

Research Interests and Lab Capabilities

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Research Interest Area 1: Environmental Analytical Chemistry

- To identify hazardous chemicals in the environment
- To determine the sources and environmental fate of these pollutants

Lab Capabilities

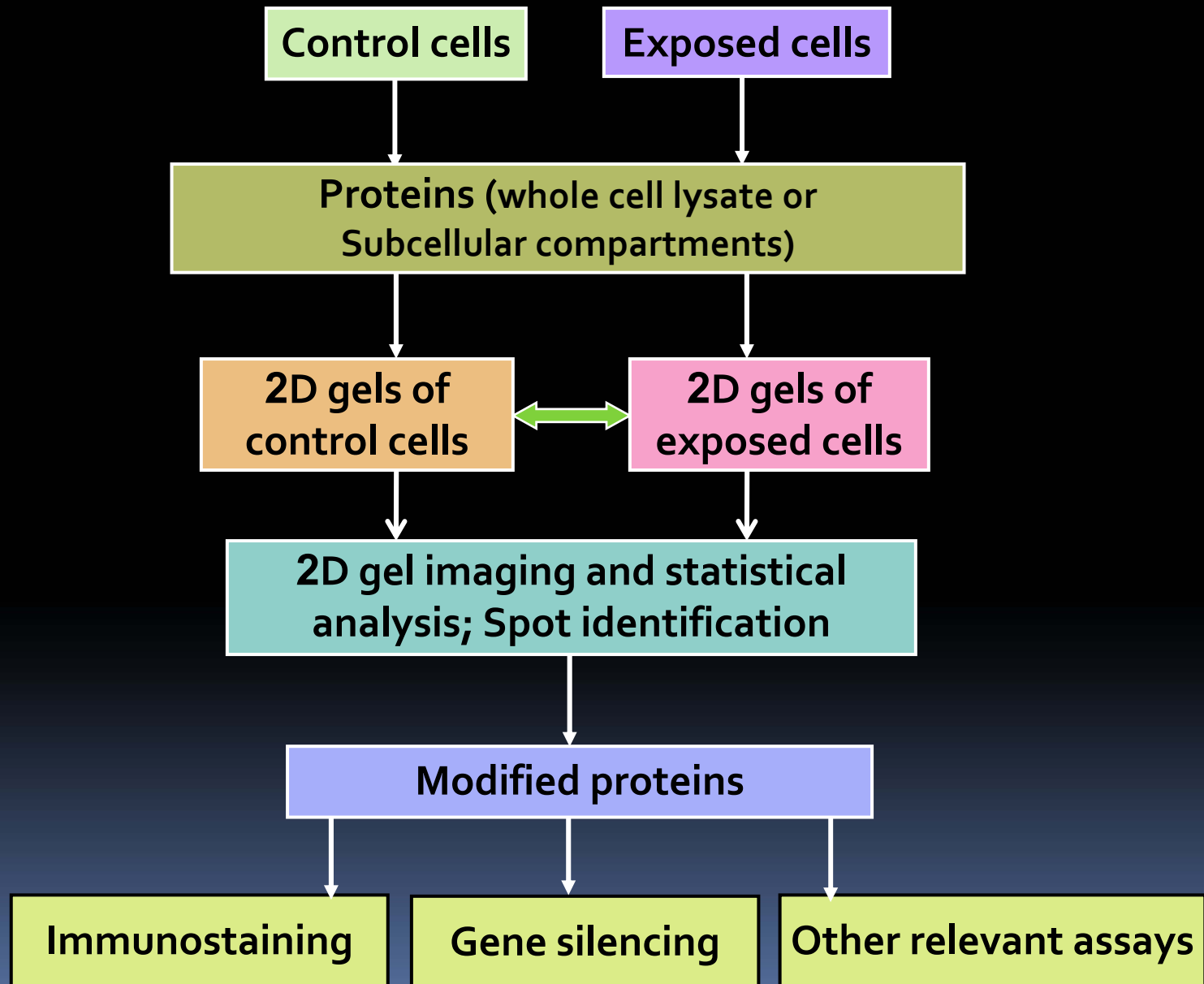
Sample Extraction

- Sample types:
Liquid samples: surface water, waste water
Solid samples: soils, sediments, suspended particles in water
- Extraction methods:
Filtering extraction disks for liquid samples
Ultra sonicator extraction (for small quantity solid particles)
Accelerated solvent extraction (ASE) for soils and sediments
Solid phase extraction (SPE) for extract cleanup

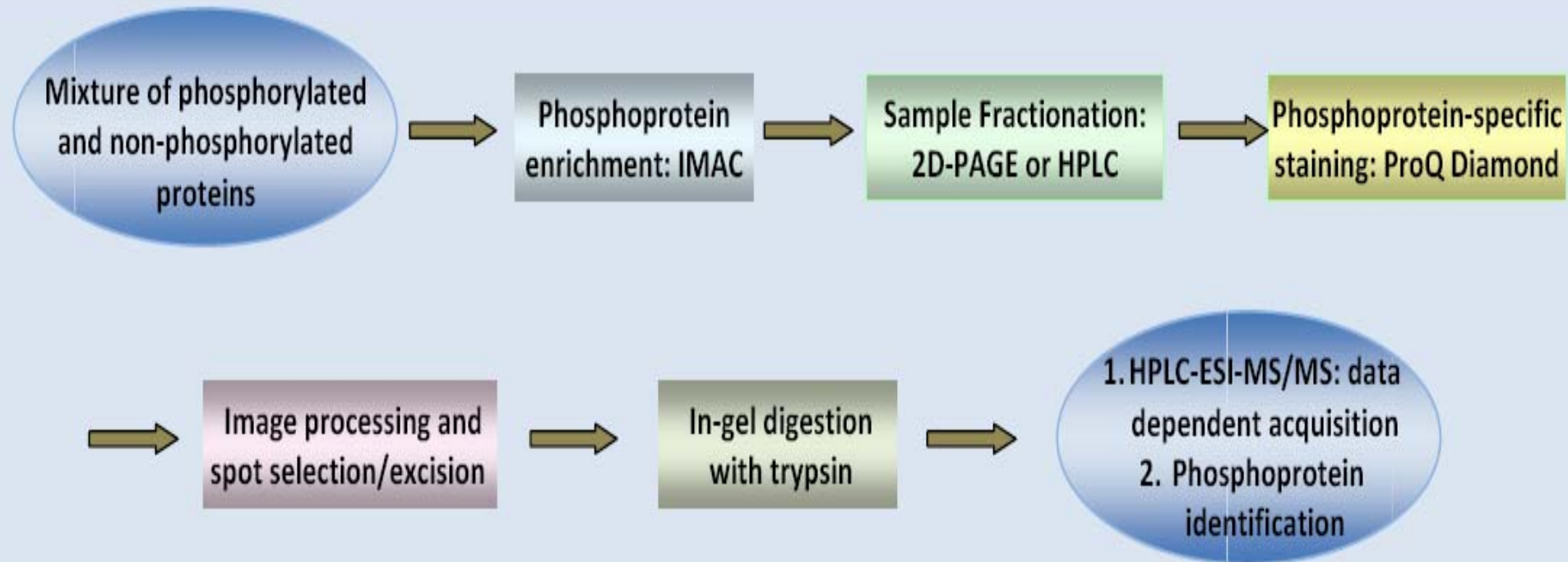
Environmental Pollutant Identification and Quantification

- Gas chromatography-mass spectrometry for PAHs, PCBs, and organochlorine pesticides.
- GC-MS for pharmaceuticals after derivatization for enhanced volatility of analytes
- HPLC-MS for direct analysis of polar compounds such as pharmaceuticals
- HPLC-MS for analysis of degradation products or metabolized forms of environmental pollutants.

Research Interest Area 2: Proteomic Analysis of Pollutant Toxicity



Phosphoproteomic Analysis



Research currently funded by USGS

Endocrine Disrupting Chemicals in New Orleans Urban Environment

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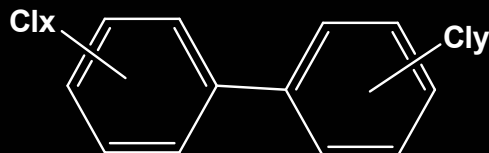
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Endocrine Disrupting Chemicals (EDCs)

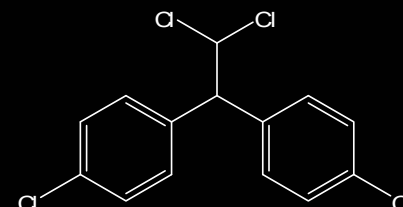
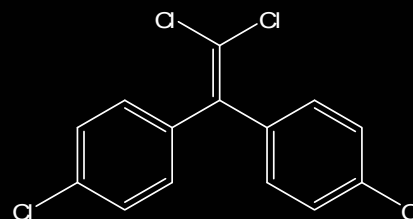
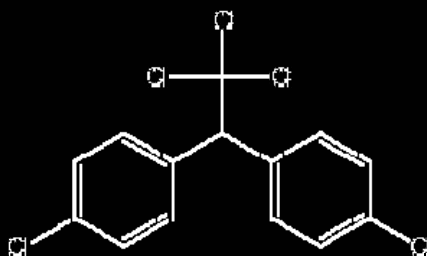
- Endocrine disrupting chemicals (EDCs) are exogenous substances that alter functions of the endocrine system and cause adverse health effects in an intact organism.
- Hundreds of environmental pollutants have been reported as known or potential endocrine disruptors, including natural and synthetic hormones, pesticides, and bisphenol A.

Environmental EDCs

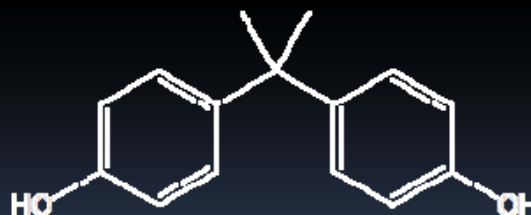
- PCBs/dioxins



- DDT/DDE/DDD

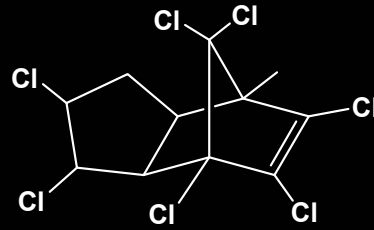
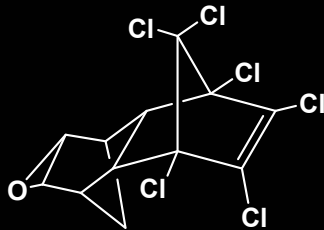


- Bisphenol A

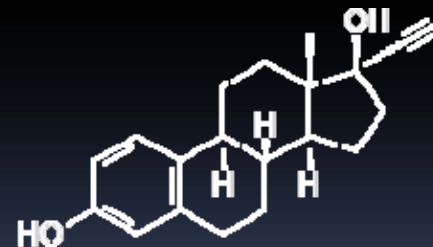
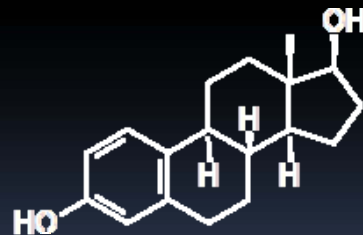
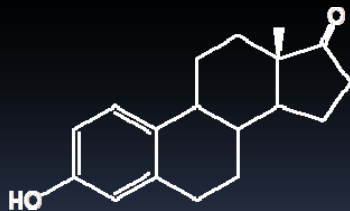


More EDCs

- Organochlorines
e.g. dieldrin, chlordane, endosulfan



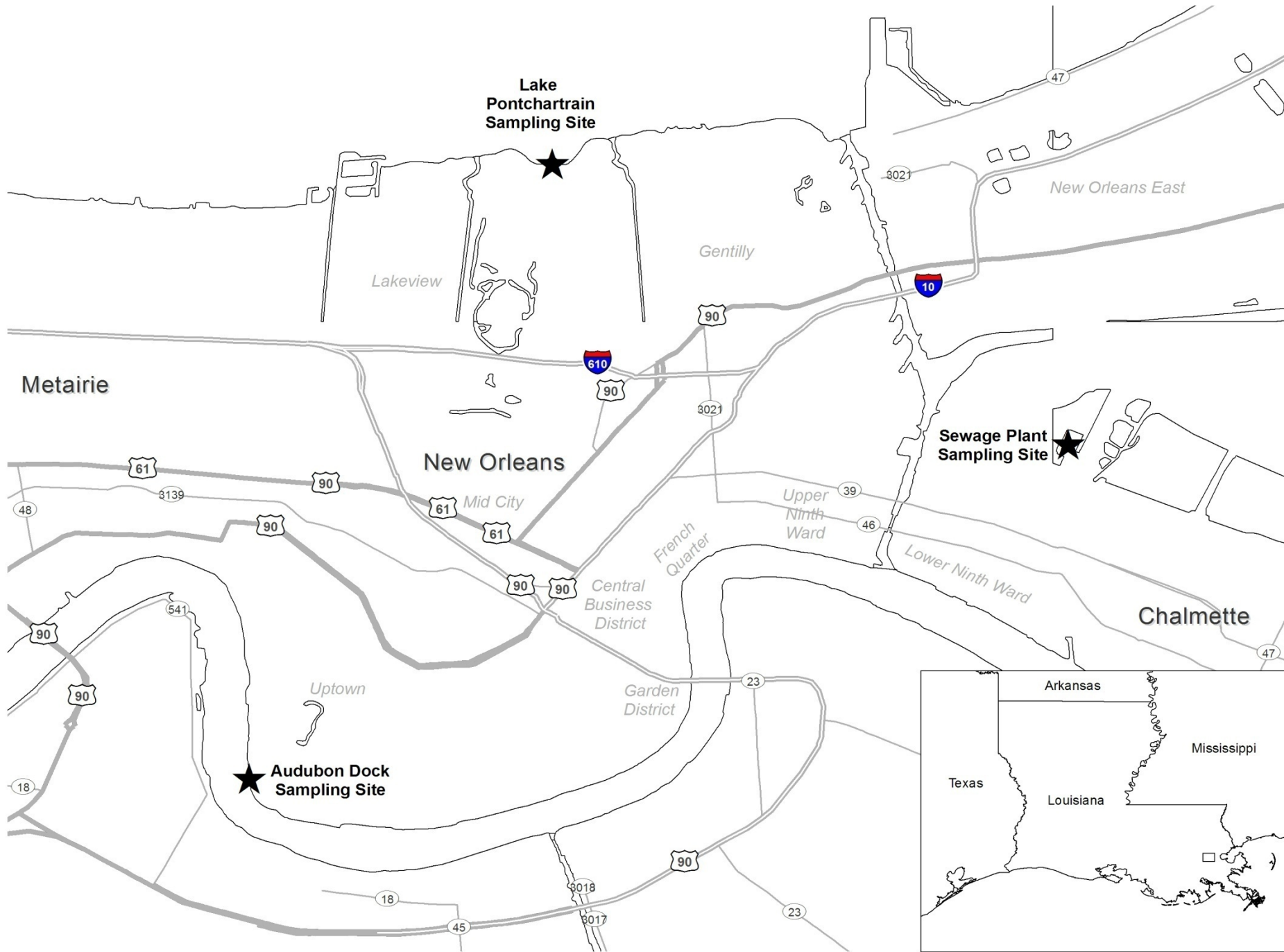
- Natural and synthetic hormones
e.g. estrone, 17 β -estradiol, 17 α -ethinylestradiol

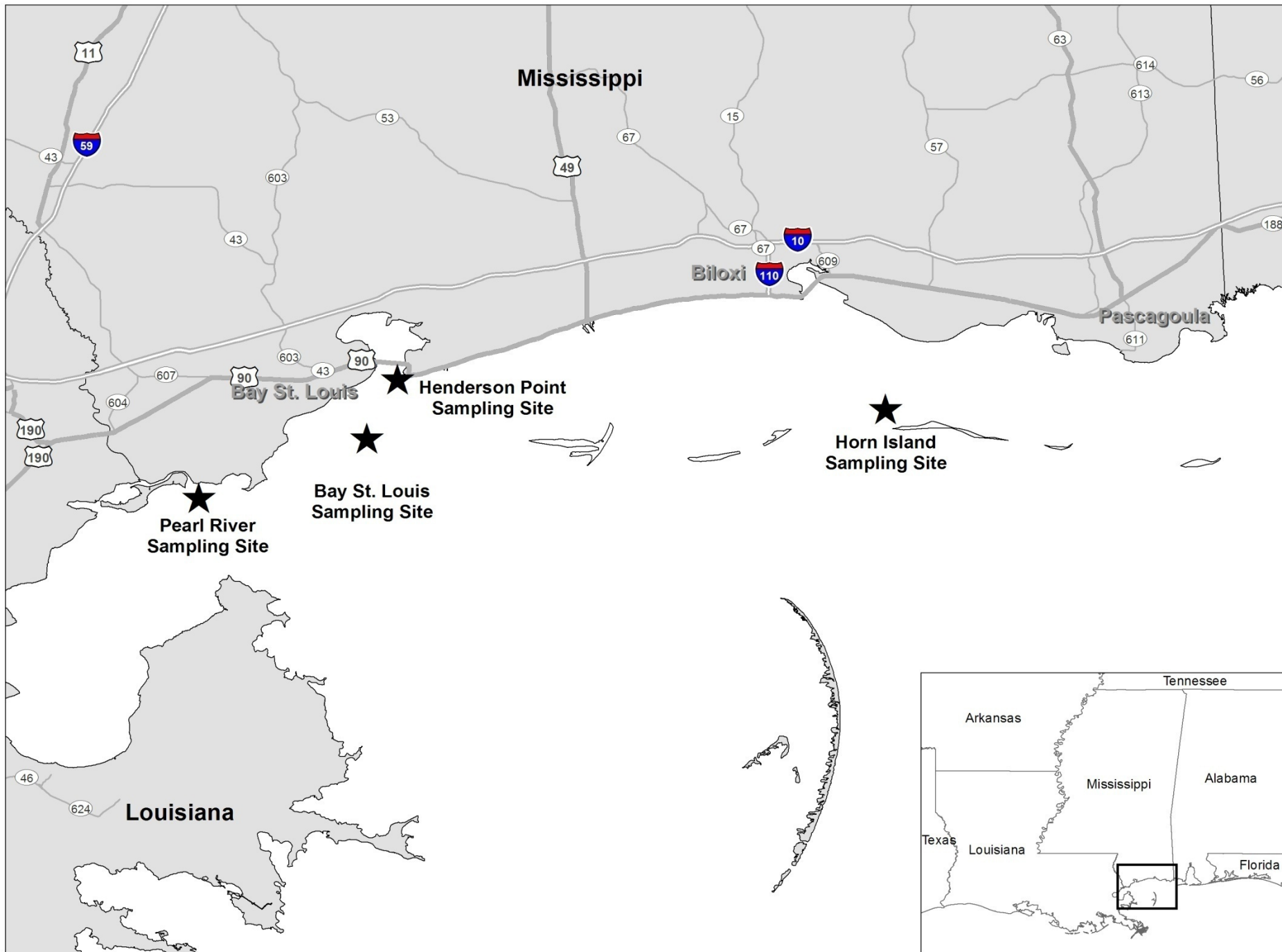


- Various other compounds:
phthalates, alkylphenols, and phytoestrogens

OBJECTIVE

- To identify and quantitatively measure endocrine disruptors in New Orleans urban environment
- To investigate the source and distribution of endocrine disruptors in the Mississippi river delta and the Gulf of Mexico

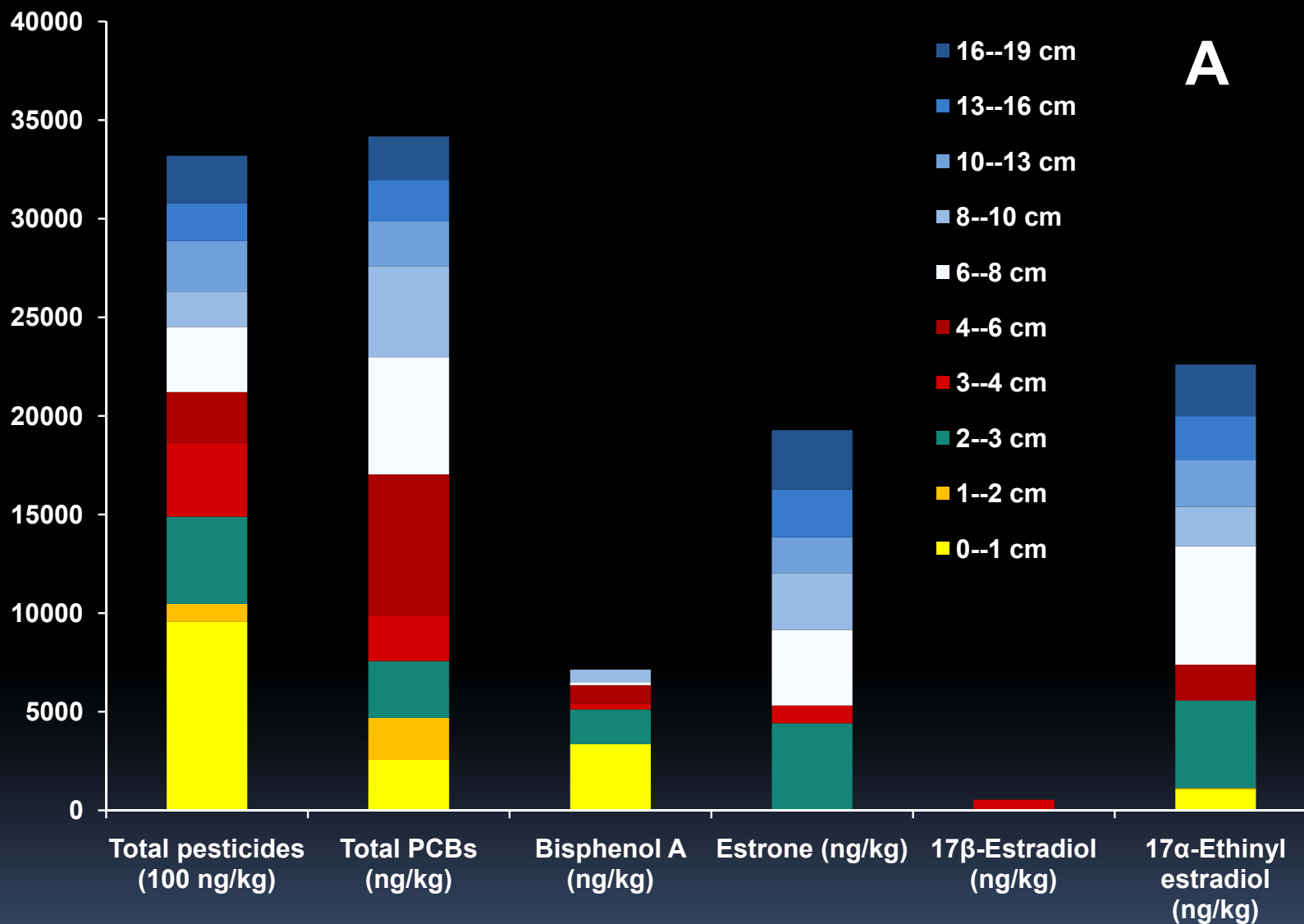




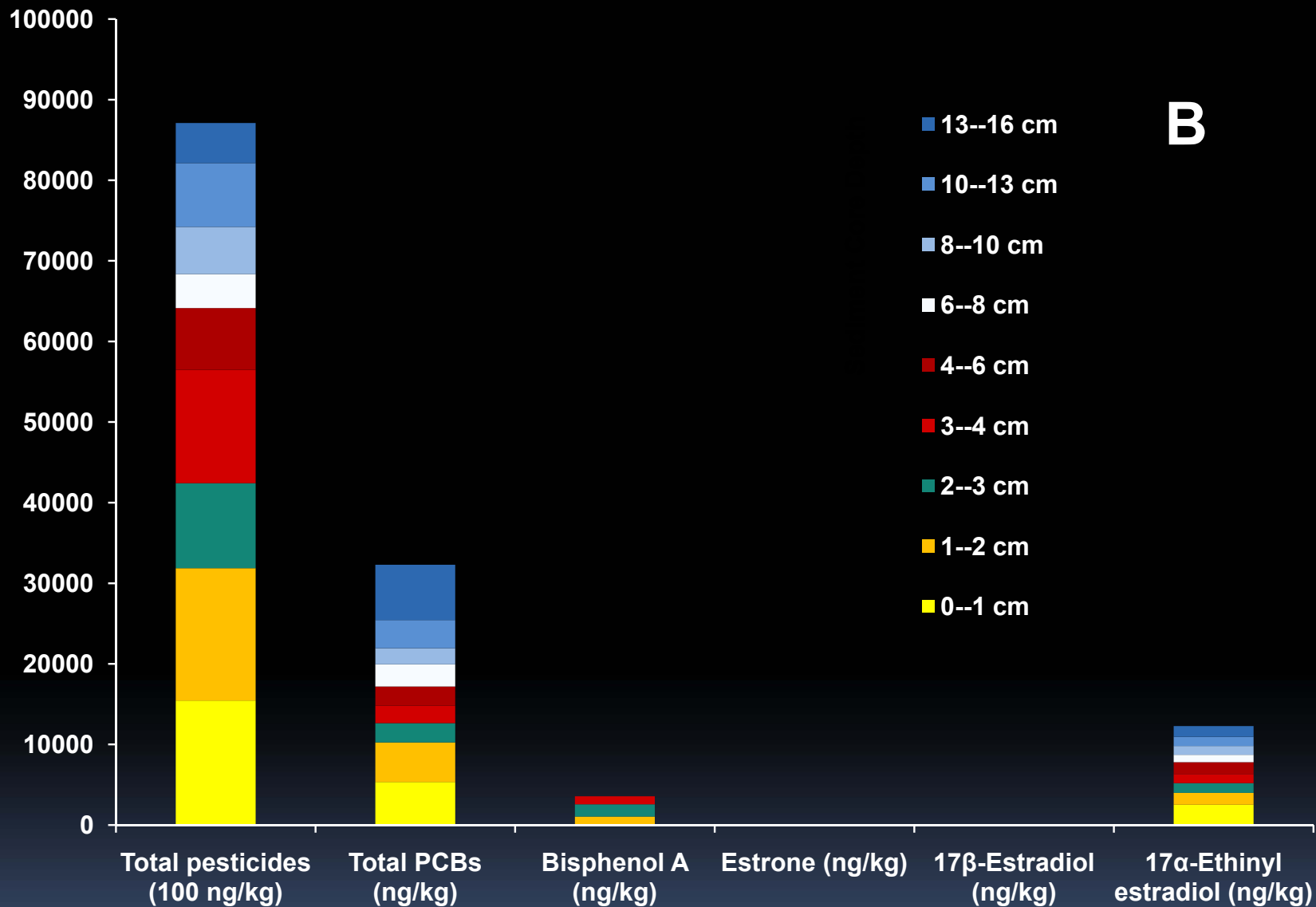
	Sewage Influent			Sewage Effluent		
	Liquid phase	Particle phase	Total	Liquid phase	Particle phase	Total
1,2-dibromo-3-chloropropane	0.00	0.00	0.00	0.00	0.00	0.00
Hexachloropentadiene	0.00	0.00	0.00	0.00	0.00	0.00
diallate	0.00	0.00	0.00	0.00	0.00	0.00
Hexachloroben zene	0.00	0.00	0.00	0.00	0.00	0.00
Alpha-BHC	0.00	0.00	0.00	0.00	0.00	0.00
chlordene	0.00	0.00	0.00	0.00	0.00	0.00
Gamma-BHC	20.39	17.54	37.93	15.19	16.90	32.09
Beta-BHC	7.75	0.00	7.75	0.00	0.00	0.00
Delta-BHC	0.00	0.00	0.00	0.00	0.00	0.00
heptachlor	0.00	0.00	0.00	0.00	0.00	0.00
aldrin	0.00	125.40	125.40	0.00	0.00	0.00
isodrin	0.00	144.46	144.46	123.42	210.04	333.46
Heptachlor epoxide-isomer B	137.23	25.07	162.29	44.41	0.00	44.41
Gamma-chlordane	0.00	59.53	59.53	0.00	5.53	5.53
trans-nonachlor	0.00	0.00	0.00	2.33	0.00	2.33
Endosulfan I	28.57	20.94	49.50	0.00	67.39	67.39
Alpha-chlordane	0.00	0.00	0.00	27.08	0.00	27.08
4,4'-DDE	61.07	58.71	119.78	0.00	0.00	0.00
dieldrin	0.00	0.00	0.00	0.00	0.00	0.00
endrin	118.85	0.00	118.85	87.79	0.00	87.79
chlorobenzilate	14.58	0.00	14.58	0.00	9.91	9.91
Cis-nonachlor	0.00	0.00	0.00	0.00	0.00	0.00
Endosulfan II	32.90	0.00	32.90	0.00	0.00	0.00
4,4'-DDD	6.24	0.00	6.24	4.72	3.90	8.63
Endrin aldehyde	0.00	70.40	70.40	6.06	0.00	6.06
4,4'-DDT	0.00	0.00	0.00	0.00	0.00	0.00
Endosulfan sulfate	0.00	10.63	10.63	0.00	0.00	0.00
Endrin keton	0.00	0.00	0.00	0.00	0.00	0.00
methoxychlor	0.00	0.00	0.00	0.00	0.00	0.00
Total organochlorine pesticides	427.57	532.67	960.25	311.00	313.69	624.69
Total PCBs (Sum of 27 congeners)	10.22	53.76	63.98	11.48	19.16	30.64
Bisphenol A	203.01	131.04	334.05	44.89	10.23	55.12
Estrone	167.3	191.69	358.99	72.73	39.14	111.87
17β-Estradiol	61.61	93.86	155.47	18.97	35.9	54.87
17α-Ethinylestradiol	18.89	27	45.89	20.63	31.09	51.72
Total EDCs	888.61	1030.02	1918.63	479.70	449.20	928.91

EDC concentrations (ng/L) in Gulf of Mexico ocean water

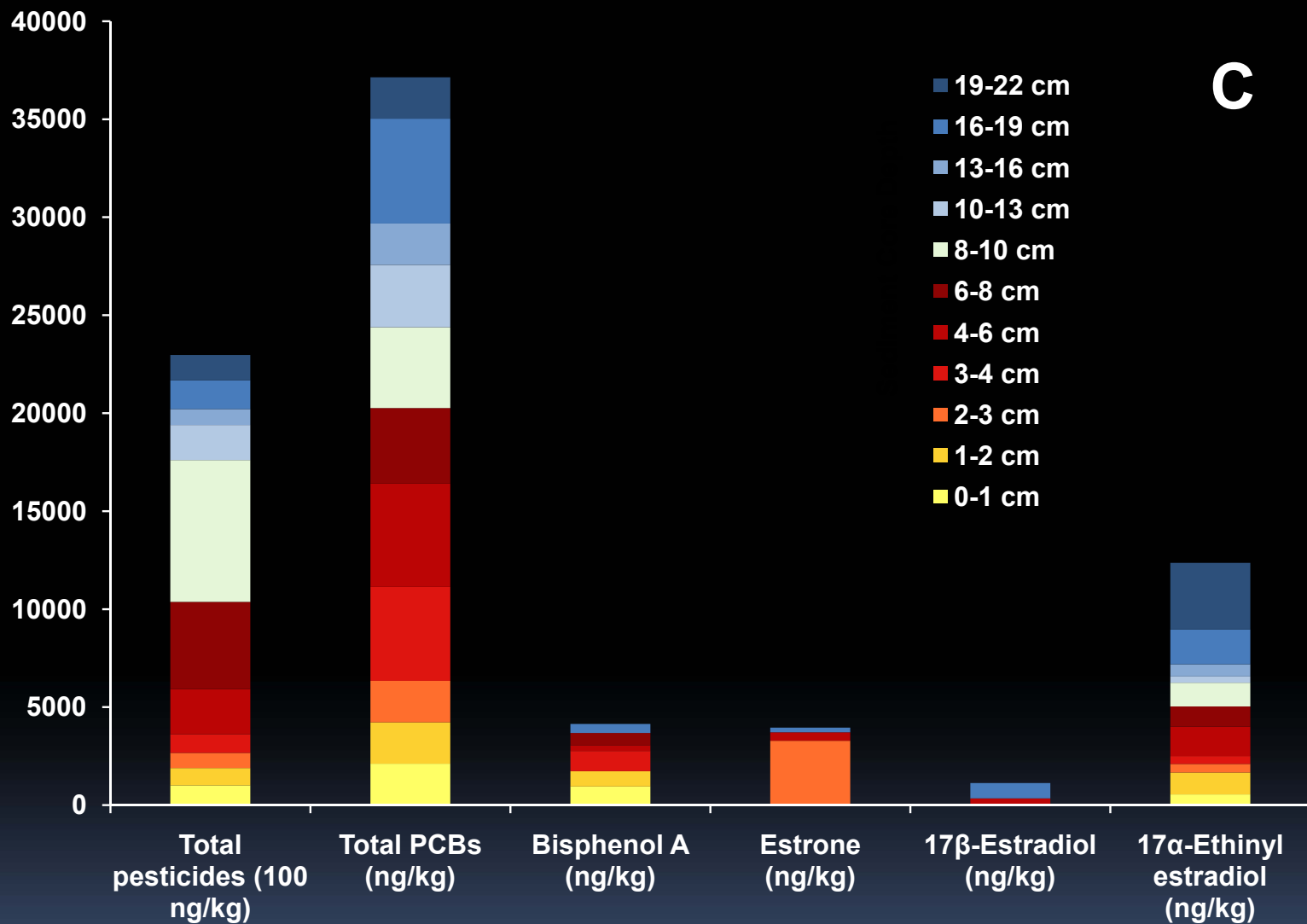
	Horn Island			Henderson Point			Pearl River Mouth			South of Bay St. Louis		
EDCs	Liquid phase	Particle phase	Total	Liquid phase	Particle phase	Total	Liquid phase	Particle phase	Total	Liquid phase	Particle phase	Total
Total organochlorine Pesticides (Sum of 29)	116.46	92.2	208.66	134.61	158.37	292.98	143.2	160.47	303.67	53.03	88.06	141.09
Total PCBs (Sum of 27 congeners)	0.16	1.25	1.41	0.21	5.55	5.76	0.26	4.17	4.43	0.24	12.56	12.8
Bisphenol A	0.49	0.31	0.8	0.13	0.67	0.8	0.16	0.7	0.86	0.31	0.15	0.46
Estrone	0	2.12	2.12	1.11	14.06	15.17	0.24	1.09	1.33	0.87	3.19	4.06
17 β -Estradiol	0	0	0	0.12	10.3	10.42	0	0	0	1.12	1.77	2.89
17 α -Ethinylestradiol	0.53	1.75	2.28	1.64	0.2	1.84	0.7	0.94	1.64	1.93	0.33	2.26
Total EDCs	117.64	97.63	215.27	137.82	189.15	326.97	144.56	167.37	311.93	57.5	106.06	163.56



EDC Concentrations in Marine Sediments from South of the Bay of St. Louis in Mississippi Sound 30° 14.0'N , 89° 20.0'W)



EDC Concentrations in Marine Sediments from Pear River mouth in Mississippi Sound (30° 10.0' N, 89° 31.0' W)



EDC Concentrations in Marine Sediments from Henderson Point in Mississippi Sound (30° 18.0' N , 89° 18.0' W)

EDC Concentrations in Marine Sediments from Horn Island in Mississippi Sound (30° 16.0' N, 88° 46.0' W)

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