How Habitat Water Temperature Affects the Fish Condition and Energy Density of Fourhorn Sculpin (Myoxocephalus quadricornis)

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To ascertain how fish condition and energy density varied with fish habitat in the Alaskan Arctic, three major habitats were sampled; Elson lagoon, the Chukchi Sea, and the Beaufort Sea near Point Barrow. Fourhorn sculpin (Myoxocephalus quadricornis) were bio-processed. They were measured, massed, and dissected. Following desiccation, they were homogenized and analyzed for energy density using a bomb calorimeter. Their stomach contents were also analyzed for prey types and quantities. The data rejected the null hypothesis that average water temperature in the habitat of Fourhorn sculpin (Myoxocephalus quadricornis) would have no effect on fish condition or energy density. Over the two-year sampling periods, the average temperature range through the habitat was 4.9-7.6 0C in 2013, to 2.1-5.2 0C in 2014. These two values exhibit significant variance between years. The average energy density in 2013 was 20.520 kJ/g dry mass, whereas the average energy density in 2014 was 20.002 kJ/g dry mass. There was a statistically confident difference between these two values (p, >.05). There was statistically higher stomach fullness in 2014 suggesting that the prey were less energy dense themselves. The data also suggests that the fish may have been affected by a large easterly storm 11 days in duration. The results of this research are widely applicable to topics involving climate change as oceans temperatures are on the rise, resulting in consequences to marine life. These results may offer insight into how the temperature oscillation affects an ecosystem in general. Further studies may involve observing upwelling patterns in response to high wind events and monitoring higher trophic level marine organisms and observe how their condition is affected by the abovementioned results.

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