Growth variability and mercury tissue concentration in anadromous Arctic charr

Summary

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The project was designed to build on prior work that examined probable climate change related growth and contaminant impacts on land-locked populations of Arctic charr by extending the analysis to include important migratory and land-locked populations of Dolly Varden Charr in the Yukon Territory. There is a notable lack of data for Dolly Varden charr, despite the importance of the species as a country food resource. Here we plan to use existing archival tissue samples to construct an historical spatial baseline for THg levels in Dolly Varden charr against which contemporary data can be compared to examine the impacts of climate change and development activities on current THg levels. Work will also be extended to include comparative examination of Dolly Varden charr in the Beaufort and a determination of where and how they function in Beaufort Sea foodwebs likely to be affected by oil and gas exploration activities. The project will also continue important partnering work begun with Nunavik Research to examine the marine life-history phase of Ungava Arctic charr introduced into a previously unoccupied river system. Previously PIT-tagged fish have begun to return in numbers and we are now able to estimate annualized marine growth and compare that growth to monitored water temperatures as a means of estimating site-specific growth temperature relationships using oxygen stable isotope methods. Obtained field results are compared to data gathered in Labrador through collaborations with Fisheries and Oceans Canada. Results and comparisons are critical for assessing the possible impacts of climate change Nunavik Arctic charr and understanding how overall availability of Arctic charr will respond to predicted climate changes. To further improve conceptual understanding of temperature-growth affects location-temperature tags will be inserted into Arctic charr and monitored via acoustic receivers to track temperature use in both the marine and freshwater environments. In concert with growth studies, the project has been monitoring the ecological impacts of Arctic charr introductions and found them to be negligible. This effort represents the first attempt to scientifically evaluate the consequences of northern ecosystem manipulation and has provided important data and insights for management purposes by showing it is possible to proactively manage Arctic charr stocks with minimal ecological consequences. Finally work continues on genetic typing of Arctic charr populations to improve our understanding of how climate change may impact the immunological capabilities of Arctic charr and their abilities to deal with new diseases and pathogens likely to be introduced into northern environments as a result of changing environmental conditions. All study generated information will contribute to the improvement of management abilities to make informed decisions about the risks associated with continued country food consumption in the face of changing conditions in the Arctic. The project also identifies key environmental indicators of changes in Arctic Char (Salvelinus alpinus) growth using both quantitative (ecological) and qualitative (Indigenous Knowledge) data by linking community-based monitoring, local expert Indigenous and ecological knowledge. Arctic Char is a staple subsistence resource for Inuvialuit on Banks and Victoria Islands in the Northwest Territories, Canada. In recent years, significant climate variability and change has been observed in the area, raising local concerns about how this variability will affect subsistence resources. Residents in local communities are the first to directly observe and report these changes and variability in local climate and the effects they have on their land, water and animals. Centuries of knowledge and observations about the environment and natural resources exist among Inuvialuit hunters and fishers. Local expert Indigenous Knowledge (IK) can complement our scientific understanding of environmental variability and change and its effects on Arctic species. Community-based monitoring (CBM) provides an opportunity to better understand the current status of Arctic species and can form the basis for understanding and preparing for future changes in Arctic species in light of projected climate variability and change. Using a mixed-methods research approach is one way in which ecological scientific and Traditional Knowledge can be brought together to complement one another and provide a more thorough understanding of northern fish species in a changing environment.

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