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Spatial and species-specific features of trace element accumulation in commercial fish of the Sea of Okhotsk

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Abstract. The northwestern Pacific Ocean is characterized by unique geochemical conditions that promote elevated trace element accumulation in marine organisms of the region. Despite the location of major fishing grounds of the Russian Federation, in this area systematic monitoring and assessment of the trace element composition in the local ichthyofauna have not been conducted. This study quantified Fe, Zn, Cu, Mn, Ni, As, Pb, and Cd concentrations in the organs (muscles, liver, and male and female gonads) of walleye pollock (*Gadus chalcogrammus*), pacific herring (*Clupea pallasii*), and yellowfin sole (*Limanda aspera*) collected from various areas of the Sea of Okhotsk in 2023–2024. Trace element concentrations were determined using inductively coupled plasma optical emission spectrometry and atomic absorption spectrometry. Zinc and iron were predominant in the organs. The liver contained the highest concentrations of iron, zinc, copper, manganese, and cadmium. Arsenic and lead accumulated predominantly in muscles. Yellowfin sole exhibited the highest levels of iron, copper, nickel, and arsenic, which stems from its demersal lifestyle. Pacific herring muscles showed comparatively lower concentrations of zinc and manganese. Walleye pollock had elevated concentrations of cadmium. It was shown that the trace element profile of fish from the Sea of Okhotsk is an integral indicator reflecting the complex interaction of multiple factors, including the biochemical properties of specific elements, geochemical features of the habitat, lifestyle, dietary composition, and other factors.

Keywords:
trace elements, atomic absorption, emission spectrometry, walleye pollock, pacific herring, yellowfin sole, organs, Sea of Okhotsk

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