ISSN 1995-4255, Contemporary Problems of Ecology, 2017, Vol. 10, No. 4, pp. 350–362. © Pleiades Publishing, Ltd., 2017.

Chironomid Fauna of the Lakes from the Pechora River Basin (East of European part of Russian Arctic): Ecology and Reconstruction of Recent Ecological Changes in the Region[1]

L. B. Nazarova[a, b, c, *], A. E. Self[d], S. J. Brooks[d], N. Solovieva[e, f], L. S. Syrykh[c, g, **], and V. A. Dauvalter[h]

[a] *Potsdam University, Institute of Earth and Environmental Science, Potsdam-Golm, 2514476 Germany*
[b] *Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research, Research Unit Potsdam, Potsdam, 14473 Germany*
[c] *Kazan Federal University, Kazan, 420008 Russia*
[d] *The Natural History Museum, London, UK*
[e] *Environmental Change Research Centre, University College London, London WC1H 0AP, UK*
[f] *Higher Colleges of Technology, Sharjah, UAE, PO BOX 7947*
[g] *Herzen State Pedagogical University of Russia, St. Petersburg, 191186 Russia*
[h] *Institute of the North Industrial Ecology Problems KSC RAS Apatity, Akademgorodok, 184209 Russia*
**e-mail: Nazarova_larisa@mail.ru*
***e-mail: lyudmilalsd@gmail.com*

Received October 19, 2016; in final form, January 25, 2017

Abstract—We investigated chironomid fauna of surface sediments and a short sediment core (Bol'shoy Kharbey Lake) from Pechora river basin, Northern Russia. Twenty three investigated lakes have thermokarst, glacial or floodplain origin and are characterised by low mineralization, mostly hydrocarbon-calcium type of water and low concentration of nutrients. Most of the lakes have circumneutral pH around ≤7 and only two lakes are slightly more acidic with pH ≤ 6. Ninety six chironomid taxa were identified in the surface sediments. Distribution of chironomids in the studied region is driven by continentality, mean T_{July} and pH. Chironomid communities from the core of the B. Kharbei Lake demonstrate the highest similarity with the fauna of the deeper lakes of the glacial origin. The glacial lakes have the highest indices of continentality and the lowest winter temperatures within the investigated data set. The chironomid fauna of the glacial lakes is composed of the profundal, oligotrophic and cold-stenotherm taxa. The fauna of the floodplain and thermokarst lakes is more closely related to T_{July} and is composed of littoral and phytophilic taxa of meso – or eutrophic waters and moderate temperature conditions. The fauna of the acidic thermokarst lakes considerably differs from the other lakes. Chironomid communities here are represented by tolerant to acidification taxa, and by the typically littoral and shallow water acid-tolerant taxa that apparently also can tolerate acidification. Studied sediment record covers *ca* last 200 years. The reconstructed T_{July} during the entire period remain slightly below the modern temperatures. From 1970 reconstructed T_{July} shows steady increase to the modern level. The reconstructed water depths (WDs) of the lake are higher than today till 1980. The highest WDs are reconstructed for *ca* 1970. After that the WDs gradually decrease to the modern level. Changes of the WDs are most probably related to changes in the precipitation rate.

Keywords: river Pechora basin, lakes, chironomids, temperature, depth, continentality, Russian Arctic
DOI: 10.1134/S1995425517040059

INTRODUCTION

Arctic regions are sensitive to global climate change and the arctic waters are excellent indicators of the global temperature rise on the planet. The, arctic lake communities are particularly vulnerable to intensive industrial development, which makes studies of Arctic lakes and their biota especially important (Frolova et al., 2014). Long-term studies of aquatic communities may reveal dynamics of aquatic ecosystem responses to global climate change. Knowledge of the entire spectrum of life strategies of the most important indicator group of benthic communities, which include heterotrophic chironomids, is essential for assessment of the ecological state of surface waters and for exploration of natural successions under the influence of natural and anthropogenic factors (Zinchenko, 2011; Kondrateva et al., 2014).

Studies of the lakes from Canadian Arctic, Scandinavia and Fennoscandia showed that the changes in their ecosystems are largely linked to global warming during the last 150–200 years (Smol et al., 2005). However, there are only few recent studies which

[1] The article is published in the original.