ROB PETERS AWARD LECTURE: BEHAVIORAL RESPONSES TO ANNUAL TEMPERATURE VARIATION ALTER THE DOMINANT ENERGY PATHWAY, GROWTH, AND CONDITION OF A COLD-WATER PREDATOR

Guzzo, M.M.[1], *, Blanchfield, P.J.[1,2], & Rennie, M.D.[1,3]

1 - Department of Biological Sciences, University of Manitoba, Winnipeg, MB
2 - Freshwater Institute, Fisheries and Oceans Canada, Winnipeg, MB
3 - Department of Biology, Lakehead University, Thunder Bay, ON

There is a pressing need to understand how ecosystems will respond to climate change. To date, no long-term empirical studies have confirmed that fish populations exhibit adaptive foraging behavior in response to temperature variation and the potential implications this has on fitness. Here, we use an unparalleled 11-year acoustic telemetry, stable isotope, and mark-recapture dataset to test if a population of lake trout (*Salvelinus namaycush*), a cold-water stenotherm, adjusted its use of habitat and energy sources in response to annual variations in lake temperatures during the open-water season and how these changes translated to the growth and condition of individual fish. We found that climate influenced access to littoral regions in spring (data from telemetry), which in turn influenced energy acquisition (data from isotopes), and growth (mark-recapture data). In more stressful years, those with shorter springs and longer summers, lake trout had reduced access to littoral habitat and assimilated less littoral energy, resulting in reduced growth and condition. Annual variation in prey abundance influenced lake trout foraging tactics (i.e., the balance of the number and duration of forays) but not the overall time spent in littoral regions. Lake trout greatly reduced their use of littoral habitat and occupied deep pelagic waters during the summer. Together, our results provide clear evidence that climate-mediated behavior can influence the dominant energy pathways of top predators, with implications ranging from individual fitness to food web stability.