Vita

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Universities Attended:

University of New Brunswick (2019)
Bachelors of Science

University of New Brunswick (2020)
Masters of Science
Biology

Conference Presentations:

Porter, R.R. and Benfey, T.J. The effect of ploidy and acclimation temperature on temperature and hypoxia tolerance in brook charr (*Salvelinus fontinalis*). Science Atlantic Aquaculture and Fisheries Conference. (Moncton: March 8-10, 2019).

The effect of acclimation temperature and triploidy on hypoxia tolerance in brook charr, *Salvelinus fontinalis*

UNIVERSITY OF NEW BRUNSWICK

THESIS DEFENCE AND EXAMINATION

in Partial Fulfillment

of the Requirement for the Degree of
Master of Science

by

Rebecca Rae Porter

in the Department of Biology

U.N.B., Fredericton, N.B.

Tuesday, August 11th, 2020
10:00 a.m.

Via MS TEAMS

Examining Committee

Dr. Tillmann Benfey	Supervisor
Dr. Mike Duffy	Internal Examiner
Dr. Ben Speers-Roesch	External Examiner
Dr. Les Cwynar	Chair of Oral Examination

Abstract

Triploid fish could be beneficial to aquaculture sustainability due to their effective sterility preventing escaped farmed fish from mating with wild fish. However, experience to date has suggested that they are less tolerant of environmental stressors. The goal of this study was therefore to determine whether acclimation to warm temperature improves the performance of both diploid and triploid brook charr (*Salvelinus fontinalis*) under conditions of high temperature and hypoxia. A preliminary experiment tested fish of both ploidies acclimated to two different temperatures (15 and 18°C) at a range of test temperatures (ambient, 20, 22, 24, 26, 28, 30°C) to determine the oxygen tension (PO_2) at loss of equilibrium and time taken to reach loss of equilibrium, during progressive hypoxia. A follow-up experiment involved first acclimating fish to the same two temperatures and then reacclimating the 18°C fish to 15°C before using the same protocol to test hypoxia tolerance at a narrower range of temperatures (ambient, 24, 26, 28, 30°C). Warm acclimation (18°C) improved high temperature and hypoxia tolerance in both ploidies, but this improvement did not last after reacclimation to cooler temperatures. Triploids had slightly lower hypoxia tolerance in both experiments. This study shows that (1) while increasing acclimation temperature improves performance of fish regardless of ploidy in high temperature and hypoxic conditions, the effect is not long-lasting, and (2) the difference in performance between ploidies may not be great enough for triploids to have a negative impact on the aquaculture industry and instead should be used to minimize negative impacts caused by farmed salmon mating with wild populations of Atlantic salmon. However, further research needs to be done to optimize this approach for use in the aquaculture industry.