## Title:

Rebuttal to Frank et al 2016

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## Abstract

## Introduction

Pelagics – key in ecosystems.   
Boom and bust dynamics– controlled bottom up?   
Capelin – northern Atlantic – Barents, Iceland, Newfoundland. Saw boom and bust in Iceland and Barents  
Bust in NL in early 1990s, no boom

Capelin (*Mallotus villosus*) play a crucial role as the link between zooplankton and large vertebrates in the Newfoundland and Labrador Shelf marine ecosystem (Lavigne 1996). This marine ecosystem underwent drastic changes during the early 1980s and early 1990s (Hutchings & Myers 1994, Gomes et al. 1995, Lilly et al. 2000, Rice 2002, Koen-Alonso et al. 2010, Hammill et al. 2011), including major changes in the biology and ecology of capelin (Carscadden & Nakashima 1997, Carscadden et al. 2001, Nakashima & Wheeler 2002, DFO 2010)

Despite its prominent position in the ecosystem, the factors that regulate the population dynamics of the capelin stock have not been well understood. Buren *et al*. (2014) postulated that the ecosystem underwent a regime shift in the early 1990s and that the dynamics of the capelin stock are regulated by bottom-up forcers acting through mortality of pre-spawning capelin. In addition, Murphy *et al.* (2018)

Mullowney *et al*. (2016) analyzed virtually the same data set as Buren *et al*. (2014) (Figure 1), and reached different conclusions. These authors postulated that the mechanism that modulates capelin abundance on the Newfoundland and Labrador Shelf is survival through the juvenile stage (age 0), explained by an interaction between a match–mismatch index (of timing of capelin spawning and timing of the spring bloom) and abundance of juvenile stages of *C. finmarchicus*.

In this letter we repeat the analyses presented in Buren et al. (2014), assuming that capelin is regulated at the juvenile stage (Mullowney et al.’s (2016) conclusion), and compare the empirical support of both hypotheses (juvenile vs pre-spawning mortality). In addition, we critique Mullowney *et al*. (2016), breaking it down in 3 main sections, namely:, 1) the data Mullowney *et al*. (2016) used to analyze year class strength of capelin is not appropriate to test this hypothesis, 2) there are several flaws in the analyses carried out in Mullowney *et al*. (2016), and 3) Mullowney *et al*. (2016) made some inappropriate interpretations of their results and of the existing literature.

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