2006/2007 REGIONAL AMBIENT FISH TISSUE MONITORING PROGRAM; SUMMARY OF THE IOWA FISH ANALYSES

Prepared by:

Watershed Monitoring and Assessment Section
Iowa Geologic and Water Survey Bureau
Environmental Services Division
Iowa Department of Natural Resources

March 30, 2009

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 (RAFT). 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 (see IDNR 2006a). The Iowa RAFT monitoring program incorporates four different types of monitoring sites: 1) status, 2) trend, 3) random and 4) 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 the 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 sites that would be monitored at regular intervals 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. From 1996-2005, half of the trend sites were sampled on odd years and the other half were sampled in even years. In 2006, due to a change in RAFT program design (U.S. EPA 2006), all 10 trend sites were sampled. All 10 trend sites were sampled again in 2008 and will be sampled every other year in the future. The following ten sites are Iowa's part of the RAFT trend monitoring program:

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
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

Random Monitoring:
In 2006, based on recommendations in U.S. EPA's RAFT workplan (U.S. EPA 2006), Iowa began sampling random sites across that state as part of an effort to determine the current level of contaminants in fish tissue on a statewide basis. The 2006 sampling sites were selected from a previous random sampling project and data were collected only from large interior rivers. In 2007, the sample sites were selected from a random list of smaller public lakes and ponds. Given that U.S. EPA has recently changed the emphasis of the RAFT program again, the future of random sampling for Iowa fish contaminants is uncertain.

Follow-up Monitoring:
If the level of a contaminant in a fish tissue sample exceeds IDNR/IDPH advisory trigger levels and/or IDNR levels of concern (Table 1; IDPH 2007), 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/IDPH advisory trigger levels, additional samples will be collected as part of follow-up monitoring for the next year's RAFT program. If follow-up monitoring confirms that levels of contamination exceed State guidelines for protection of human health, a fish consumption advisory is issued. For more information on consumption advisories see the IDNR RAFT website: http://wqm.igsb.uiowa.edu/wqa/raft.html.

2006 Results:
The 2006 RAFT program in Iowa involved the collection of 67 samples from 50 waterbodies (Table 2). In June through October 2006, IDNR fisheries biologists collected, processed, and prepared the RAFT samples for shipping. These activities were conducted according to procedures described in the workplan for the 2006 RAFT in Iowa (IDNR 2006b). 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 2006. 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 February 2008.

Status monitoring in 2006 included collection of 20 composite fillet samples from 10 sites. Trend monitoring included collection of 10 composite whole-fish samples of common carp from 10 sites. Random monitoring included the collection of 15 samples from 15 sites. Follow-up monitoring included 22 collections of composite samples from 15 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.

2007 Results:
The 2007 RAFT program in Iowa involved the collection of 88 samples from 51 waterbodies (Table 3). In July through October 2007, IDNR fisheries biologists collected, processed, and prepared the RAFT samples for shipping. These activities were conducted according to procedures described in the workplan for the 2007 RAFT in Iowa (IDNR 2007). 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 2007. 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 June 2008.

Status monitoring in 2007 included collection of 31 composite fillet samples from 16 sites. Random monitoring included the collection of 46 samples from 24 sites. Follow-up monitoring included 11 collections of composite samples from 11 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.

The results of RAFT monitoring in 2006 and 2007 are presented and summarized in Tables 2 through 12 and in Figures 1 through 8 of this report. All results are in mg/kg (ppm) except for Table 6: the dioxin analyses.

References:

IDNR. 2006a. Fish tissue monitoring in Iowa. Water Fact Sheet 2006-5. Geological and Water Survey, Iowa Department of Natural Resources. 4 pgs (http://wqm.igsb.uiowa.edu/publications/fact%20sheets/2006FactSheets/2006-5%2011x17.pdf).

IDNR. 2006b. Sampling procedures for the 2006 Region VII Ambient Fish Tissue Monitoring Program in Iowa. Water Quality Bureau, Environmental Protection Division, Iowa Department of Natural Resources. 20 pp

IDNR. 2007. Sampling procedures for the 2007 Region VII Ambient Fish Tissue Monitoring Program in Iowa. Water Quality Bureau, Environmental Protection Division, Iowa Department of Natural Resources. 16 pp

IDPH. 2007. Fish consumption advisory protocol in Iowa. Iowa Department of Public Health. 8 pgs.

U.S. EPA. 2006. EPA Region 7 Regional Ambient Fish Tissue Monitoring Program (RAFTMP) program rationale, design and implementation plans for 2006 - 2010. Environmental Services Division, U.S. Environmental Protection Agency Region 7 and the Region 7 Fish Tissue Monitoring Workgroup. 24 pgs.

List of tables:

List of figures:

List of fishes:

abbreviation	common name	Scientific name	RAFT code
bgill	bluegill	Lepomis macrochirus	8
blcrp	black crappie	Pomoxis nigromaculatus	5
carp	common carp	Cyprinus carpio	12
ccat	channel catfish	Ictalurus punctatus	16
drum	freshwater drum	Aplodinotus grunniens	20
fcat	flathead catfish	Pylodictis olivarus	19
golrdhrs	golden redhorse	Moxostoma erythrurum	na
lmb	largemouth bass	Micropterus salmoides	31
smb	smallmouth bass	Micropterus dolomieu	47
wbass	white bass	Morone chrysops	57
ybull	yellow bullhead	Ameiurus natalis	na

Table 1. Summary of contaminants and respective criteria for samples of fish collected for the 2006 and 2007 Regional Ambient Fish Tissue (RAFT) monitoring program in Iowa.

	Contaminant	Detection Level (ppm[2])	IDNR/IDPH advisory level (ppm)	IDNR/IDPH advisory meal allowance	FDA Action Level (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 0.3	unrestricted	1.0	
			>0.3 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	none
25	selenium	0.5			none	none
26	1,2,4,5-tetrachlorobenzene[1]	0.004			none	none
27	trifluralin	0.003			none	0.2

[1]trend samples only

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

Table 2. Summary of sites, samples, and collectors for the 2006 RAFT program in Iowa.

Site Name	county	sample type	# of samples	biologist/ collector
Beaver Creek - REMAP 174	Franklin	random	1	UHL
Cedar Bend Lake at Cedar Rapids	Linn	followup	1	Sleeper
Cedar Lake at Cedar Rapids	Linn	followup	2	Sleeper
Cedar River - REMAP 185	Linn	random	1	UHL
Cedar River - Waterloo	Black Hawk	random	1	UHL
Cedar River - West Branch	Cedar	random	1	UHL
Cedar River at Cedar Rapids	Linn	status	2	Sleeper
Des Moines River - REMAP 177	Pocahontas	random	1	UHL
Des Moines River - REMAP 202	Van Buren	random	1	UHL
Des Moines River - REMAP 221	Webster	random	1	UHL
Des Moines River at Cliffland Access - Ottumwa	Wapello	status	1	Flammang
Des Moines River at Des Moines	Polk	trend	1	Dodd
Des Moines River NNW of Keosauqua	Van Buren	trend	1	Flammang
Floyd River - REMAP 225	Sioux	random	1	UHL
Iowa River - REMAP 302	Johnson	random	1	UHL
Iowa River - REMAP 45	Louisa	random	1	UHL
Iowa River at Iowa City	Johnson	status	1	Sleeper
Iowa River E of Wapello	Louisa	trend	1	Kline
Lake Anita SW of Anita	Cass	followup	1	Larson
Lake Geode E of Lowell	Henry	followup	1	Kline
Lake of Three Fires NE of Bedford	Taylor	followup	1	Sobotka
Little Cedar River at Chickasaw Park	Chickasaw	followup	1	Kalishek
Little River Lake W of Leon	Decatur	followup	2	Sobotka
Little Sioux River S of Washta	Cherokee	trend	1	Miller
Maquoketa River - REMAP 28	Delaware	random	1	UHL
Maquoketa River NE of Maquoketa	Jackson	trend	1	Kirby
Mississippi River - Mud Lake near Dubuque	Dubuque	status	2	Gritters
Mississippi River at Davenport	Scott	status	2	Hansen
Mississippi River at Hamm Island - Dubuque	Dubuque	status	4	Hansen
Mississippi River at Keokuk	Lee	status	2	Schonhoff
Mississippi River at Lansing	Allamakee	trend	1	Gritters
Mississippi River at Linwood	Scott	trend	1	Schonhoff
Mississippi River at Linwood	Scott	status	2	Schonhoff
Mississippi River downstream of Dubuque	Dubuque	trend	1	Hansen
Mississippi River downstream of Muscatine	Muscatine	status	2	Schonhoff
Morman Trail Pond E of Bridgewater	Adair	followup	1	Larson
North Banner Lake near Indianola	Warren	followup	1	Schultz
North Raccoon River - REMAP 164	Sac	random	1	UHL
Ottumwa Lagoon at Ottumwa	Wapello	followup	1	Flammang
Skunk River - REMAP 194	Lee	random	1	UHL
Skunk River N of Brighton	Washington	status	2	Kline
Skunk River NE of Wever	Lee	trend	1	Kline
South Banner Lake near Indianola	Warren	followup	1	Schultz
South Skunk River NE of Oskaloosa	Mahaska	followup	1	Flammang
Upper Iowa River at Decorah	Winneshiek	followup	2	Kalishek
Upper Iowa River near Kendallville	Winneshiek	followup	2	Kalishek
Upper Iowa River near Lime Springs	Howard	followup	2	Kalishek
Upper Iowa River SE of Dorchester	Allamakee	followup	2	Kalishek
Wapsipinicon River - Central City	Linn	random	1	UHL
Wapsipinicon River SSE of Grand Mound	Scott	trend	1	Kline
West Fork Little Sioux River - REMAP 173	Woodbury	random	1	UHL

Table 3. Summary of sites, samples, and collectors for the 2007 RAFT program in Iowa.

Site Name	county	sample type	# of samples	biologist/ collector
Albia City Reservoir	Monroe	random	2	Flammang
Ambrosson Pits RA	Winnebago	random	2	Wahl
Beeds Lake WNW of Hampton	Franklin	status	2	Wahl
Big Woods Lake N of Waterloo	Black Hawk	followup	1	Kirby
Boone River S of Webster City	Hamilton	status	2	Wahl
Brown Lake	Jackson	random	2	Kirby
Cedar River W of Osage	Mitchell	followup	1	Kalishek
Central City Ponds	Linn	random	2	Sleeper
Corning Reservoir	Adams	random	2	Sobotka
Corydon Reservoir Park	Wayne	random	2	UHL
Des Moines River at Des Moines	Polk	followup	1	Dodd
Dickcissell Lake	Boone	random	2	Dodd
Douma Area Pond	O'Brien	random	2	Hawkins
Fisher Lake	Black Hawk	random	2	UHL
George Wyth Lake at Waterloo	Black Hawk	status	2	Kirby
Glenwood Park Lake	Mills	random	2	Hayes
Grade Lake	Clarke	random	2	Sobotka
Greenfield Lake	Adair	random	2	Hayes
Iowa River - Hills CO Park Access - Hills	Johnson	followup	1	Sleeper
Iowa River E of Wapello	Louisa	status	2	Kline
Lake Ahquabi S of Indianola	Warren	status	2	Dodd
Lake Macbride WSW of Solon	Johnson	status	2	Sleeper
Larson Lake County Park	Cherokee	random	2	Miller
Little Wall Lake S of Jewell	Hamilton	followup	1	Wahl
Marathon City Park Pond	Buena Vista	random	2	Miller
Middle Raccoon River SE of Panora	Guthrie	status	2	Hayes
Middle Sabula Lake	Jackson	random	2	Kirby
Mississippi River at Keokuk	Lee	followup	1	Schonhoff
Mississippi River at Montrose	Lee	status	2	Schonhoff
Mississippi River downstream of Guttenberg	Clayton	status	2	Gritters
Missouri River at Nebraska City, NE	Fremont	status	2	Sterner
Missouri River W of Sergeant Bluff	Woodbury	followup	1	Sterner
Nine Eagles Lake near Davis City	Decatur	followup	1	Sobotka
Nodaway River S of Shambaugh	Page	status	1	Sobotka
Ocheyedan Pits RA	Osceola	random	2	Hawkins
Percival Lake SWMA	Fremont	random	2	UHL
Pilot Knob Lake State Park, Hancock	Hancock	random	1	Wahl
Prairie Rose Lake near Harlan	Shelby	status	2	Hayes
Railroad Lake (Falls Access)	Black Hawk	random	2	UHL
Red Haw Lake ESE of Chariton	Lucas	followup	1	Flammang
Rock River at Rock Rapids	Lyon	followup	1	Hawkins
Schaben Pond, Harrison	Harrison	random	1	UHL
Scharnberg Pond County Park	Clay	random	2	UHL
Seminole Valley Park Lakes	Linn	random	2	Sleeper
Shimek State Forest Ponds	Lee	random	2	Kline
Skunk River NE of Wever	Lee	status	2	Kline
Turkey River S of Garber	Clayton	status	2	Kalishek
TwelveMile Lake E of Creston	Union	status	2	Sobotka
Union Grove Lake S of Gladbrook	Tama	status	2	Sleeper
Upper Centerville Reservoir	Appanoose	random	2	Flammang
Volga River near Volga Recreation Area	Fayette	followup	1	Kalishek

Table 4. Summary of the 2006 IA RAFT trend site samples.

Site Name (Pool)	Mississippi River at Linwood (16)	Maquoketa River NE of Maquoketa	Des Moines River at Des Moines	Des Moines River NNW of Keosauqua	Iowa River E of Wapello	Little Sioux River S of Washta	Mississippi River downstream of Dubuque (12)	Skunk River NE of Wever	Mississippi River at Lansing (9)	Wapsipinicon River SSE of Grand Mound
Date	8/2/2006	8/3/2006	8/7/2006	8/11/2006	8/16/2006	8/16/2006	8/16/2006	8/16/2006	9/14/2006	9/26/2006
county	Scott	Jackson	Polk	Van Buren	Louisa	Cherokee	Dubuque	Lee	Allamakee	Scott
fish species (whole)	carp	carp	carp	carp	carp	carp	carp	carp	carp	carp
sample type	trend	trend	trend	trend	trend	trend	trend	trend	trend	trend
1,2,4,5-tetrachlorobenzene	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
cadmium (total)	<0.077	<0.056	<0.13	<0.12	<0.15	<0.12	<0.05	<0.15	<0.037	<0.067
chlordane (total)	0.054	0.059	0.077	0.058	0.043	<0.03	<0.03	0.046	<0.03	0.03
DDD	<0.0064	<0.0082	<0.0076	<0.004	<0.0054	<0.004	<0.004	<0.0051	<0.004	<0.004
DDE	0.025	0.023	0.043	0.019	0.024	0.013	0.011	0.022	<0.005	0.0096
DDT	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
gamma-BHC (lindane)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
heptachlor	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
hexachlorobenzene	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
lead (total)	<0.33	<0.14	<0.27	<0.14	<0.2	<0.17	<0.14	<0.14	<0.14	<0.14
mercury (total)	0.179	0.117	0.122	0.133	0.196	0.102	0.136	0.191	0.062	0.0533
mirex	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
pentachloroanisole (PCA)	0.0014	0.0012	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
pentachlorobenzene	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
selenium (total)	<1.43	<1.45	<2.23	<1.78	<1.85	<2.24	<1.78	<1.85	<1.45	<1.72
total PCBs (sum aroclors 1248, 1254, 1260)	0.291	0.45	0.28	0.164	0.223	<0.09	0.208	0.133	0.12	<0.09

Table 5a. Summary of the 2006 IA RAFT status site samples.

Site Name (Pool)	Cedar River at Cedar Rapids	Cedar River at Cedar Rapids	Des Moines River at Cliffland Access - S of Ottumwa	Iowa River at Iowa City	Mississippi River - Mud Lake near Dubuque (11)	Mississippi River - Mud Lake near Dubuque (11)	Mississippi River at Davenport (15)	Mississippi River at Davenport (15)	Mississippi River at Hamm Island - Dubuque (12)	Mississippi River at Hamm Island - Dubuque (12)
Date	7/11/2006	7/11/2006	8/21/2006	7/12/2006	8/23/2006	8/23/2006	8/15/2006	8/23/2006	8/16/2006	8/16/2006
county	Linn	Linn	Wapello	Johnson	Dubuque	Dubuque	Scott	Scott	Dubuque	Dubuque
fish species (fillet)	ccat	drum	ccat	carp	carp	lmb	carp	lmb	carp	carp
biopart	fillet	fillet	fillet	fillet	fillet	fillet	fillet	fillet	fillet	fillet
sample type	status	status	status	status	status	status	status	status	status	status
cadmium (total)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
chlordane (total)	<0.03	<0.03	0.048	<0.021	<0.03	<0.03	<0.03	<0.03	<0.0029	<0.022
cis-chlordane (chlordane isomer)	<0.002	<0.002	0.0045	0.0024	<0.002	<0.002	<0.002	<0.002	0.0031	<0.0029
cis-nonachlor (chlordane isomer)	<0.002	<0.002	0.0029	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
DDD	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
DDE	<0.0099	<0.005	0.017	0.011	<0.005	<0.005	<0.005	<0.005	0.0063	<0.0053
DDT	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
gamma-BHC (lindane)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
heptachlor	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
hexachlorobenzene	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
lead (total)	<0.76	<0.35	<7.03	<0.86	<0.77	<0.6	<0.14	<0.14	<0.14	<0.14
mercury (total)	0.0803	0.104	0.115	0.195	0.0909	0.204	0.0897	0.184	0.145	0.17
oxychlordane	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
pentachloroanisole (PCA)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
selenium (total)	<1.11	<1.5	<0.91	<1.87	<1.48	<1.56	<1.36	<1.4	<1.8	<1.8
total PCBs (sum aroclors 1248, 1254, 1260)	0.091	<0.09	0.114	<0.09	<0.09	<0.09	<0.09	<0.09	0.114	<0.095
trans-chlordane (chlordane isomer)	<0.002	<0.002	0.0031	<0.0017	<0.002	<0.002	<0.002	<0.002	0.0024	<0.0018
trans-nonachlor (chlordane isomer)	<0.002	<0.002	0.0074	0.0023	<0.002	<0.002	<0.002	<0.002	0.0028	<0.0025

Table 5b. Summary of the 2006 IA RAFT status site samples.

Site Name (Pool)	Mississippi River at Hamm Island - Dubuque (12)	Mississippi River at Hamm Island - Dubuque (12)	Mississippi River at Keokuk (20)	Mississippi River at Keokuk (20)	Mississippi River at Linwood (16)	Mississippi River at Linwood (16)	Mississippi River down stream of Muscatine (17)	Mississippi River down stream of Muscatine (17)	Skunk River N of Brighton	Skunk River N of Brighton
Date	8/22/2006	8/22/2006	8/7/2006	8/7/2006	8/3/2006	8/3/2006	8/10/2006	8/10/2006	8/7/2006	8/7/2006
county	Dubuque	Dubuque	Lee	Lee	Scott	Scott	Muscatine	Muscatine	Washington	Washington
fish species (fillet)	lmb	lmb	carp	wbass	carp	wbass	carp	wbass	drum	carp
sample type	status	status	status	status	status	status	status	status	status	status
cadmium (total)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
chlordane (total)	<0.03	<0.03	<0.032	<0.03	<0.03	<0.03	0.038	<0.03	<0.03	<0.022
cis-chlordane (chlordane isomer)	<0.002	<0.002	<0.0023	<0.002	<0.002	<0.002	0.0045	0.02	<0.002	0.0024
cis-nonachlor (chlordane isomer)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
DDD	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	0.0052	<0.004	<0.004	<0.004
DDE	<0.005	<0.005	<0.012	<0.005	<0.011	<0.0075	0.012	<0.005	<0.0054	0.0053
DDT	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
gamma-BHC (lindane)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
heptachlor	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
hexachlorobenzene	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
lead (total)	<0.14	<0.14	<0.14	<0.14	<0.29	<0.22	<0.14	<0.14	<0.29	<0.23
mercury (total)	0.206	0.311	0.252	0.116	0.232	0.217	0.131	0.165	0.331	0.196
oxychlordane	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
pentachloroanisole (PCA)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001
selenium (total)	<1.55	<1.4	<1.05	<1.4	<1.46	<1.98	<1.64	<1.69	<1.47	<1.67
total PCBs (sum aroclors 1248, 1254, 1260)	<0.09	<0.09	0.125	<0.09	0.131	0.108	0.147	<0.09	<0.09	<0.09
trans-chlordane (chlordane isomer)	<0.002	<0.002	<0.0023	<0.002	<0.002	<0.002	0.0027	<0.002	<0.002	<0.0018
trans-nonachlor (chlordane isomer)	<0.002	<0.002	<0.0042	<0.002	<0.0032	<0.002	0.0049	<0.002	<0.0026	0.0025

Table 6. Summary of the 2006 IA RAFT status sites and samples used for the dioxon analyses.

Site Name (Pool)	Cedar River at Cedar Rapids	Mississippi River at Keokuk (20)
Date	7/11/2006	8/7/2006
county	Linn	Lee
fish species (fillet)	ccat	carp
sample type	status	status
2,3,7,8-dioxin total equivalents (ng/kg)	0	0
2,3,7,8-tetrachlorodibenzo-p-dioxin (mg/kg)	<0.962	<0.962
heptachlorodibenzofuran,1234678- (pg/g)	<4.81	<4.81
heptachlorodibenzofuran,1234789- (pg/g)	<4.81	<4.81
heptachlorodibenzo-p-dioxin,1234678- (pg/g)	<4.81	<4.81
hexachlorodibenzofuran, 234678- (pg/g)	<4.81	<4.81
hexachlorodibenzofuran,123478- (pg/g)	<4.81	<4.81
hexachlorodibenzofuran,123678- (pg/g)	<4.81	<4.81
hexachlorodibenzofuran,123789- (pg/g)	<4.81	<4.81
hexachlorodibenzo-p-dioxin,123478- (pg/g)	<4.81	<4.81
hexachlorodibenzo-p-dioxin,123678- (pg/g)	<4.81	<4.81
hexachlorodibenzo-p-dioxin,123789- (pg/g)	<4.81	<4.81
octachlorodibenzofuran (pg/g)	<9.62	<9.62
octachlorodibenzo-p-dioxin (pg/g)	<9.62	<9.62
pentachlorodibenzofuran, 23478- (pg/g)	<4.81	<4.81
pentachlorodibenzofuran,12378- (pg/g)	<4.81	<4.81
pentachlorodibenzo-p-dioxin,12378- (pg/g)	<4.81	<4.81
tetrachlorodibenzofuran, 2378- (pg/g)	<0.962	<0.962

Table 7a. Summary of the 2006 IA RAFT random samples.

Site Name	Beaver Creek - REMAP 174	Cedar River - Waterloo	Cedar River - REMAP 185	Cedar River - West Branch	Des Moines River - REMAP 177	Des Moines River - REMAP 221	Des Moines River - REMAP 202	Floyd River - REMAP 225
Date	10/26/2006	9/28/2006	10/24/2006	9/12/2006	10/23/2006	9/18/2006	9/6/2006	8/16/2006
county	Franklin	Black Hawk	Linn	Cedar	Pocahontas	Webster	Van Buren	Sioux
fish species (fillet)	carp	carp	carp	carp	carp	carp	carp	carp
sample type	random	random	random	random	random	random	random	random
chlordane (total)	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
cis-chlordane (chlordane isomer)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
cis-nonachlor (chlordane isomer)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
DDD	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
DDE	0.0061	0.018	0.019	<0.005	0.0091	<0.0062	<0.005	0.0095
DDT	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
dieldrin	0.0074	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.003
gamma-BHC (lindane)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
heptachlor	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
heptachlor epoxide	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
hexachlorobenzene	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
mercury (total)	0.159	0.166	0.305	0.266	0.283	0.239	0.258	0.121
oxychlordane	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
pentachloroanisole (PCA)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
total PCBs (sum aroclors 1248, 1254, 1260)	<0.09	<0.09	0.198	<0.09	<0.09	<0.09	<0.09	<0.09
trans-chlordane (chlordane isomer)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
trans-nonachlor (chlordane isomer)	<0.002	<0.002	0.0032	<0.002	<0.002	<0.002	0.0023	<0.002
treflan	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003

Table 7b. Summary of the 2006 IA RAFT random samples, continued.

Site Name	Iowa River - REMAP 302	Iowa River - REMAP 45	Maquoketa River - REMAP 28	North Raccoon River - REMAP 164	Skunk River - REMAP 194	Wapsipinicon River - Central City	WF Little Sioux River - REMAP 173
Date	10/23/2006	10/30/2006	10/27/2006	10/25/2006	9/7/2006	9/27/2006	10/24/2006
county	Johnson	Louisa	Delaware	Sac	Lee	Linn	Woodbury
fish species (fillet)	carp	carp	carp	carp	carp	ccat	carp
sample type	random	random	random	random	random	random	random
chlordane (total)	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
cis-chlordane (chlordane isomer)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
cis-nonachlor (chlordane isomer)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
DDD	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
DDE	0.0084	0.0092	<0.005	0.013	<0.005	<0.005	0.0071
DDT	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
dieldrin	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
gamma-BHC (lindane)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
heptachlor	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
heptachlor epoxide	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
hexachlorobenzene	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
mercury (total)	0.181	0.183	0.178	0.222	0.218	0.263	0.132
oxychlordane	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
pentachloroanisole (PCA)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
total PCBs (sum aroclors 1248, 1254, 1260)	<0.09	0.1	<0.09	<0.09	<0.09	<0.09	<0.09
trans-chlordane (chlordane isomer)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
trans-nonachlor (chlordane isomer)	0.0021	0.0024	<0.002	<0.002	<0.002	<0.002	<0.002
treflan	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003

Table 8. Summary of the 2006/2007 IA RAFT followup samples (except mercury).

Site Name (Pool)	Cedar Bend Lake at Cedar Rapids	Ottumwa Lagoon at Ottumwa	Cedar Lake at Cedar Rapids	Cedar Lake at Cedar Rapids	Mississippi River at Keokuk (20)	Des Moines River at Des Moines	Iowa River - Hills CO Park Access - Hills	Missouri River W of Sergeant Bluff
Date	6/16/2006	8/7/2006	9/7/2006	9/7/2006	8/16/2007	8/17/2007	8/23/2007	9/21/2007
county	Linn	Wapello	Linn	Linn	Lee	Polk	Johnson	Woodbury
fish species (fillet)	carp	ccat	carp	ccat	carp	carp	ccat	drum
sample type	followup	followup	followup	followup	followup	followup	followup	followup
cadmium (total)					<0.02	<0.02	<0.02	<0.02
chlordane (total)	<0.03	0.3	0.12	0.15	0.063	0.05	0.045	<0.03
cis-chlordane (chlordane isomer)	<0.002	0.034	0.014	0.02	0.0047	0.0048	0.0039	<0.002
cis-nonachlor (chlordane isomer)	<0.002	0.014	0.006	0.009	0.0036	<0.002	0.0025	<0.002
DDD	<0.004	<0.0048	<0.047	<0.033	<0.004	0.011	<0.0048	<0.004
DDE	0.0088	0.022	0.07	0.079	0.016	0.27	0.023	<0.005
DDT	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
dieldrin					<0.0071	0.0068	0.0079	<0.003
gamma-BHC (lindane)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
heptachlor	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
heptachlor epoxide					<0.003	<0.003	0.003	<0.003
hexachlorobenzene	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
lead (total)					<0.14	<0.13	<0.14	<0.14
mercury (total)	0.184				0.155	0.191	0.058	0.195
oxychlordane	<0.002	0.0024	0.0021	<0.002	<0.002	<0.002	<0.002	<0.002
pentachloroanisole (PCA)	<0.001	0.003	0.0039	0.0039	<0.001	<0.001	0.002	<0.001
selenium (total)					<1.84	2.51	<1.76	2.68
total PCBs (sum aroclors 1248, 1254, 1260)	0.24	0.133	0.38	0.41	0.171	0.101	0.125	<0.09
trans-chlordane (chlordane isomer)	<0.002	0.02	0.0074	0.0097	0.0027	0.0025	0.0024	<0.002
trans-nonachlor (chlordane isomer)	<0.002	0.034	0.011	0.016	0.01	0.0065	0.0064	<0.002
treflan					<0.003	0.0049	<0.003	<0.003

Table 9. Summary of the 2006/2007 IA RAFT followup mercury samples.

Site Name	county	Date	fish species (fillet)	sample type	mercury (total)
Big Woods Lake N of Waterloo	Black Hawk	9/24/2007	lmb	followup	0.24
Cedar River W of Osage	Mitchell	8/8/2007	smb	followup	0.219
Lake Anita SW of Anita	Cass	8/17/2006	lmb	followup	0.252
Lake Geode E of Lowell	Henry	9/13/2006	lmb	followup	0.51
Lake of Three Fires NE of Bedford	Taylor	9/11/2006	lmb	followup	0.37
Little Cedar River at Chickasaw Park	Chickasaw	8/4/2006	smb	followup	0.239
Little River Lake W of Leon	Decatur	9/18/2006	ccat	followup	0.186
Little River Lake W of Leon	Decatur	9/27/2006	lmb	followup	0.174
Little Wall Lake S of Jewell	Hamilton	8/9/2007	lmb	followup	0.167
Morman Trail Pond E of Bridgewater	Adair	8/17/2006	lmb	followup	0.565
Nine Eagles Lake near Davis City	Decatur	10/1/2007	lmb	followup	0.412
North Banner Lake near Indianola	Warren	9/29/2006	lmb	followup	0.413
Red Haw Lake ESE of Chariton	Lucas	8/15/2007	lmb	followup	0.516
Rock River at Rock Rapids	Lyon	9/12/2007	smb	followup	0.222
South Banner Lake near Indianola	Warren	9/29/2006	lmb	followup	0.517
South Skunk River NE of Oskaloosa	Mahaska	8/10/2006	carp	followup	0.201
Upper Iowa River at Decorah	Winneshiek	7/27/2006	smb	followup	0.32
Upper Iowa River at Decorah	Winneshiek	7/27/2006	golrdhrs	followup	0.567
Upper Iowa River near Kendallville	Winneshiek	8/8/2006	smb	followup	0.357
Upper Iowa River near Kendallville	Winneshiek	8/8/2006	golrdhrs	followup	0.26
Upper Iowa River near Lime Springs	Howard	6/21/2006	smb	followup	0.221
Upper Iowa River near Lime Springs	Howard	6/21/2006	golrdhrs	followup	0.254
Upper Iowa River SE of Dorchester	Allamakee	7/12/2006	golrdhrs	followup	0.362
Upper Iowa River SE of Dorchester	Allamakee	7/18/2006	smb	followup	0.37
Volga River near Volga Recreation Area	Fayette	8/17/2007	smb	followup	0.241

Table 10a. Summary of the 2007 IA RAFT status samples (except mercury).

Site Name (Pool)	Iowa River E of Wapello	Missouri River at Nebraska City, NE	Lake Macbride WSW of Solon	Mississippi River at Montrose (19)	Lake Ahquabi S of Indianola	Prairie Rose Lake near Harlan	George Wyth Lake at Waterloo	Beeds Lake WNW of Hampton	TwelveMile Lake E of Creston	Union Grove Lake S of Gladbrook	Turkey River S of Garber	Boone River S of Webster City	Middle Raccoon River SE of Panora	Skunk River NE of Wever	Mississippi River downstream of Guttenberg (11)	Nodaway River S of Shambaugh
Date	8/13/2007	9/27/2007	7/27/2007	8/14/2007	8/21/2007	8/24/2007	8/22/2007	9/21/2007	9/17/2007	9/28/2007	8/2/2007	9/6/2007	9/30/2007	9/27/2007	9/5/2007	9/27/2007
county	Louisa	Fremont	Johnson	Lee	Warren	Shelby	Black Hawk	Franklin	Union	Tama	Clayton	Hamilton	Guthrie	Lee	Clayton	Page
fish species (fillet)	carp	carp	ccat	carp	ccat	ccat	ccat	ccat	ccat	ccat	ccat	ccat	carp	carp	carp	ccat
sample type	status	status	status	status	status	status	status	status	status	status	status	status	status	status	status	status
cadmium (total)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
chlordane (total)	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.068
cis-chlordane (chlordane isomer)	<0.002	<0.002	<0.002	0.0021	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0046
cis-nonachlor (chlordane isomer)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0026
DDD	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
DDE	0.0056	0.016	<0.005	0.0064	<0.005	0.0062	<0.005	0.0059	<0.005	0.013	0.005	0.013	0.019	0.012	0.0086	0.0067
DDT	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
dieldrin	0.0062	<0.003	<0.003	0.0036	<0.003	<0.003	<0.003	0.0052	<0.003	<0.003	<0.003	0.0083	0.0045	0.01	<0.003	0.019
gamma-BHC (lindane)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
heptachlor	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
heptachlor epoxide	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
hexachlorobenzene	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0011	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
lead (total)	<0.14	<0.14	<0.14	<0.14	<0.14	<0.13	<0.13	<0.14	<0.13	<0.14	<0.14	<0.14	<0.13	<0.13	<0.14	<0.13
mercury (total)	0.12	0.126	0.179	0.15	0.0379	0.0273	0.131	0.0516	0.088	0.043	0.09	0.178	0.097	0.208	0.126	0.087
oxychlordane	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0023
pentachloroanisole (PCA)	0.0011	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0013	<0.001	0.0017	<0.001	0.0013
selenium (total)	2.37	<2.77	2.34	<1.78	<1.9	<1.79	<1.92	2.42	<1.71	<1.9	<2.03	<1.61	2.74	2.25	<1.91	<2.01
total PCBs (sum aroclors 1248, 1254, 1260)	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	0.099	<0.09	0.112	<0.09
trans-chlordane (chlordane isomer)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0022
trans-nonachlor (chlordane isomer)	0.0024	0.0025	<0.002	0.0041	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0042	<0.002	0.012
treflan	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.0033	<0.003	<0.003	<0.003	<0.003

Table 10b. Summary of the 2007 IA RAFT status mercury samples.

Site Name (pool)	Iowa River E of Wapello	Missouri River at Nebraska City, NE	Lake Macbride WSW of Solon	Mississippi River at Montrose (19)	Lake Ahquabi S of Indianola	Prairie Rose Lake near Harlan	George Wyth Lake at Waterloo	Beeds Lake WNW of Hampton	TwelveMile Lake E of Creston	Union Grove Lake S of Gladbrook	Turkey River S of Garber	Boone River S of Webster City	Middle Raccoon River SE of Panora	Skunk River NE of Wever	Mississippi River downstream of Guttenberg (11)
Date	8/13/2007	9/27/2007	7/27/2007	8/14/2007	8/21/2007	8/21/2007	9/24/2007	9/14/2007	9/17/2007	10/25/2007	8/3/2007	9/6/2007	9/30/2007	8/27/2007	9/5/2007
county	Louisa	Fremont	Johnson	Lee	Warren	Shelby	Black Hawk	Franklin	Union	Tama	Clayton	Hamilton	Guthrie	Lee	Clayton
fish species (fillet)	drum	fcat	lmb	lmb	lmb	lmb	lmb	lmb	lmb	lmb	smb	smb	smb	wbass	wbass
sample type	status	status	status	status	status	status	status	status	status	status	status	status	status	status	status
mercury (total)	0.098	0.113	0.0627	0.137	0.181	0.091	0.0926	0.0765	0.249	0.058	0.514	0.196	0.0554	0.152	0.065

Table 11a. Summary of the 2007 IA RAFT random small lake samples (except mercury).

Site Name	Albia City Reservoir	Ambrosson Pits RA	Brown Lake	Central City Ponds	Corning Reservoir	Corydon Reservoir Park	Dickcissell Lake	Douma Area Pond	Fisher Lake	Glenwood Park Lake	Grade Lake
Date	8/16/2007	8/17/2007	9/4/2007	9/14/2007	9/18/2007	10/5/2007	8/16/2007	9/21/2007	10/4/2007	8/23/2007	8/13/2007
county	Monroe	Winnebago	Jackson	Linn	Adams	Wayne	Boone	O'Brien	Black Hawk	Mills	Clarke
fish species (fillet)	ccat	ccat	carp	ybull	ccat	carp	ccat	ccat	carp	ccat	ccat
sample type	random	random	random	random	random	random	random	random	random	random	random
cadmium (total)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
chlordane (total)	<0.03	<0.03	<0.03	<0.13	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
cis-chlordane (chlordane isomer)	<0.002	<0.002	<0.002	<0.0084	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0037
cis-nonachlor (chlordane isomer)	<0.002	<0.002	<0.002	<0.0084	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
DDD	<0.004	<0.004	<0.004	<0.017	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
DDE	<0.005	<0.005	<0.005	<0.021	<0.005	<0.005	<0.005	<0.005	0.0055	<0.005	0.0061
DDT	<0.005	<0.005	<0.005	<0.021	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
dieldrin	<0.003	<0.003	<0.003	<0.013	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
gamma-BHC (lindane)	<0.002	<0.002	<0.002	<0.0084	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
heptachlor	<0.003	<0.003	<0.003	<0.013	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
heptachlor epoxide	<0.003	<0.003	<0.003	<0.013	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
hexachlorobenzene	0.0014	<0.001	<0.001	<0.0042	<0.001	0.0046	<0.001	0.0013	<0.001	<0.001	<0.001
lead (total)	<0.14	<0.14	<0.13	<0.14	<0.13	<0.14	<0.14	<0.14	<0.13	<0.14	<0.14
oxychlordane	<0.002	<0.002	<0.002	<0.0084	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
pentachloroanisole (PCA)	<0.001	<0.001	<0.001	<0.0042	0.0015	<0.001	<0.001	0.0017	<0.001	<0.001	0.0026
selenium (total)	<1.73	<1.46	<1.6	<1.45	<1.3	<1.98	<1.67	<1.86	<2	<1.7	<1.56
total PCBs (sum aroclors 1248, 1254, 1260)	<0.09	<0.09	<0.09	<0.231	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09
trans-chlordane (chlordane isomer)	<0.002	<0.002	<0.002	<0.0084	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
trans-nonachlor (chlordane isomer)	<0.002	<0.002	<0.002	<0.0084	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0025
treflan	<0.003	<0.003	<0.003	<0.013	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003

Table 11b. Summary of the 2007 IA RAFT random small lake samples (except mercury).

Site Name	Greenfield Lake	Larson Lake County Park	Marathon City Park Pond	Middle Sabula Lake	Ocheyedan Pits RA	Percival Lake SWMA	Railroad Lake (Falls Access)	Scharnberg Pond County Park	Seminole Valley Park Lakes	Shimek State Forest Ponds	Upper Centerville Reservoir
Date	8/16/2007	8/13/2007	9/5/2007	9/4/2007	10/5/2007	10/9/2007	10/3/2007	9/14/2007	9/12/2007	10/11/2007	8/15/2007
county	Adair	Cherokee	Buena Vista	Jackson	Osceola	Fremont	Black Hawk	Clay	Linn	Lee	Appanoose
fish species (fillet)	ccat	carp	ccat	carp	ccat	carp	carp	ccat	carp	ccat	ccat
sample type	random	random	random	random	random	random	random	random	random	random	random
cadmium (total)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
chlordane (total)	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
cis-chlordane (chlordane isomer)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
cis-nonachlor (chlordane isomer)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0025	<0.002
DDD	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.0048	<0.004	<0.004
DDE	0.014	0.02	<0.005	<0.005	<0.005	0.0055	<0.005	<0.005	0.02	<0.005	0.0071
DDT	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
dieldrin	0.0045	0.0091	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.0045	<0.003	<0.003
gamma-BHC (lindane)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
heptachlor	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
heptachlor epoxide	<0.003	0.0031	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
hexachlorobenzene	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
lead (total)	<0.14	<0.13	<0.13	<0.14	<0.14	<0.13	<0.13	<0.14	<0.14	<0.14	<0.13
oxychlordane	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
pentachloroanisole (PCA)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
selenium (total)	<1.47	<1.96	<1.96	<1.5	<3.1	<1.77	<1.72	<2.06	2.32	<1.18	<1.43
total PCBs (sum aroclors 1248, 1254, 1260)	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	0.55	<0.09	<0.09
trans-chlordane (chlordane isomer)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
trans-nonachlor (chlordane isomer)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0029	<0.002
treflan	<0.003	0.0056	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003

Table 12. Summary of the 2007 IA RAFT random small lake mercury samples.

Site Name	Date	County	fish species (fillet)	sample type	mercury (total)
Albia City Reservoir	8/16/2007	Monroe	ccat	random	0.0149
Albia City Reservoir	8/16/2007	Monroe	lmb	random	0.127
Ambrosson Pits RA	8/17/2007	Winnebago	ccat	random	0.047
Ambrosson Pits RA	8/14/2007	Winnebago	lmb	random	0.267
Brown Lake	9/4/2007	Jackson	blcrp	random	0.114
Brown Lake	9/4/2007	Jackson	carp	random	0.1
Central City Ponds	7/30/2007	Linn	lmb	random	0.0788
Central City Ponds	9/14/2007	Linn	ybull	random	0.0526
Corning Reservoir	9/18/2007	Adams	ccat	random	0.0181
Corning Reservoir	9/10/2007	Adams	unk.	random	0.0426
Corydon Reservoir Park	10/5/2007	Wayne	carp	random	0.107
Corydon Reservoir Park	10/5/2007	Wayne	lmb	random	0.216
Dickcissell Lake	8/16/2007	Boone	ccat	random	0.0451
Dickcissell Lake	8/17/2007	Boone	lmb	random	0.181
Douma Area Pond	9/21/2007	O'Brien	bgill	random	0.0895
Douma Area Pond	9/21/2007	O'Brien	ccat	random	0.0763
Fisher Lake	10/4/2007	Black Hawk	carp	random	0.118
Fisher Lake	10/4/2007	Black Hawk	lmb	random	0.226
Glenwood Park Lake	8/23/2007	Mills	ccat	random	0.121
Glenwood Park Lake	8/23/2007	Mills	lmb	random	0.126
Grade Lake	8/13/2007	Clarke	ccat	random	0.0222
Grade Lake	10/1/2007	Clarke	lmb	random	0.338
Greenfield Lake	8/16/2007	Adair	ccat	random	0.0201
Greenfield Lake	8/16/2007	Adair	lmb	random	0.0633
Larson Lake County Park	8/13/2007	Cherokee	carp	random	0.091
Larson Lake County Park	8/13/2007	Cherokee	lmb	random	0.22
Marathon City Park Pond	9/5/2007	Buena Vista	ccat	random	0.171
Marathon City Park Pond	9/5/2007	Buena Vista	lmb	random	0.138
Middle Sabula Lake	9/4/2007	Jackson	blcrp	random	0.0173
Middle Sabula Lake	9/4/2007	Jackson	carp	random	0.0457
Ocheyedan Pits RA	10/5/2007	Osceola	bgill	random	0.0944
Ocheyedan Pits RA	10/5/2007	Osceola	ccat	random	0.0522
Percival Lake SWMA	10/9/2007	Fremont	carp	random	0.176
Percival Lake SWMA	10/9/2007	Fremont	lmb	random	0.17
Pilot Knob Lake State Park	8/14/2007	Hancock	lmb	random	0.124
Railroad Lake (Falls Access)	10/3/2007	Black Hawk	carp	random	0.0819
Railroad Lake (Falls Access)	10/3/2007	Black Hawk	lmb	random	0.104
Schaben Pond, Harrison	10/9/2007	Harrison	lmb	random	0.248
Scharnberg Pond Co Park	9/14/2007	Clay	bgill	random	0.119
Scharnberg Pond Co Park	9/14/2007	Clay	ccat	random	0.0287
Seminole Valley Park Lakes	9/12/2007	Linn	carp	random	0.217
Seminole Valley Park Lakes	9/12/2007	Linn	lmb	random	0.142
Shimek State Forest Ponds	10/11/2007	Lee	ccat	random	0.0603
Shimek State Forest Ponds	10/11/2007	Lee	lmb	random	0.269
Upper Centerville Reservoir	8/15/2007	Appanoose	ccat	random	0.0909
Upper Centerville Reservoir	8/15/2007	Appanoose	lmb	random	0.299

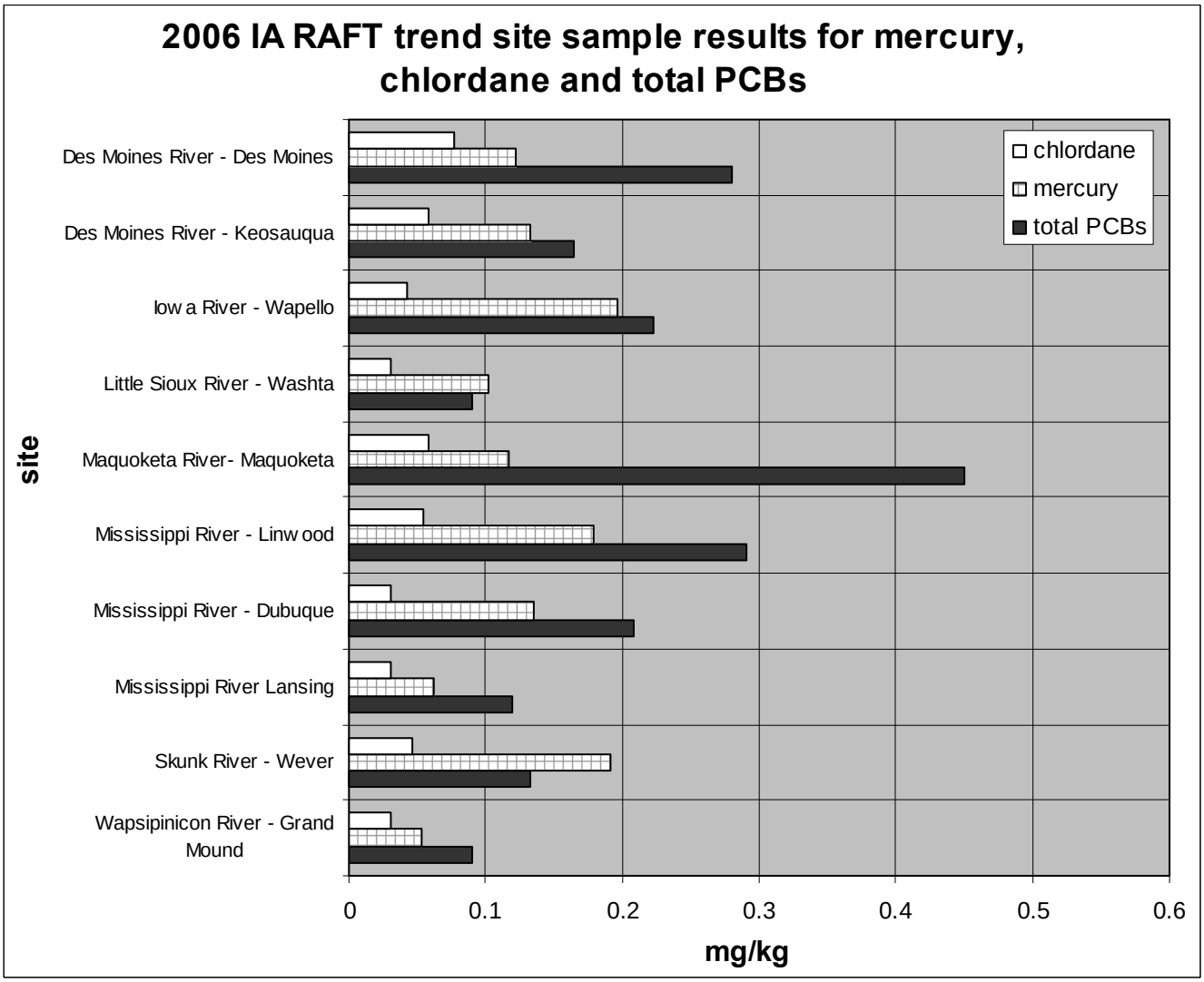

Figure 1. 2006 Iowa RAFT trend site sample results for mercury, chlordane and total PCBs using whole carp.

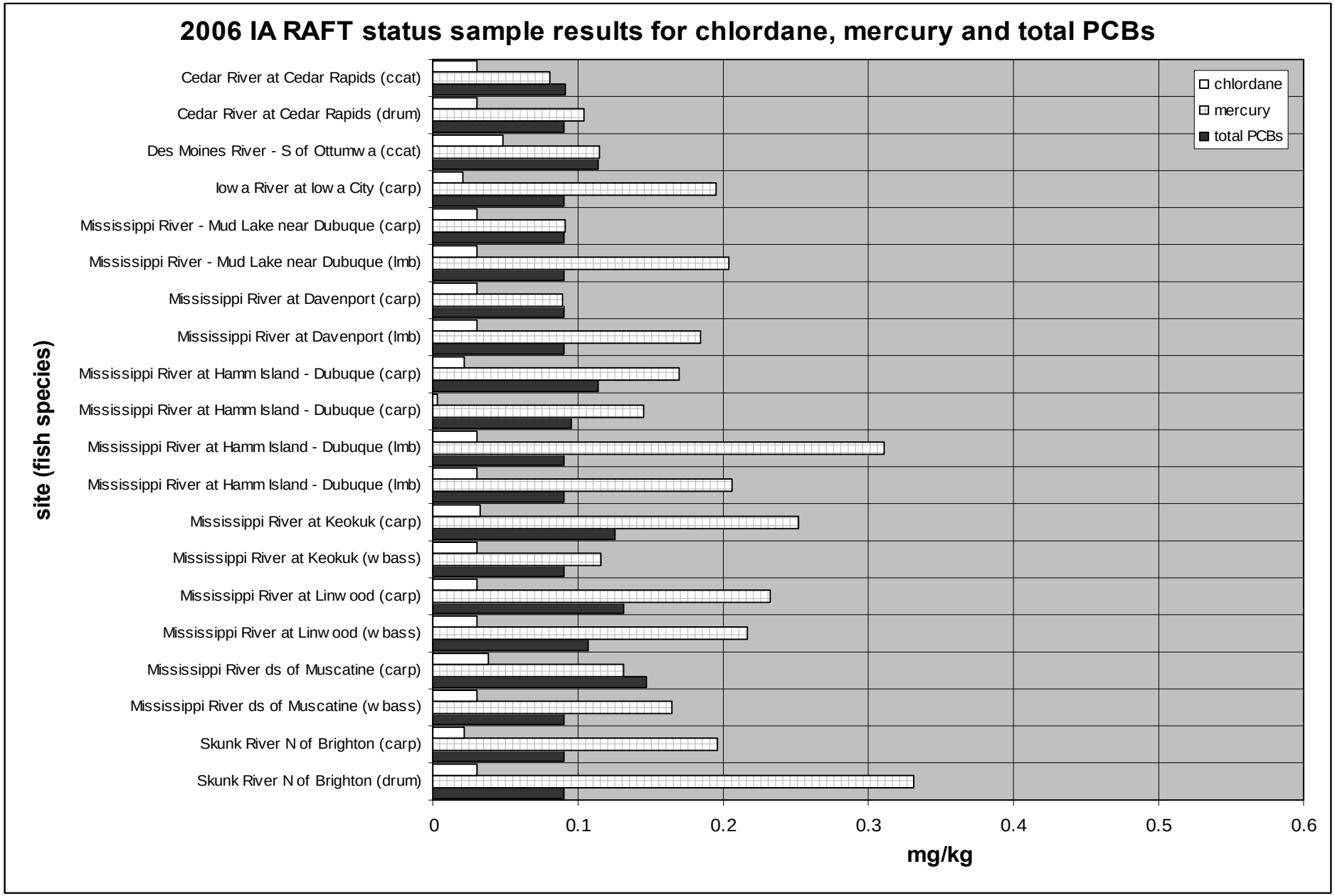

Figure 2. 2006 Iowa RAFT status sample results for chlordane, mercury and total PCBs.

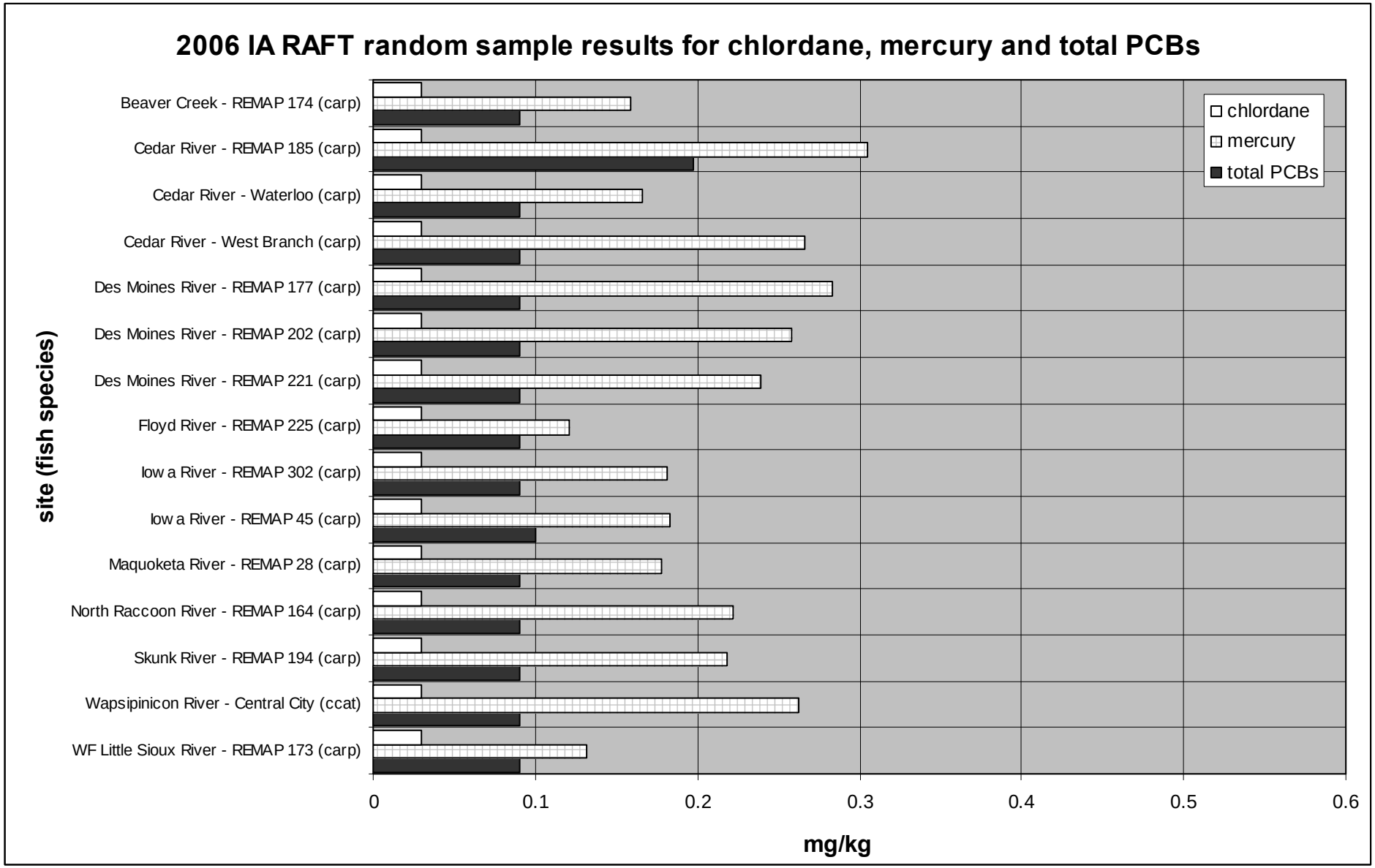

Figure 3. 2006 Iowa RAFT random sample results for chlordane, mercury and total PCBs.

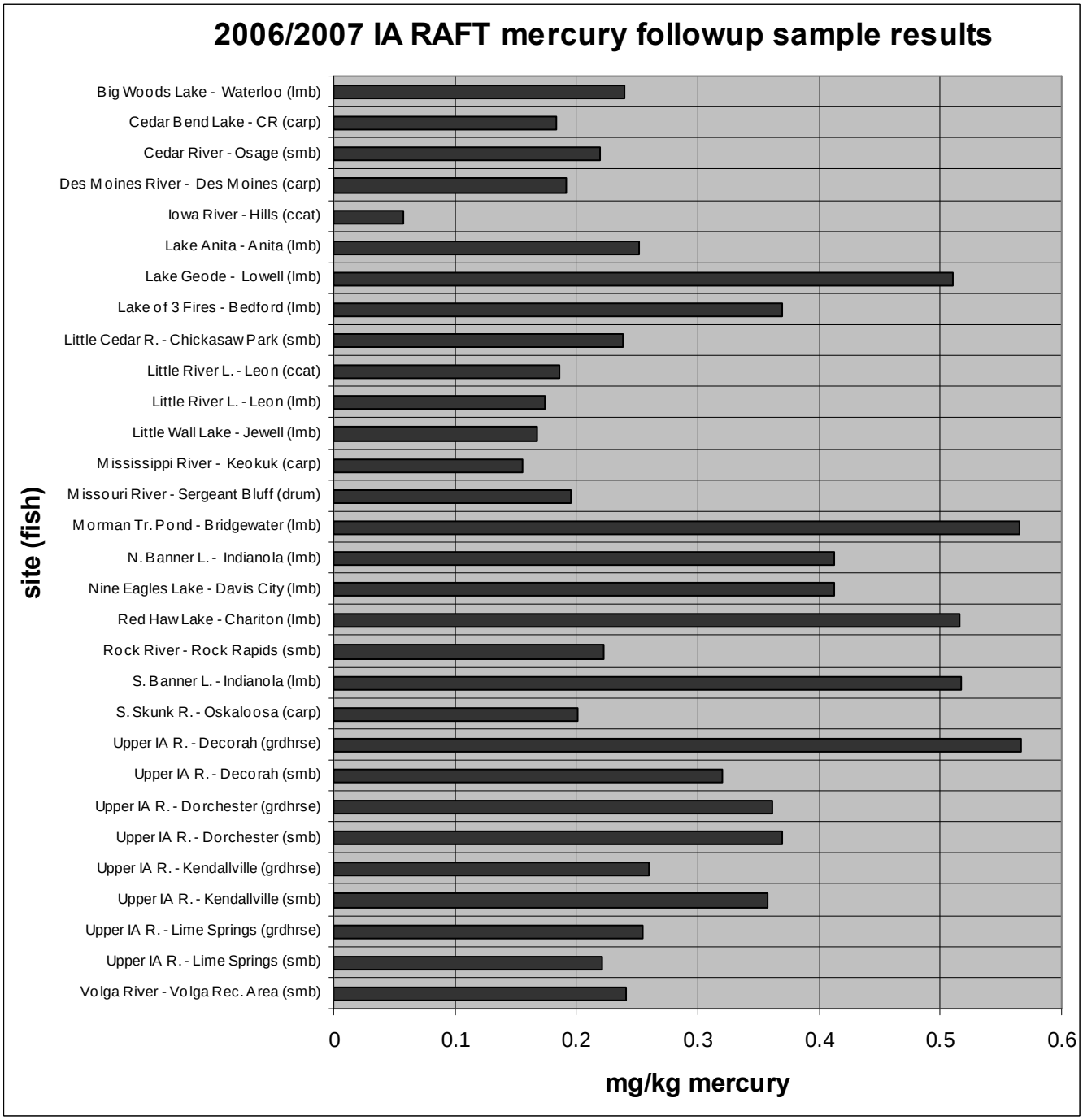

Figure 4. 2006/2007 Iowa RAFT mercury followup sample results.

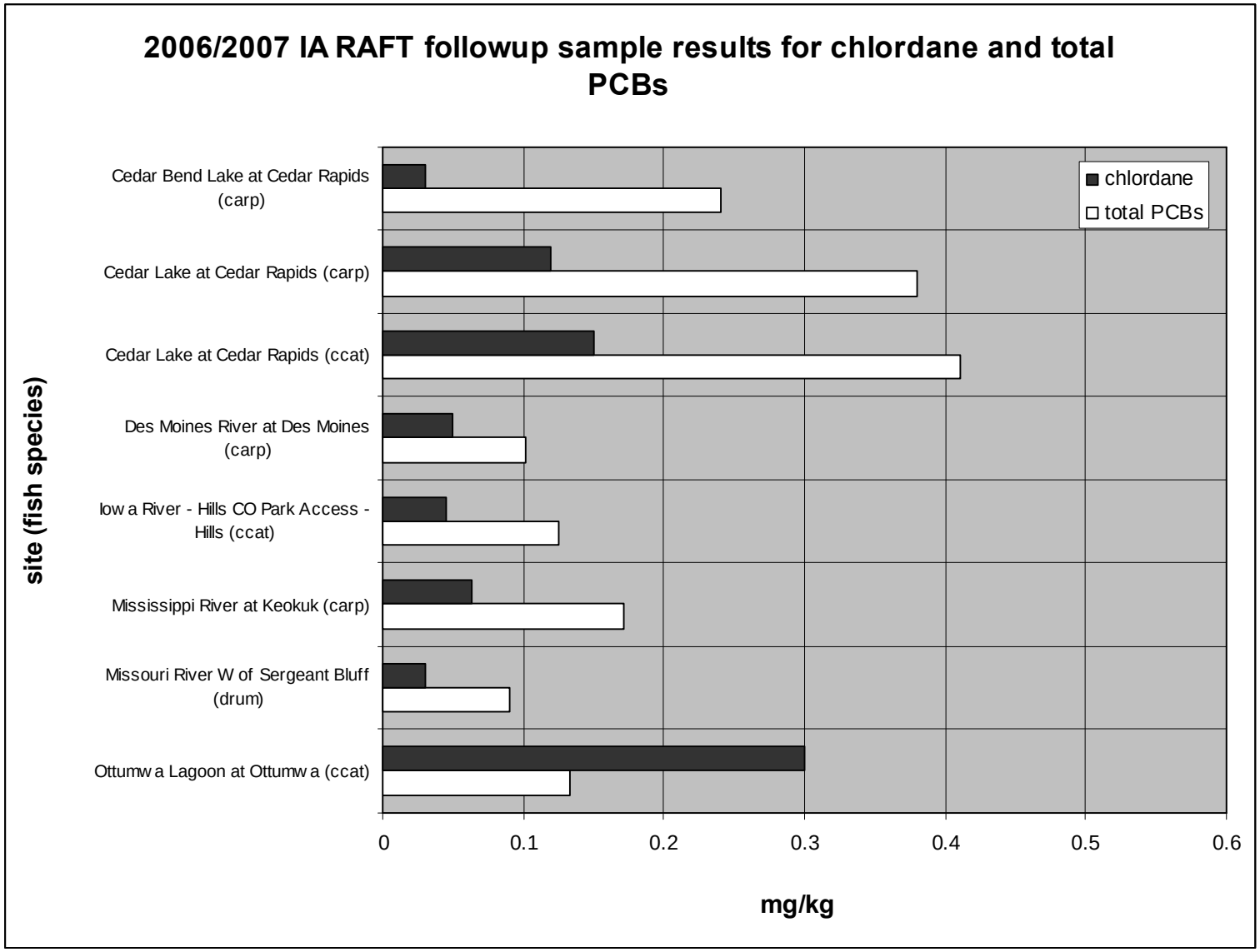

Figure 5. 2006/2007 Iowa RAFT followup sample results for chlordane and total PCBs.

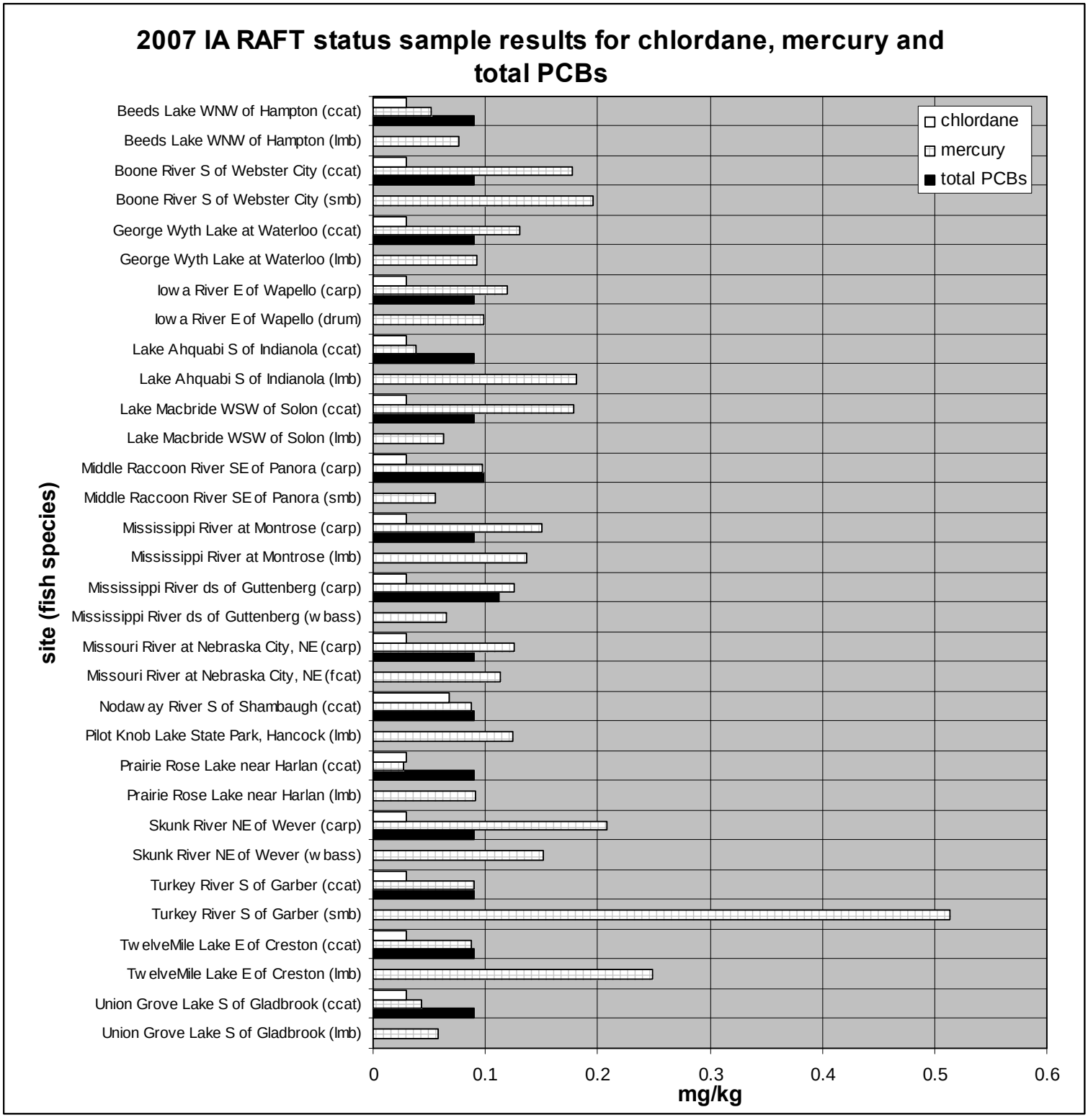

Figure 6. 2007 Iowa RAFT status sample results for chlordane, mercury and total PCBs.

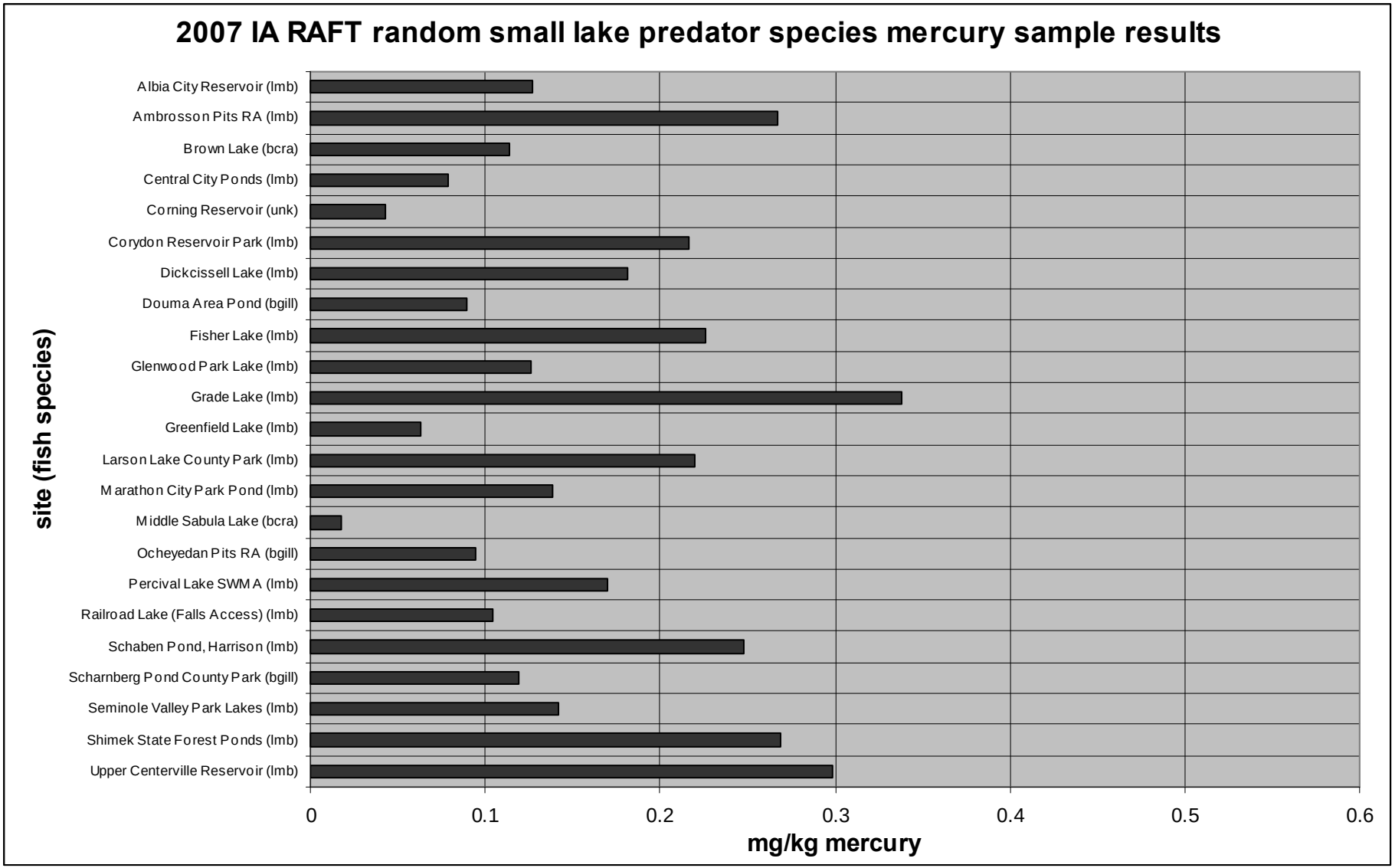

Figure 7. 2007 Iowa RAFT random small lake predator species mercury sample results.

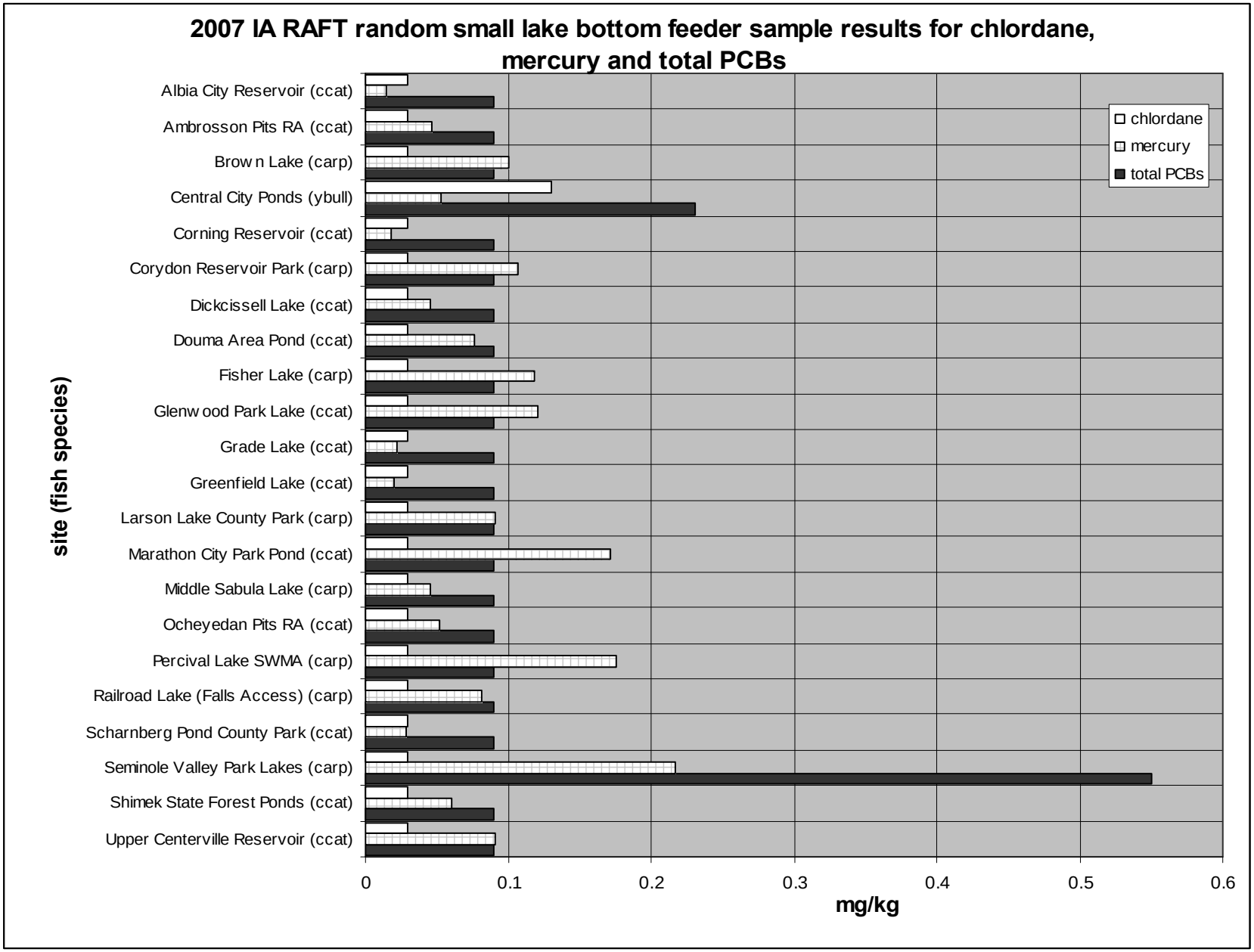

Figure 8. 2007 Iowa RAFT random small lake bottom feeder sample results for chlordane, mercury and total PCBs.