Dioxins and PCBs in Galveston Bay

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TCEQ – Houston Region

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WATER QUALITY PROCESS

SET USES & STANDARDS

MONITOR

ASSESS

LIST

PLAN

2012 Texas Integrated Report: Assessment Results fo

SEGID 2422B Double Bayou West Fork (unclassified water body)

AUID 2422B_01 From the Trinity Bay confluence to Belton Road

USE Aquatic Life Use

Method	Parameter	ASSMT Start Date	ASSMT End Date	# Actual	Mean Actual
Dissolved Oxygen grab screening level	Dissolved Oxygen Grab	11/1/2005	11/30/2010	127	
Dissolved Oxygen grab minimum	Dissolved Oxygen Grab	11/1/2005	11/30/2010	127	
Dissolved Oxygen 24hr average	Dissolved Oxygen 24hr Avg	11/1/2005	11/30/2010	14	
Dissolved Oxygen 24hr minimum	Dissolved Oxygen 24hr Min	11/1/2005	11/30/2010	14	
Rubner	Rubner	11/1/2005	11/30/2010	3	11.00
Macrobenthic Community	Macrobenthic Community	11/1/2005	11/30/2010	3	27.92
Fish Community	Fish Community	11/1/2005	11/30/2010	8	34.10

USE Recreation Use

Method	Parameter	ASSMT Start Date	ASSMT End Date	# Actual	Mean Actual
Bacteria Geometric	Bacteria	11/1/2005	11/30/2010	48	61.14

USE General Use

Method	Parameter	ASSMT Start Date	ASSMT End Date	# Actual	Mean Actual
National Screening Levels	Nitrate	11/1/2005	11/30/2010	89	
National Screening Levels	Orthophosphorus	11/1/2005	11/30/2010	117	

LIST OF IMPAIRED WATERS 303(d)

SegID: 2422B **Double Bayou West Fork (unclassified water body)**

From the Trinity Bay confluence to Belton Road in Chambers County

Parameter(s)		*Category*	*Year Segment First Listed*
bacteria		**5c**	**2006**
2422B_01	From the Trinity Bay confluence to Belton Road		

Parameter(s)		*Category*	*Year Segment First Listed*
depressed dissolved oxygen		**5b**	**2004**
2422B_01	From the Trinity Bay confluence to Belton Road		

Parameter(s)		*Category*	*Year Segment First Listed*
dioxin in edible tissue		**5a**	**2010**
2422B_01	From the Trinity Bay confluence to Belton Road		

Parameter(s)		*Category*	*Year Segment First Listed*
PCBs in edible tissue		**5a**	**2010**
2422B_01	From the Trinity Bay confluence to Belton Road		

SegID: 2422D **Double Bayou East Fork (unclassified water body)**

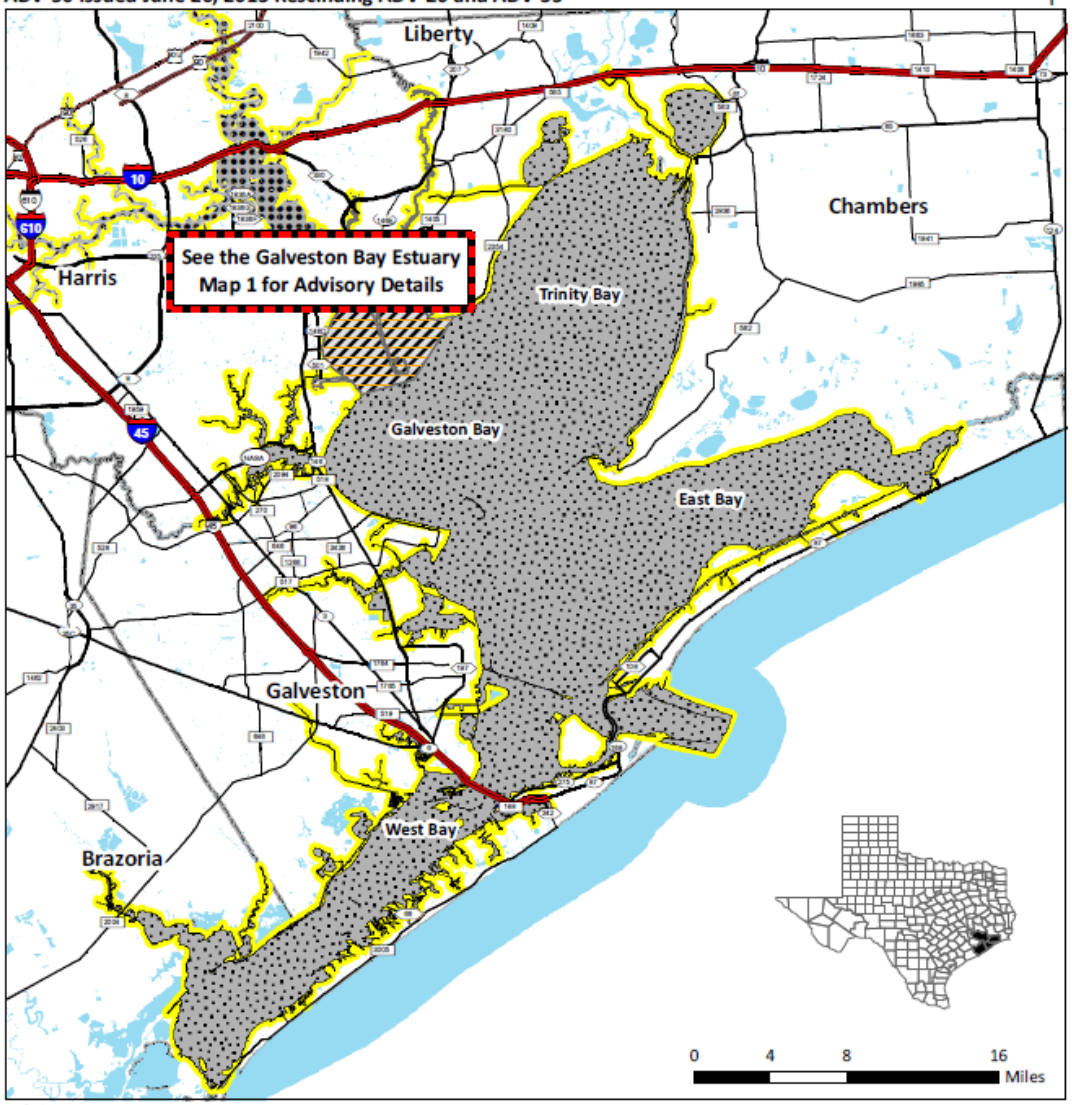
From the Trinity Bay confluence to a point 2.6 km (1.6 mi) upstream of SH 65

Parameter(s)		*Category*	*Year Segment First Listed*
dioxin in edible tissue		**5a**	**2010**
2422D_01	From the Trinity Bay confluence to a point 2.6 km (1.6 mi) upstream of SH 65		

Parameter(s)		*Category*	*Year Segment First Listed*
PCBs in edible tissue		**5a**	**2010**
2422D_01	From the Trinity Bay confluence to a point 2.6 km (1.6 mi) upstream of SH 65		

Fish Advisory: Galveston Bay

- Entire bay – all species of catfish - no more than 1 meal/month except children and women of childbearing age who should not consume any catfish from Galveston Bay



Advisory Area:

Galveston Bay and all contiguous waters including Chocolate Bay, East Bay, Trinity Bay, and West Bay

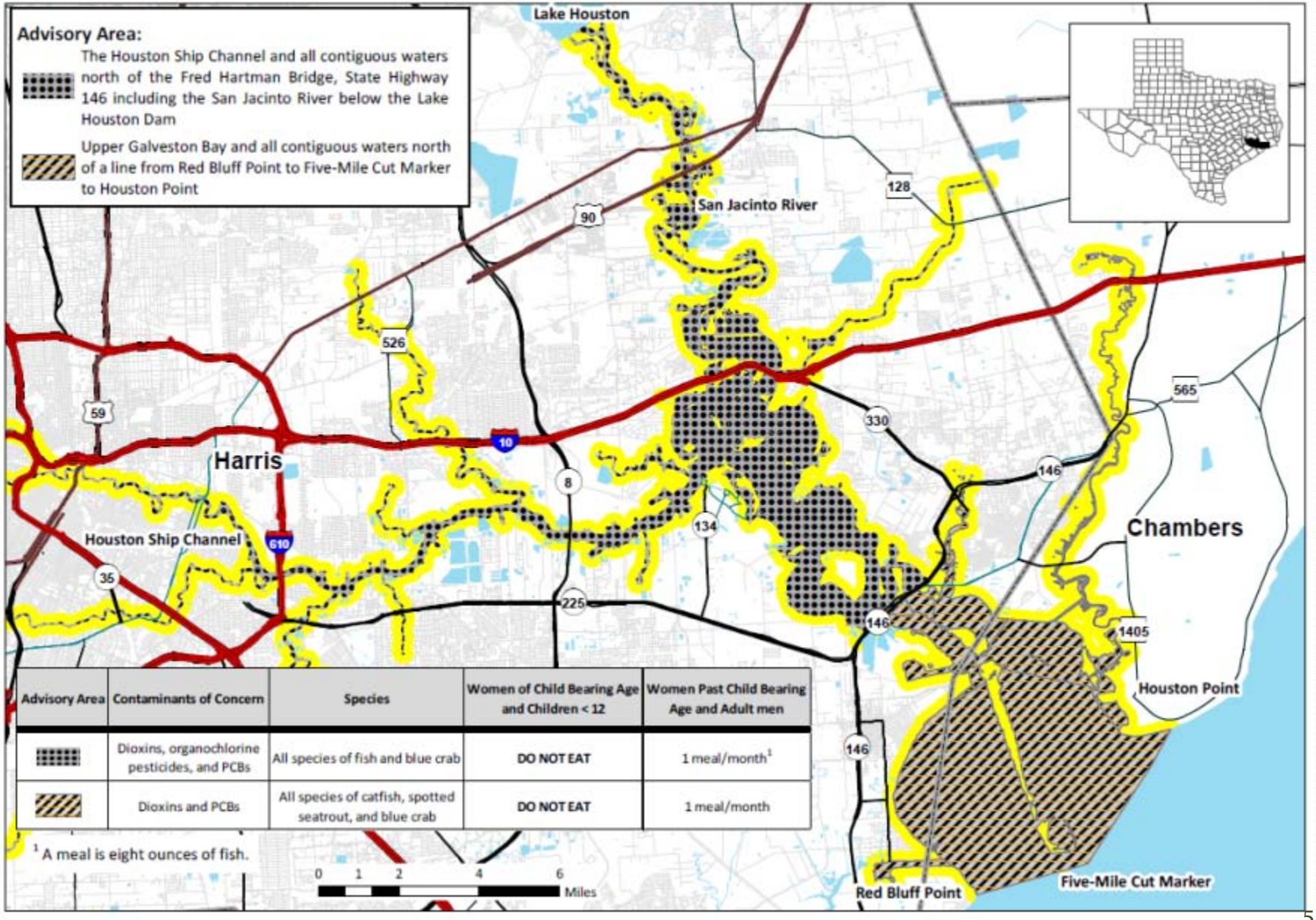
Advisory Area	Contaminants of Concern	Species	Women of Child Bearing Age and Children < 12	Women Past Child Bearing Age and Adult men
	Dioxins and PCBs	All species of catfish	**DO NOT EAT**	1 meal/month[1]

[1] A meal is eight ounces of fish.

Galveston Bay Estuary (Map 1) – Houston Ship Channel, San Jacinto River, and Upper Galveston Bay

Chambers and Harris Counties

ADV-49 and ADV-50 Issued June 26, 2013 Rescinding ADV-3, ADV-20, and ADV-35



Advisory Area	Contaminants of Concern	Species	Women of Child Bearing Age and Children < 12	Women Past Child Bearing Age and Adult men
	Dioxins, organochlorine pesticides, and PCBs	All species of fish and blue crab	DO NOT EAT	1 meal/month[1]
	Dioxins and PCBs	All species of catfish, spotted seatrout, and blue crab	DO NOT EAT	1 meal/month

[1] A meal is eight ounces of fish.

Texas Department of State Health Services (TDSHS)

www.dshs.state.tx.us/seafood/

PCBs & DIOXINS in FISH TISSUE

1) TDSHS issues advisory based on:
   - Levels in fish tissue
   - Calculations of levels that might have a health effect
     - Long-term consumption
2) TCEQ lists waterbody as not meeting water quality standards if it has a consumption advisory from TDSHS
3) TCEQ then develops a plan to improve the water quality (in this case - fish tissue concentrations)

TCEQ PLAN: TMDL

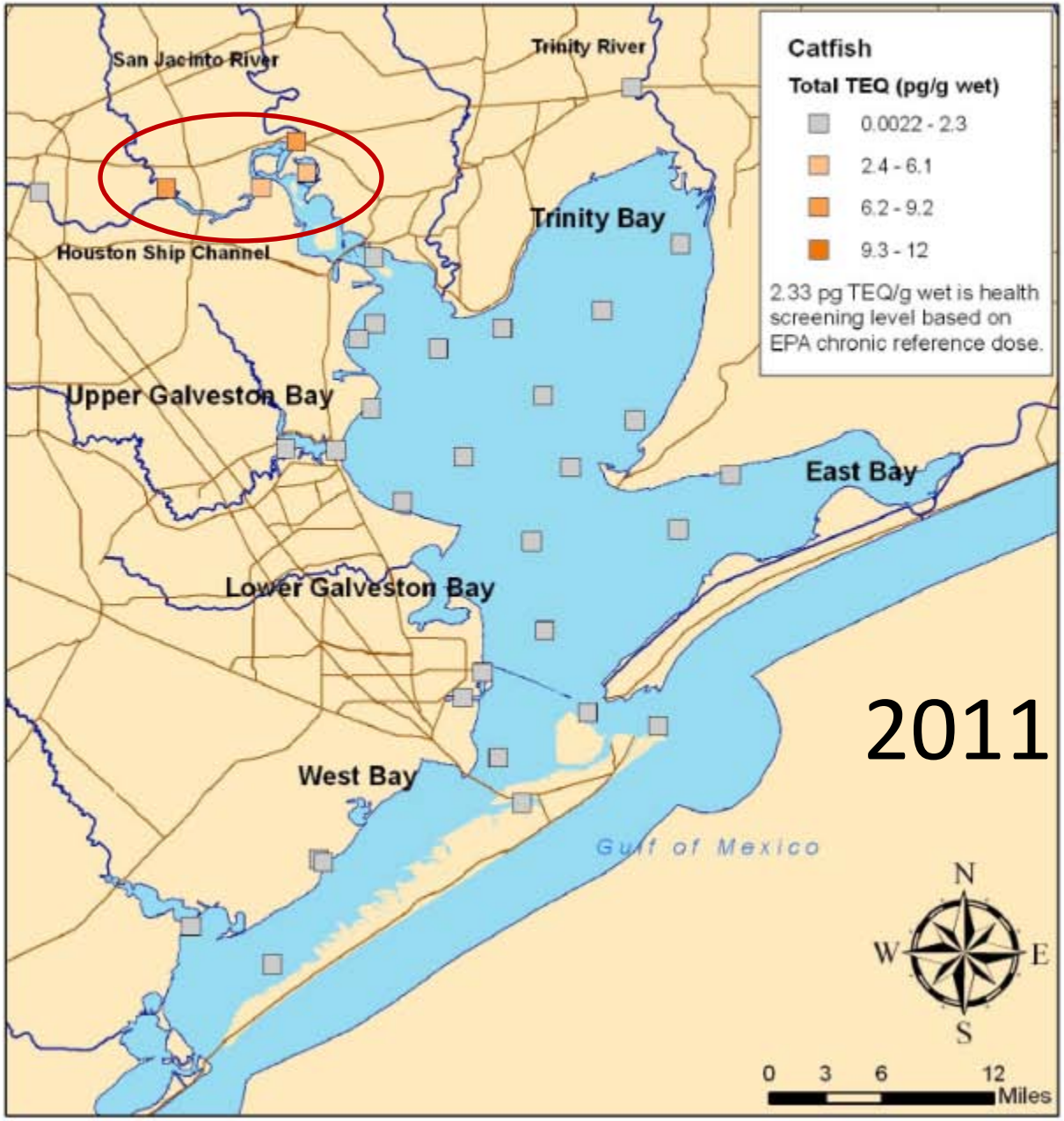
- **Houston Ship Channel and Galveston Bay: A TMDL Project for Dioxin**
  - **Started in 2002**
- **Houston Ship Channel and Upper Galveston Bay: A TMDL Project for PCBs in Fish Tissue**
  - **Started in 2006**
- **Both involve extensive sampling of fish tissue, water, and sediment**

DIOXIN

- Polychlorinated dibenzodioxins (PCDD) and Polychlorinated dibenzofurans (PCDF)
- Unintentional byproduct of some chemical manufacturing, paper bleaching, and combustion
- TDSHS Tissue Screening Level 2.33 ppt
- Exposure is mostly through diet
- Health effects on reproduction, development, immune system, or cancer

Catfish Samples for 2378-TCDD Toxic Equivalency (TEQ) as pg/g wet

DIOXINS



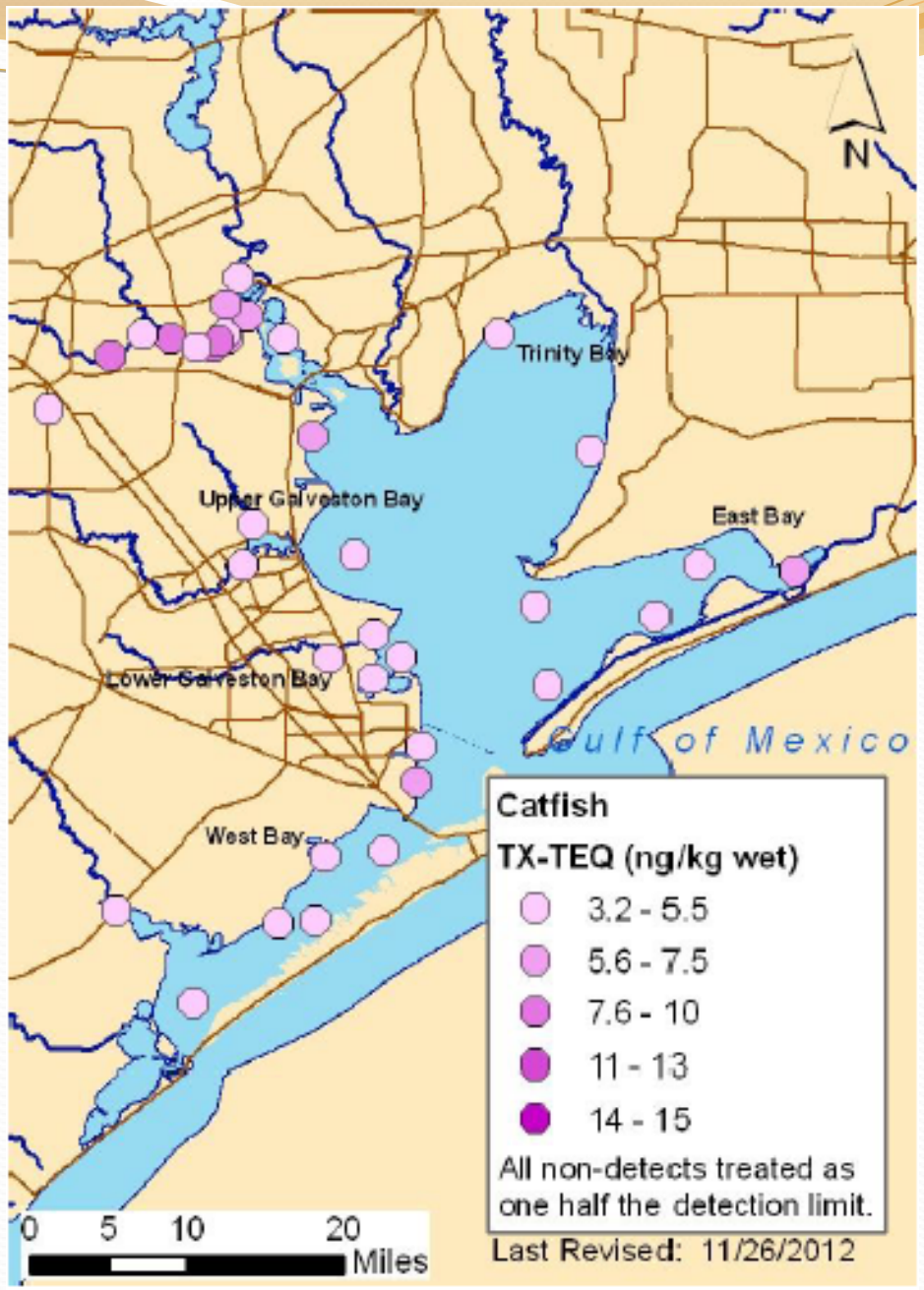
2.33 pg/g wet TEQ represents the Texas Dept State Health Service non-cancer health screening level.

2011 CATFISH

DIOXINS

2012 Catfish

- Higher in Houston Ship Channel



Atlantic Croaker and Trout Samples for 2378-TCDD Toxic Equivalency (TEQ) as pg/g wet

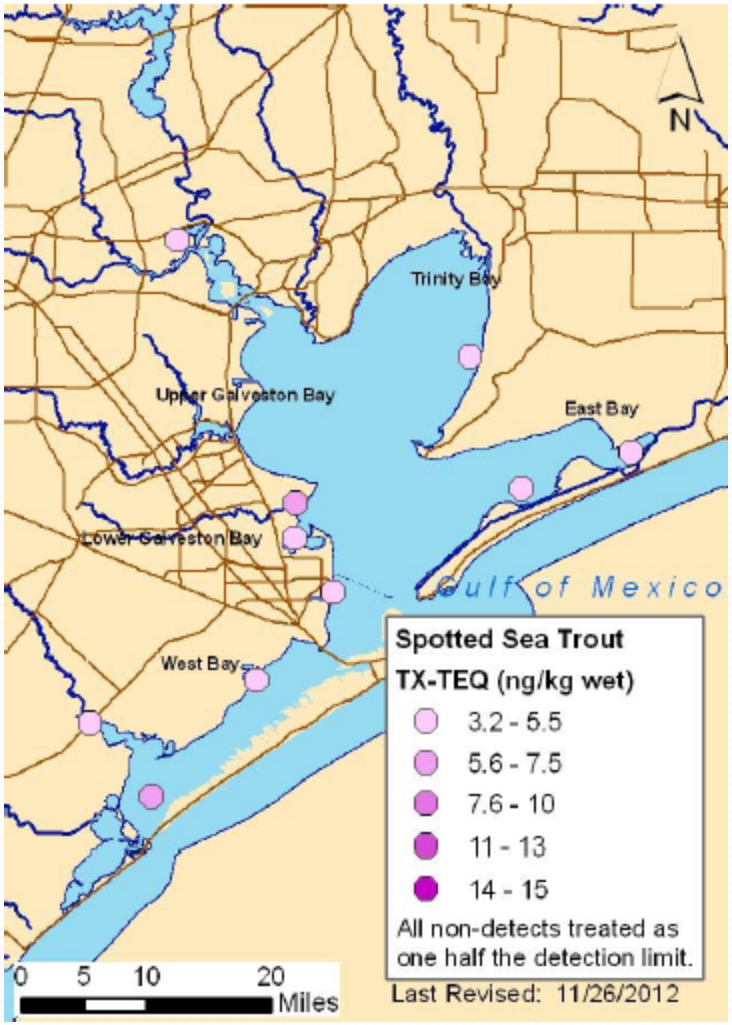
2.33 pg/g wet TEQ represents the Texas Dept State Health Service non-cancer health screening level.

Grayed samples (lower right plot) represent samples nominally below the health screening level.

DIOXINS

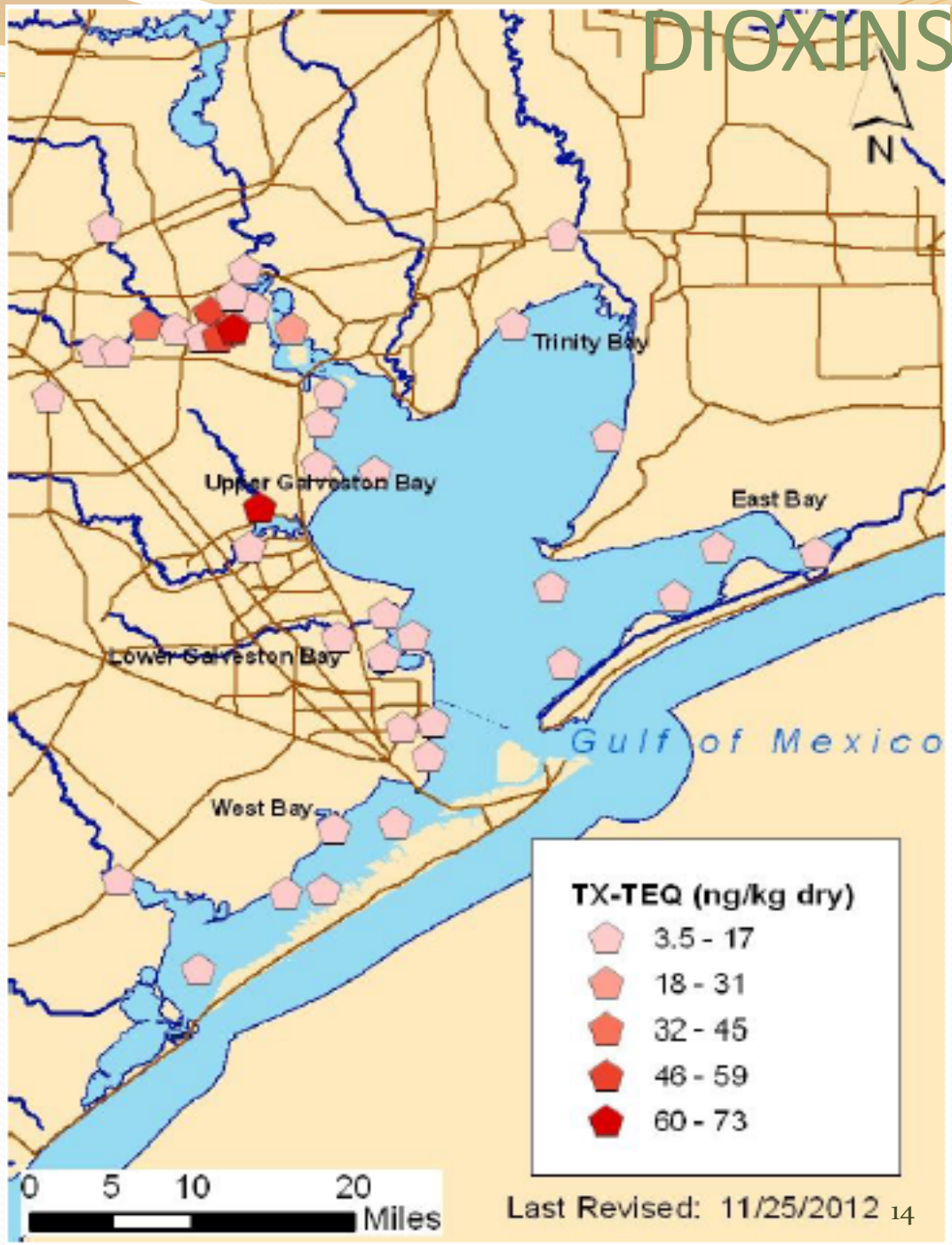
2011 CROAKER AND TROUT

2012 Croaker and Trout



SEDIMENT DIOXIN

- Houston Ship Channel



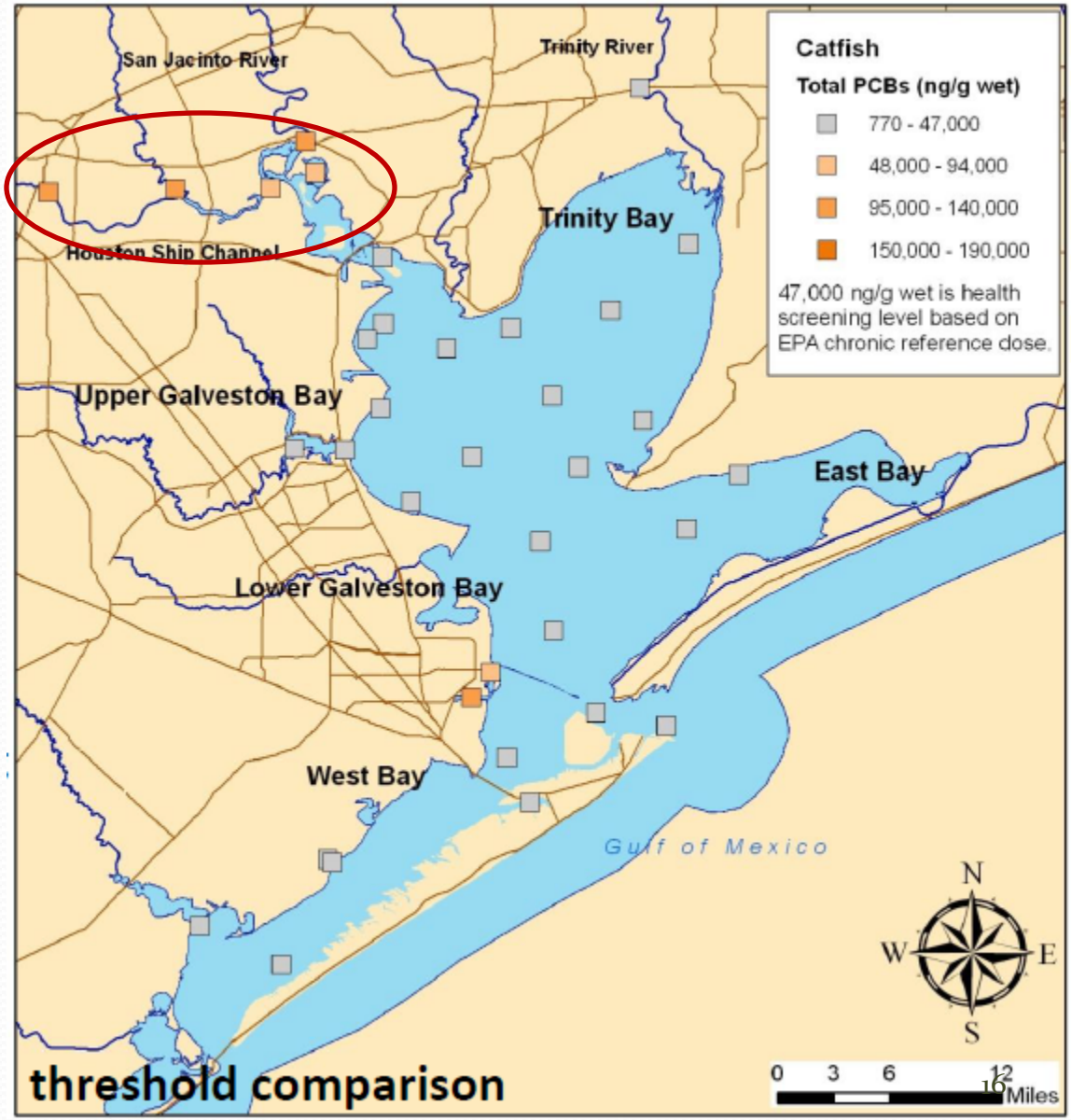
PCBs = Polychlorinated Biphenyls

- Used for electrical transformers, and in plastics, paints, and oils
- Manufacture in US stopped in 1979
- Effects on reproduction, immune system, cancer, or other serious health effects
- TDSHS Tissue Screening Level 47 ppm

2011 Catfish

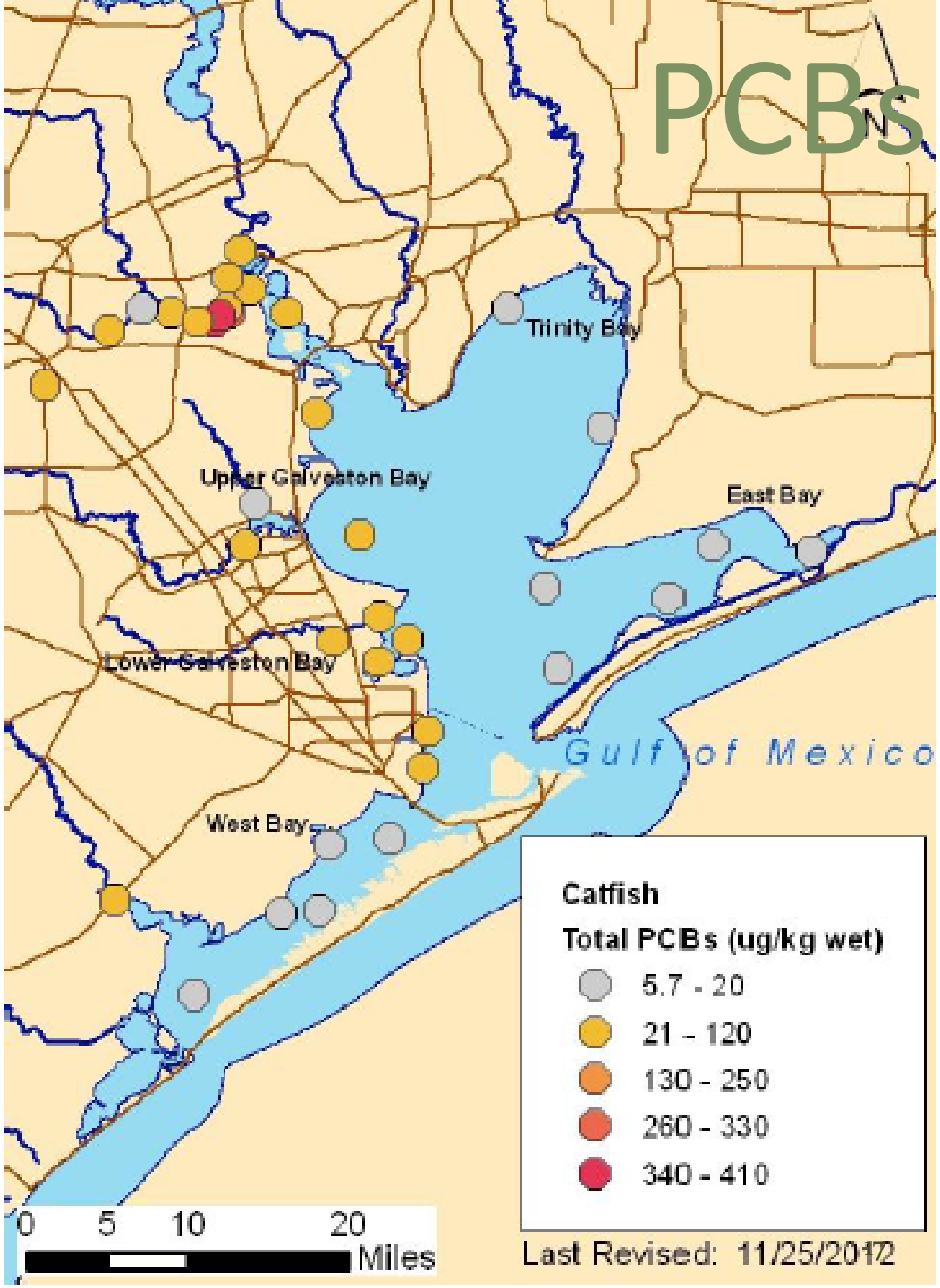
PCBs

- Screening Level is 47 ppm (47,000 ng/g)



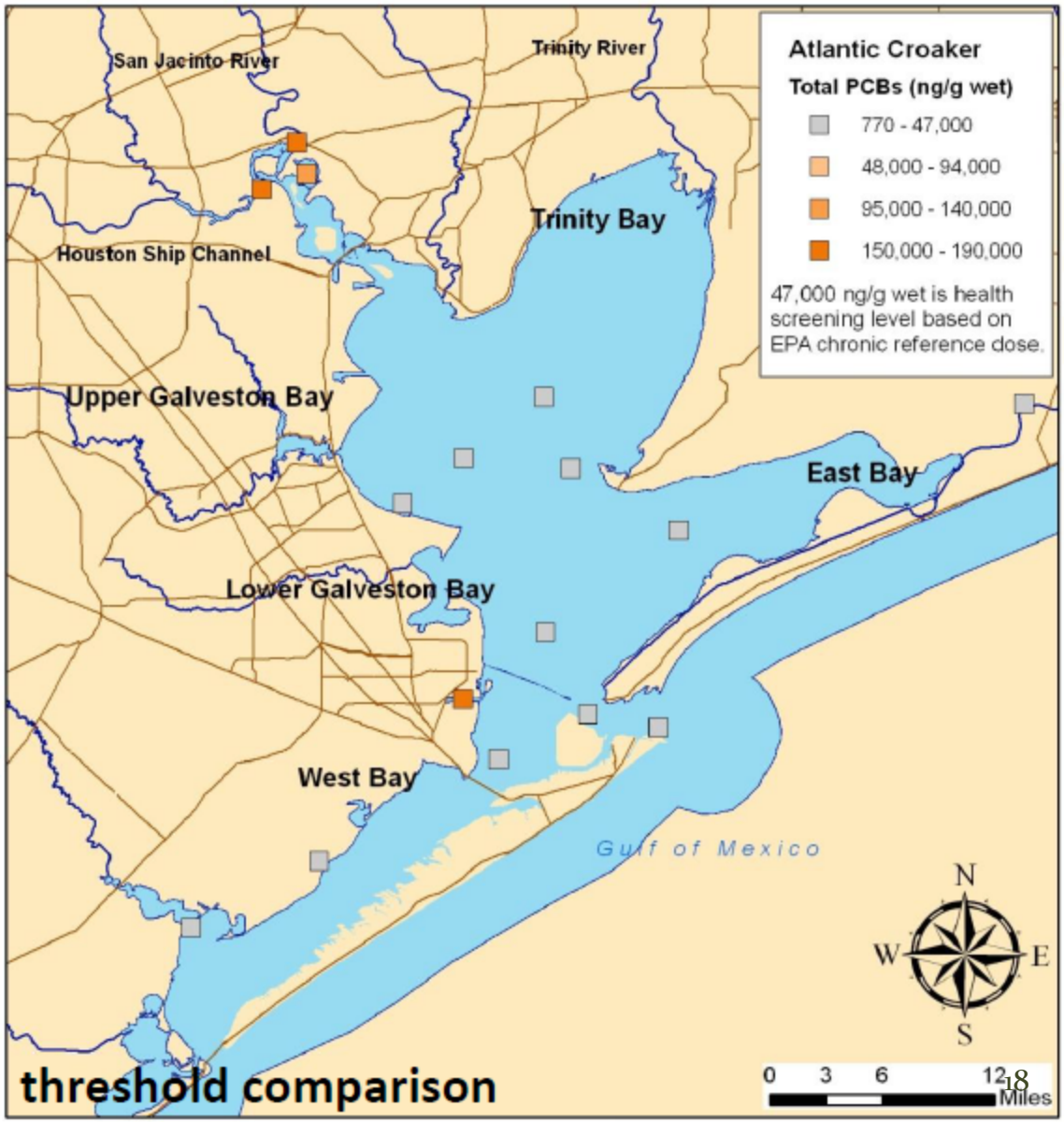
2012 DATA

- CATFISH TISSUE
- Screening Level is 47 ppm



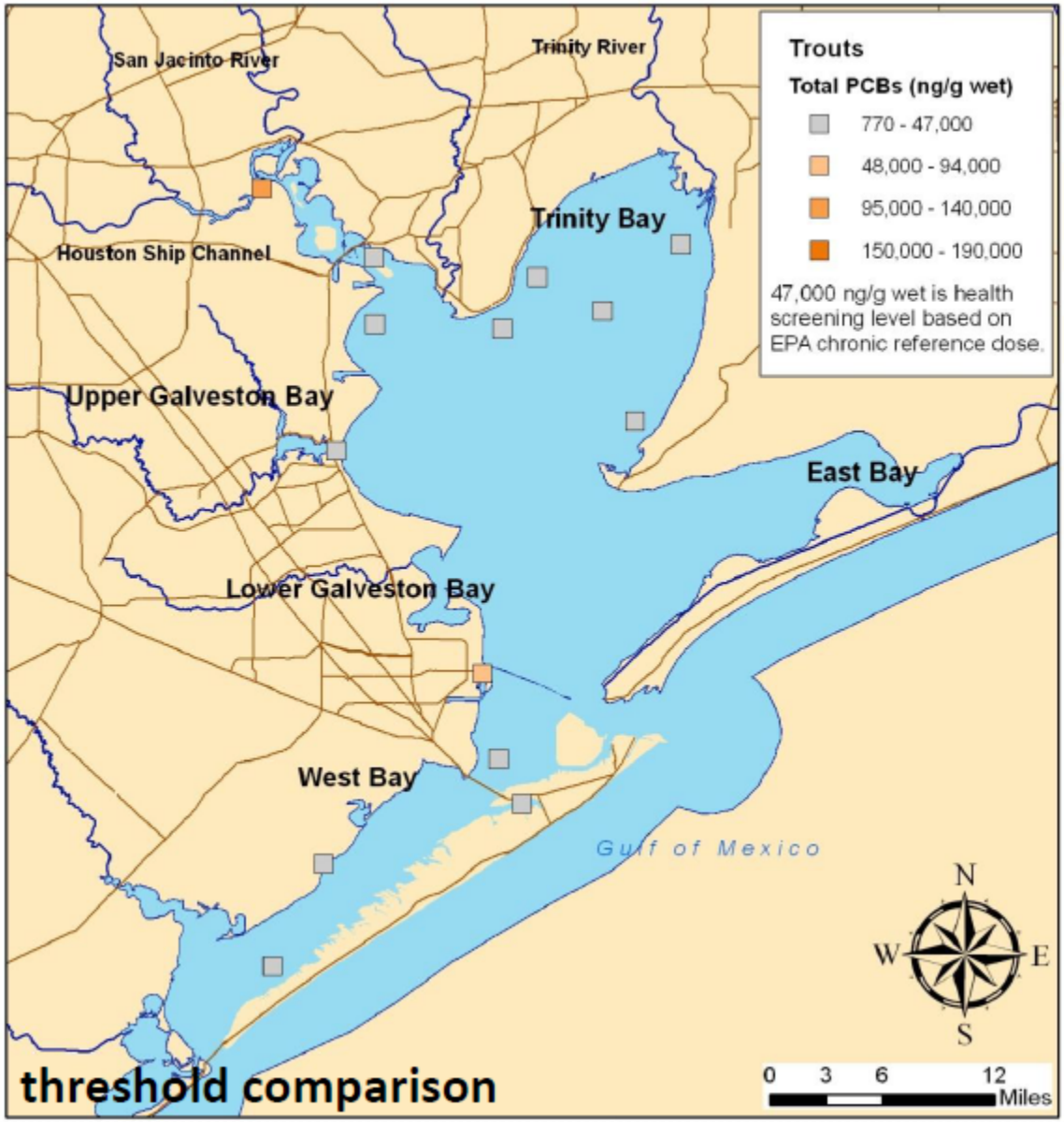
2011 Croaker

PCBs



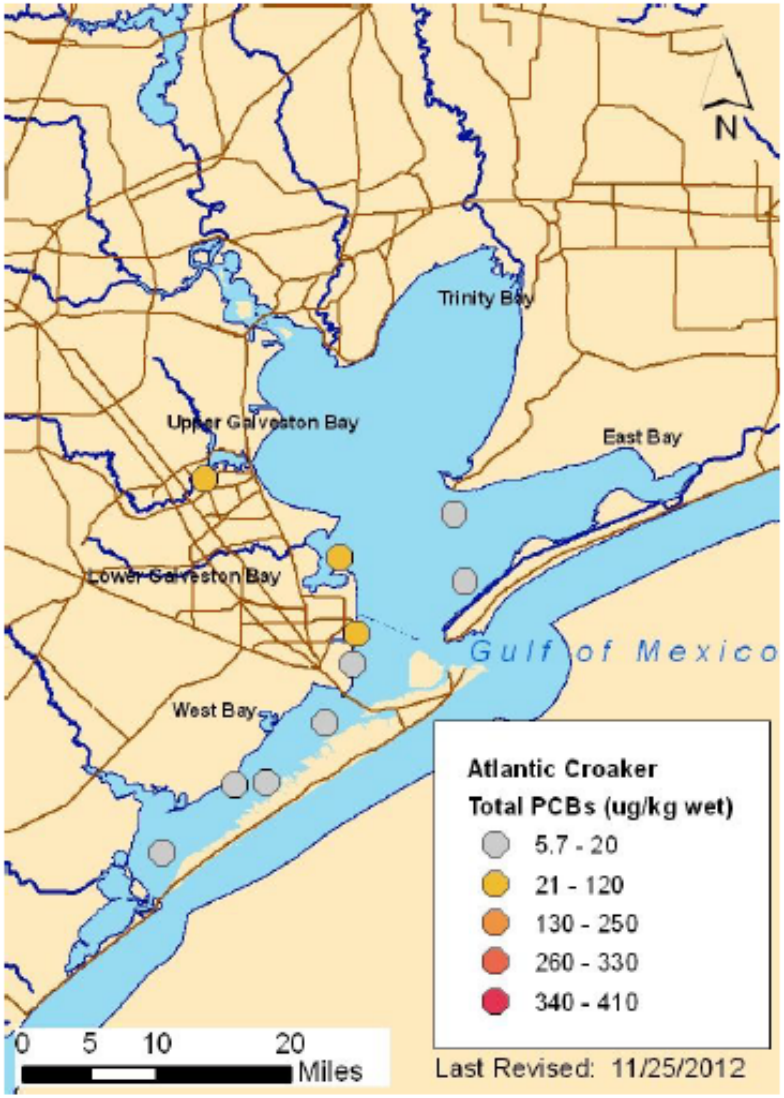
2011 Trout

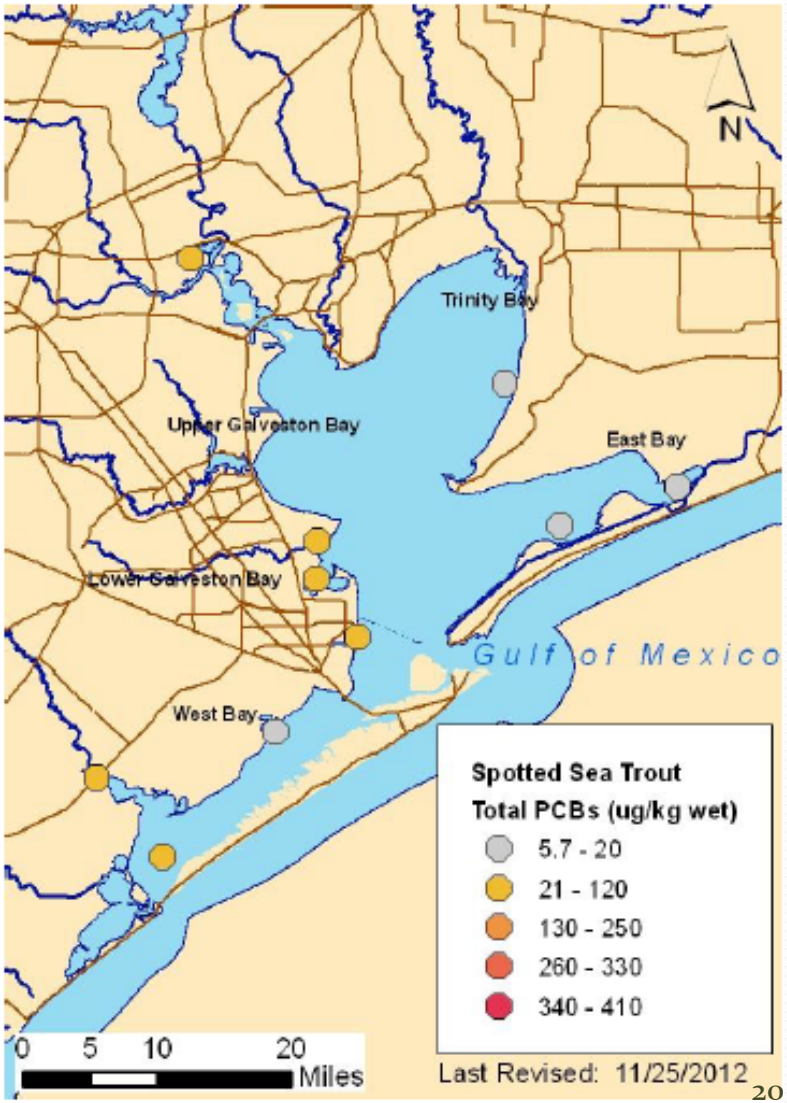
PCBs



2012 Croaker and Trout

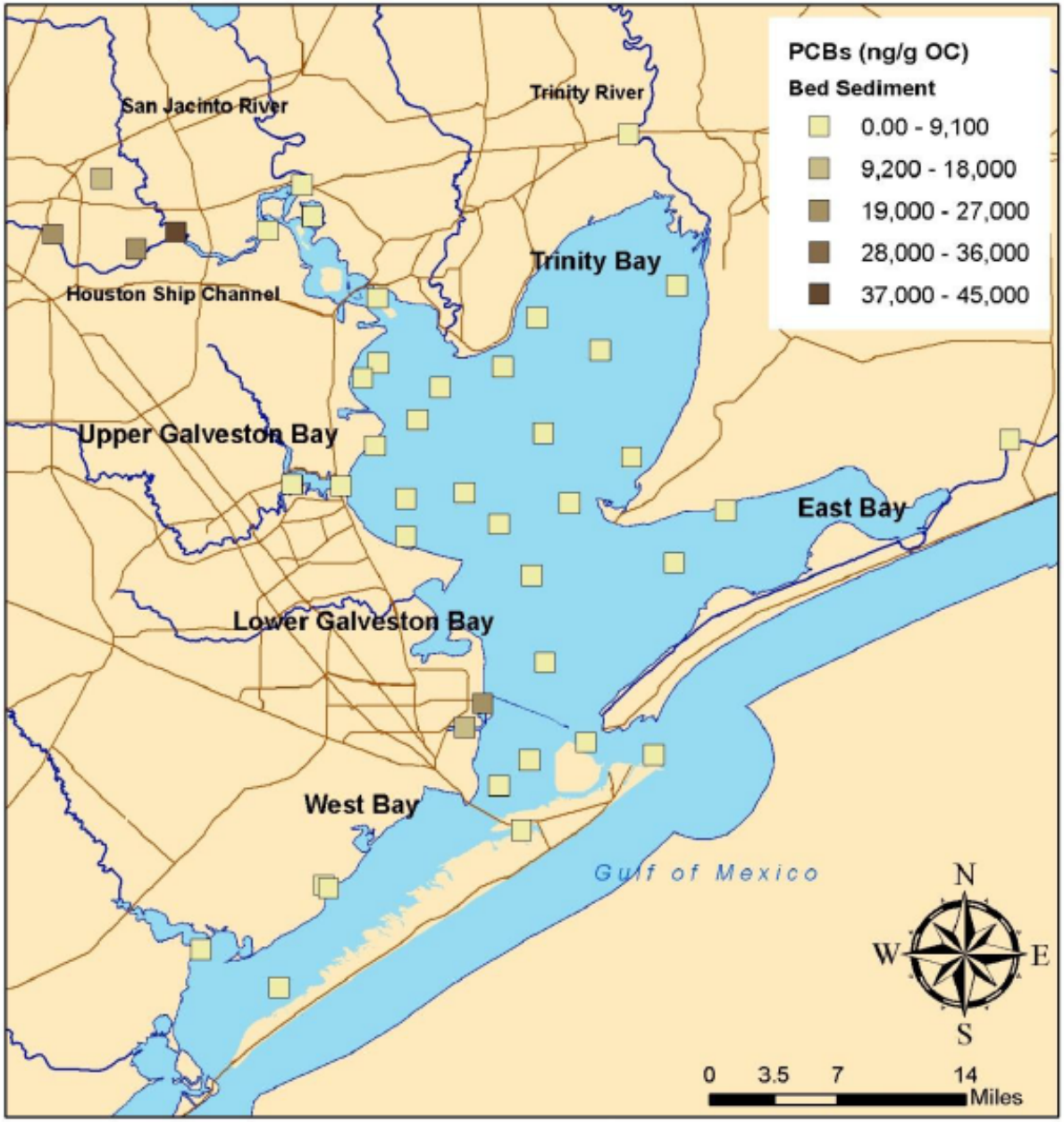
PCBs





SEDIMENT PCBs

- Houston Ship Channel



Summary

- Catfish Tissue in Galveston Bay may be contaminated
  - TDSHS advisory is to eat < 1 meal per month, except children and women of childbearing age, who should eat no catfish from the bay
  - Other species are OK
- Most of the contamination is in the HSC sediments and it is transferred up the food chain to the fish
- A project is under way to figure out how to address the sediment contamination so that the fish concentrations will be reduced
  - No actions in the Double Bayou watershed will affect the fish tissue, but you can participate in the larger Galveston Bay project as a stakeholder

HSC Dioxin/PCB Project

- More information on that TMDL project available at
  - http://www.tceq.texas.gov/waterquality/tmdl/nav/tmdl projectname.html
  - http://www.h-gac.com/community/water/tmdl/hsc-ugb/default.aspx
  - Handouts at back of room

- Data discussed here was collected as part of Dioxin/PCB TMDL project for the Houston Ship Channel by Dr. Hanadi Rifai of University of Houston

QUESTIONS?

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