

Center for Environmental Diagnostics and Bioremediation (CEDB)
University of West Florida, Pensacola, FL 32514

Partnership for Environmental Research and Community Health (PERCH)
Bioaccumulation Study

Background

The Bioaccumulation Study is assessing the magnitude of contamination in fish and shellfish tissues in the Pensacola Bay region and evaluating the potential human health effects from consumption of locally harvested fish and shellfish.

Activities

Sampling for speckled trout (*Cynoscion nebulosus*), redfish (red drum; *Sciaenops ocellatus*), and flounder (*Paralichthys sp.*) is in progress. Sampling for largemouth bass (*Micropterus salmoides*) and mullet (*Mugil cephalus*) (Figure 1) has been completed and data have been processed. Largemouth bass were sampled from ten locations in the Perdido (2), Escambia (2), Blackwater (2), Yellow (2), and Shoal Rivers (1), and Eleven Mile Creek (1). Mullet were sampled from thirteen locations throughout the bays and bayous in the Pensacola area. Five sampling locations were common to both species.

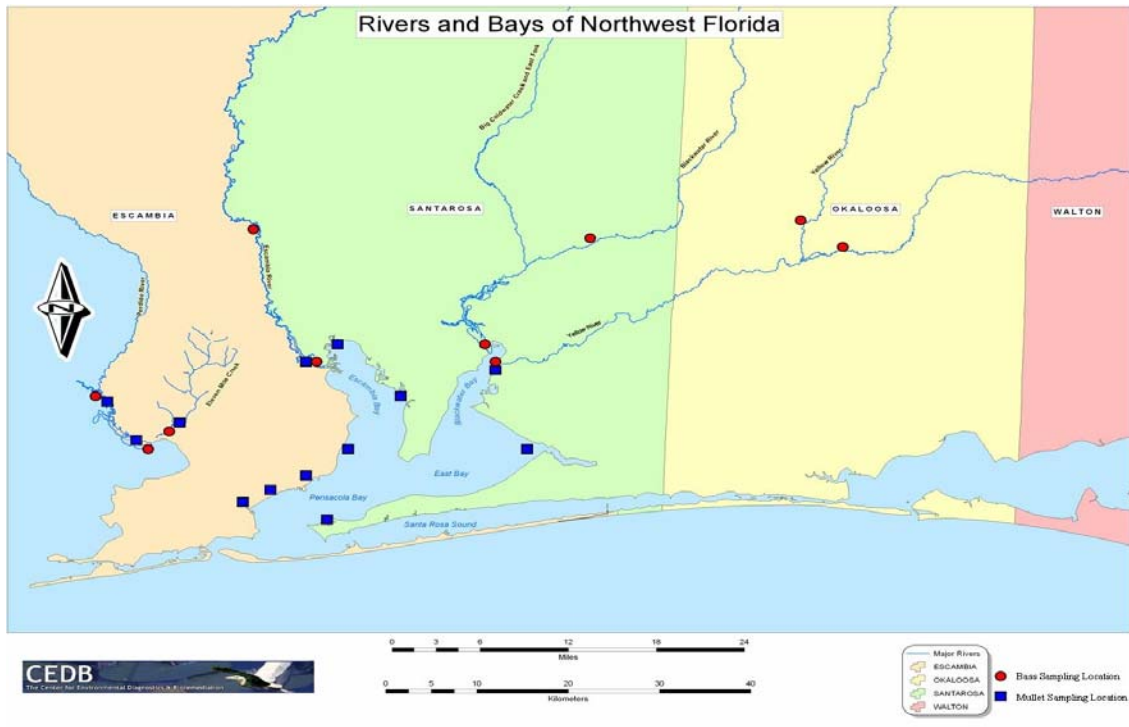


Figure 1. Largemouth bass and mullet sampling locations.

Data from largemouth bass in the rivers of Northwest Florida (Table 1) suggest that these fish may be a potential source of contaminants to local consumers. The data in Table 1 represent mean values from three composite samples per site. The majority of locations exceeded the U.S. EPA recreational screening values (SV) for dioxins and dioxin-like PCBs (TEQ_{DFP}) and mercury (U.S. EPA, 2000). Likewise, mercury levels in all but two locations exceeded the State of Florida SV of 0.5 mg/kg. The total PCB SV was exceeded at one location, the Lower Escambia River samples in which the PCB concentrations were roughly 65 times those found at the Upper Escambia River sampling site. The Lower Escambia River sampling location is located downstream of a historical point source of PCBs. In the late 1960's, an industrial plant was found to be discharging one to three gallons per day of Aroclor 1254 into the Escambia River from the use of Pydraul AC in air compressors (Parrar et al., 1969). The persistence of the PCBs in the Lower Escambia system is evident from the tissue levels found in the largemouth bass.

Table 1. Mean concentrations of contaminants in largemouth bass from rivers in the Pensacola Bay area.

Location	TEQ _{DF} ng/Kg	TEQ _P ng/Kg	TEQ _{DFP} ng/Kg	ΣPCBs ng/Kg	ΣPBDE ng/Kg	As mg/Kg	In. As mg/Kg	Hg mg/Kg
Lower Escambia	0.27	2.82	3.09	52697.5	349.4	0.16	<DL	0.46
Upper Escambia	0.25	0.06	0.31	807.0	676.4	0.02	<DL	0.56
11-Mile Creek	0.16	0.19	0.35	3115.5	1501.0	0.06	<DL	0.37
Lower Perdido	0.18	0.17	0.35	2911.6	337.3	0.34	<DL	0.56
Upper Perdido	0.20	0.07	0.27	1304.4	847.7	0.07	<DL	0.78
Lower Blackwater	0.17	0.16	0.34	3195.7	341.1	0.18	<DL	0.57
Upper Blackwater	0.23	0.04	0.27	98.6	455.3	0.02	<DL	0.82
Lower Yellow River	0.17	0.13	0.30	2311.8	1307.2	0.06	<DL	0.68
Upper Yellow River	0.35	0.05	0.39	855.0	455.1	0.03	<DL	0.71
Shoal River	0.19	0.06	0.25	1059.0	554.2	0.02	<DL	0.63
Recreational SV	-	-	0.26	20000.0	-	-	0.026	0.40

<DL = below detection limit (0.010 mg/kg)

TEQ_{DF}= TEQ for dioxins/furans TEQ_P= TEQ for dioxin-like PCBs

TEQ_{DFP}= total TEQ

In the case of mullet, mercury levels were relatively low (Table 2), but the total TEQs for dioxins, furans, and dioxin-like PCBs exceeded EPA recreational SVs for TEQs at all sampling sites. As in the case of largemouth bass, the highest level of total PCBs in mullet were found in samples collected from the lower Escambia River; the detected level was more than two-fold higher than the EPA recreational fisher SV. Mullet samples from NE Escambia Bay, SW Escambia Bay, and Bayou Chico also had PCB levels higher than the recreational fisher SV for total PCBs. The finding of elevated levels of PCBs in bass and mullet from the lower

Table 2 Contaminant levels in mullet collected across the Pensacola Bay area.

Location	TEQ _{DF} ng/Kg	TEQ _P ng/Kg	TEQ _{DFP} ng/Kg	ΣPCBs ng/Kg	ΣPBDE ng/Kg	As mg/Kg	In. As mg/Kg	Hg mg/Kg
11-Mile Creek	0.35	0.32	0.68	14027	378.8	0.32	<DL	0.018
Bayou Chico	0.85	1.11	1.96	29392	2648.1	0.45	<DL	0.008
Bayou Grande	0.43	0.56	0.99	18803	1406.0	0.61	<DL	0.008
Bayou Texar	0.50	0.38	0.88	14113	1875.5	0.46	<DL	0.010
East Bay	0.14	0.29	0.43	8792		0.43	<DL	0.026
Hoffmann Bayou	0.64	0.36	1.00	12705	758.2	0.72	<DL	0.014
Indian/Trout Bayous	0.62	0.38	1.00	14058	2458.6	0.40	<DL	0.014
Lower Escambia River/ NW Esc Bay	0.37	0.95	1.33	48605	336.8	0.40	<DL	0.017
Lower Perdido River	0.20	0.13	0.33	3843	361.8	0.45	<DL	0.021
Lower Yellow River/ Blackwater Bay	0.20	0.09	0.29	3370	157.5	0.31	<DL	0.012
NE Escambia Bay	0.24	0.87	1.11	32062		0.34	<DL	0.018
SW Escambia Bay	0.29	0.60	0.89	22410		0.37	<DL	0.024
Upper Perdido River	0.36	0.19	0.55	6363	633.2	0.27	<DL	0.010
Recreational SV	-	-	0.26	20000	-	-	0.026	0.40

<DL = below detection limit

TEQ_{DF}= TEQ for dioxins/furans

TEQ_P= TEQ for dioxin-like PCBs

TEQ_{DFP}= total TEQ

Escambia River, along with elevated levels of PCBs in mullet from the Escambia Bay, point to the lingering effects of PCB spill from the 1960's. Currently fish consumption advisories in Northwest Florida are based on mercury levels. The elevated levels of PCBs in fish from certain locations merits consideration in evaluating potential human health impacts and for issuance of appropriate fish consumption advisories.

References

Parrar, M.N., Hodges, P.B., John, E.V., Richard, W.R., Wheeler, E.P., 1969. Report of Arochlor Ad-hoc Committee. Monsanto Chemical Co.

U.S. EPA, 2000. Guidance for assessing chemical contaminant data for use in fish advisories: fish sampling and analysis. US EPA.