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ORGANOCHLORINE COMPOUNDS IN SMALL LAKES AT DIFFERENT STAGES OF ISOLATION FROM THE WHITE SEA

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Northern ecosystems exhibit low resilience to diverse stressors and demonstrate extremely slow recovery rates. The White Sea waters and its coastal zone are exposed to anthropogenic pressures from both regional and global sources. Emissions of organochlorine compounds (OCs), particularly those classified as persistent organic pollutants (POPs), remain a significant environmental threat (Stockholm Convention, 2025). These compounds pose risks due to their resistance to degradation in natural ecosystems, high lipophilicity, bioaccumulative potential, and multifaceted toxic effects on biota. Notably, the presence of OCs (including chlorophenolic compounds, CPs) in natural ecosystems may also stem from non-anthropogenic sources. The ongoing uplift of the White Sea's coastal zone gradually isolates small water bodies, fostering the development of unique hydrological and hydrochemical regimes. These regimes are shaped by morphometric characteristics, water exchange dynamics, and the freshwater-to-seawater ratio (Krasnova, 2021). Such factors steer the evolution of these water bodies toward salinization, desalination, or the establishment of a meromictic structure. As isolation progresses, the aquatic biota undergoes significant transformation: marine species are gradually replaced by a diverse assemblage of organisms capable of thriving across a wide salinity gradient, including fully freshwater conditions. Research on these isolating water bodies provides valuable insights for predicting the formation of OCs in larger natural systems, where direct study is often expensive. This study presents findings on the behavior of OCs (including POPs) in bottom sediments of small lakes at different stages of isolation from the White Sea. Analyses revealed the presence of persistent highly chlorinated benzenes and CPs in the lake sediments. The occurrence of POPs is attributed to long-range transport from low and temperate latitudes, as well as inputs from nearby regions. CPs are dominated by mono- and dichlorinated phenols. Furthermore, the study demonstrates that seawater influences both the composition and spatial distribution of OCs in the bottom sediments.

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Keywords: White Sea, small lakes, bottom sediments, highly chlorinated benzenes, chlorophenolic compounds.

References: Stockholm Convention on Persistent Organic Pollutants (POPs). Text and Annexes. Revised in 2025. http://www.pops.int/TheConvention/Overview/TextoftheConvention/tabid/2232/Default.aspx. Accessed 7 Marth 2026

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