



Freshwater Contaminants

Glacier Bay National Park and Preserve
Klondike Gold Rush National Historical Park
Sitka National Historical Park

Importance

Even in pristine national parklands, scientists have been able to detect concentrations of global contaminants such as mercury and Persistent Organic Pollutants (POPs). Freshwater habitat and organisms in Southeast Alaska are affected by pollutants from far and near-field sources, including examples such as coal emissions in Eurasia, previous pesticide applications of DDT, and natural geologic sources of mercury. Recent studies of lake sediments from Glacier Bay National Park and Preserve and nearby Chichagof Island demonstrate increasing mercury levels. This trend is the opposite of lower latitudes, where mercury levels have generally been dropping since the 1970s. Organisms at all levels of the food web are subject to this pollution, but higher trophic level animals such as birds and fish are especially vulnerable. Biomagnification, or the tendency for larger organisms to demonstrate elevated toxicity due to consumption of smaller contaminated organisms, results in concentrated toxin levels throughout upper trophic levels.

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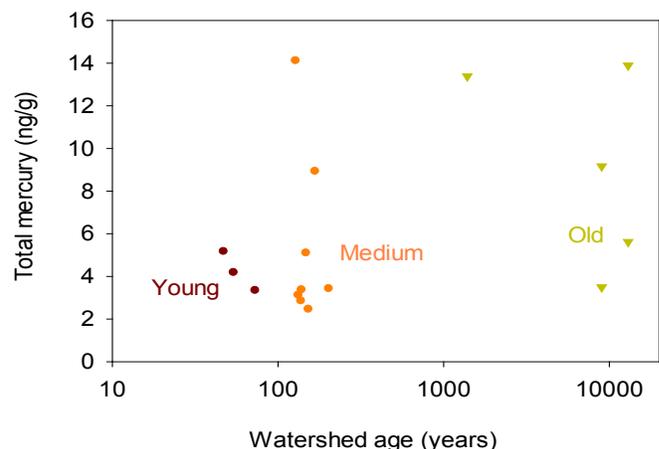


Photo: Paul Kaiser/USFWS

Total mercury concentrations from 2007 SEAN samples were quite low in water, sediment, and age-0 coho. However, age-1 coho tissue samples were as high as 80 ng/g, which approaches the 100 ng/g threshold for the protection of fish-eating birds and mammals set by the U.S. Environmental Protection Agency.

Program Design and Status

The Southeast Alaska Network (SEAN) recently completed a baseline analysis of contaminants samples from streamwater, streambed sediments, benthic macroinvertebrates, and juvenile coho salmon in collaboration with a multi-organization team of researchers led by University of Alaska Southeast (UAS) faculty (Nagorski et al. 2011). POPs were quite low throughout SEAN, although higher levels of polychlorinated biphenyls (PCBs) were found in the Indian River in Sitka National Historical Park. In all cases, POPs were below levels causing human and environmental health concerns. These initial analyses will act as important references for future SEAN contaminants monitoring. SEAN has recently initiated a protocol development process with partners from the University of Alaska-Fairbanks and UAS, which will include methods for multi-year, long-term data collection, analysis, reporting, and managing from a variety of samples, including water, sediment, stream invertebrate, and fish tissue.



In Glacier Bay, mercury concentrations found in age-0 coho salmon tended to increase with increasing watershed age. Older watersheds have a higher occurrence of sulfate-reducing bacteria, which converts inorganic mercury deposited from the atmosphere into methylmercury, a form more readily accumulated by aquatic organisms. Therefore, future sampling efforts must consider landscape features as well as different species and ages of aquatic organisms.