



# Contaminated Fish: The Mercury Connection



National Atmospheric  
Deposition Program

# Mercury Sources

## ***Natural Sources:***

- Occurs naturally in soils, sediments, and rocks
- Volcanic eruptions
- Wildfires



## ***Man-Made Sources:***

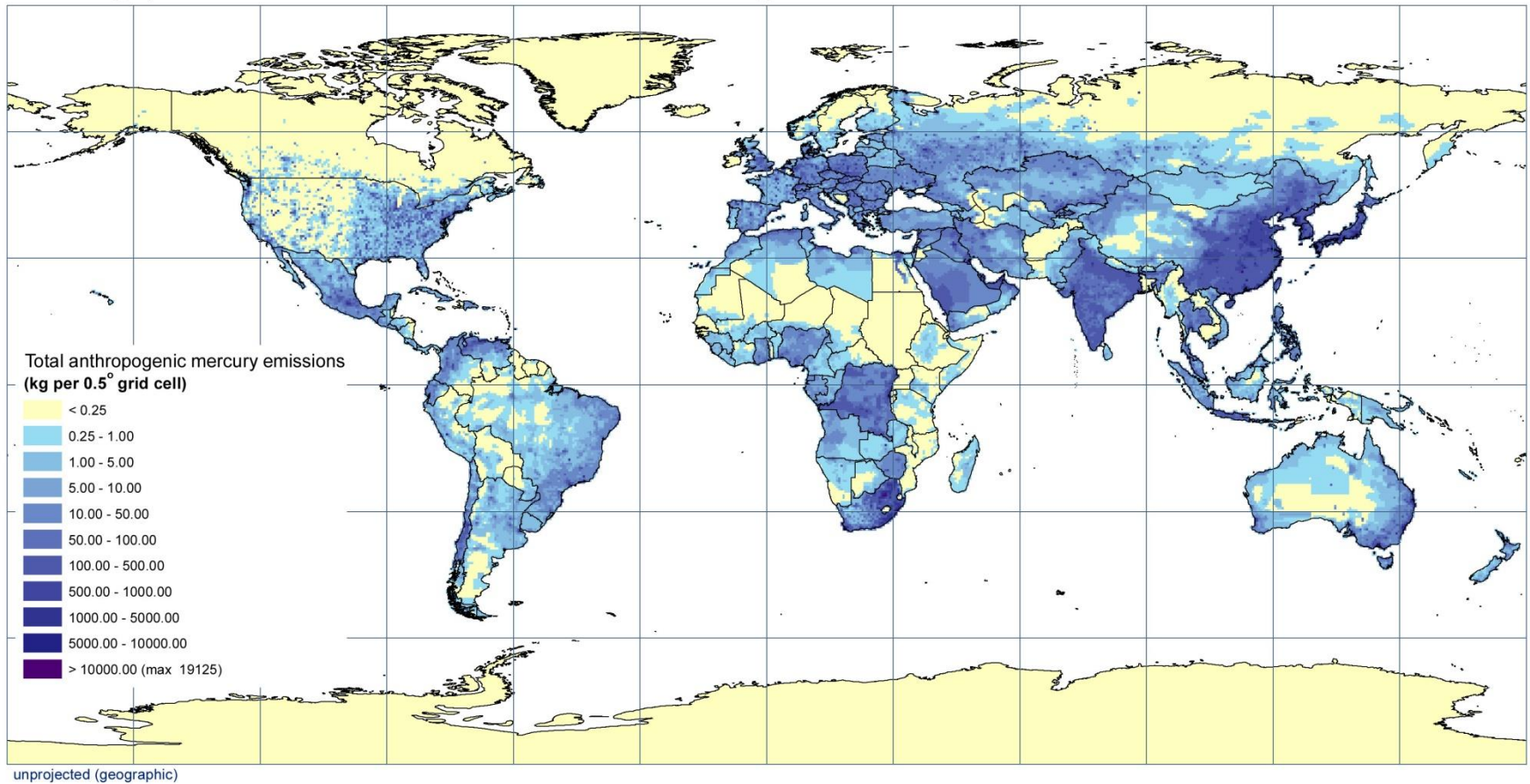
- Coal combustion
- Medical waste incineration
- Chemical manufacturing



# Major Sources of Mercury Emission

## Spatially Distributed Inventories of Global Anthropogenic Emissions of Mercury to the Atmosphere, 2000

Total Hg, point sources + distributed sources, 0.5° grid



citation:

Pacyna, J., S. Wilson and F. Steenhuisen. 2005.  
Spatially Distributed Inventories of Global Anthropogenic  
Emissions of Mercury to the Atmosphere.  
([www.amap.no/Resources/HgEmissions/HgInventoryMain.html](http://www.amap.no/Resources/HgEmissions/HgInventoryMain.html))



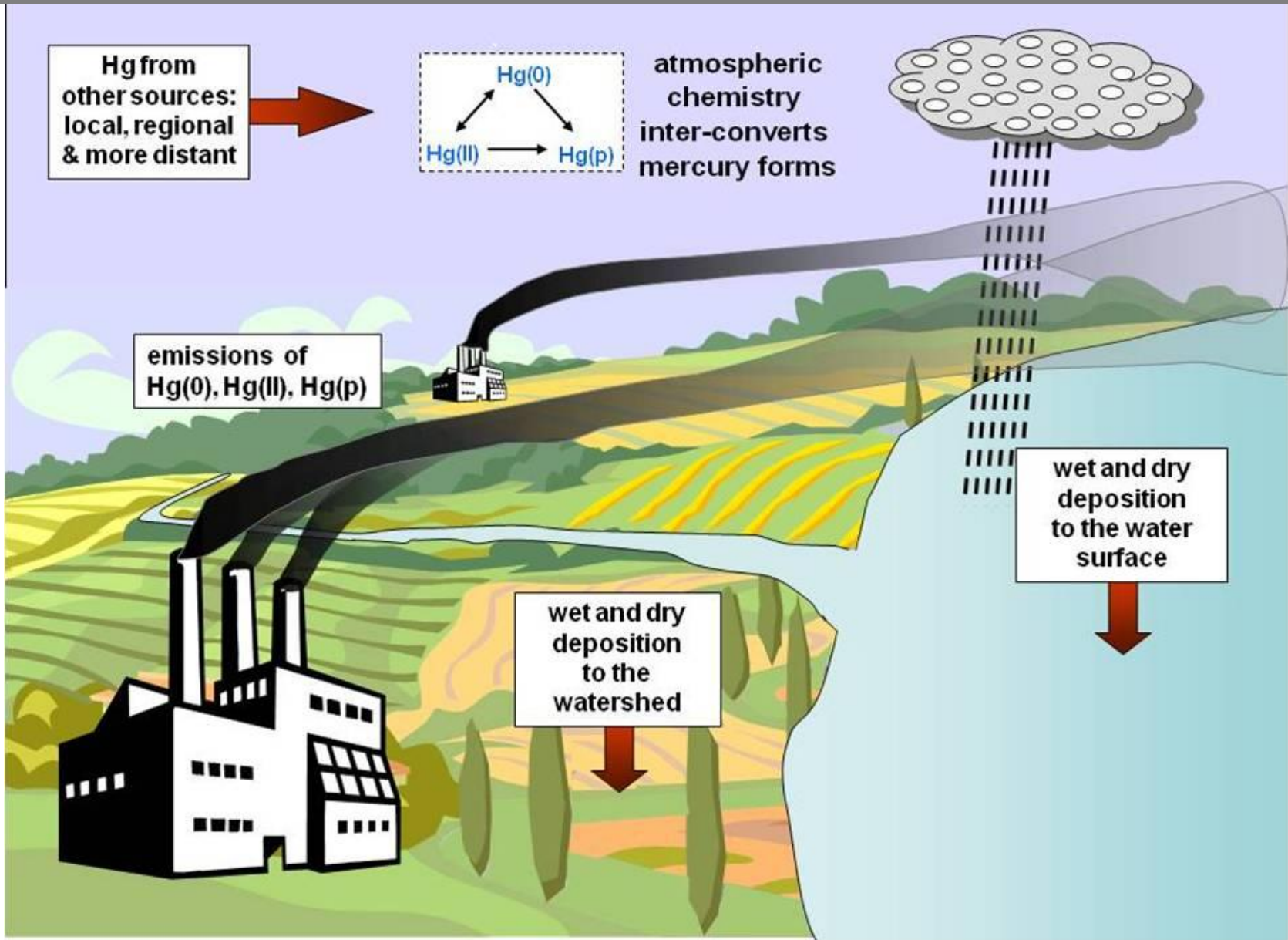
S. Wilson (AMAP), F. Steenhuisen (Arctic Centre, RuG), J. Pacyna (NILU)

# Mercury Transport

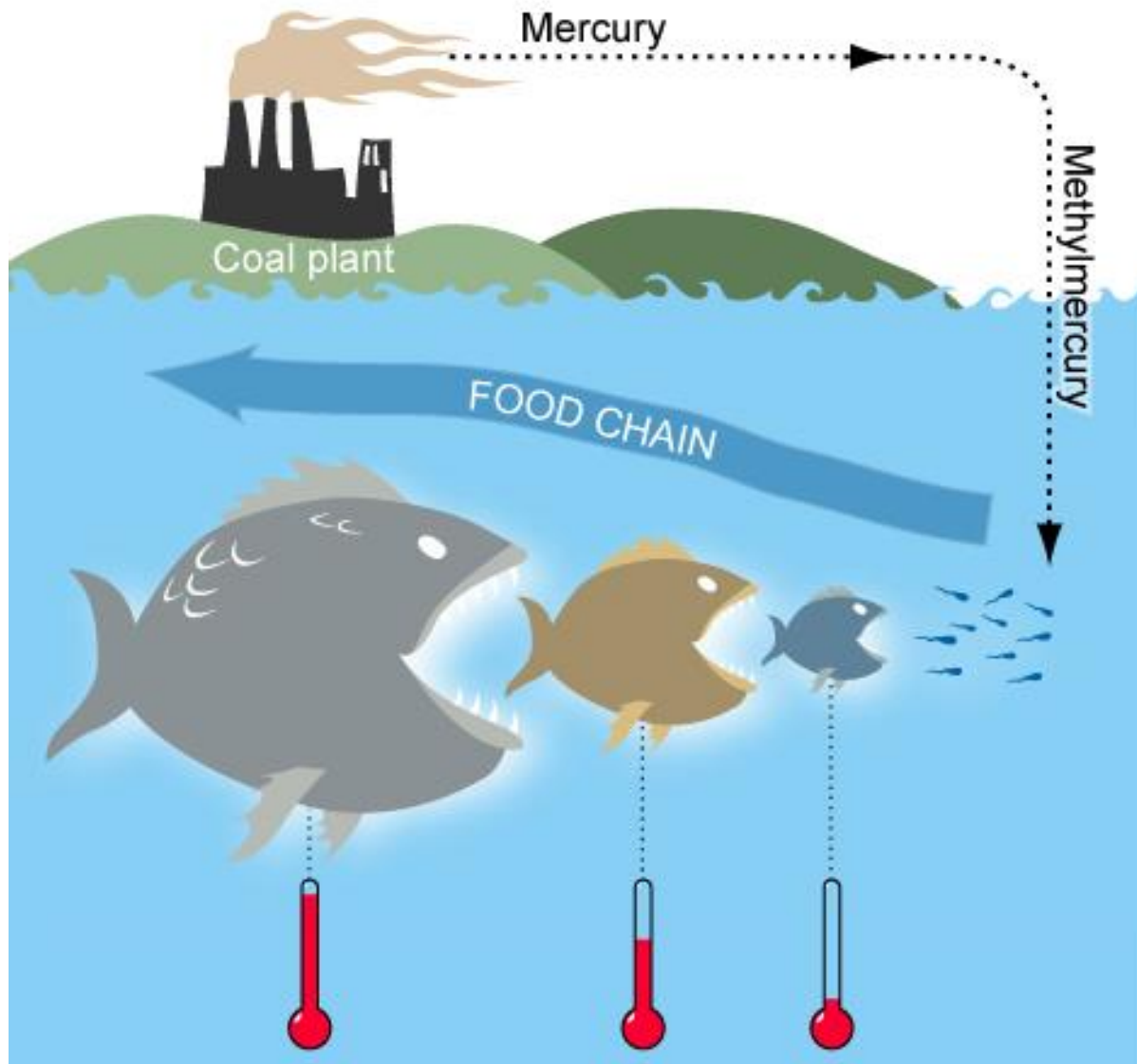


- (1) Rain and snow wash mercury out of the environment and into oceans, lakes, and rivers
- (2) Natural processes in water convert mercury to its toxic form, methyl mercury
- (3) Fish species consume methyl mercury
- (4) Methyl mercury levels accumulate in large fish and humans (bioaccumulation)

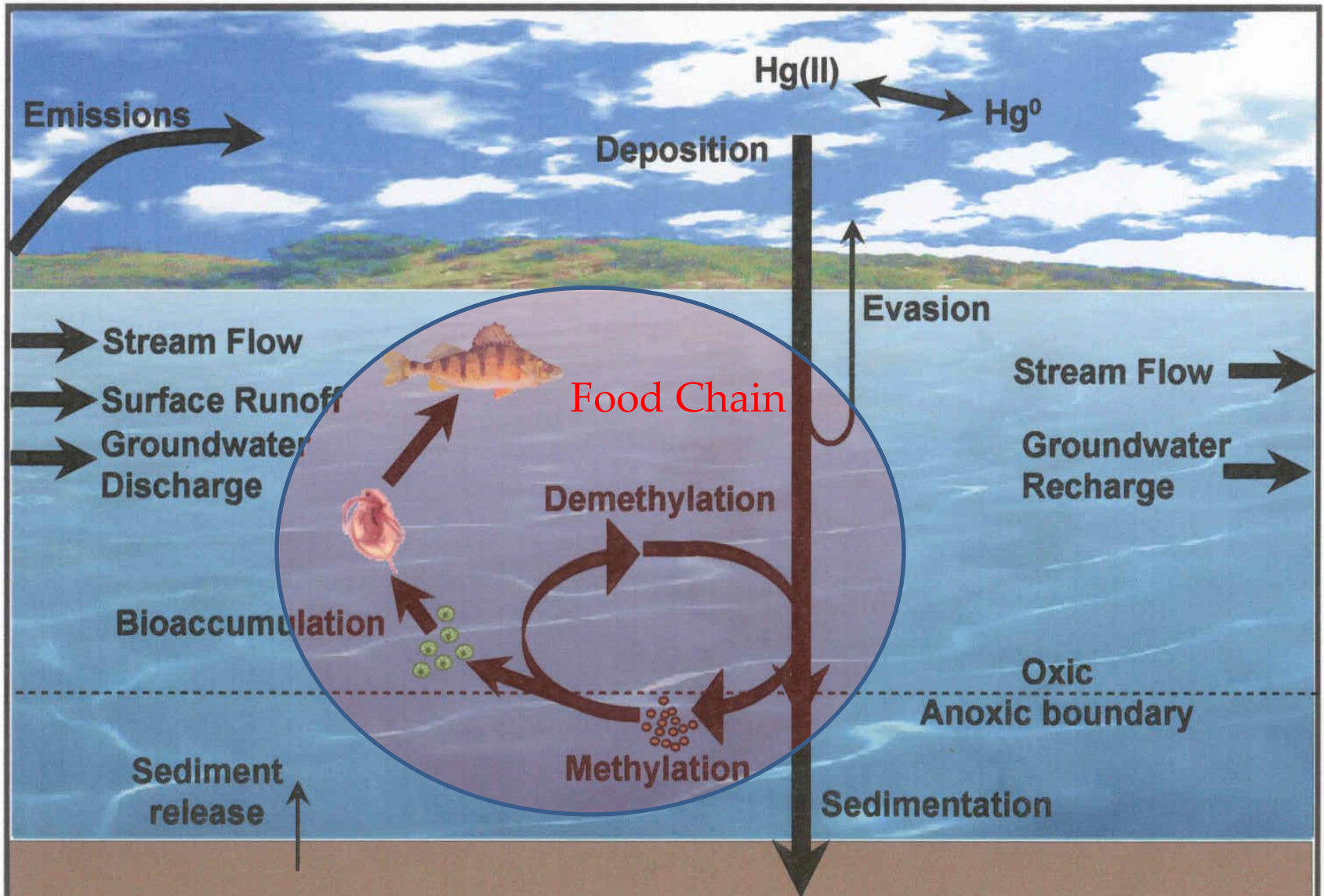
# Mercury Transport



# Up the Food Chain

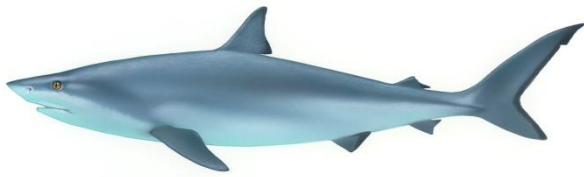


# The Aquatic Mercury Cycle

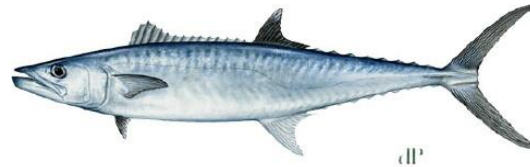


# Top of the Aquatic Food Chain

Large, long-living predator fish



Shark



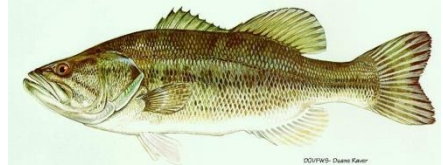
King mackerel



Walleye



Northern pike



Largemouth bass



Swordfish



Lake trout



# At-Risk Populations

Children are most susceptible to Mercury;

- Pregnant women
- Women who might become pregnant
- Nursing mothers
- Young children



# Human Health Effects of Mercury

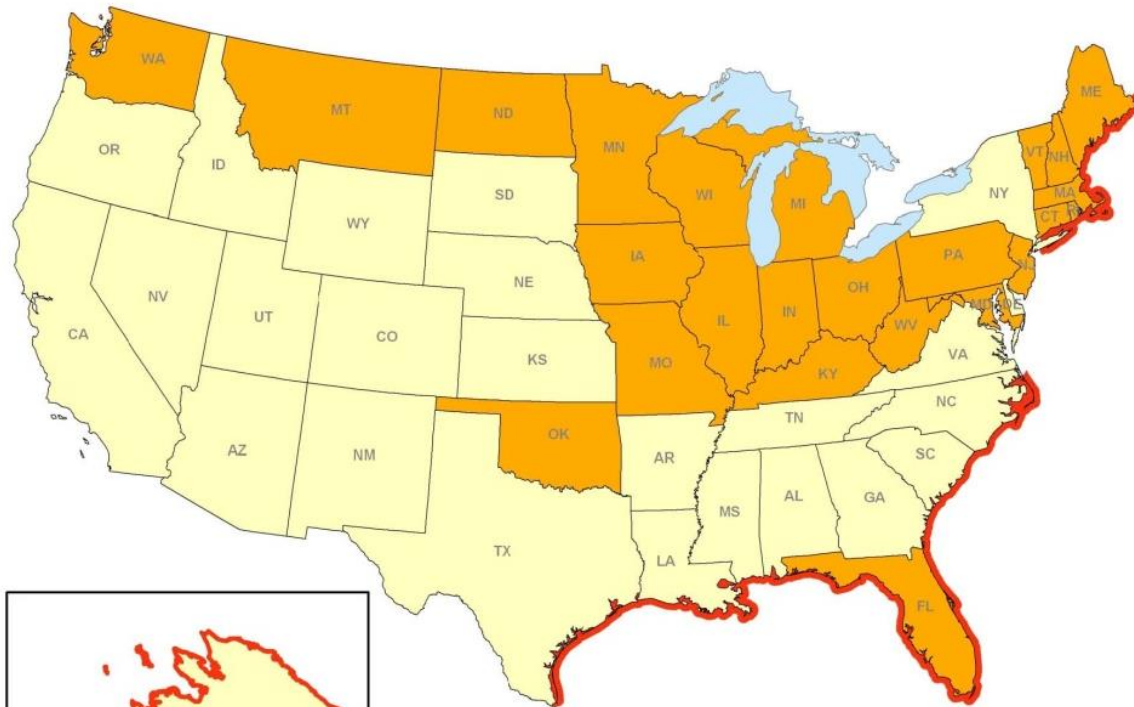
Damage to:

- Heart
- Kidneys
- Central Nervous System (neurotoxin)



# Advisories & Guidelines

Issued advisories for populations at risk to limit fish intake and avoid various larger species.



## Mercury Fish Advisories

- States with at least one mercury advisory
- Statewide mercury advisory
- Statewide coastal mercury advisory

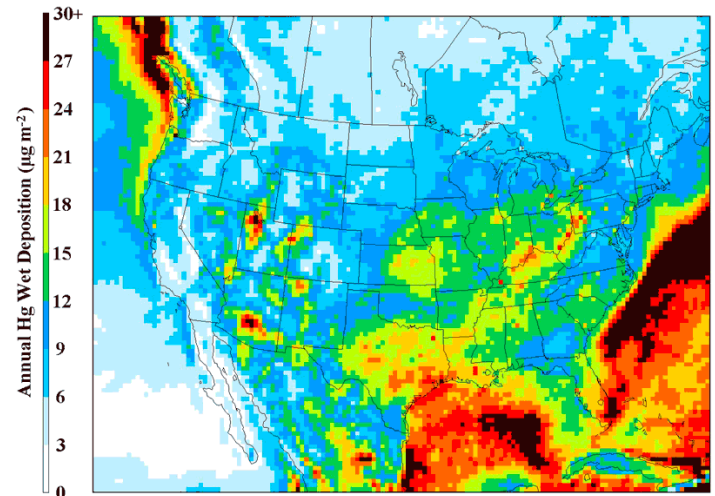
EPA guidelines for safe consumption: levels of mercury under 0.3 parts per million.

# Research

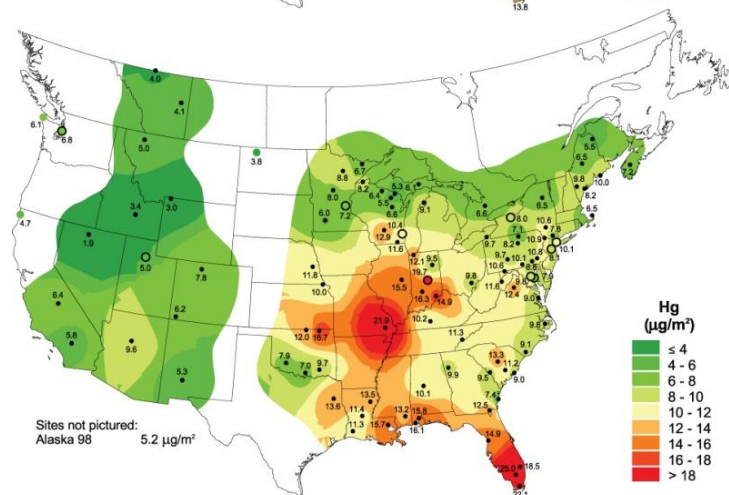
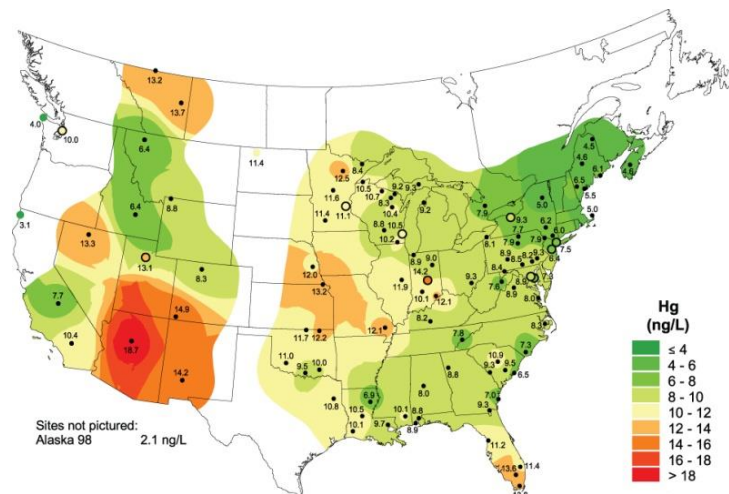
Studies show nearly all fish contain traces of methyl mercury.

Methyl mercury concentrations are highest in fish living in:

- Heavily polluted areas
- Coastal wetlands of Florida Everglades, Gulf of Mexico, the Atlantic Ocean, San Francisco Bay



# NADP Mercury Deposition Network

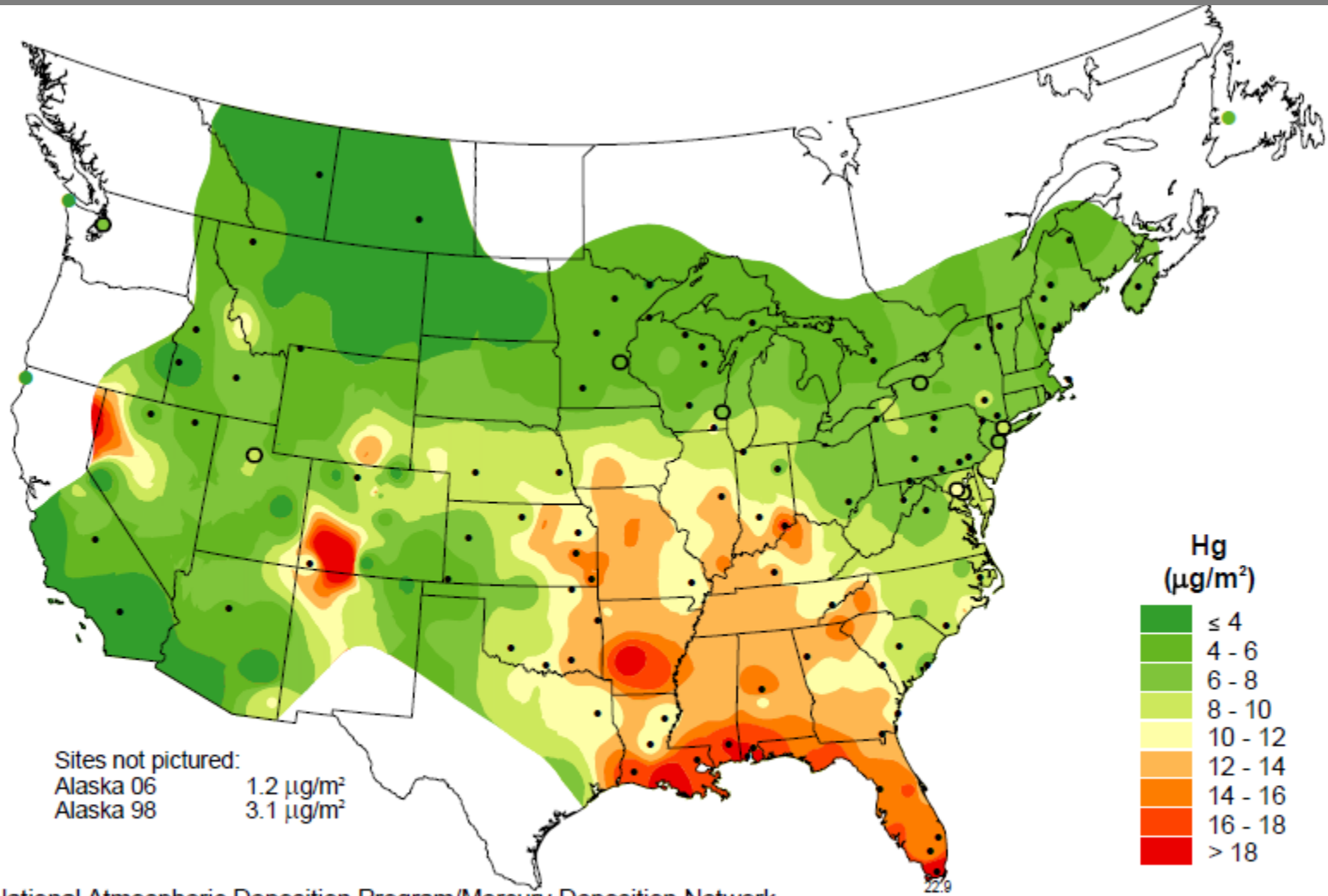


National Atmospheric Deposition Program/Mercury Deposition Network

*Total annual average mercury concentration in rainfall (top), and total annual mercury wet deposition (bottom) in 2008.*

MDN samples mercury in rain and snow to help researchers determine trends on mercury deposition: where it is deposited, at which rate, and at which concentration.

# 2009 Mercury Deposition



National Atmospheric Deposition Program/Mercury Deposition Network



# National Atmospheric Deposition Program

For more information about this presentation or the NADP, please contact:

NADP Program Office

Wisconsin State Laboratory of Hygiene

E-mail: [nadp@slh.wisc.edu](mailto:nadp@slh.wisc.edu)

NADP Web site: <http://nadp.slh.wisc.edu>

- The NADP is National Research Support Project-3: A Long-Term Monitoring Program in Support of Research on the Effects of Atmospheric Chemical Deposition. More than 250 sponsors support the NADP, including private companies and other nongovernmental organizations, universities, local and state government agencies, State Agricultural Experiment Stations, national laboratories, Native American organizations, Canadian government agencies, the National Oceanic and Atmospheric Administration, the Environmental Protection Agency, the Tennessee Valley Authority, the U.S. Geological Survey, the National Park Service, the U.S. Fish & Wildlife Service, the Bureau of Land Management, the U.S. Department of Agriculture - Forest Service, and the U.S. Department of Agriculture - National Institute of Food and Agriculture, under agreement no. 2008-39134-19508. Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of the sponsors or the Wisconsin state :Laboratory of Hygiene.*

- Title: “Contaminated Fish: The Mercury Connection”
- Audience: High school students, high school science teachers
- Plan: offer it on the web as a presentation download (for Teachers to use) or as a pdf download
- Notes: