

Comparing the Effects of Exhaustive Chasing and Lethal Exposure to TFM Lampricide in Non-Target Great Lakes Species

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Introduction

The pesticide **3-trifluoromethyl-4-nitrophenol (TFM)** is regularly applied to streams around the Laurentian Great Lakes to control invasive sea lamprey (*Petromyzon marinus*; McDonald and Kolar 2007).

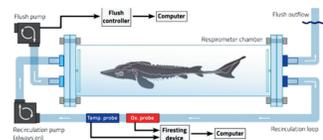
However, the Great Lakes' tributaries are also inhabited by sensitive native species. Recent work indicates that **mass-specific oxygen consumption ($\dot{M}O_2$)** may be used as a proxy for TFM sensitivity (D'Souza et al. 2025).

In this project I aim to determine if the **maximum metabolic rate (MMR)** of an aquatic species is comparable to their $\dot{M}O_2$ during lethal TFM exposure.

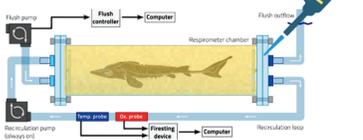
Methods

TFM Trials

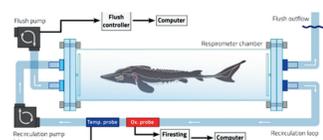
Overnight habituation



TFM exposure, 12 h

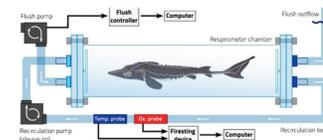


Recovery in clean water



MMR Trials

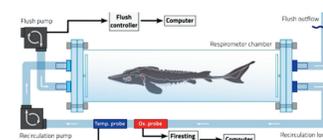
Overnight habituation



Chasing to exhaustion

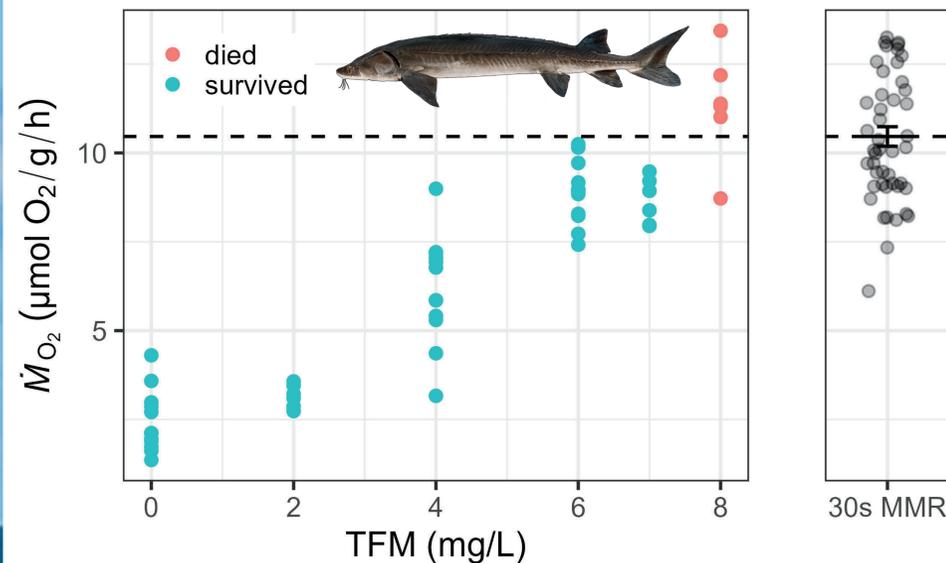


Measure MMR, recovery



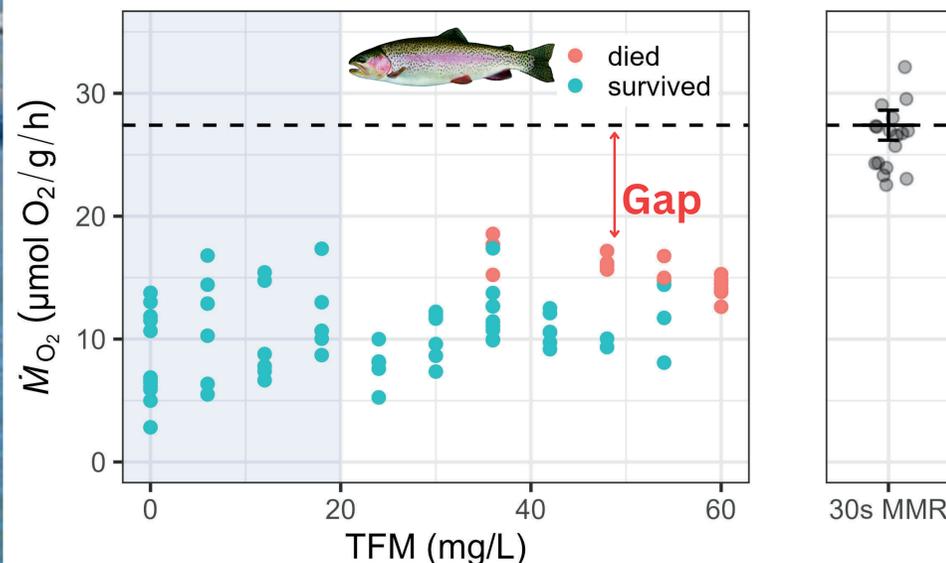
Results

Lake sturgeon (sensitive)



Oxygen consumption during TFM exposure is similar to that experienced after chasing (MMR)

Rainbow trout (resistant)



Oxygen consumption during TFM exposure does not approach MMR

Discussion

MMR derived by exhaustive chasing is:

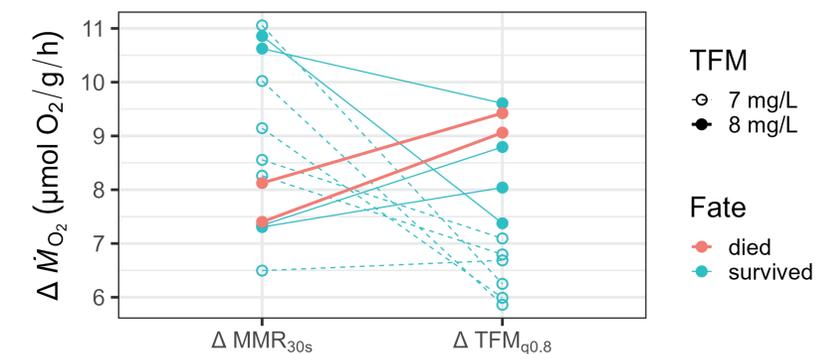
- ✓ Comparable to the increase in $\dot{M}O_2$ induced by lethal TFM exposure in sensitive species.
- ✗ Not comparable in resistant species.

Next steps:

Compare lake sturgeon's MMR and lethal TFM sensitivity at an individual animal level (below).

Explore the physiological underpinnings of why TFM leads rainbow trout to die before reaching their exercise-derived MMR.

Lake sturgeon individual response (preliminary)



Significance

This method enables **nonlethal testing** of sensitive Great Lakes species to determine their TFM sensitivity, which will **reduce the number of specimens** required for scientific experiments.

It could also be implemented as a **real-time monitoring tool** to help prevent the overdose of TFM during stream applications.



References:

