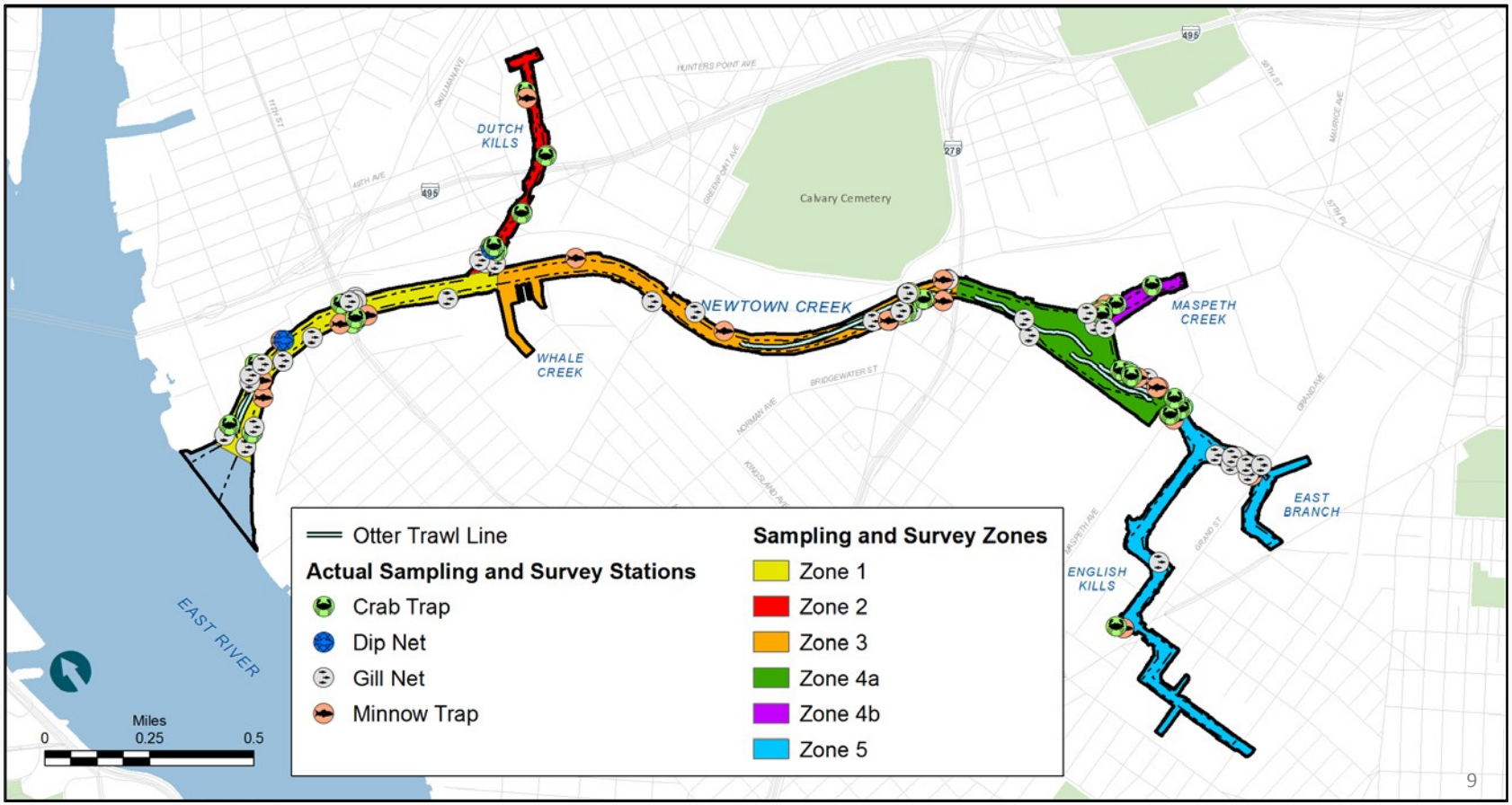
Total Ambient Air Samples:
Study Area: 24
Background: 5

Fish Sampling Zones



Program	Target Sample Size	Study Area	Reference Areas
BHHRA Fish	10	10	20
BHHRA Crab	10	10	20
BERA Crab	20	24	20
BERA Fish	20	24	20

Study Area Fish and Crab Sampling Stations

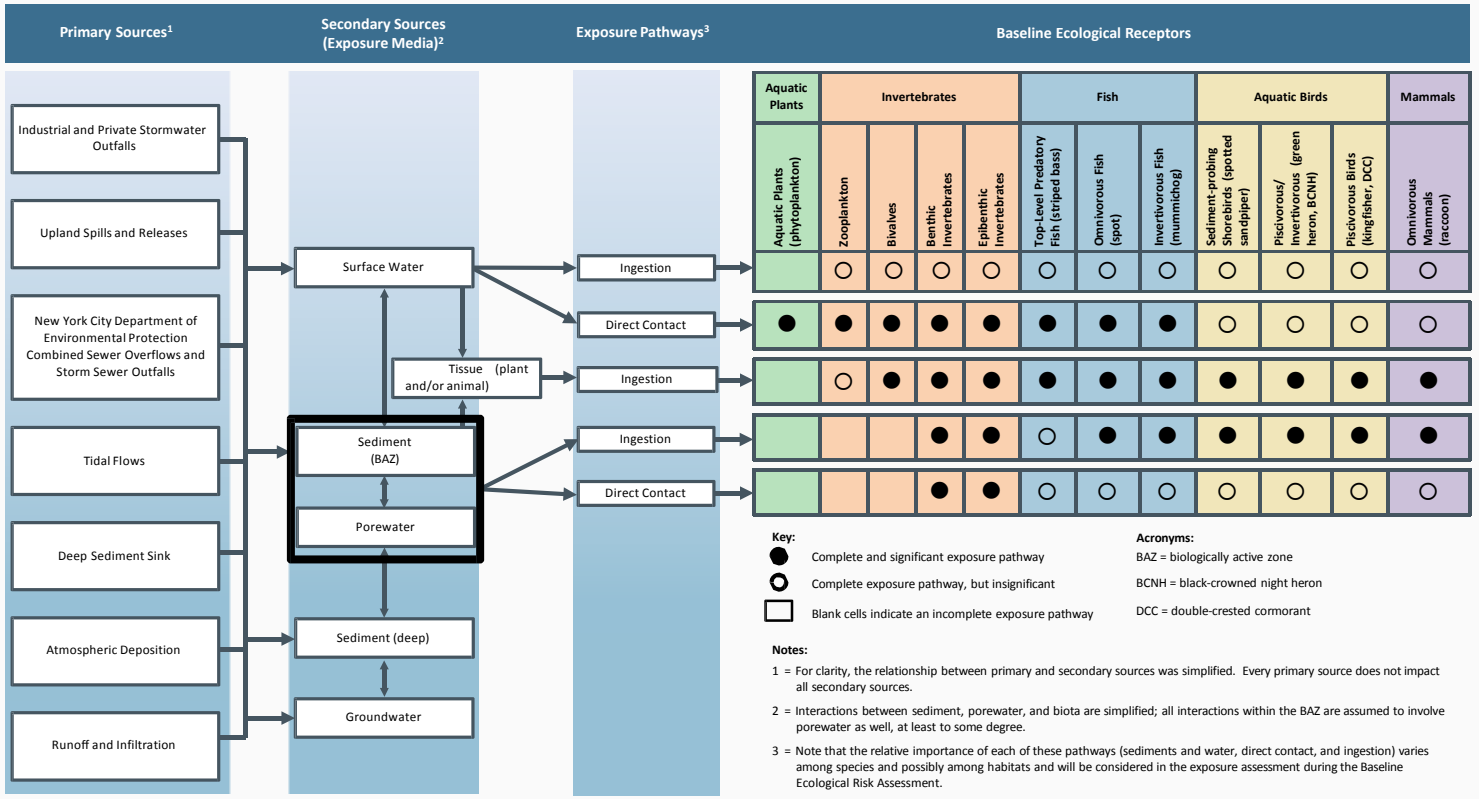


Baseline Ecological Risk Assessment

Baseline Ecological Risk Assessment

- Conceptual Site Model
- Receptors – Phytoplankton, aquatic plants, zooplankton, invertebrates, blue crab, amphibians and reptiles, fish (mummichog, spot (now white perch), striped bass, Atlantic menhaden), birds (belted kingfisher, green heron and spotted sandpiper), raccoon
- Data:
  - Sample collection numbers
  - Fish tissue concentrations in mummichog from Newtown Creek and four reference areas for select compounds (PCBs, PAHs and copper)
  - Worm tissue and sediment concentrations from Newtown Creek for select compounds (PCBs, PAHs and copper
- Status

Ecological Exposure Pathways and Receptors



BERA Surface Sediment

Receptor	Study Area	Reference Areas	Pathway
Benthic Invertebrates	463	40	Direct Exposure
Benthic Invertebrates	152	40	Benthic Community Health
Benthic Invertebrates	36	24	Benthic Toxicity
Fish	463	40	Incidental Ingestion
Wildlife (Study Area wide)	463	40	Incidental Ingestion
Wildlife (Intertidal)	43	16	Incidental Ingestion

BERA Benthic Invertebrates – Bioavailability

Pathway/Analytes	Study Area	Reference Areas	Comments
Bulk Sediment			
Acid-volatile sulfide (AVS) and Simultaneously extracted metals (SEM)	156	88	Toxicity tests + plus additional benthic community
Porewater			
Metals, ammonia, sulfide	36	24	"In-situ cores" Centrifugation
Metals	36	24	Toxicity Tests (peepers)
34 PAHs	36	24	Toxicity Test (SPME)
PCB Congeners	36	24	Toxicity Test (SPME)
Pesticides	36	24	Toxicity Test (SPME)

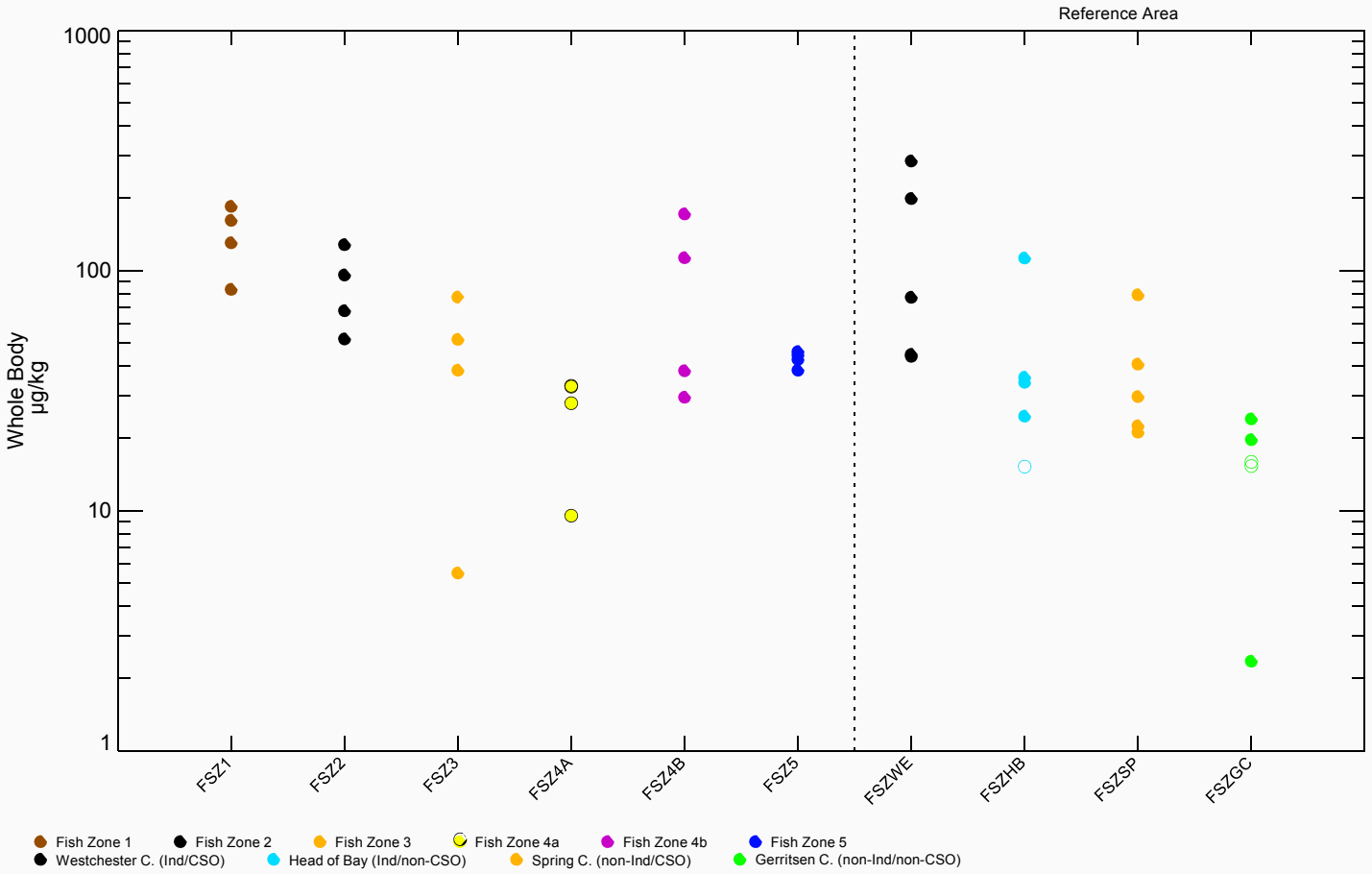
SPME – Solid-phase microextraction

BERA Tissue

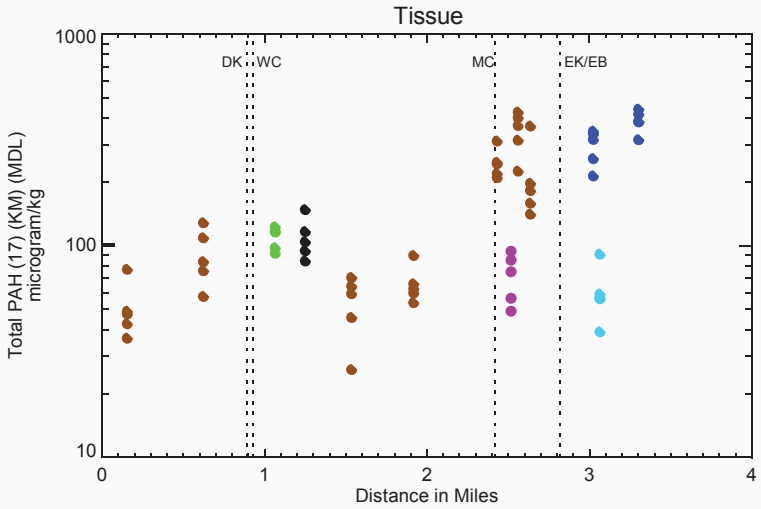
Receptor	Study Area[a]	Reference Areas[a]	Pathway
Striped bass	28	20	Receptor; wildlife prey
Atlantic menhaden	24	20	Wildlife prey
Mummichog	24	20	Receptor; wildlife prey
Blue crab	24	20	Receptor; wildlife prey
Ribbed mussel	10	NA	Special study; Study Area receptor; wildlife prey
Polychaete (worms)	13[b]	NA	Special study; Study Area receptor; wildlife prey

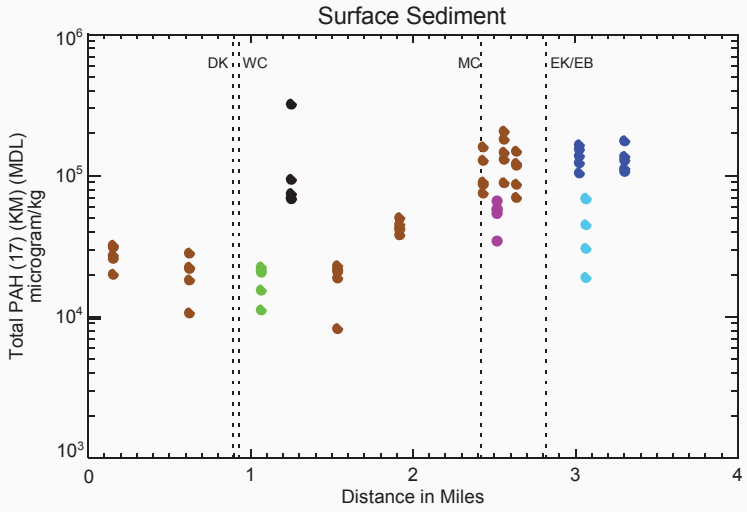
Notes:
a = Each composite consisted of a minimum of 5 individuals
b = Five replicates at each station
NA = Not applicable

Total PAH in Mummichog



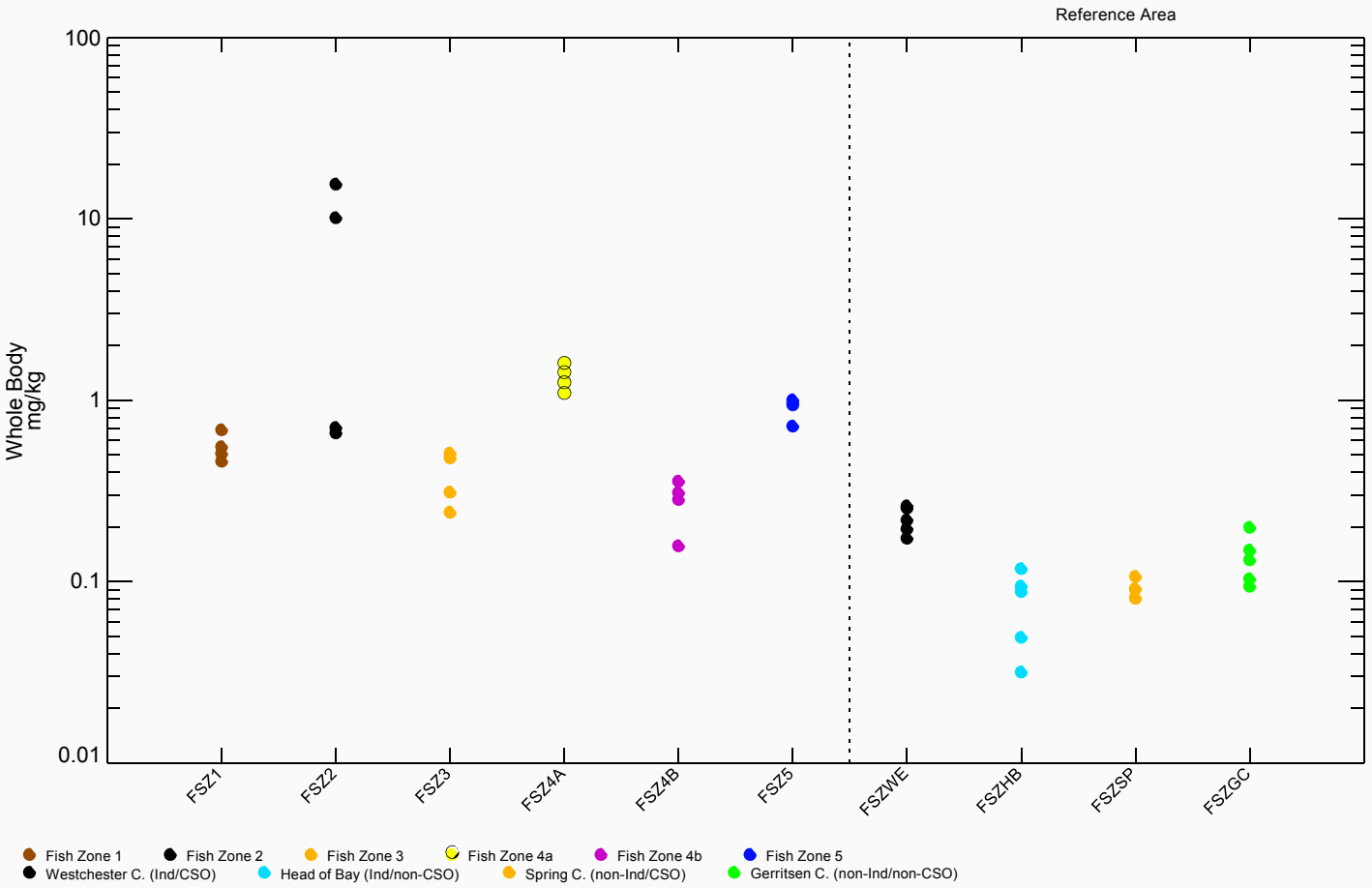
Total PAH Bioaccumulation - Polychaetes



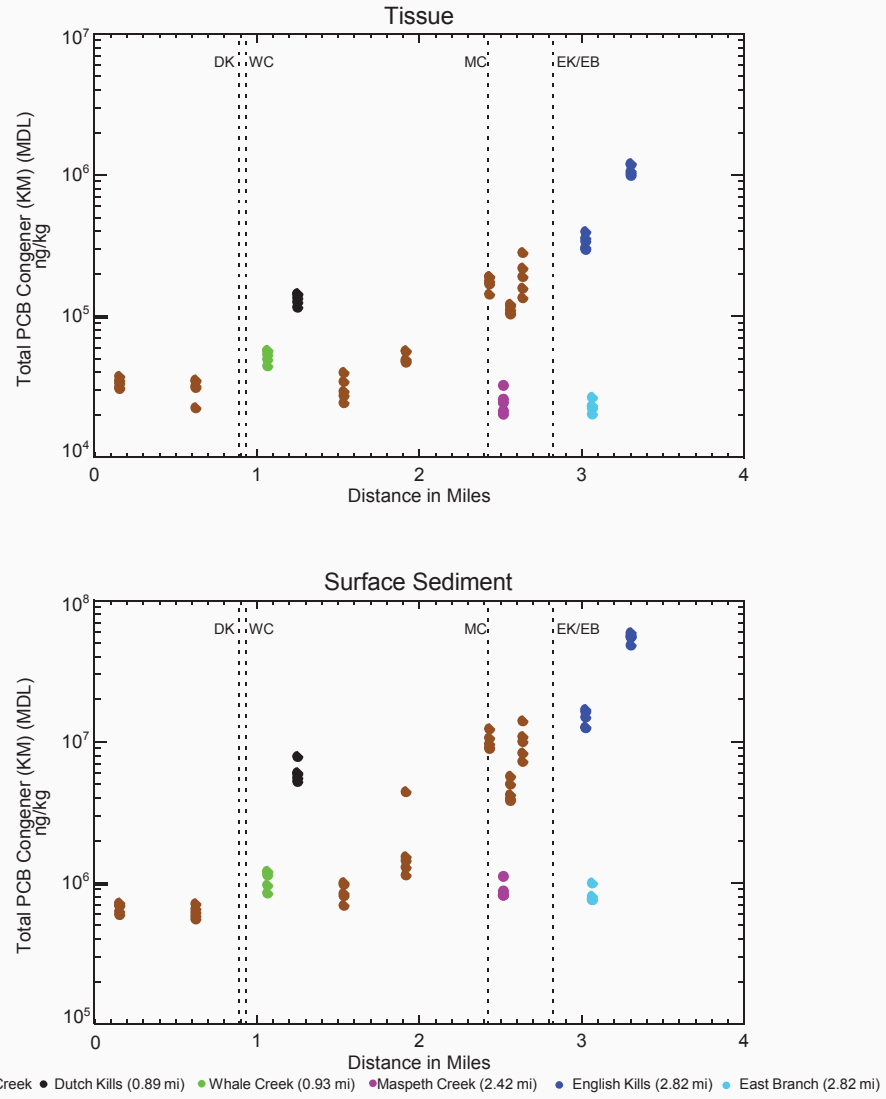


Newtown Creek · Dutch Kills (0.89 mi) · Whale Creek (0.93 mi) · Maspeth Creek (2.42 mi) · English Kills (2.82 mi) · East Branch (2.82 mi)

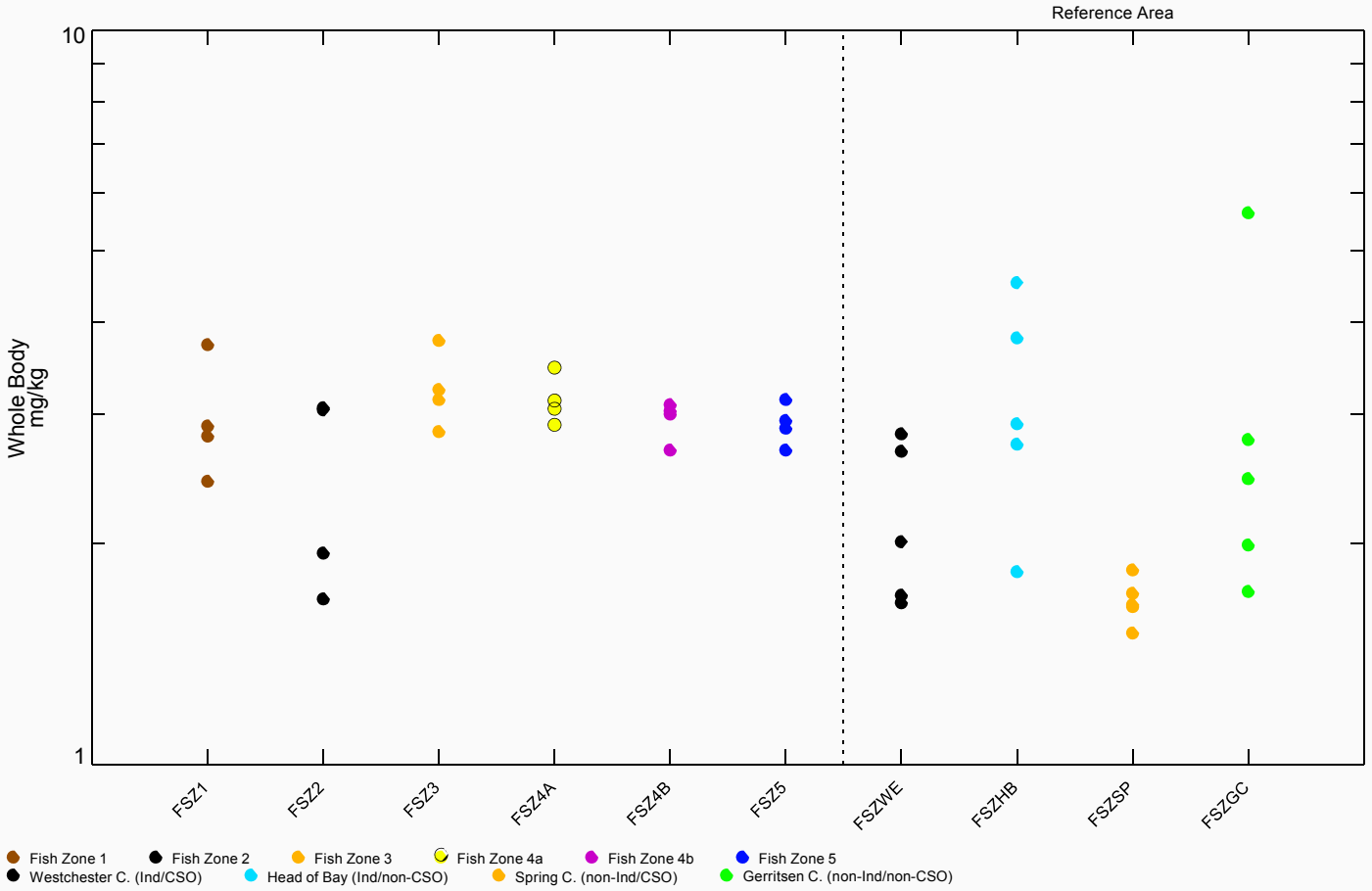
Total PCB Congener in Mummichog



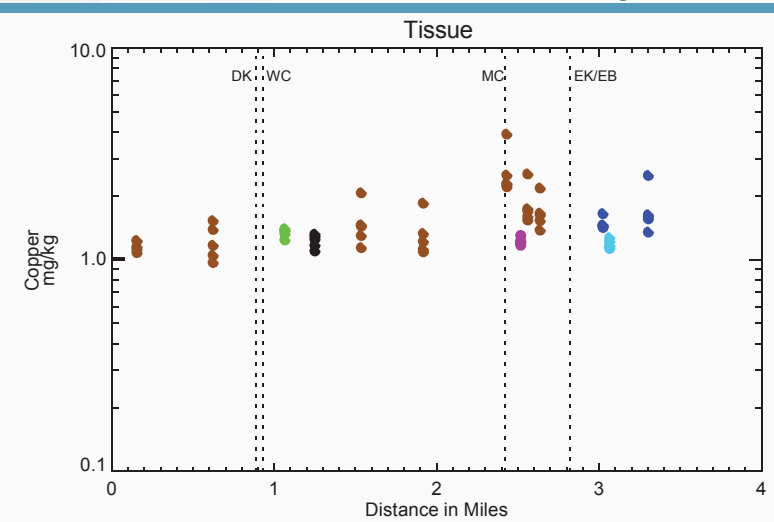
Total PCB Congener Bioaccumulation - Polychaetes

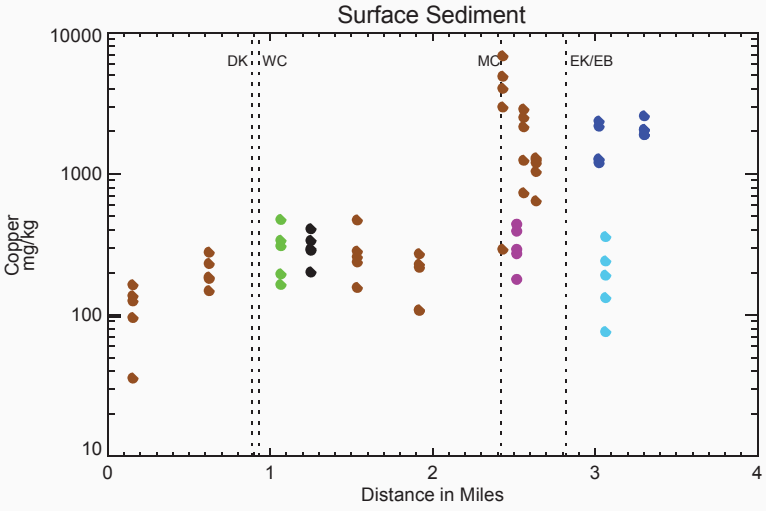


Copper in Mummichog



Copper Bioaccumulation - Polychaetes





Newtown Creek · Dutch Kills (0.89 mi) · Whale Creek (0.93 mi) · Maspeth Creek (2.42 mi) · English Kills (2.82 mi) · East Branch (2.82 mi)

Status

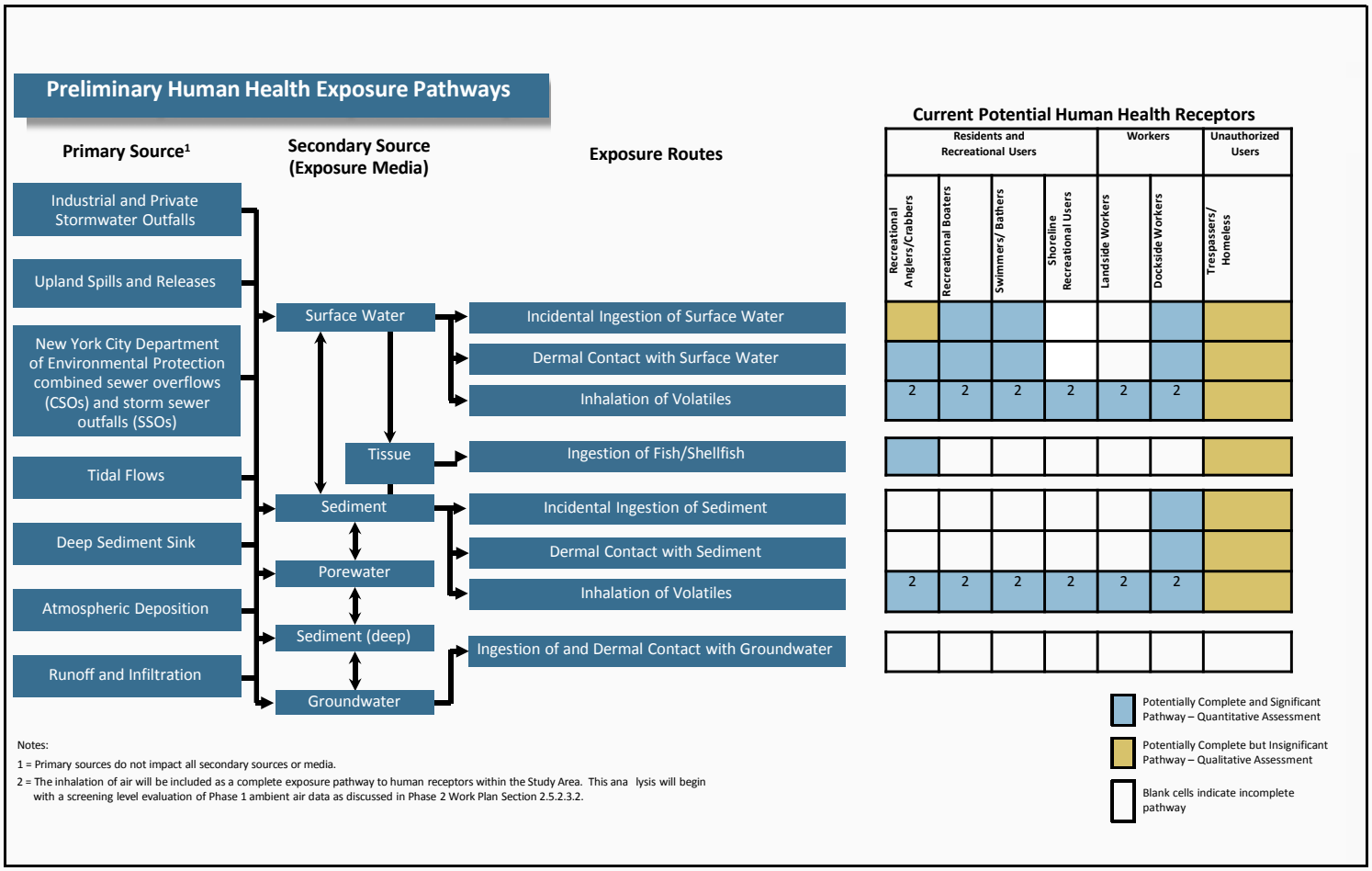
- Draft Report
  - Scheduled for submittal on February 2, 2016

Human Health Risk Assessment

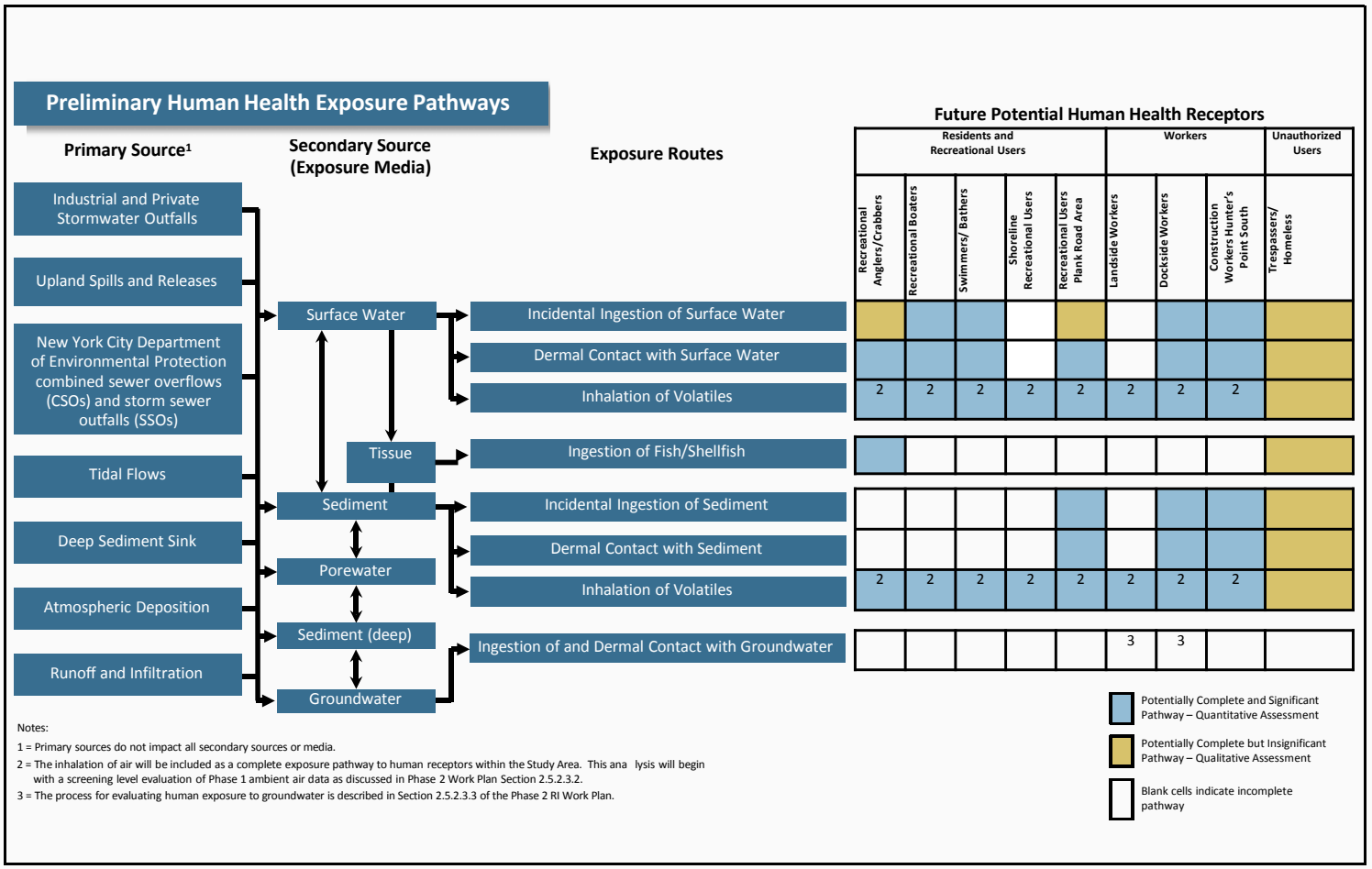
Human Health Risk Assessment

- Conceptual Site Model
  - Current Land Use
  - Future Land Use
- Tissue Samples
- Concentrations in Striped Bass and Blue Crab
  - Total PAH
  - Total PCB
  - Copper
- Status
  - Dispute Resolution – Fish and Crab Consumption Rate
  - Report

Current Human Health Exposure and Receptors



Future Human Health Exposure and Receptors



Notes:

1 = Primary sources do not impact all secondary sources or media.

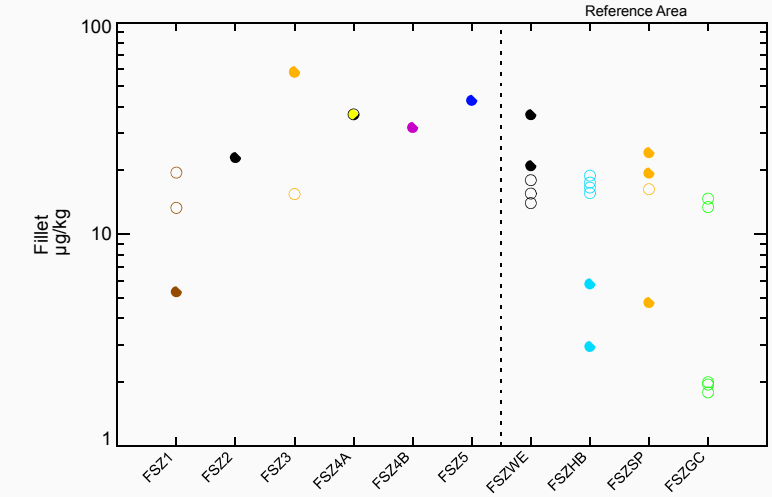
2 = The inhalation of air will be included as a complete exposure pathway to human receptors within the Study Area. This ana lysis will begin with a screening level evaluation of Phase 1 ambient air data as discussed in Phase 2 Work Plan Section 2.5.2.3.2.

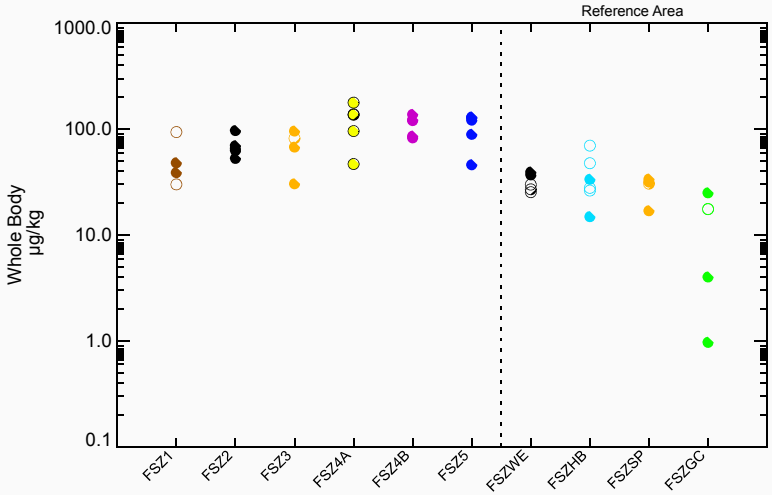
3 = The process for evaluating human exposure to groundwater is described in Section 2.5.2.3.3 of the Phase 2 RI Work Plan.

BHHRA Tissue Composite Samples[a]

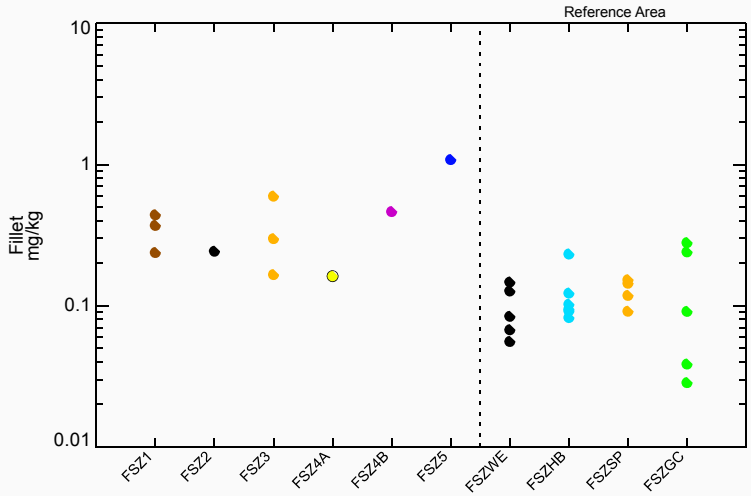
BHHRA Species	Study Area	Reference Areas	Comments
Striped bass	10	20	Fillet
White perch	7	5	Fillet
Blue crab	10	20	Combined muscle and hepatopancreas

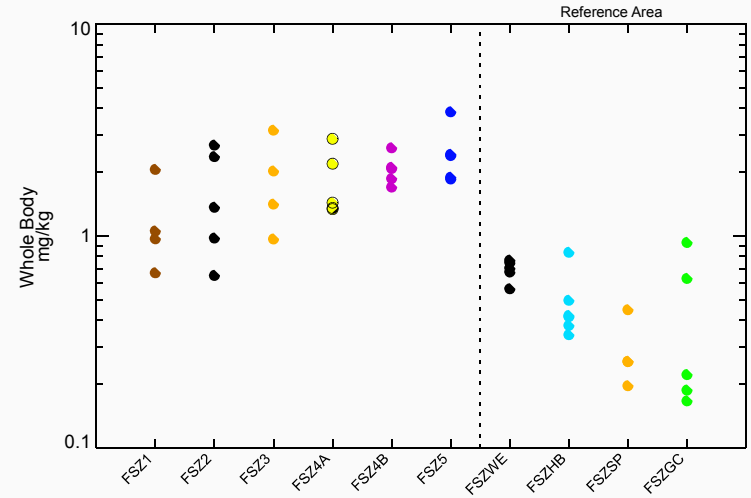
Total PAH in Striped Bass



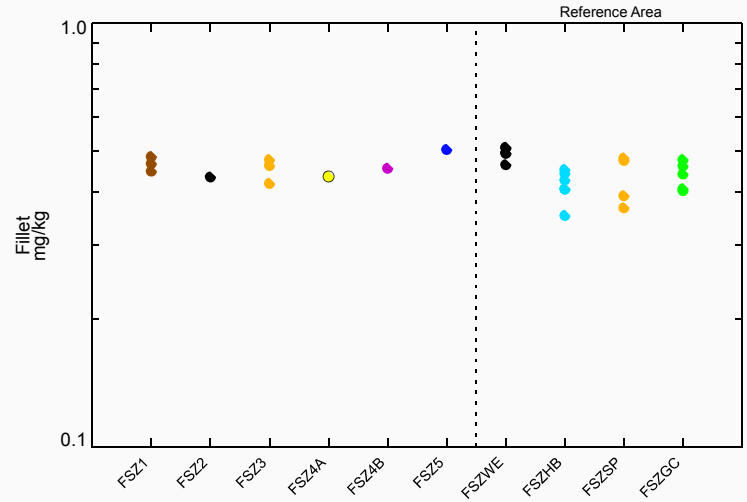


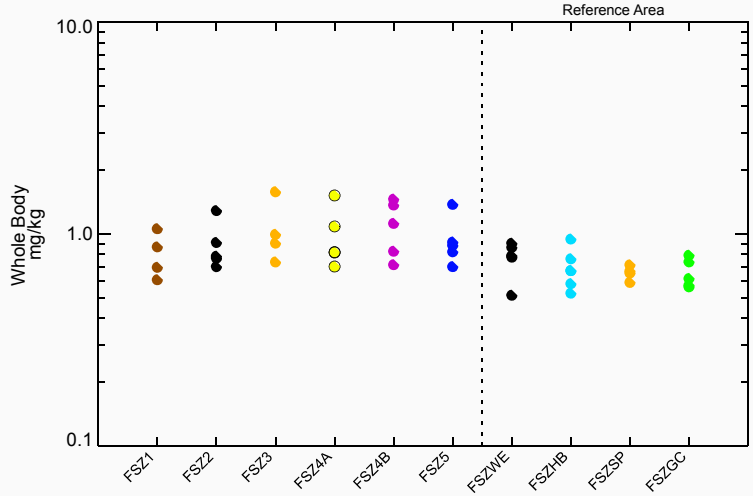
Total PCB Congener in Striped Bass



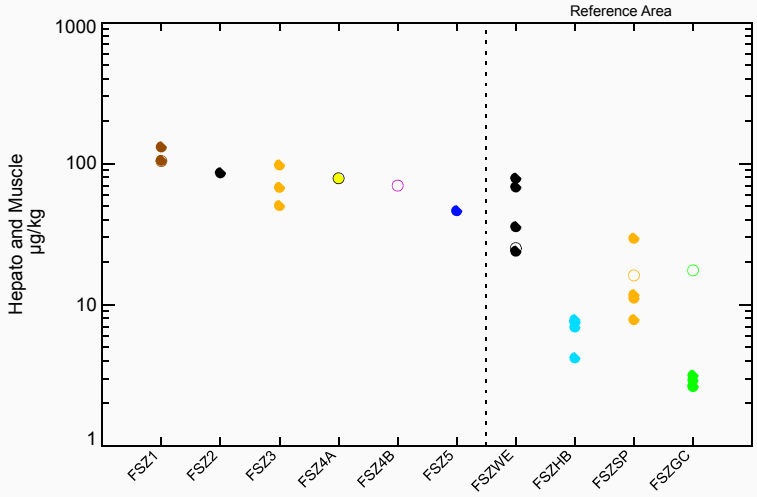


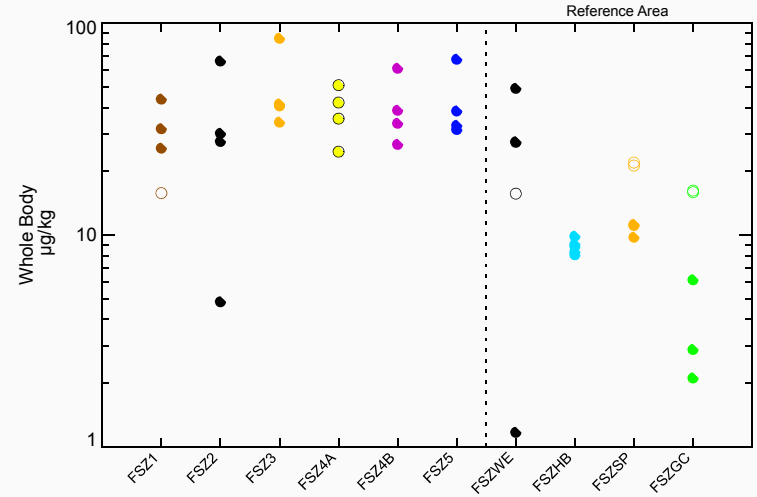
Copper in Striped Bass



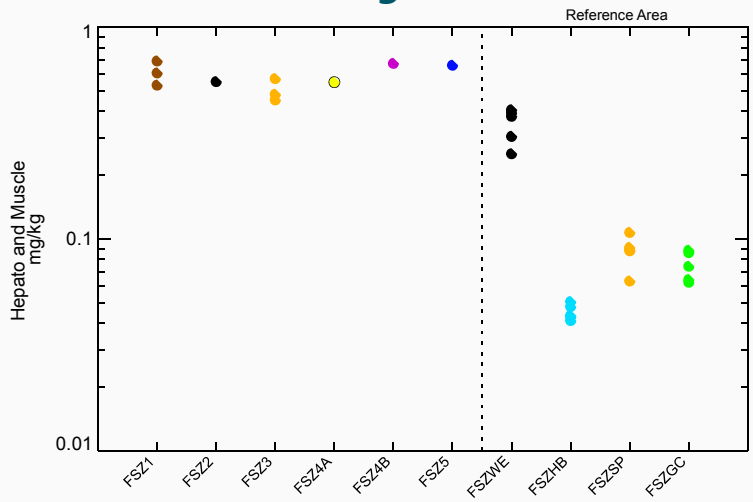


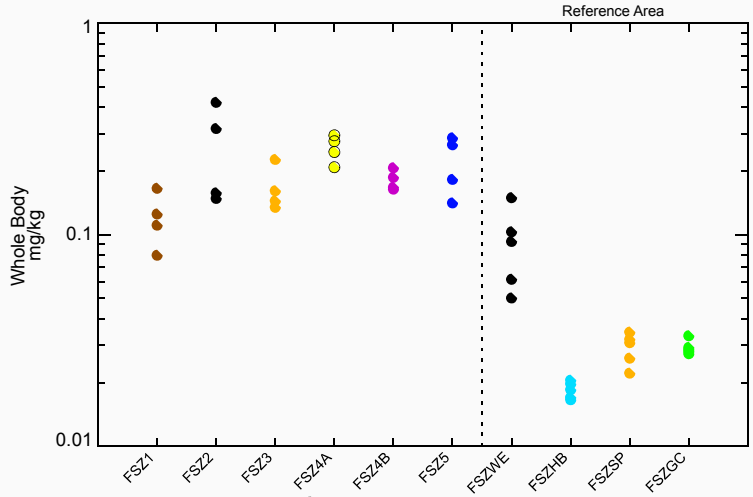
Total PAH in Blue Crab



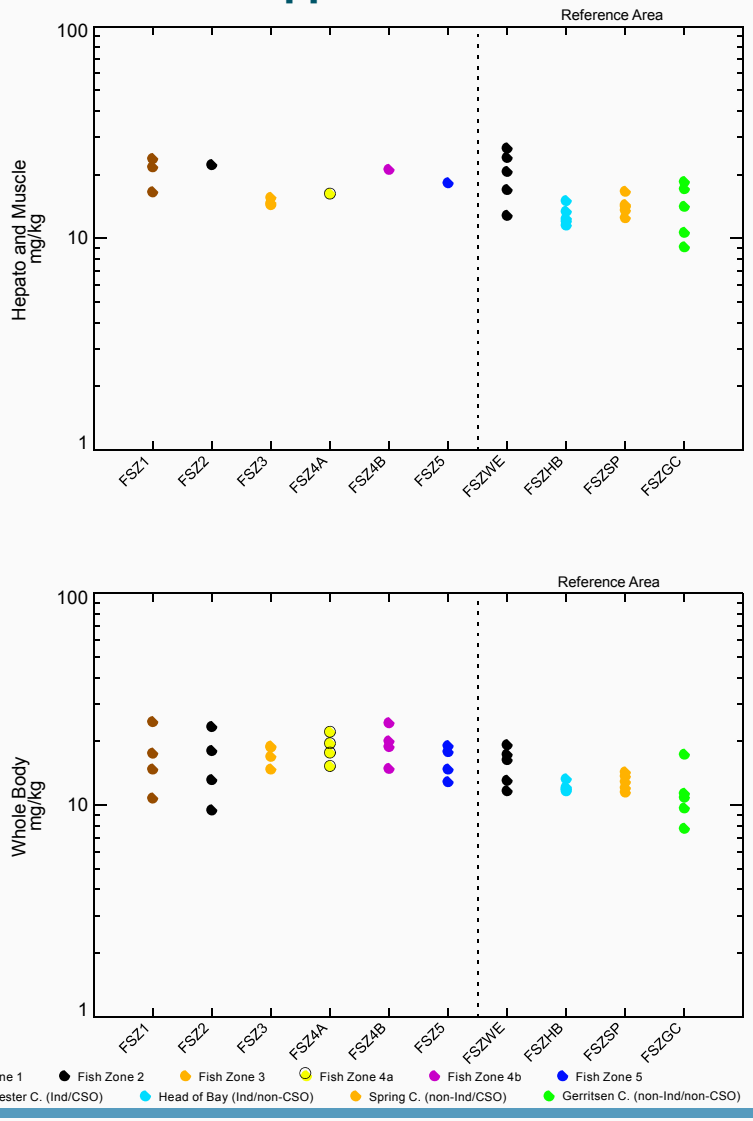


Total PCB Congener in Blue Crab





Copper in Blue Crab



Fish and Crab Consumption Rate (FCR)
(in gram/day)

	Receptor	EPA Directed FCR
Fish	Adult Angler	26
	Adolescent Angler	17
	Child of Angler	9
Crab	Adult Crabber	20.9
	Adolescent Crabber	14
	Child of Crabber	7

Equation for Estimating Potential Exposure from Fish and Crab Consumption

$$DI = \frac{C_{tiss} \times CF \times CR \times FI \times (1 - Loss) \times EF \times ED}{AT \times BW}$$

Status

- Draft Report
  - Received on November 2
  - Contained data not approved by EPA
  - Revised draft report expected by end of December 31