



Contribution ID : 180

Type : Oral

Combined effects of warming and acidification on hypoxia tolerance of northern shrimp, *Pandalus borealis*

Tuesday, 4 September 2018 15:30 (15)

Northern shrimp (*Pandalus borealis*) of the Estuary and Gulf of St. Lawrence (EGSL) typically inhabit waters deeper than 175 m and face chronic hypoxia (dissolved oxygen [DO] levels of 18–40% sat.). Hypoxia is typically accompanied by high PCO_2 values and low pH. For instance, the pH of the deep waters of the EGSL are currently below 7.75. However, most studies of hypoxia tolerance have been performed at current surface pH values. This is the case for *P. borealis*: published values of O_2 crit, a measure of hypoxia tolerance, show that the species is fairly hypoxia tolerant at uncontrolled (~8) pH: 9 and 16% sat. at 5 °C and 14 and 22% sat. at 8 °C, in males and females, respectively. With global warming, the deep waters of the EGSL are expected to become ~ 2–4 °C warmer by the end of the century. Hypoxia and acidification are expected to get worse and shrimp may face DO levels 4% sat. lower and pH of 7.55, or worse. Metabolic rate is expected to rise with increasing temperature. This increased oxygen requirement should reduce hypoxia tolerance. But the effect of pH on hypoxia tolerance is unknown for this species. The main objective of this study is to determine the impact of temperature and pH on standard and maximum metabolic rate and on hypoxia tolerance of female *P. borealis*. Female shrimp were exposed to 12 combinations of temperature (3, 6, 9, 12 °C) and pH (8, 7.75, 7.55) for a minimum of 30 days and tested in individual intermittent-flow respirometers. There was no effect of pH on SMR and MMR, and both increased significantly with temperature. Hypoxia tolerance decreased with increasing temperature, as expected. Interestingly, hypoxia tolerance was lower at the most severe pH level (7.55), but only at 3 and 6 °C. These results suggest that future combinations of temperature, DO and pH will result in habitat loss for this species in the EGSL.

Position

Senior Scientist

Affiliation

Fisheries & Oceans Canada

Email Address

denis.chabot@dfo-mpo.gc.ca

Are you a SFB 754 / Future Ocean member?

No

Primary author(s): Mr CHABOT, Denis (Maurice-Lamontagne Institute, Fisheries & Oceans Canada); CALOSI, Piero (Université du Québec à Rimouski)

Presenter(s): Mr CHABOT, Denis (Maurice-Lamontagne Institute, Fisheries & Oceans Canada)

Session Classification : 06 Physiological Effects of Oxygen & Interactions with Multiple Stressors

Track Classification : 06 Physiological Effects of Oxygen & Interactions with Multiple Stressors