Project Title: Temperature and Spawning Success of Salmon

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Study Location: Pilgrim River watershed (Latitude: 65.1558333 - Longitude: -165.2225), Port Clarence District, near Nome, AK.

Abstract: We propose to use sockeye salmon (*Oncorhynchus nerka*) in the Pilgrim River as a model of salmon response to water temperatures in the Arctic-Yukon-Kuskokwim (AYK) region. Temperature is a master factor controlling fish production and aquatic food web dynamics. Temperature changes in freshwater lakes and rivers due to climate change have the potential to alter fish populations and this is especially true in arctic and subarctic systems. Particularly susceptible to changes in river conditions are anadromous salmon due to the physiological challenge of migrating upriver to spawn and complete their life cycle. Recently, low numbers of sockeye salmon have returned to the Pilgrim River (Nome, AK) coinciding with warm river temperatures. We hypothesize that higher river temperatures have increased the energetic demands on sockeye salmon causing more en route and pre-spawn mortality. This mortality reduces spawning escapement and eventually contributes to the low number of returning adults. We will deploy temperature sensors throughout the Pilgrim River and capture sockeye salmon at multiple points throughout their upriver migration to measure their energy density. A non-lethal microwave meter will be used to measure the lipid content of the fish, an estimate of their energetic condition. We will also measure the amount of pre-spawn mortality from carcasses on the spawning grounds. Determining if the higher temperatures are an energetic cost to migrating salmon will help identify a mechanism influencing spawning escapement and population dynamics. Exploring the influence of temperature on sockeye salmon in the Pilgrim River will be insightful as we are likely to see a large effect of temperature at the northern end of the distribution of salmon.