

Accepted Manuscript

Model estimates of the impact of bioirrigation activity of MARENZELLERIA SPP. on the Gulf of Finland ecosystem in a changing climate

A.V. Isaev, T.R. Eremina, V.A. Ryabchenko, O.P. Savchuk

PII: S0924-7963(16)30240-8
DOI: doi: [10.1016/j.jmarsys.2016.08.005](https://doi.org/10.1016/j.jmarsys.2016.08.005)
Reference: MARSYS 2862

To appear in: *Journal of Marine Systems*

Received date: 30 March 2016
Revised date: 15 June 2016
Accepted date: 9 August 2016



Please cite this article as: Isaev, A.V., Eremina, T.R., Ryabchenko, V.A., Savchuk, O.P., Model estimates of the impact of bioirrigation activity of MARENZELLERIA SPP. on the Gulf of Finland ecosystem in a changing climate, *Journal of Marine Systems* (2016), doi: [10.1016/j.jmarsys.2016.08.005](https://doi.org/10.1016/j.jmarsys.2016.08.005)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Model estimates of the impact of bioirrigation activity of *MARENZELLERIA* SPP. on the Gulf of Finland ecosystem in a changing climate

A.V. Isaev^{a,b,*}, T.R. Eremina^a, V.A. Ryabchenko^b, O.P. Savchuk^{c,d}

^a Russian State Hydrometeorological University, 195196, St. Petersburg, Russia

^b P.P. Shirshov Institute of Oceanology, St. Petersburg branch, 199053, St. Petersburg, Russia

^c Baltic Nest Institute, Stockholm University Baltic Sea Centre, 10691, Stockholm, Sweden

^d Institute of Earth Sciences, St. Petersburg State University, 199034, St. Petersburg, Russia

* Corresponding author at: Russian State Hydrometeorological University, 195196, St. Petersburg, Russia. *e-mail address*: isaev@rshu.ru (A.V. Isaev)

Abstract

Drastic changes have occurred in the Eastern Gulf of Finland ecosystem after recent invasion and establishment of polychaete *Marenzelleria* spp. Possible mechanisms of these changes are explored with the help of three-dimensional ecosystem model SPBEM. Relative significance of bioirrigation activity is studied by results' comparing of two climate change scenario simulations, which include or disregard *Marenzelleria* effects. The novel results obtained with this approach demonstrate that on a system level biogeochemical consequences of both implemented climate changes scenario and polychaete activity are equivalent to a weakening of "vicious circle" of the Baltic Sea eutrophication. The eutrophication-mitigating effects of the *Marenzelleria* invasion into the Eastern Gulf of Finland, revealed by the long-term field measurements, are explained by simulation-based considerations.

Highlights

3D ecosystem model SPBEM was modified to account for bioirrigation by *Marenzelleria*.
 Scenarios for the Gulf of Finland ecosystem in the future climate with- and without invaders.
 Increasing oxygenation of sediments was projected in both scenarios.
 Decreased denitrification and increased phosphorus sediment P retention.
 Pelagic DIN/DIP increase resulted in decreasing cyanobacterial nitrogen fixation.

Key words: Biogeochemical cycles, Gulf of Finland, *Marenzelleria*, modelling

Download English Version:

<https://daneshyari.com/en/article/8886016>

Download Persian Version:

<https://daneshyari.com/article/8886016>

[Daneshyari.com](https://daneshyari.com)