February 2006 Water Fact Sheet 2006-5

IOWA'S WATER
Ambient Monitoring Program

Fish Tissue Monitoring in Iowa

Why monitor fish tissue?

Fish tissue monitoring is conducted in Iowa to supplement other water quality monitoring programs and to determine if Iowa's fish are safe to eat. The tendency for several toxic substances to accumulate in fish above levels observed in water (a process called bioconcentration or bioaccumulation) makes fish useful for monitoring certain toxic contaminants (for example, pesticides, toxic organic chemicals, and toxic metals). These contaminants routinely exist in the environment at levels too low to be detected in lakes and rivers. Thus, results from fish tissue monitoring can be used to identify locations and potential sources of environmental contamination. Toxic substances can also reach concentrations in fish that pose potential health risks to consumers due to long-term (lifetime) consumption of contaminated fish. If high levels of toxic substances are found in Iowa fish, the results are used by the Iowa Department of Natural Resources (IDNR) to issue advisories that warn against the consumption of contaminated fish.

IDNR *staff sampling fish with a boat-mounted electrofisher on the Maquoketa River in Delaware County downstream from Delhi Dam.*

Who monitors levels of contaminants in Iowa fish?

Nearly all of the annual fish tissue monitoring conducted in Iowa is part of two long-term programs: (1) U.S. Environmental Protection Agency's (EPA's) *Regional Ambient Fish Tissue* (RAFT) *Monitoring Program* and (2) the U.S. Army Corps of Engineers (USCOE) water quality studies of the Des Moines River near Saylorville and Red Rock reservoirs, and the Iowa River near Coralville Reservoir.

Since 1977, annual fish collection and analysis activities have been conducted by the IDNR as part of the EPA's RAFT Monitoring Program. Every summer, IDNR fisheries biologists collect samples of both bottom-feeding and predator fish from approximately 20 locations on rivers and lakes in Iowa. The

EPA analyzes the samples for 27 pesticides, toxic organic compounds, and toxic metals at no cost to the state of Iowa (Table 1). Results are transmitted to the IDNR in the spring following sampling and the annual RAFT report is completed shortly thereafter (see www.iowadnr.com/water/tmdlwqa/wqa/raft.html). Since 1977, nearly 800 fish tissue samples from over 200 sites have been collected and analyzed for the RAFT program.

Iowa State University conducts annual fish contaminant monitoring at Saylorville Reservoir near Des Moines and Red Rock Reservoir near Pella as part of a long-term USCOE water quality monitoring program. In addition, the University of Iowa conducts fish contaminant monitoring as part of this USCOE program at Coralville Reservoir near Iowa City.

Are levels of contaminants in Iowa fish high or low?

Annual monitoring for over 25 years has shown that, in general, contaminant levels in Iowa fish are low, and that levels of several contaminants have decreased greatly in recent years (Figures 1 and 2). Most of these decreases resulted from the banning of a number of pesticides and other toxic compounds by the EPA in the 1970s and 1980s. Monitoring has shown that the newer pesticides formulated to replace these now-banned chemicals do not tend to accumulate in fish (or other animal) tissue. These trends suggest Iowa's fish currently have lower levels of these once troublesome contaminants than at any time over the last 50 years. However, levels of mercury remain steady and have not shown any obvious upward or downward trend over the 25 years of RAFT monitoring in Iowa (Figure 3).

This monitoring has also shown that, in general, contaminant levels in lake fish (except from urban lakes) are lower than in fish from Iowa's rivers. Levels of the toxic chlorinated compounds such

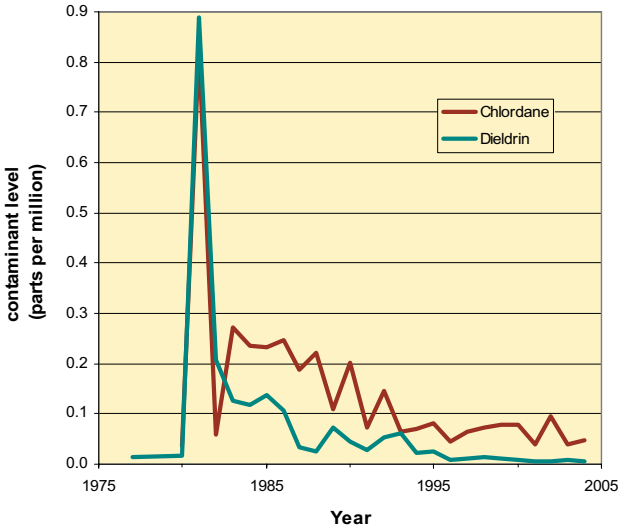

***Figure* 1.** *Yearly averages of chlordane and dieldrin in Iowa fish.*

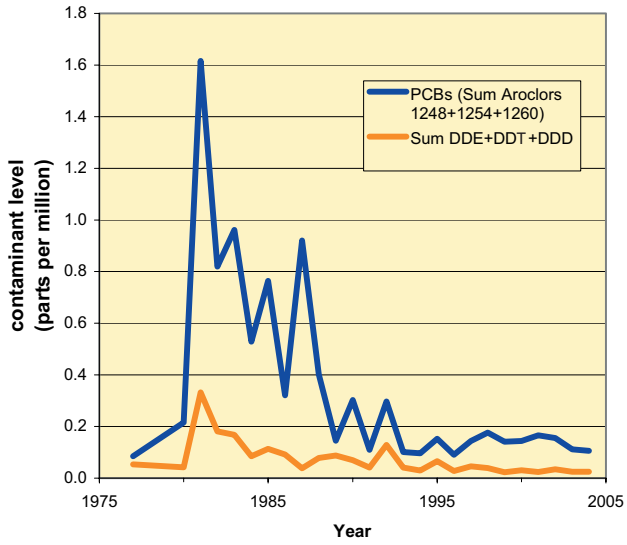

***Figure* 2.** *Yearly averages of* PCBs *and* DDT *in Iowa fish.*

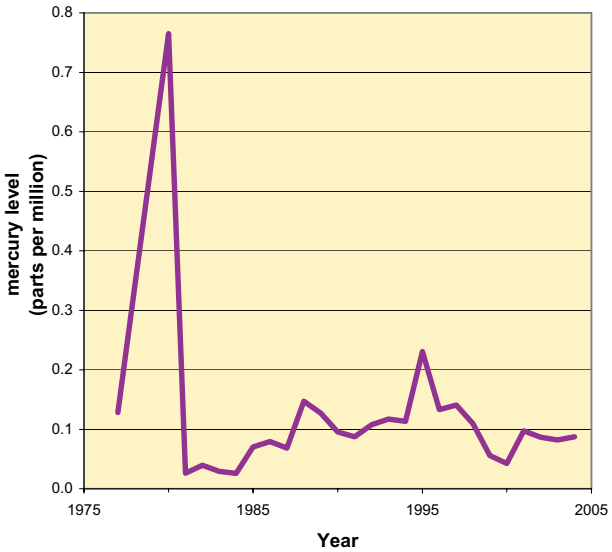

***Figure* 3.** *Yearly averages of mercury in Iowa fish.*

as dieldrin, chlordane, and PCBs (all of which were banned from use in the United States many years ago) have tended to occur at higher levels in bottom-feeding fish such as common carp and channel catfish. Mercury is the only contaminant of concern that tends to occur at higher levels in predator fish such as largemouth bass, smallmouth bass, and walleye. These same trends and patterns in contaminant levels also occur nationwide.

***Table* 1.** *Contaminant list currently monitored for the* RAFT *program. For detailed background information on these contaminants, see information provided by the* U.S. *Department of Health and Human Services* (*www.atsdr.cdc.gov/toxfaq.html*).

mercury	chlordane, technical	BHC (lindane)
PCB-Aroclor 1248	chlordane, cis-	cadmium
PCB-Aroclor 1254	chlordane, trans-	selenium
PCB-Aroclor 1260	nonachlor, cis-	trifluralin
DDD, 4,4'-	nonachlor, trans-	pentacloroanisole
DDE, 4,4'-	oxychlordane	Diazinon
DDT, 4,4'-	heptachlor	mirex
dieldrin	heptachlor epoxide	1,2,4,5-tetrachlorobenzene
lead	hexachlorobenzene	pentachlorobenzene

Are the fish safe to eat?

In nearly all cases, the results of over 25 years of fish contaminant monitoring in Iowa have shown that the state's fish are safe to eat. The Iowa Department of Public Health (IDPH) recommends, and the IDNR agrees, that fish is an important part of a healthy diet. Over the last 25 years, however, several contaminants have occasionally approached or exceeded federal guidelines established by the U.S. Food and Drug Administration (FDA) for safe consumption (called action levels or ALs). These contaminants include mercury, dieldrin, PCBs, and chlordane (see Figures 1-3). Levels of dieldrin, PCBs, and chlordane were much higher in the 1980s and early 1990s than today. With the exception of chlordane levels in fish from two urban lakes (Cedar Lake in Cedar Rapids and Ottumwa Lagoon in Ottumwa), levels of these contaminants have been well below federal guidelines in recent years. All other contaminants have either not been detected in the samples or have been found at very low levels.

***Table* 2.** *Comparison of consumption advisory protocols used by* IDNR: *the* FDA ALs *used prior to* 2006 *and the risk-based protocol developed by the* IDPH *in* 2005.

Contaminants	FDA Action Level (ppm[1])	IDPH advisory level (ppm[1])	Meal allowance
chlordane (technical)	0.3	0 to 0.6	unrestricted consumption
		>0.6 to <5.0	one meal per week
		5.0 and over	do not eat
mercury (methylmercury)	1.0	0 to 0.2	unrestricted consumption
		>0.2 to <1.0	one meal per week
		1.0 and over	do not eat
PCB-Aroclor 1248	sum = 2.0	0 to 0.2	unrestricted consumption
PCB-Aroclor 1254		>0.2 to <2.0	one meal per week
PCB-Aroclor 1260		2.0 and over	do not eat
[1]ppm = parts per million and is equivalent to milligrams/kilogram (mg/kg)			

If, however, results of monitoring indicate that levels of contamination in fish from an Iowa lake or river approach or exceed levels considered safe for human consumers, the IDNR will conduct additional (follow-up) fish contaminant monitoring to confirm that high contaminant levels exist. If the high levels are confirmed, the IDNR, with the cooperation of the IDPH, will establish a fish consumption advisory that warns people either to not consume or to limit their consumption of fish from a particular Iowa lake or reach of river. Advisories are announced through press releases to local news media and are summarized in the IDNR fishing regulations. At waterbodies covered by fish consumption advisories,

fish contaminant monitoring is conducted on an every-other-year basis as part of RAFT monitoring to justify continuing or removing the advisory. An advisory will not be removed until two consecutive samplings have shown that contaminant levels are below safe levels.

Like most state environmental agencies, the IDNR has historically relied on the ALs established by the FDA to determine whether Iowa fish were safe to eat. These ALs are the same levels still used by the FDA to determine whether fish and other food products involved in interstate commerce – such as in grocery stores – are safe to eat. Over the last 25 years, only five Iowa waterbodies have been covered by consumption advisories due to contaminant levels exceeding FDA ALs and currently, only three of these five waterbodies – Cedar Lake in Cedar Rapids, Ottumwa Lagoon in Ottumwa, and Carter Lake near Council Bluffs – are covered by advisories.

Looking to the future

In recent years, many states have abandoned the use of the FDA ALs in favor of a more protective "risk-based" approach. Thus, in 2005, the IDPH used EPA guidance to develop a risk-based advisory system for Iowa that covers the primary contaminants of concern (mercury, PCBs, and chlordane) (Table 2). This new advisory protocol, which will be first used in 2006, will likely result in issuance of a number of new advisories for Iowa lakes and rivers and will result in modifications of Iowa's existing consumption advisories. Regardless of the changes in Iowa's advisory system, IDNR expects that the number of advisories will remain low and that Iowans can continue to catch and safely consume fish from the vast majority of Iowa's streams, rivers, and lakes.

Acknowledgements

Over the last 25 years, a large number of environmental scientists, engineers, and biologists from several agencies have contributed to fish contaminant monitoring programs in Iowa. Special recognition is due to the biologists of the IDNR Fisheries Bureau—current and former—who have found the time and patience to collect all Iowa RAFT samples since the inception of the program over 25 years ago. Analysis of RAFT samples has been generously provided by the Region VII EPA Laboratory in Kansas City, KS. Staff of the IDNR Watershed Monitoring and Assessment Section have interpreted results of RAFT monitoring and have prepared summary reports. The following individuals have provided invaluable assistance with fish contaminant monitoring in Iowa: Marion Conover of the IDNR Fisheries Bureau; Tom Newton, Stuart Schmitz, and Charles Barton of the Iowa Department of Public Health; and Bruce Littell (retired) and Lorenzo Sena of U.S. EPA Region VII. The U.S. Army Corps of Engineers (Rock Island District) is acknowledged for their long-standing and continued support of annual fish contaminant monitoring at Saylorville, Red Rock, and Coralville reservoirs. John Olson and Ken Krier, IDNR Watershed Monitoring and Assessment Section, coordinate the RAFT program for IDNR and prepared this fact sheet.

Photo by Bryan Hayes, IDNR Fisheries Bureau.

Funding

Funding for RAFT program coordination and report preparation comes from an EPA grant through Section 106 of the Clean Water Act. Funds for RAFT sample collection and for special non-RAFT sample analysis come from Iowa's Fish & Wildlife Trust Fund (fishing license revenues).

Iowa Watershed Monitoring and Assessment Program Web Site – wqm.igsb.uiowa.edu

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