To be submitted to the Coastal and Estuarine Research Federation 2011 conference in Dayton Beach, FL, 6-10 November.

1. For oral presentation:

Tracing nitrogen through landscapes to coastal wetlands using δ^{15}N of larval fish

Joel C Hoffman, John R Kelly, Gregory S Peterson, Anne M Cotter

Our objective was to evaluate the use of the nitrogen stable isotope value (δ^{15}N) of larval fish as an indicator of incipient anthropogenic nitrogen loading to coastal wetlands in the Great Lakes. We sampled coastal wetlands in five Lake Superior south shore tributaries that had contrasting land cover attributes but similarly low agricultural activity within their watersheds, and their receiving coastal waters. Our results demonstrate that larval fish are a potentially powerful indicator of nutrient pollution at both watershed and within-watershed scales. The δ^{15}N value in fish larvae was strongly influenced by the source geochemistry of the water in which the fish were caught. Mixing of lake water into the coastal wetlands diluted tributary sources of nitrogen and thereby gave rise to a significant change in δ^{15}N as a function of lake intrusion. After accounting for this hydrologic influence, we found that the δ^{15}N in larval fish is significantly correlated to the human pressure on the landscape, measured as either the percent of developed land or the human population density in the watershed. These results suggest that there are nested scales of watershed response to human-caused change. At a basin scale, previous research demonstrated that δ^{15}N responds to regional-scale changes in agriculture practices. At a regional scale in which agriculture practices are similar, our study suggests δ^{15}N is sensitive to human pressures, likely responding to sources of waste water contributed by humans to the local watershed. At a within-wetland scale, hydrologic mixing is an important driver, as well. This abstract does not necessarily reflect U.S. EPA policy.