7-2008

Factors Governing Variation In Fish Tissue Mercury Concentrations Across North Carolina

Dana Sackett
North Carolina State University at Raleigh

W. Gregory Cope
North Carolina State University at Raleigh

James A. Rice
North Carolina State University at Raleigh

Abstracts of presentations given in Session 4 of the UCOWR conference.

4.1

Factors Governing Variation In Fish Tissue Mercury Concentrations Across North Carolina

Presenter **Dana Sackett**
NC State University
Raleigh, NC USA
910-578-1088 dana_sackett@ncsu.edu

Co-Author(s)

W. Gregory Cope, North Carolina State University, Raleigh, NC, USA
greg_cope@ncsu.edu

James A. Rice, North Carolina State University, Raleigh, NC, USA
jim_rice@ncsu.edu

Factors Governing Variation In Fish Tissue Mercury Concentrations Across North Carolina

Mercury contamination of aquatic food webs was first recognized in the 1950s in Minimata, Japan, where human consumption of fish contaminated with methylmercury (MeHg) resulted in significant lethal and sub-lethal effects. Since then, research on mercury contamination has focused on MeHg production and accumulation in aquatic systems, because the majority of human risk results from fish consumption. Methylmercury is a potent neurotoxin, and nearly all of mercury present in fish tissue is in this toxic form. A variety of biotic and environmental factors such as fish size, fish age, pH, selenium, dissolved organic carbon, and certain watershed characteristics have been related to the bioavailability and bioaccumulation of MeHg in aquatic systems. Studies elsewhere suggest that quantifying these relationships should explain much of the variability in fish tissue mercury concentrations in North Carolina's waterbodies. The North Carolina Division of Water Quality (NCDWQ) has collected data on mercury concentrations in fish tissue from numerous waterbodies since 1990. Reported mercury levels are highly variable; fish tissue concentrations often vary 75-fold or more within individual species across the state, and 10-fold to 100-fold among samples within and between adjacent counties. We discuss the construction and preliminary analysis of a comprehensive statewide database combining NCDWQ fish tissue mercury concentrations with all other available and relevant biotic and abiotic environmental variables. Thus far, we have found correlations between mercury concentrations in fish and abiotic and biotic factors such as pH, chlorophyll a, turbidity, ammonia, fish size, age, and trophic level. These results are generally consistent with published data from other systems, and provide further evidence of the importance of specific biotic and abiotic variables to mercury dynamics in aquatic systems. We consider the implications of these findings, and discuss efforts underway to further elucidate the dynamics of MeHg production and bioaccumulation and associated health implications for humans and wildlife.