

**2004 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 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 but equally important 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 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 federal guidelines for protection of human health, IDNR may conduct intensive follow-up monitoring. This will allow the confirmation that contaminant levels exceed guidelines and the issuance of a fish consumption advisory is justified.

2004 Results:

The 2004 RAFT program in Iowa involved the collection of 39 samples from 23 waterbodies for the three types of RAFT sites (Table 2). In August, September, and October, IDNR fisheries biologists collected, processed, and prepared the 2004 RAFT samples for shipping. These activities were conducted according to procedures described in the workplan for the 2004 RAFT in Iowa (IDNR 2004). 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 2004. 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 August 2005. The lead analyses were incorrect and the samples were analyzed by EPA a second time for lead which caused the delay in IDNR receiving the sample results. The final results were received on December 15, 2005.

Status monitoring in 2004 included collection of 31 composite fillet samples from 16 sites. Trend monitoring included collection of five composite whole-fish samples of common carp from five sites. Follow-up monitoring included two collections of composite samples of channel catfish fillets from two sites and the collection of one composite sample of carp fillets at one site. The criteria used to evaluate the results of this monitoring (i.e., U.S. Food and Drug Administration (FDA) action levels (ALs) and IDNR "levels of concern") 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 and follow-up sites are summarized in Table 2 and Figure 3. The results of all other contaminants were below the FDA AL or the IDNR "level of concern". Levels of lead in two samples from two status sites exceeded the IDNR level of concern of 1.0 ppm: South Skunk River at Story City (1.09 ppm in the sample of smallmouth bass fillets) and Mississippi River near Burlington (1.26 ppm in the sample of common carp fillets). IDNR is working with the Iowa Department of Public Health to determine the significance of these elevated levels of lead. These two sites will again be sampled in 2006 as part of RAFT follow-up monitoring to confirm the presence of elevated levels of lead in fish from these sites.

References:

IDNR. 2004. Sampling procedures for the 2004 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 2004 Regional Ambient Fish Tissue (RAFT) monitoring program in Iowa.

	Contaminant	Detection Level wet weight ppm²	FDA Action Level wet weight ppm	IDNR "level of concern" wet weight ppm
1	BHC (lindane)	0.002	none	0.1
2	cadmium	0.06	none	0.3
3	chlordan, technical	0.03	0.3	0.15
4	chlordan, cis-	0.002	sum = 0.3	sum = 0.15
5	chlordan, trans-	0.002		
6	nonachlor, cis-	0.002		
7	nonachlor, trans-	0.002		
8	oxychlordan	0.002		
9	DDD, 4,4'-	0.004	sum = 5.0	sum = 2.5
10	DDE, 4,4'-	0.005		
11	DDT, 4,4'-	0.005		
12	Diazinon ¹	0.04	none	none
13	dieldrin	0.003	0.3	0.15
14	heptachlor	0.003	sum = 0.3	sum = 0.15
15	heptachlor epoxide	0.003		
16	hexachlorobenzene	0.001	none	0.01
17	lead	0.17	none	1.0
18	mercury	0.0181	1.0	0.5
19	mirex ¹	0.003	0.1	0.05
20	PCB-Aroclor 1248	0.04	sum = 2.0	sum = 1.0
21	PCB-Aroclor 1254	0.03		
22	PCB-Aroclor 1260	0.002		
23	pentachloroanisole	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 (sum of Aroclors 1248, 1254 and 1260), and chlordane collected for the 2004 RAFT program in Iowa.

Station Name - Location	Biologist	Date	Fish (All skinless fillets except Trend sites which use whole fish)	Sample Type	Sum PCBs (mg/kg)	Chlordane (mg/kg)	Mercury (mg/kg)	Information
BIG CREEK LAKE NW OF POLK CITY	McWilliams	8/17/2004	Channel Catfish	Status	<0.09	<0.03	<0.0181	Lake not sampled for 10 years.
BIG CREEK LAKE NW OF POLK CITY	McWilliams	8/17/2004	Largemouth Bass	Status	<0.09	<0.03	0.043	Lake not sampled for 10 years.
BLACK HAWK CREEK WSW OF HUDSON	Hayes	7/22/2004	Channel Catfish	Status	0.092	0.044	0.072	River reach not sampled for five years.
BLACK HAWK CREEK WSW OF HUDSON	Hayes	9/2/2004	Smallmouth Bass	Status	<0.09	<0.03	0.098	River reach not sampled for five years.
CEDAR LAKE AT CEDAR RAPIDS	Sleeper	8/12/2004	Carp	Followup	0.180	0.0391	0.029	Historically elevated chlordane levels.
CEDAR LAKE AT CEDAR RAPIDS	Sleeper	8/12/2004	Channel Catfish	Followup	0.277	0.163	0.02	Historically elevated chlordane levels.
DES MOINES RIVER NNW OF KEOSAUQUA	Flammang	9/2/2004	Carp	Trend	0.136	0.09	0.062	Trend site scheduled for 2004.
EAST OKOBOJI LAKE SE OF SPIRIT LAKE	Christianson	8/10/2004	Channel Catfish	Status	0.092	<0.03	0.032	Lake not sampled for 10 years.
EAST OKOBOJI LAKE SE OF SPIRIT LAKE	Christianson	8/10/2004	Yellow Perch	Status	<0.09	<0.03	0.037	Lake not sampled for 10 years.
LAKE DARLING WEST OF BRIGHTON	Kline	9/21/2004	Channel Catfish	Status	<0.09	0.049	0.092	Lake not sampled for 10 years.
LAKE DARLING WEST OF BRIGHTON	Kline	9/21/2004	Largemouth Bass	Status	<0.09	<0.03	0.11	Lake not sampled for 10 years.
LITTLE SIOUX RIVER SOUTH OF WASHTA	Miller	8/25/2004	Carp	Trend	<0.09	<0.03	0.059	Trend site scheduled for 2004.
MC CLOUD RUN AT CEDAR RAPIDS	Sleeper	6/28/2004	Rainbow Trout	Status	<0.09	<0.03	<0.0181	River reach not previously sampled for RAFT.
MC CLOUD RUN AT CEDAR RAPIDS	Sleeper	6/28/2004	White Sucker	Status	0.091	0.032	0.085	River reach not previously sampled for RAFT.
MISSISSIPPI RIVER AT LINWOOD	Schonhoff	9/16/2004	Carp	Trend	0.25	<0.03	0.095	Trend site scheduled for 2004.
MISSISSIPPI RIVER AT MARQUETTE/MCGREGOR	Gritters	9/9/2004	Carp	Status	0.094	<0.03	0.084	River reach not previously sampled for RAFT.
MISSISSIPPI RIVER AT MARQUETTE/MCGREGOR	Gritters	9/2/2004	Sauger	Status	<0.09	0.025	0.098	River reach not previously sampled for RAFT.
MISSISSIPPI RIVER DOWNSTREAM OF BURLINGTON	Schonhoff	8/31/2004	Carp	Status	<0.09	<0.03	0.098	River reach not sampled for five years.
MISSISSIPPI RIVER DOWNSTREAM OF BURLINGTON	Schonhoff	9/2/2004	White Crappie	Status	<0.09	<0.03	0.055	River reach not sampled for five years.
MISSISSIPPI RIVER DOWNSTREAM OF DUBUQUE	Boland	8/18/2004	Carp	Trend	0.14	<0.03	0.05	Trend site scheduled for 2004.
MISSOURI RIVER WEST OF LITTLE SIOUX	Larson	8/24/2004	Carp	Status	<0.09	<0.03	0.092	River reach not sampled for five years.
MISSOURI RIVER WEST OF LITTLE SIOUX	Larson	8/24/2004	Flathead Catfish	Status	<0.09	<0.03	0.069	River reach not sampled for five years.
MISSOURI RIVER WEST OF SERGEANT BLUFF	Miller	8/30/2004	Carp	Status	<0.09	0.043	0.101	River reach not sampled for five years.
MISSOURI RIVER WEST OF SERGEANT BLUFF	Miller	8/30/2004	Flathead Catfish	Status	<0.09	<0.03	0.062	River reach not sampled for five years.
OTTUMWA LAGOON AT OTTUMWA	Flammang	8/26/2004	Channel Catfish	Followup	0.116	0.446	<0.0181	Historically elevated chlordane levels.
PIERCE CREEK LAKE	Sobotka	10/5/2004	Largemouth Bass	Status	<0.09	<0.03	0.126	Lake not sampled for 10 years.
RATHBUN LAKE AT THE ISLAND VIEW AREA	Flammang	8/24/2004	Channel Catfish	Status	<0.09	<0.03	0.031	Lake not sampled for five years.
RATHBUN LAKE AT THE ISLAND VIEW AREA	Flammang	8/11/2004	White Crappie	Status	<0.09	<0.03	<0.0181	Lake not sampled for five years.
SAND LAKE AT MARSHALLTOWN	Sleeper	8/11/2004	Carp	Status	<0.09	<0.03	0.078	Lake not previously sampled for RAFT.
SAND LAKE AT MARSHALLTOWN	Sleeper	8/11/2004	Largemouth Bass	Status	<0.09	<0.03	0.122	Lake not previously sampled for RAFT.
SOUTH SKUNK RIVER SSE OF STORY CITY	McWilliams	9/16/2004	Carp	Status	<0.09	0.031	0.069	River reach not sampled for five years.
SOUTH SKUNK RIVER SSE OF STORY CITY	McWilliams	9/16/2004	Smallmouth Bass	Status	<0.09	<0.03	0.109	River reach not sampled for five years.
UPPER IOWA RIVER SOUTHEAST OF DORCHESTER	Kalishhek	9/3/2004	Carp	Status	0.13	<0.03	0.228	River reach not sampled for five years.
UPPER IOWA RIVER SOUTHEAST OF DORCHESTER	Kalishhek	9/3/2004	Smallmouth Bass	Status	<0.09	<0.03	0.486	River reach not sampled for five years.
WAPSIPINICON RIVER @ MCCAUSLAND ACCESS	Kline	8/19/2004	Carp	Trend	<0.09	0.083	0.141	Trend site scheduled for 2004.
WEST OKOBOJI LAKE NORTH OF MILFORD	Christianson	8/11/2004	Carp	Status	<0.09	<0.03	0.039	Lake not sampled for 10 years.
WEST OKOBOJI LAKE NORTH OF MILFORD	Christianson	8/11/2004	Yellow Perch	Status	<0.09	<0.03	0.068	Lake not sampled for 10 years.
WINNEBAGO RIVER JUST EAST OF MASON CITY	Wahl	8/26/2004	Carp	Status	0.101	<0.03	0.136	River reach not sampled for five years.
WINNEBAGO RIVER JUST EAST OF MASON CITY	Wahl	8/26/2004	Northern Pike	Status	<0.09	<0.03	0.16	River reach not sampled for five years.

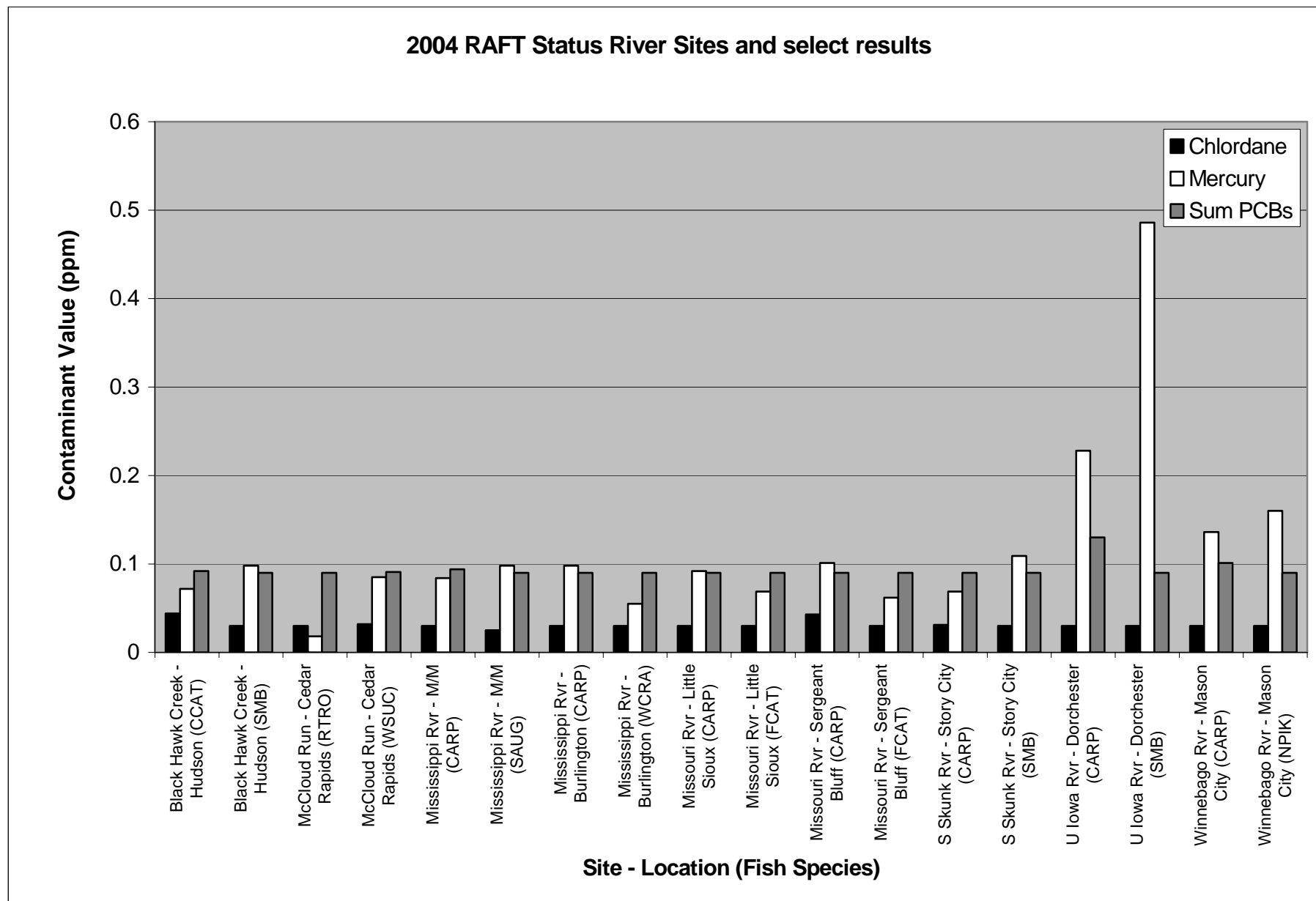


Figure 1. 2004 RAFT status river sites and sample results for mercury, chlordane, and total PCBs (sum of Aroclors 1248, 1254 and 1260). The FDA action level for mercury is 1.0 ppm, for total PCBs is 2.0 ppm, and for chlordane is 0.3 ppm.

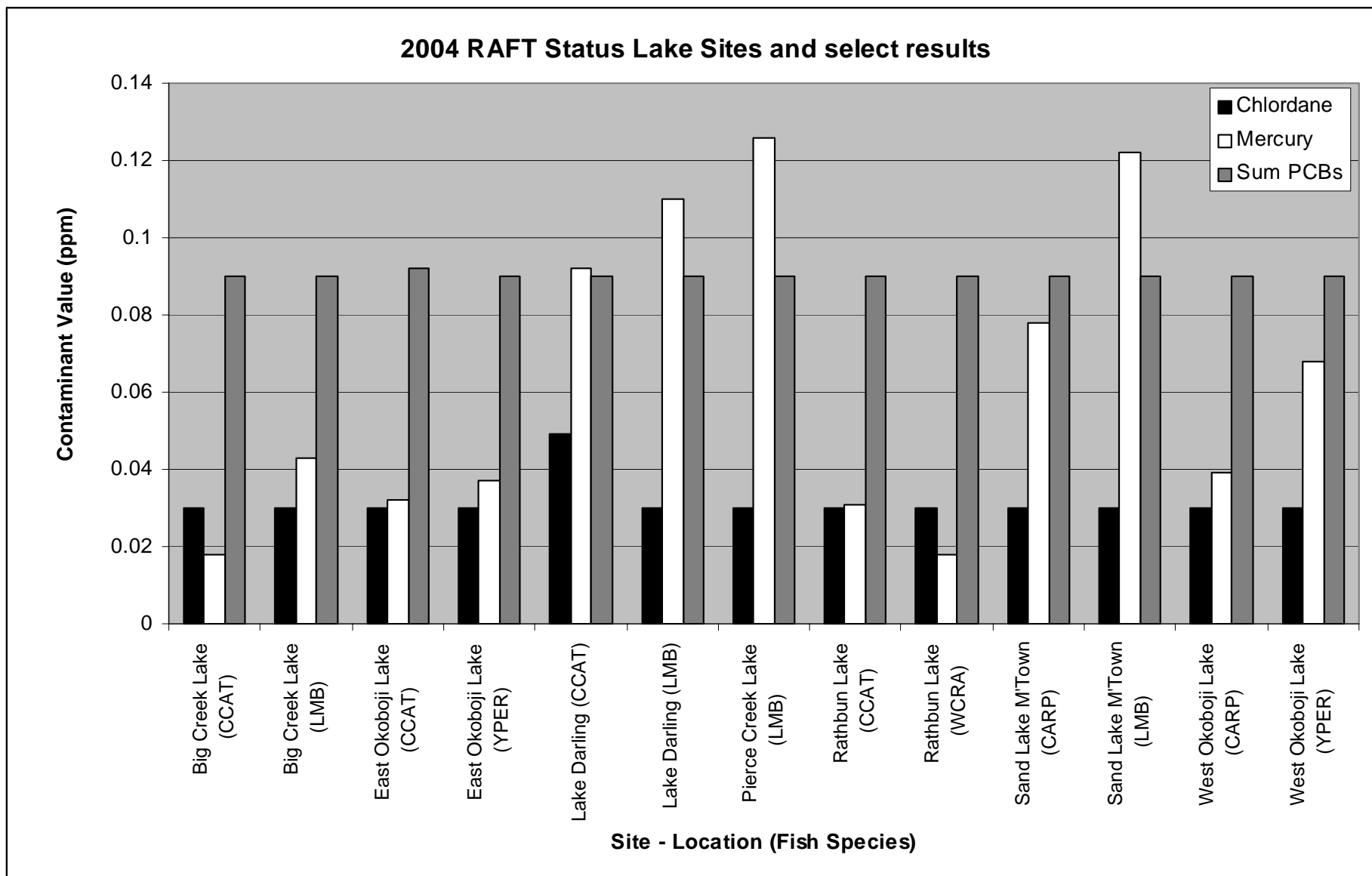


Figure 2. 2004 RAFT status lake sites and sample results for mercury, chlordane, and total PCBs (sum of Aroclors 1248, 1254 and 1260). The FDA action level for mercury is 1.0 ppm, for total PCBs is 2.0 ppm, and for chlordane is 0.3 ppm.

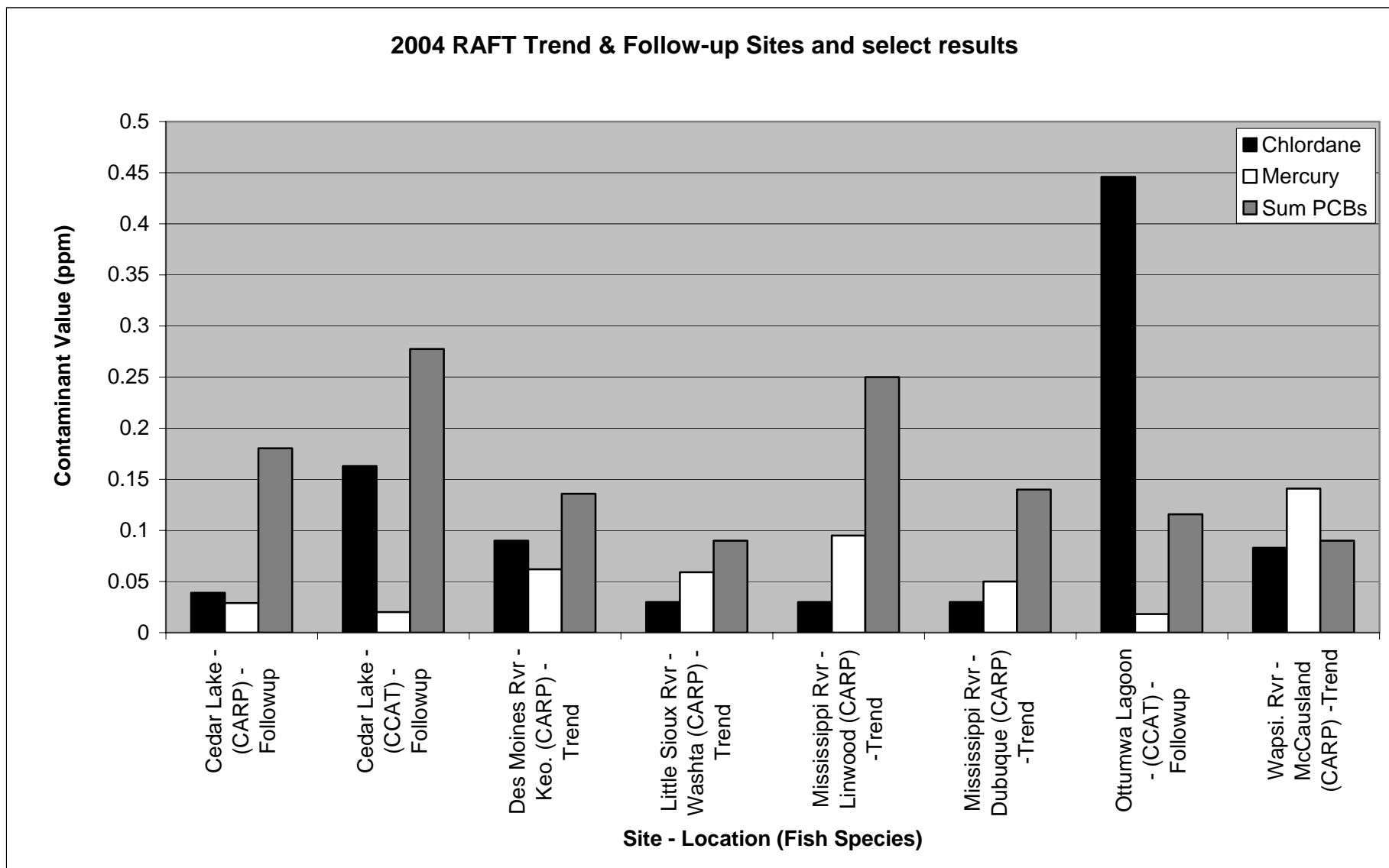


Figure 3. 2004 RAFT trend (whole-fish) and follow-up (fillet) sites and sample results for mercury, total PCBs (sum of Aroclors 1248, 1254 and 1260), and chlordane. The FDA action level for mercury is 1.0 ppm, for total PCBs is 2.0 ppm, and for chlordane is 0.3 ppm.