



Alagnak

Aniakchak

Katmai

Kenai Fjords

Lake Clark

Resident Lake Fish — Contaminants

Resource Brief
October 2011

Importance

Resident lake fish serve important ecological, recreational, and subsistence roles in SWAN parks. They represent a variety of trophic levels (omnivores, insectivores, planktivores, and piscivores) and hence reflect changes that occur in the food chain. There is growing concern that fish species in some of SWAN's lakes have acquired elevated levels of mercury and other contaminants. Contaminants can enter a system through a variety of pathways, including naturally through weathering of inorganic material, atmospheric deposition, and migrating Pacific salmon. Mercury is of special concern as it is primarily found within fish tissue as methylmercury, an especially toxic form that is readily incorporated into organic tissue and accumulates at faster rates than it is eliminated. Contaminants can bioaccumulate and biomagnify in fish tissue, especially in long-lived, predatory species like northern pike (*Esox lucius*) and lake trout (*Salvelinus namaycush*). When contaminants reach high enough levels of concern, fish consumption advisories are often placed on a particular water body or fish species. Given the importance of resident lake fish as a food source for subsistence users, elevated contaminant levels in fish populations have ecological and human-health ramifications.

Long-term Monitoring

Are bioaccumulated contaminants increasing in fish in SWAN lakes? To answer this question, biologists are collecting and analyzing tissue samples of resident lake fish from select lakes within Lake Clark and Katmai National Parks and Preserves. These efforts are similar to those conducted by the Alaska Department of Environmental Conservation and U.S.

Fish and Wildlife Service in which subsistence and commercial fish species from across Alaska were analyzed to identify potential species of concern. Samples of whole fish or fish fillets will

be analyzed for total mercury, arsenic, cadmium, copper, selenium, lead, and zinc concentrations approximately every 5 years. Persistent organic pollutants (e.g., PCBs, dioxins, and organochlorine) will be analyzed less frequently (e.g., 10-15 years), primarily due to the high expense of laboratory analysis.



Fish were caught using hook and line and held in an underwater live well until they were processed. Each fish was processed individually following strict handling guidelines to preserve the tissue.



Discussion

In 2011, SWAN sampled selected freshwater fish species to establish baseline contaminant concentrations to assess future trends. This sampling effort focused on two aspects of contaminant monitoring: 1) assessment of total mercury and heavy metals in lake trout, northern pike, and whitefish (*Coregonus* spp.), and 2) assessment of persistent organic pollutants in lake trout and slimy sculpin (*Cottus cognatus*). Over 200 fish were collected from anadromous and non-anadromous lakes to assess the role that Pacific salmon play in importing contaminants into SWAN lakes. For mercury and heavy metals, our primary concern is bioaccumulation in freshwater species utilized by subsistence users. By comparing heavy metal concentrations in freshwater species collected in anadromous and non-anadromous lakes, we can estimate the contribution of marine sources of mercury and other heavy metals transported into these systems by Pacific salmon. Our primary interest in persistent organic pollutants is one of ecological effects, thus we will sample ubiquitous species from different trophic levels.