Lake Trout *Salvelinus namaycush* (Walbaum, 1792) Habitat Use and Growth in an Arctic Estuarine Environment

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Introduction

Husky Lakes are a highly used Lake Trout Fishery in the Inuvialuit Settlement Region. Hundreds of local anglers, primarily from Inuvik and Tuktoyaktuk, use this lake system annually. Husky Lakes are a series of five interconnected basins that drain into the Beaufort Sea.

Lake Trout have long been considered a freshwater species[4] but recent laboratory[2] and field studies[1,3,5] have shown that Lake Trout are more saline tolerant than previously thought.

The observation of saline habitat use by Lake Trout has observed in Husky Lakes, NT (Fig 3).

Anadromous and landlocked life-histories can affect mercury concentrations in fish[6] and may alter mercury stable isotope fractionation.

Objectives:

1.) Assess Lake Trout habitat use (brackish water 1-12ppt and freshwater < 1ppt) , 2.) Compare habitat uses affects on growth rates and 3.) Aid interpretation of mercury concentrations and mercury stable isotope fractionation

Methods

Assessment of growth rates and habitat use have been accomplished by analyzing otolith (fish inner ear bones) trace elements microchemistry (Strontium concentrations [Sr]) and annuli.

Otolith [Sr] has been shown to represent the ambient water concentrations surrounding the fish. Ambient water [Sr] typically increase with increased marine water influence creating variable elemental environments in estuaries like the Husky Lakes.

Lake Trout were obtained from anglers during subsistence fishing and summer gillnet surveys 2011-2012. Archival otoliths were also obtained from assessments established by 2000-2004.[1,3] Water samples were collected to analyze water [Sr] 2011-2012.

Sagital otoliths were dried, embedded in epoxy, sectioned, photographed and then re-embedded into rings for trace element analysis. Otolith microchemistry was analyzed using a laser ablation inductively coupled mass spectrometry (N. Halden Lab, U of M). Growth rates were analyzed from otolith photographs

Results

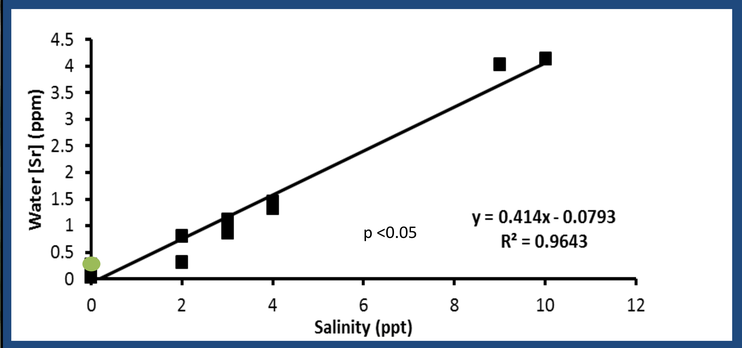

Fig 1. [Sr] in water samples collected throughout Husky Lakes and local freshwater lakes, Noell and Ya Ya (green), NT 2011-12.

Results

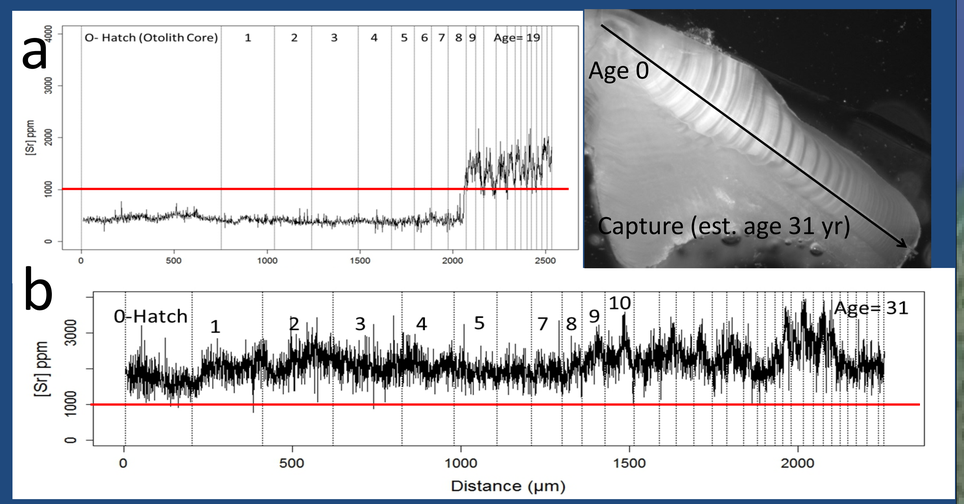

Fig 2. a.) anadromous and b.) brackish water Lake Trout otolith Sr profile Husky Lakes, NT. Otolith increments are represented by vertical bars. The distance between vertical bars represents one year of otolith growth. The first increment (0-hatch) represents the time within the egg.

Fig 3. Annual surface water salinity range. Lake Trout distribution (red line) based on capture data.[1,2]

References:

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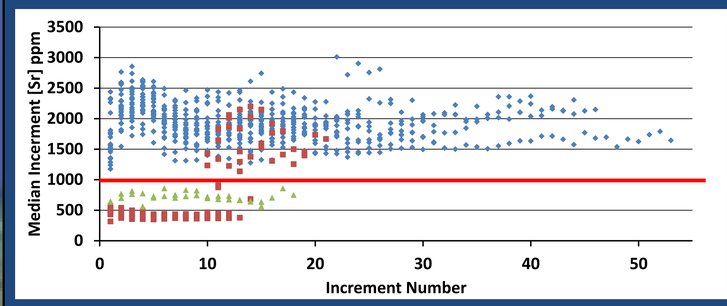

Fig 4. Represents median [Sr] for each increment for anadromous (n=8, red) brackish water (n=26, blue) Lake Trout Husky Lakes, NT. Freshwater (n=3, green) Lake Trout form Ya Ya Lake, NT.

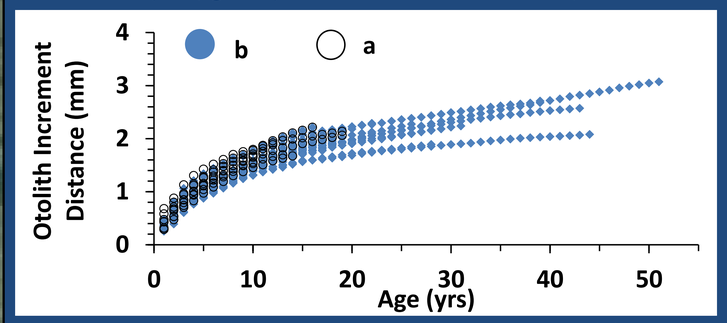

Fig 5. Otolith incremental growth of individuals from (a) anadromous and (b) brackish water life histories.

Conclusions

-Otolith Sr profiles indicate some Lake Trout reside their entire lives in brackish water > 2ppt. This would be the first observation of entirely brackish water life history in the world for Lake Trout.

-At least two spawning locations are used by Husky Lakes Lake Trout. 1.connected freshwater lake(s) and 2.the brackish waters of Husky Lakes.

-Lake Trout seem to have different growth patterns likely linked to habitat use, prey selection, and physiology. Differences in life history may be linked to variable mercury signatures (discussed in Gantner et al. 2013 poster at this workshop)

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