

## Are Fish From the Chesapeake Bay Safe To Eat?

By Sally Hornor



We know that fish are an important part of a healthy diet but we also know that the tributaries to the Chesapeake Bay are impaired with respect to toxic pollutants. Whether you fish for recreation or if you find your fish dinner at the store or at a local restaurant, you might be wondering if local fish are safe to eat. What are the contaminants of concern and what do we know about their presence in our fish and shellfish?

The Maryland Dept. of the Environment (MDE) has an extensive program in place to test for contaminants in our local fish just as the Food and Drug Administration (FDA) and the Environmental Protection Agency (EPA) have a long-standing program to determine the safety of our food supply. The websites from these agencies are an excellent source of information and are heavily tapped for this article. According to the EPA, Maryland had 80 statewide coastal fish consumption advisories in 2011 for chain pickerel, large and small mouth bass, spotted seatrout, yellow perch, bluefish, striped bass and bluegill. For finfish, the primary contaminants are the heavy metal mercury, polychlorinated biphenyls (PCBs) and pesticides. For shellfish, the primary concern is microbial. The FDA is mainly concerned with mercury, and their guidelines

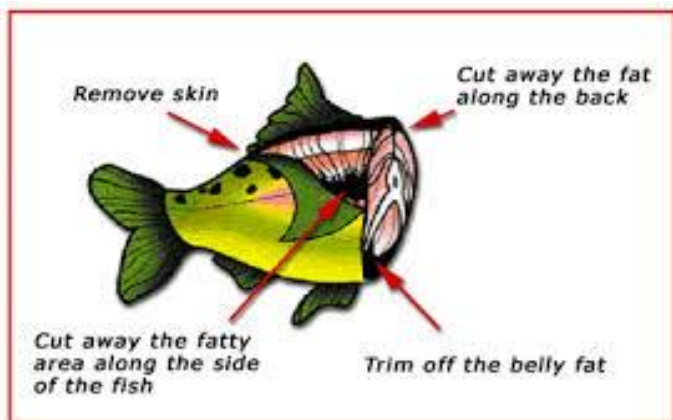
are based on limiting consumption of mercury for pregnant women and children. According to the EPA, the extent and severity of mercury contamination is widespread throughout the watershed while metals like aluminum, chromium, or iron are more localized. Polychlorinated Chlorinated Biphenyls (PCBs) and pesticides as well as heavy metals and microbial contaminants are addressed by the MDE.

**Mercury:** About half of the mercury in our waterways is derived from coal combustion and ends up in our water through atmospheric deposition. The other half is either naturally occurring or from the combustion of municipal waste or other industrial processes. Once it sinks to the sediments, bacteria in the bottom mud convert elemental mercury to methylmercury, which is volatile and rises into the water column where it is taken up by phytoplankton and then concentrated over time through the food chain. As a result, the top predators shark, sword and tuna tend to have the highest concentrations.

Age of fish is also significant as older predators tend to have higher concentrations of metals. An article in Rodale Organic Life (2010) summarizes research published in the Journal Biological Letters where scientists collected tuna at 54 sushi restaurants and 15 grocery stores in New York, New Jersey and Colorado. They found the highest mercury concentrations in sushi grade tuna which are larger and contain more fat. But, most tuna in grocery stores is from young yellowfin tuna and has the lowest levels. For Chesapeake Bay fish, the principles of looking for younger and less fatty fish apply.

Mercury is particularly damaging to fetuses and young children as the developing human brain is exquisitely sensitive to methylmercury. This is why guidelines are set for consumption of tuna for pregnant women, women who may become pregnant and children up to the age of 7. The National Wildlife Organization has reported that one-sixth of all women of child-bearing age in the U.S. have mercury levels in their blood that exceed EPA guidelines. The EPA and the FDA have prepared guidelines for fish consumption geared toward women who are pregnant or may become pregnant, breastfeeding mothers and parents of young children ([www.fda.gov/fishadvice](http://www.fda.gov/fishadvice) and [www.epa.gov/fishadvice](http://www.epa.gov/fishadvice)). High levels of mercury will impact adults, but such levels are apparently not found in fish.

**PCBs:** PCBs were widely used up until 1977 as flame retardants in electrical equipment before we knew how toxic and persistent they are in the environment. These manmade chlorinated compounds are very tough for bacteria to degrade and therefore they tend to persist in our waterways to this day. These fat-soluble compounds are concentrated up the food chain so the top predators in the Chesapeake, rockfish (striped bass) and bluefish, tend to have the highest concentrations. PCBs are stored in skin and fat. Also, the "mustard" in crabs tends to have higher concentrations of PCBs than crab meat.



PCBs are endocrine disrupters and cause a broad range of biological impacts, ranging from damage to DNA, developmental issues and reproductive problems. According to the national Center for Disease Control, babies born to women who ate PCB-contaminated fish have been found to have weaker reflexes, less motor maturity and a more pronounced startle response. At the age of four, they still showed low weight and impaired responsiveness and memory. At age 11, they had lower than average IQs. Similarly, reduced memory and attention were seen in a study of Canadian adults who had eaten PCB-contaminated fish.

There are two pieces of good news, however: PCB levels in rockfish in the Bay have decreased between 2005 and 2010, according to MDE, and we can remove most of the PCBs in rockfish and bluefish by careful preparation. The MDE website ([mde.gov](http://mde.gov)) provides information regarding which fish are safe to eat as well as some excellent tips and a video on how to prepare fish to minimize these

contaminants. The tips address ways to remove fat from the fish by careful filleting and by removing skin (see figure). Also, they say that bluefish and rockfish should not be breaded and fried as the PCBs tend to remain in the fat; grilling and broiling are preferred. This can be found at <https://www.youtube.com/watch?v=M08ABIPjebg>. It can also be found on the MDE Fish Advisory website <http://mde.maryland.gov/programs/Marylander/fishandshellfish/Pages/fishconsumptionadvisory.aspx>.

**Other organic compounds: PAHs**, or polycyclic aromatic hydrocarbons, form when gas, coal and oil are burned. These organic compounds are found in our more industrially-polluted tributaries. They have been associated with liver tumors in bottom-feeding fish such as the brown bullhead catfish.

**Pesticides:** While agriculture accounts for about 75 percent of all pesticide use, 85 percent of U.S. households store at least one pesticide at home, according to MDE. In Maryland the pesticide chlordane appears to be the most prevalent contaminant in fish. Even low levels of chlordane can cause chronic liver damage and lead to liver cancer. As discussed in an earlier article (CEPA Newsletter Spring 2016), pharmaceuticals and personal care products are an emerging concern in the region. These contaminants can appear in our landfills and our wastewater, and have been linked to behavior changes and reproductive disruptions in fish and other species.

**Fish consumption guidelines vary with the source of the fish:** Fish that spend most of their life in the ocean are of concern primarily due to mercury but fish that live in our coastal waters may have a range of contaminants. The EPA has identified three "regions of concern" -- Baltimore Harbor, the Anacostia River, and the Elizabeth River. The MDE website posts a nine-page table listing number of servings of fish that can safely be eaten, depending on the river in which they are caught ([Maryland Fish Advisories 2014 March17](#)). Some of the recommendations, based on the most recent data, (2014) are:

- \* **Brown bullhead** from the Magothy River, can be eaten six times a month whereas the same fish from the Chester River can be safely eaten eight times a month but when it's from Baltimore Harbor, only once every two months.
- \* **Smaller rockfish** (less than 28") can be eaten three times a month but larger rockfish from anywhere in the Bay watershed should not be eaten more than once per month.
- \* **Smaller bluefish** from the Bay watershed (less than 15") can be eaten twice per month but there is no safe level for any bluefish consumption for larger bluefish (MDE was not able to catch enough larger bluefish to arrive at a safe limit).

**Microbial contaminants:** Since they are filter-feeders, shellfish may concentrate pathogenic viruses or bacteria as they feed. MDE monitors the fecal coliform count in areas in Maryland where shellfish are harvested commercially. These bacteria are associated with fecal waste of warm-blooded animals and thus act as indicators of contamination due to wastewater treatment plants, failing septic systems, illegal discharge or stormwater runoff. This summer, shellfish harvesting in parts of the Rhode River was closed due to high coliform counts. In addition to gastrointestinal illnesses, consumption of contaminated shellfish may also lead to hepatitis A which is associated with liver damage. All of these illnesses can be avoided by cooking shellfish, but raw oysters are popular in Maryland requiring that water quality be closely monitored. Since stormwater can be a major source of fecal contamination, oyster beds are conditionally closed for three days to harvest by MDE if more than 1" of rain falls within 24 hours. There is no restriction on crab harvest due to possible water contamination since crabs are not filter feeders.

**So, are local fish safe to eat?** In conclusion, fish and shellfish are an important part of a healthy diet. Nutritionists often recommend eating fish twice a week. They are a good source of lean protein and beneficial fatty acids. Regarding chemical contamination of local fish, the bottom line for most of us is that most fish caught locally and prepared properly are safe to eat in moderation. Caveats are in place for pregnant women and small children with respect to swordfish and tuna due to mercury levels, and large bluefish from the Bay apparently are not safe for any of us to eat. Fish caught in highly contaminated waters are suspect for PCBs and other organic pollutants and should be eaten infrequently.