

## Other Indicators

There are many other factors that affect water quality in the Lake Michigan Drainage area. Some of the more notable indicators include heavy metals (i.e. lead, mercury, copper and zinc), pesticides, polycyclic aromatic hydrocarbons (PAH's) and polychlorinated biphenyls (PCB's). Even in low to moderate concentrations many of these materials are harmful to aquatic organisms, fish, and people because they concentrate in fatty tissue and move up the aquatic and terrestrial food chain, as predator eats prey.

**Heavy Metals:** In highly industrialized and urban areas these materials come from a variety of sources that include industrial discharges, scrap metal storage or salvage operations, the incomplete combustion of fossil fuels, sewage overflows, and farmland runoff. Dust, in the form of atmospheric deposition, also contributes these materials to the waterways as it settles on the water or is carried by precipitation. Cars, trucks and other vehicles add heavy metals to the environment by their exhaust, in the wear and tear of their tires, brakes, and body frames.



**Pesticides:** Pesticides are used to control fungi, weeds, insects, plant diseases and rodents. However, the improper use of these chemicals can also have unintended consequences by killing desirable organisms or contaminating their food sources. Pesticide residues and their byproducts can remain in the environment for long periods and can accumulate in the tissue of living organisms.

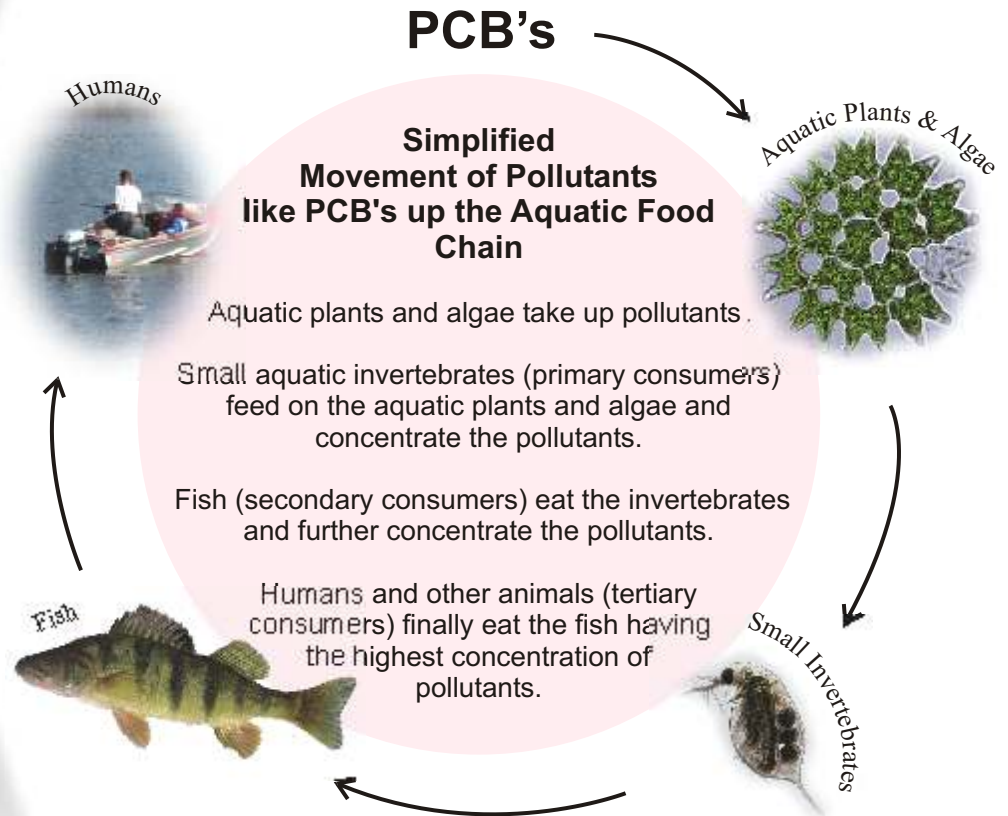
**PAH's:** Just like pesticides, PAH's also persist in the environment for long periods and concentrate up the food chain where they can become toxic or cause cancer. PAH's are formed from the incomplete combustion of fossil fuels and organic matter. They are also a component of many petroleum products, creosote, asphalt, and vehicle exhaust. Residential wood burning is also a source of PAH's in rural and urban environments.

The increase in paved surfaces has been spurred not only by urban and suburban development, but also by a steady increase in the use of automobiles, the primary mode of daily transportation for most Americans.

# Other Indicators

**PCB's:** PCB's constitute a family of 209 manmade, fat soluble, chlorinated compounds. Because of their insulating and non-flammable properties, PCB's were widely used in the past as hydraulic fluids, coolants and lubricants in transformers, capacitors and other electrical equipment. PCB's were banned from production in the United States in 1976, so PCB's found in the environment today are from historical uses and former spills.

*The impact upon the aquatic ecosystem from any or all of their indicators, either individually or in combination may include sensitive life stage mortality, damage to reproductive systems and general overall population declines.*



**Chlorides:** Chloride (salt) levels are yet another indicator of water quality. In freshwater systems chlorides occur naturally at low levels; however, chloride concentrations are steadily increasing in our waterways, largely due to winter roadway salting. Chlorides in freshwater systems also come from other human-related activities including irrigational



*Salt storage used in winter road salting.*

practices, water softeners, discharges of domestic and industrial effluents and sewer overflows.

Excessively high concentrations of chlorides from road salt can damage vegetation along the waterways and can also cause shock to freshwater organisms when sudden winter thaw conditions create highly salty runoff.

## Fish Consumption Advisories

Fish consumption is a major pathway of human exposure to persistent toxic substances such as PCB's and mercury. State issued fish consumption advisories are designed to protect the public from potential adverse health effects of eating contaminated fish. Fish consumption advisories include information on the type and amount of fish that can be eaten safely with proper preparation. PCB's and mercury are the primary contaminants responsible for fish consumption advisories in Lake Michigan Drainage area.