



Science Guidance (01-0408)

Western Airborne Contaminants Assessment Project: A Human Health Perspective

I. Background

Recently, results from the Western Airborne Contaminants Assessment Project (WACAP) were published indicating elevated levels of contaminants in some lake ecosystems. Although detectable levels of contaminants were found in a number of locations, the most likely route of human exposure is consumption of fish. This guidance examines results from the WACAP as related to elevated levels of contaminants in fish and suggests ways to reduce human exposure to these contaminants.

The WACAP was conducted from 2002 through 2007 in eight parks located in the western United States. Over 100 semi-volatile organic compounds and metals were tested and 70 were found at detectable levels in snow, water, vegetation, sediment, and/or fish. Contaminants that are of human health concern and exceeded human health thresholds in this study include: Mercury, Dieldrin, and DDT.

II. Guidance

Many parks units in National Park Service (NPS) allow visitors and employees to fish in lakes and other bodies of water while recreating or working in a park. Fish sampled from certain NPS areas in this study were found to contain elevated levels of Mercury, Dieldrin, and DDT. Although fish can be a good source of protein and an important component of a healthy diet, eating fish with high levels of certain contaminants over time may adversely impact a person's health. When choosing to consume fish from areas known to have elevated levels of these chemicals, certain practices and precautions can reduce exposure.

The WACAP's findings and recommendations are summarized below for each contaminant:

A. Mercury

- Mercury is a naturally occurring element, but it is also emitted from the combustion of fossil fuels (coal) and burning of hazardous wastes.
- Humans are primarily affected by a particular toxic form of mercury called methylmercury which impairs neurological development in fetuses, infants, and children.

- Average mercury levels in lake trout from Alaska's Noatak National Preserve were above the guidelines established by EPA¹. Mercury levels in other species of fish collected at Gates of the Arctic, Olympic, Mount Rainier (LP19 Lake only), and Sequoia (Pear Lake only) National Parks also exceeded the EPA thresholds.

B. Dieldrin

- Dieldrin is an acutely toxic carcinogenic and endocrine-disrupting² compound once used to control insects on citrus, corn, cotton, and termite control.
- Dieldrin reduces the effectiveness of the immune system, reduces reproductive success, and causes neurological problems.
- In 3 of the 8 parks assessed (Rocky Mountain, Sequoia & Kings Canyon, Glacier) concentration of the pesticide dieldrin was detected in some fish at levels above EPA's human cancer risk threshold for recreational fish consumption. Dieldrin concentrations in fish at all national parks, except Olympic, exceeded human health thresholds for subsistence fish consumption.

C. DDT

- DDT, an insecticide banned in the U.S. in 1972, is a known endocrine-disrupting compound².
- DDT is a probable human carcinogen, damages the liver, temporarily damages the nervous system, reduces reproductive success, can cause liver cancer, and damages the reproductive system.
- Average DDT (i.e., p,p'-DDE) concentrations in fish exceeded the human cancer risk threshold for subsistence fishers at Sequoia & Kings Canyon National Park lakes and Oldman Lake in Glacier National Park.

¹According to the State of Alaska guidelines, sensitive members of the population, such as pregnant woman and children, can safely eat up to 16 meals per month of lake trout at Noatak, and no consumption restrictions would be recommended at Gates of the Arctic or Denali National Park.

²Chemical substances that are thought to mimic hormones thus adversely affecting hormone balance and normal function in the organs that hormones regulate. By EPA's working definition, endocrine disruptors "interfere with the synthesis, secretion, transport, binding, action, or elimination of natural hormones in the body that are responsible for the maintenance of homeostasis (normal cell metabolism), reproduction, development, and/or behavior."

The WACAP study results indicate that even in lakes that are thought to be pristine, elevated levels of contaminants have been found in fishes. One way humans can be exposed to these contaminants is through ingestion of fish either through recreational or subsistence fishing. Although the risk of adverse health effects are relatively low when fish are eaten periodically, as in recreational fishing, these particular risks can be even further minimized by following local fish advisories which will indicate not only which local fishes will tend to have higher contaminants but also how often those particular fishes can be consumed in a safe manner. In general, different restrictions may be applied to vulnerable populations such as pregnant women, breastfeeding women, women of childbearing age, and children than the general population. Some general recommendations for fish consumption and preparation to reduce exposure to risk are:

- When fishing, check the local fishing regulations and fish consumption advisories. If there are no guidelines then you may want to choose smaller fish for consumption as they may likely be younger and contain lower levels of harmful contaminants.
- If local fish advisories warn about contaminants that concentrate in the fatty portion of the fish (PCB, Organochlorine pesticides, dioxins, PBDEs) then consume less fatty fishes or fishes that that feed on the bottom of lakes and streams as they may have higher levels of these harmful contaminants.
- When preparing fish, remove skin, fat, and organs where contaminants are more likely to accumulate.
- Prepare fish by grilling, if possible, letting the fat drip off.

Several DOI bureaus, including the NPS Office of Public Health, plan to further explore this issue. As additional, coordinated advice is developed, this advisory will be updated and refined.

III. Additional Information

More information on the contaminants mentioned in this guidance can be found at the following links:

Mercury:

- <http://www.atsdr.cdc.gov/cabs/mercury/>
- <http://www.epa.gov/mercury/about.htm>

Dieldrin:

- <http://www.atsdr.cdc.gov/tfacts1.html>
- <http://www.epa.gov/pbt/pubs/aldrin.htm>

DDT:

- <http://www.atsdr.cdc.gov/tfacts35.html>
- <http://www.epa.gov/pbt/pubs/ddt.htm>

A guide to healthy eating of the fish caught either through recreational and subsistence fishing can be found at:

<http://www.nmenv.state.nm.us/swqab/advisories/HealthyFishBrochure.pdf>

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