

**2005 REGIONAL AMBIENT FISH TISSUE MONITORING
PROGRAM; SUMMARY OF THE IOWA FISH ANALYSES**

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Introduction:

To supplement other environmental monitoring programs and to protect the health of people consuming fish from waters within this state, the state of Iowa conducts fish tissue monitoring. Since 1980, the Iowa Department of Natural Resources (IDNR), the United States Environmental Protection Agency Region VII (U.S. EPA), and the University of Iowa Hygienic Laboratory (UHL) have cooperatively conducted annual statewide collections and analyses of fish for toxic contaminants. Beginning in 1983, this monitoring effort became known as the Regional Ambient Fish Tissue Monitoring Program (the RAFT program). Currently, the RAFT program is the only statewide fish contaminant-monitoring program in Iowa. Historically, the data generated from the RAFT program have enabled IDNR to document temporal changes in contaminant levels and to identify Iowa lakes and rivers where high levels of contaminants in fish potentially threaten the health of fish-consuming Iowans. The Iowa RAFT monitoring program incorporates three different types of monitoring sites: 1) status, 2) trend, and 3) follow-up.

Status monitoring:

The majority of RAFT sites sampled each year determine whether the waterbodies meet the "fish consumption" portion of the fishable goal of the federal Clean Water Act. In other words, these sites are used to screen for contamination problems and to determine the water quality "status" of the waterbodies. Analyses for a variety of pesticides, other toxic organic compounds, and metals are conducted on samples of omnivorous bottom-dwelling fish and carnivorous predator fish. Most status sites on rivers and lakes have either never been sampled or have not been sampled within the last five years (rivers) or 10 years (lakes). Staff of the IDNR divisions of Environmental Services and Conservation and Recreation select status sites. Status monitoring occurs on most types of Iowa waterbodies (interior rivers, border rivers, and manmade and natural lakes) in both rural and urban areas. Lakes and river reaches known to support considerable recreational fishing receive highest priority, but IDNR attempts to sample all lakes and river reaches designated in the *Iowa Water Quality Standards* for recreational fishing. Approximately one-third to one-half of Iowa RAFT status sites are on lakes; the remaining sites are either on interior rivers or on the border rivers (Mississippi, Missouri or Big Sioux).

Trend monitoring:

In 1994 U.S. EPA Region VII in cooperation with the Region VII states (Iowa, Kansas, Missouri, and Nebraska), identified stations that would be monitored every other year to determine trends in levels of contamination. One sample of three to five common carp from each station is submitted for whole-fish analysis. Whole-fish samples are more likely to contain detectable levels of most contaminants than are fillet samples (edible portions). Examination of the trend monitoring results may help identify temporal changes in contaminant concentrations and may expose new contaminants entering the food chain. In Iowa, the following ten locations are part of the RAFT trend monitoring.

Stations first sampled in 1994 and sampled in even years since:

1. Mississippi River downstream from Dubuque, Dubuque County
2. Mississippi River downstream from Linwood, Scott County
3. Wapsipinicon River north of Donahue, Scott County
4. Des Moines River at Keosauqua, Van Buren County
5. Little Sioux River near Washta, Ida County

Stations first sampled in 1995 and sampled in odd years since:

6. Mississippi River at Lansing, Allamakee County
7. Maquoketa River at Maquoketa, Jackson County
8. Iowa River at Wapello, Louisa County
9. Skunk River at Augusta, Lee County
10. Des Moines River at Des Moines, Polk County

Follow-up Monitoring:

If levels of contaminants in status samples exceed federal guidelines, IDNR/IDPH advisory trigger levels and/or IDNR levels of concern (Table 1), the RAFT program conducts follow-up monitoring to better define the levels of contaminants. For example, if status monitoring shows that contaminant levels in fish from a waterbody exceed IDNR levels of concern, additional samples will be collected as part of follow-up monitoring for the next year's RAFT program. If follow-up monitoring shows that levels of contamination exceed State or federal guidelines for protection of human health, a fish consumption advisory will be issued. For more information on consumption advisories see the IDNR RAFT website <http://wqm.igsb.uiowa.edu/wqa/raft.html>.

2005 Results:

The 2005 RAFT program in Iowa involved the collection of 40 samples from 27 waterbodies for the three types of RAFT sites (Table 2). In August, September, and October, IDNR fisheries biologists collected, processed, and prepared the 2005 RAFT samples for shipping. These activities were conducted according to procedures described in the workplan for the 2005 RAFT in Iowa (IDNR 2005). Once frozen, samples were transported or shipped to the Ankeny office of the UHL. Samples were stored at the UHL until shipment to the U.S. EPA Region VII laboratory in Kansas City, Kansas. All samples were shipped to the U.S. EPA Region VII laboratory for analysis by December 2005. Samples were analyzed for a variety of contaminants, including pesticides, other toxic organic compounds, and toxic metals (Table 1). IDNR received results of all sample analyses in April 2006.

Status monitoring in 2005 included collection of 28 composite fillet samples from 15 sites. Trend monitoring included collection of five composite whole-fish samples of common carp from five sites. Follow-up monitoring included seven collections of composite samples (3 smallmouth bass, 2 largemouth bass, 1 walleye and 1 channel catfish) from seven sites. The criteria used to evaluate the results of this monitoring are summarized in Table 1. Levels of nearly all contaminants were low in all samples collected. Results for mercury, total PCBs, and chlordane from the river status sites can be found in Table 2 and Figure 1 and results from the lake status sites can be found in Table 2 and Figure 2. Results for mercury, total PCBs, and chlordane for trend sites are summarized in Table 2 and Figure 3 and results from the follow-up monitoring can be found in Table 2 and Figure 4. The results of all other contaminants were not detected or were below any of the advisory levels.

References:

IDNR. 2005. Sampling procedures for the 2005 Region VII Ambient Fish Tissue Monitoring Program in Iowa. Water Quality Bureau, Environmental Protection Division, Iowa Department of Natural Resources. 20 pp

Table 1. Summary of contaminants and respective criteria for samples of fish collected for the 2005 Regional Ambient Fish Tissue (RAFT) monitoring program in Iowa.

	Contaminant	Detection Level wet weight ppm ²	IDNR/IDPH advisory level (ppm)	IDNR/IDPH advisory meal allowance	FDA Action Level wet weight ppm	IDNR "level of concern" wet weight ppm
1	chlordane, technical	0.03	0 to 0.6	unrestricted	0.3	
			>0.6 to <5.0	one meal per week		
			5.0 and over	do not eat		
2	mercury	0.0181	0 to 0.2	unrestricted	1.0	
			>0.2 to <1.0	one meal per week		
			1.0 and over	do not eat		
3	PCB-Aroclor 1248	0.04	sum = 0 to 0.2	unrestricted	sum = 2.0	sum = 1.0
4	PCB-Aroclor 1254	0.03	sum >0.2 to <2.0	one meal per week		
5	PCB-Aroclor 1260	0.02	sum 2.0 and over	do not eat		
6	chlordane, cis-	0.002			sum = 0.3	sum = 0.15
7	chlordane, trans-	0.002				
8	nonachlor, cis-	0.002				
9	nonachlor, trans-	0.002				
10	oxychlordane	0.002				
11	DDD, 4,4'-	0.004			sum = 5.0	sum = 2.5
12	DDE, 4,4'-	0.005				
13	DDT, 4,4'-	0.005				
14	BHC (lindane)	0.002			none	0.1
15	cadmium	0.06			none	0.3
16	Diazinon ¹	0.04			none	none
17	dieldrin	0.003			0.3	0.15
18	heptachlor	0.003			sum = 0.3	sum = 0.15
19	heptachlor epoxide	0.003				
20	hexachlorobenzene	0.001			none	0.01
21	lead	0.17			none	1.0
22	mirex ¹	0.003			0.1	0.05
23	pentacloroanisole	0.001			none	0.1
24	pentachlorobenzene ¹	0.001			none	
25	selenium	0.5			none	
26	1,2,4,5-tetrachlorobenzene ¹	0.004			none	
27	trifluralin	0.003			none	0.2

¹trend samples only

²ppm = parts per million and is equivalent to milligrams/kilogram (mg/kg)

Table 2. Summary of samples, sample sites, species sampled, and results for mercury, total PCBs and chlordane collected for the 2005 RAFT program in Iowa.

Station Name - Location	County	Biologist	Date	Fish Species ¹	Sample Type	Chlordane (mg/kg)	Mercury (mg/kg)	Total PCBs (mg/kg) ²	Sampling Rationale
Arbor Lake at Grinnell	Poweshiek	Sleeper	9/13/2005	Largemouth Bass	Followup		0.17		Historically elevated mercury level.
Briggs Woods Lake SE of Webster City	Hamilton	Wahl	8/12/2005	Channel Catfish	Status	<0.03	0.0194	<0.09	Lake not sampled for 10 years.
Briggs Woods Lake SE of Webster City	Hamilton	Wahl	8/10/2005	Largemouth Bass	Status	<0.03	0.111	<0.09	Lake not sampled for 10 years.
Cedar Bend Lake at Cedar Rapids	Linn	Sleeper	8/23/2005	Carp	Status	<0.03	0.196	0.239	Lake not previously sampled for RAFT.
Cedar Bend Lake at Cedar Rapids	Linn	Sleeper	8/23/2005	Largemouth Bass	Status	<0.03	0.0568	<0.09	Lake not previously sampled for RAFT.
Cedar River at Palisades Park	Linn	Sleeper	8/3/2005	Channel Catfish	Followup		0.0731		Historically elevated mercury level.
Cedar River west of Osage	Mitchell	Kalishhek	9/14/2005	Walleye	Followup		0.33		Historically elevated mercury level.
Des Moines River at Des Moines	Polk	McWilliams	8/15/2005	Carp - Whole	Trend	0.084	0.0569	0.34	Trend site scheduled for 2005.
Des Moines River below Fort Dodge	Webster	Miller	8/22/2005	Carp	Status	<0.03	0.183	<0.09	River reach not sampled for five years.
Des Moines River below Fort Dodge	Webster	Miller	8/22/2005	Freshwater Drum	Status	<0.03	0.139	<0.09	River reach not sampled for five years.
Des Moines River near Croton	Lee	Kline	8/18/2005	Carp	Status	<0.03	0.196	<0.09	River reach not sampled for five years.
Des Moines River near Croton	Lee	Kline	8/18/2005	Freshwater Drum	Status	<0.03	0.152	<0.09	River reach not sampled for five years.
Easter Lake SE of Des Moines	Polk	Schultz	9/19/2005	Channel Catfish	Status	0.026	0.0512	<0.09	Lake not sampled for nearly 10 years.
Easter Lake SE of Des Moines	Polk	Schultz	9/22/2005	Largemouth Bass	Status	<0.03	0.172	<0.09	Lake not sampled for nearly 10 years.
Iowa River east of Wapello	Louisa	Kline	8/22/2005	Carp - Whole	Trend	0.051	0.111	0.193	Trend site scheduled for 2005.
Lake Manawa south of Council Bluffs	Pottawattamie	Larson	9/23/2005	Channel Catfish	Status	<0.03	0.026	<0.09	Lake not sampled for nearly 10 years.
Lake Manawa south of Council Bluffs	Pottawattamie	Larson	8/22/2005	Largemouth Bass	Status	<0.03	0.0314	<0.09	Lake not sampled for nearly 10 years.
Little River Lake west of Leon	Decatur	Sobotka	Fall/2005	Channel Catfish	Status	<0.03	0.92	<0.09	Lake not sampled for 10 years.
Little River Lake west of Leon	Decatur	Sobotka	Fall/2005	White Crappie	Status	<0.03	0.12	<0.09	Lake not sampled for 10 years.
Lost Island Lake north of Ruthven	Palo Alto	Christianson	9/27/2005	Carp	Status	<0.03	0.031	<0.09	Lake not sampled for 10 years.
Lost Island Lake north of Ruthven	Palo Alto	Christianson	9/27/2005	Walleye	Status	<0.03	0.0244	<0.09	Lake not sampled for 10 years.
Maquoketa River NE of Maquoketa	Jackson	Hayes	7/29/2005	Carp - Whole	Trend	<0.03	0.105	<0.09	Trend site scheduled for 2005.
Mississippi R at Beaver Slough, Clinton	Clinton	Pitlo	8/26/2005	Bluegill	Status	<0.03	0.105	<0.09	River reach not sampled for five years.
Mississippi R at Beaver Slough, Clinton	Clinton	Pitlo	8/26/2005	Channel Catfish	Status	<0.03	0.0479	0.102	River reach not sampled for five years.
Mississippi River at Lansing	Allamakee	Gritters	8/24/2005	Carp - Whole	Trend	<0.03	0.0569	0.119	Trend site scheduled for 2005.
Mississippi River below Muscatine	Muscatine	Schonoff	9/6/2005	Carp	Status	<0.03	0.0668	0.09	River reach not sampled for five years.
Mississippi River below Muscatine	Muscatine	Schonoff	9/6/2005	White Crappie	Status	<0.03	0.0227	<0.09	River reach not sampled for five years.
Missouri River at Council Bluffs	Pottawattamie	Larson	8/17/2005	Carp	Status	<0.03	0.117	<0.09	River reach not sampled for five years.
Missouri River at Council Bluffs	Pottawattamie	Larson	8/17/2005	Channel Catfish	Status	<0.03	0.0386	0.102	River reach not sampled for five years.
Nine Eagles Lake near Davis City	Decatur	Sobotka	1/1/2005	Largemouth Bass	Followup		0.3		Historically elevated mercury level.
North Banner Lake near Indianola	Warren	Schultz	9/12/2005	Channel Catfish	Status	<0.03	0.165	<0.09	Lake not previously sampled for RAFT.
North Banner Lake near Indianola	Warren	Schultz	9/15/2005	Largemouth Bass	Status	<0.03	0.408	<0.09	Lake not previously sampled for RAFT.
NF Maquoketa River below Cascade	Jones	Sleeper	8/25/2005	Smallmouth Bass	Followup		0.143		Historically elevated mercury level.
Shell Rock River south of Northwood	Worth	Wahl	7/26/2005	Carp	Status	<0.03	0.186	0.108	River reach not sampled for five years.
Skunk River NE of Wever	Lee	Kline	8/16/2005	Carp - Whole	Trend	0.076	0.0855	0.188	Trend site scheduled for 2005.
South Banner Lake near Indianola	Warren	Schultz	9/12/2005	Channel Catfish	Status	<0.03	0.118	<0.09	Lake not previously sampled for RAFT.
South Banner Lake near Indianola	Warren	Schultz	9/15/2005	Largemouth Bass	Status	<0.03	0.41	<0.09	Lake not previously sampled for RAFT.
South Skunk River NE of Oskaloosa	Mahaska	Flammang	9/12/2005	Carp	Status	<0.03	0.215	<0.09	River reach not sampled for five years.
Upper Iowa River above Decorah	Winneshiek	Kalishhek	8/29/2005	Smallmouth Bass	Followup		0.292		Historically elevated mercury level.
Volga River near Volga Recreation Area	Fayette	Kalishhek	10/5/2005	Smallmouth Bass	Followup		0.545		Historically elevated mercury level.

¹ Edible skinless fillets were sampled from the fish unless indicated otherwise.

² Total PCBs = Sum Aroclors 1248 + 1254 + 1260

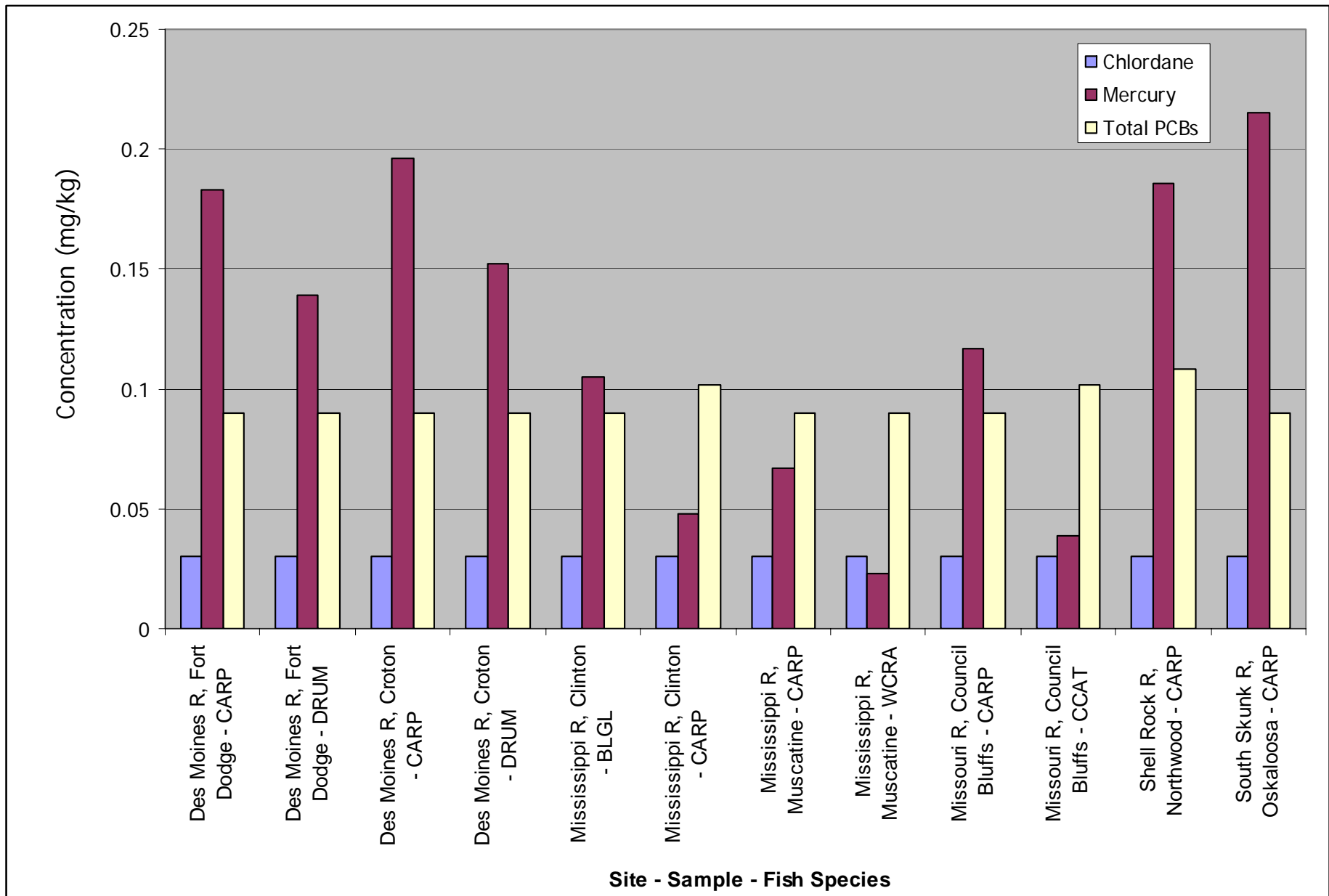


Figure 1. 2005 RAFT status river sites and sample results for mercury, chlordane, and total PCBs (sum of Aroclors 1248, 1254 and 1260).

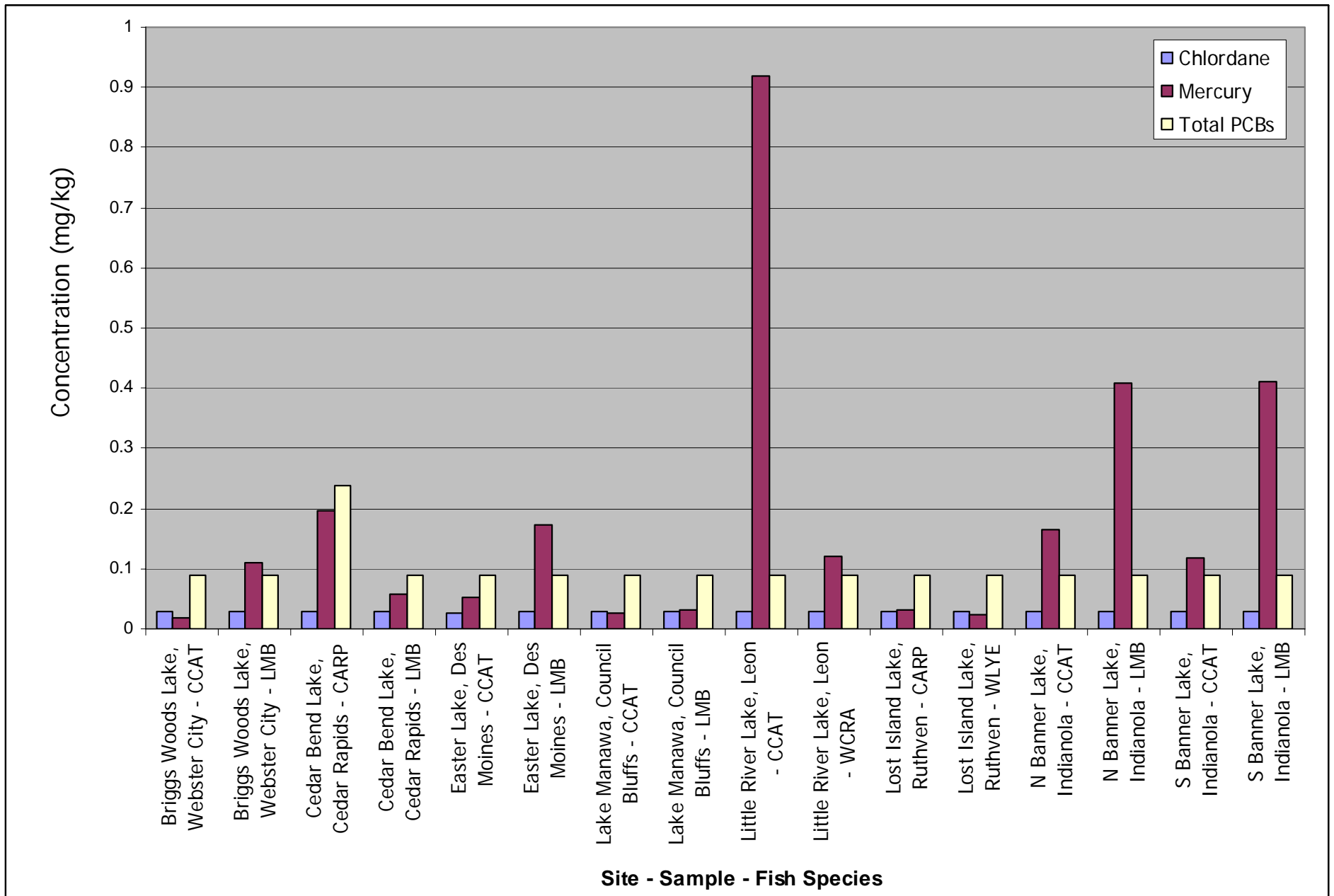


Figure 2. 2005 RAFT status lake sites and sample results for mercury, chlordane, and total PCBs (sum of Aroclors 1248, 1254 and 1260).

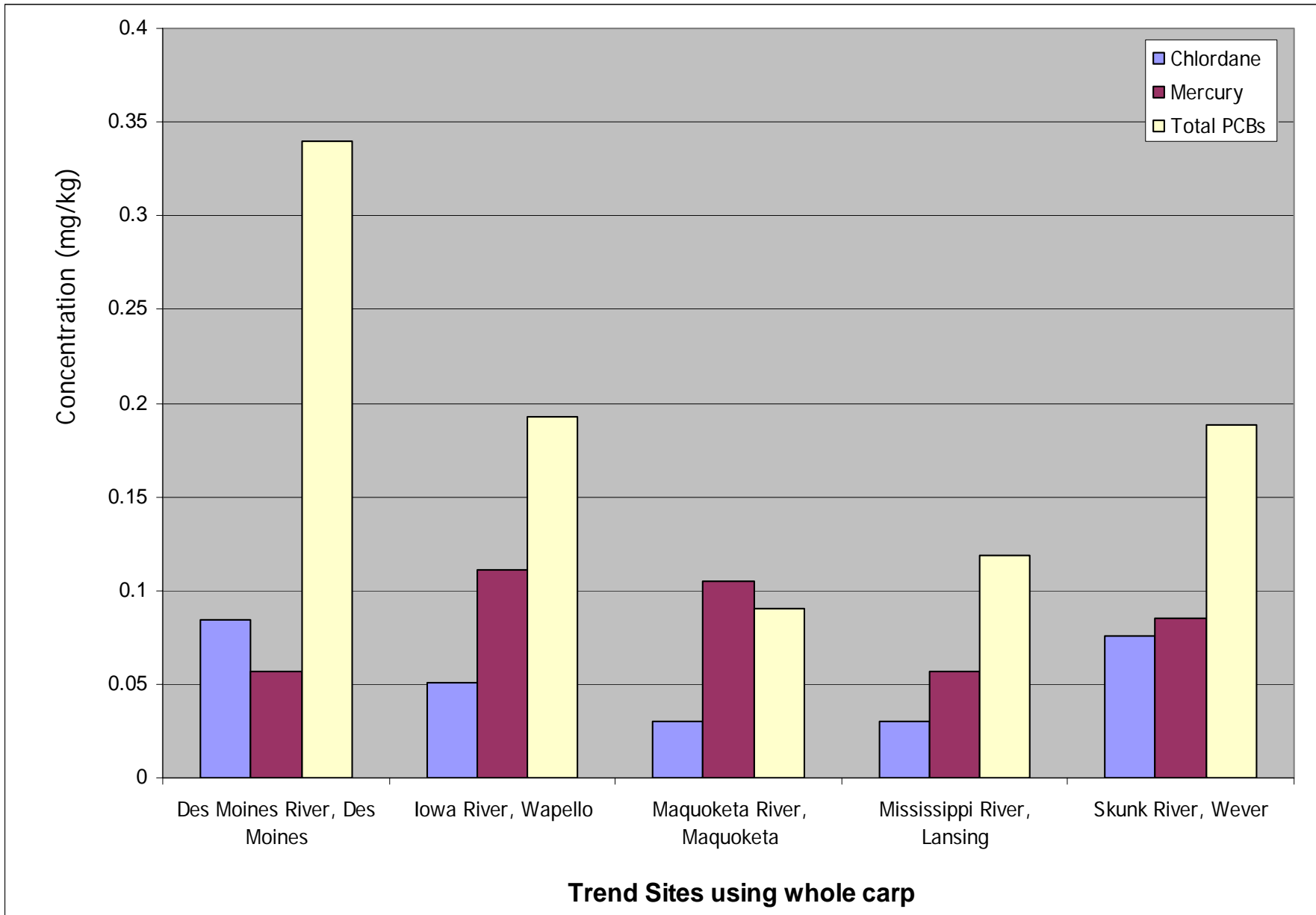


Figure 3. 2005 RAFT trend sample results for chlordane, mercury and total PCBs (sum of Aroclors 1248, 1254 and 1260).

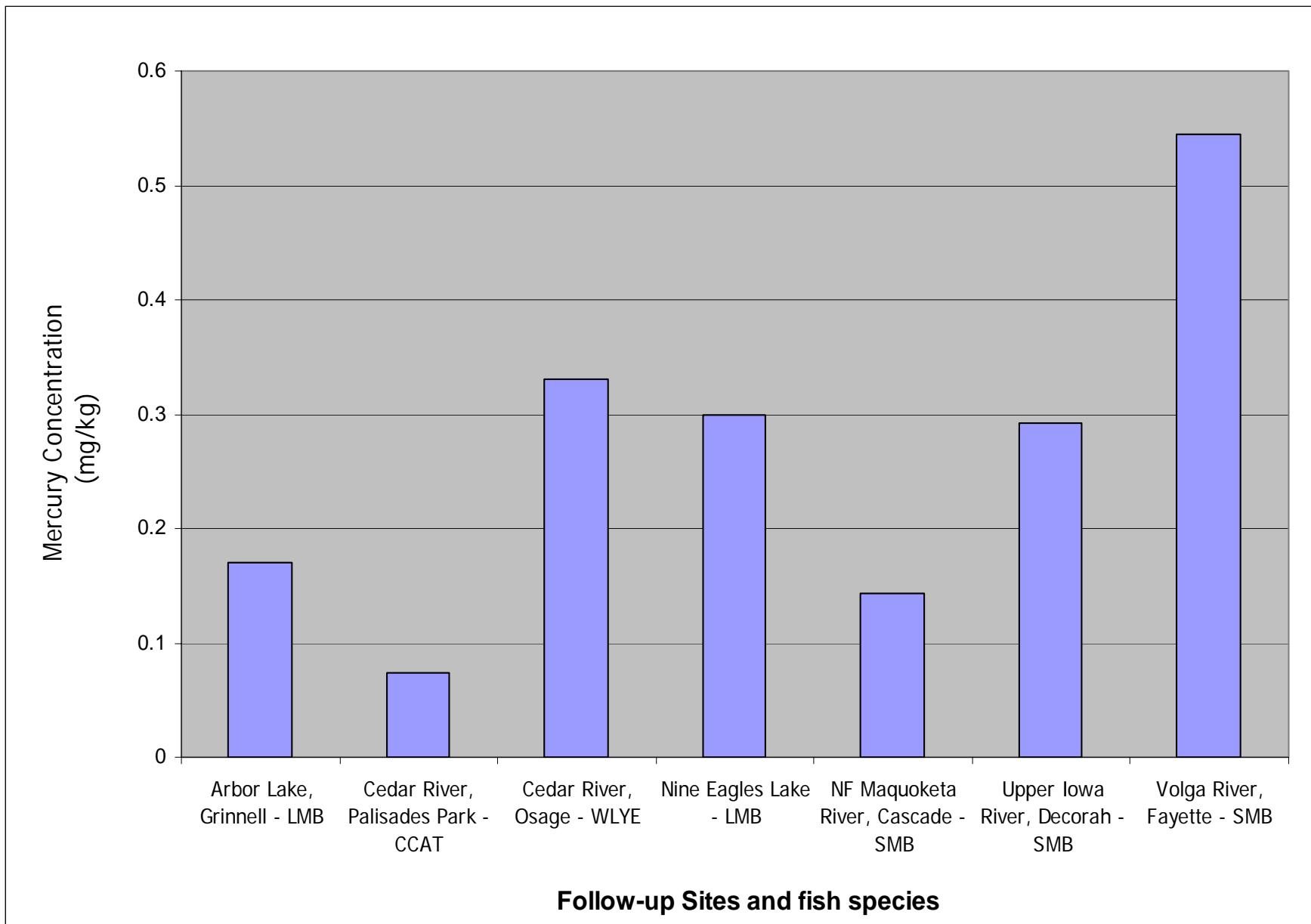


Figure 4. 2005 RAFT follow-up sample results for mercury.

