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The Meeting is invited to take note of the information.

^{137}Cs and ^{90}Sr in the Polish sector of the Baltic Sea, in 2020

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Seawater samples were collected in June 2019 during the cruise onboard r/v 'Baltica'. Sampling was carried out at 17 stations located in the southern region of the Baltic Sea (Fig.1 and Fig.2). Samples were taken from the surface, bottom (2 m above the seabed) and along water profile at 5 stations. Simultaneously salinity and temperature were measured along the sampling profile.

^{137}Cs activity concentration in seawater samples was measured with gamma spectrometry, using an HPGe detector, with a relative efficiency of 40% and a resolution of 1.8 keV for the peak of 1332 keV of ^{60}Co. The detector was coupled with an 8192-channel computer analyser and GENIE 2000 software. ^{90}Sr activity concentration was determined by radiochemical method followed by β-radiation measurements of ^{90}Y samples using Low-Level Beta Counter FHT 7700T (ESM Eberline) with the background count rate of 0.01 counts s^{-1} and the minimum detectable activity of 3 mBq per sample.

In 2020, the average concentration of ^{137}Cs in seawater in the Polish part of the Baltic Sea was - 19.4 Bq m^{-3} (Fig. 3). In 2019, concentrations of ^{137}Cs changed in the range from 11.3 Bq m^{-3} to 25.5 Bq m^{-3}. The lowest ^{137}Cs concentrations in the offshore area were found in the vicinity of the Vistula river mouth, while the highest one in the surface water close to the Hel Peninsula. Relatively low concentration was detected, as in the previous years, in the near-bottom waters of the Bornholm Basin (15.4 Bq m^{-3}), resulting from the contribution of less contaminated waters from the North Sea, which was confirmed by higher salinity in deeper layers.

In 2020, the average activity of ^{90}Sr (calculated as a mean value of all results obtained in the year) specific for the southern Baltic waters was equal to 5.0 Bq m^{-3} (Fig. 3) and was slightly lower than the value found in 2019 (5.8). Presented values confirm the lack of unambiguous trends in concentrations of ^{90}Sr in seawater, which is the common feature observed since 1997. In general, ^{90}Sr was uniformly distributed in the Polish sector of the Baltic Sea. The lowest concentration of ^{90}Sr (3.7 Bq m^{-3}) was recorded in the near-bottom waters of the Bornholm Basin, while the highest value (7.7 Bq m^{-3}) was found in the surface water in the Gotland Basin.

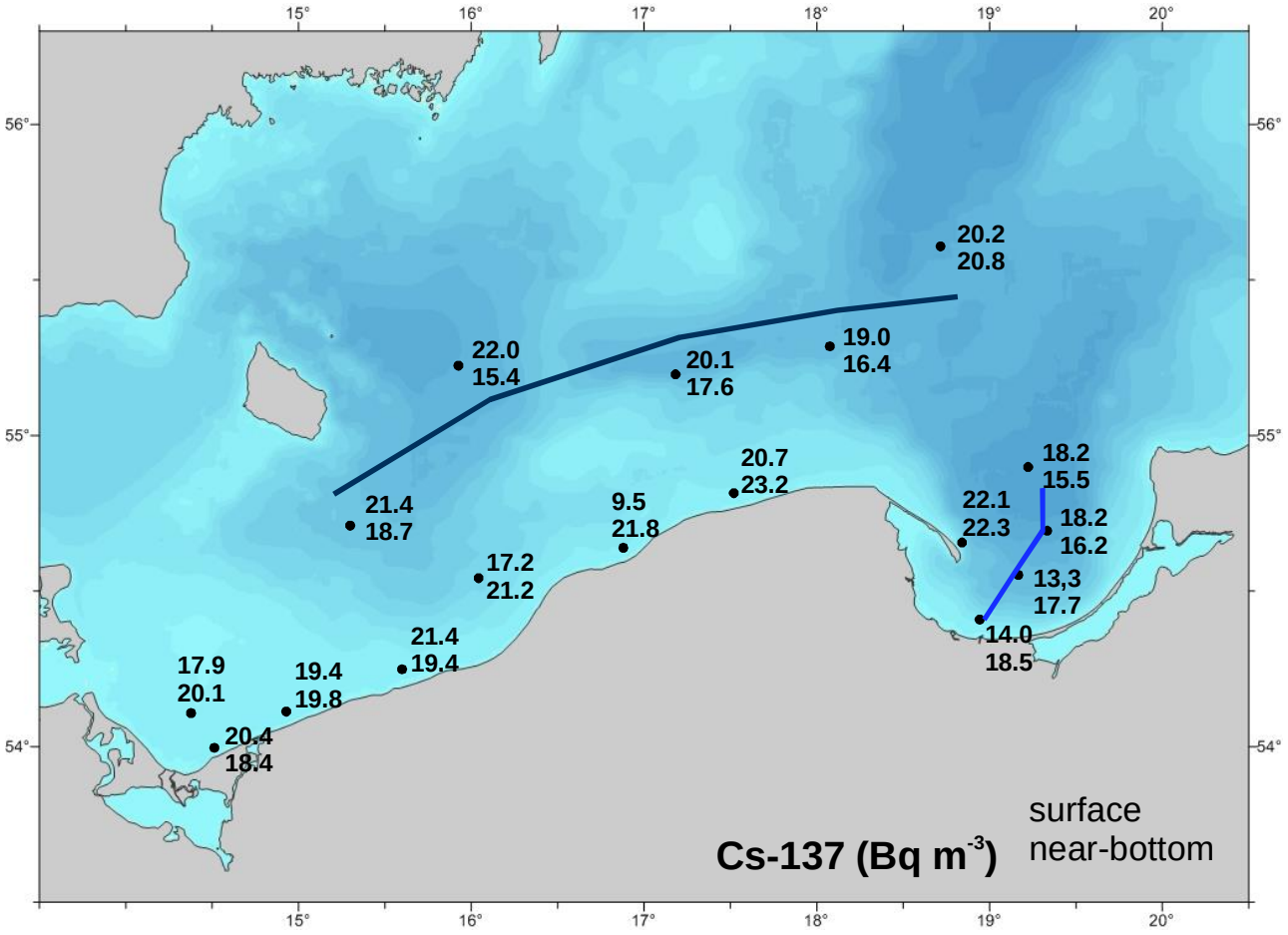

Fig.1 ^{137}Cs activity concentrations in surface and near-bottom water in the Polish sector of the Baltic Sea in 2020 (lines indicate profiles – see Fig. 3)

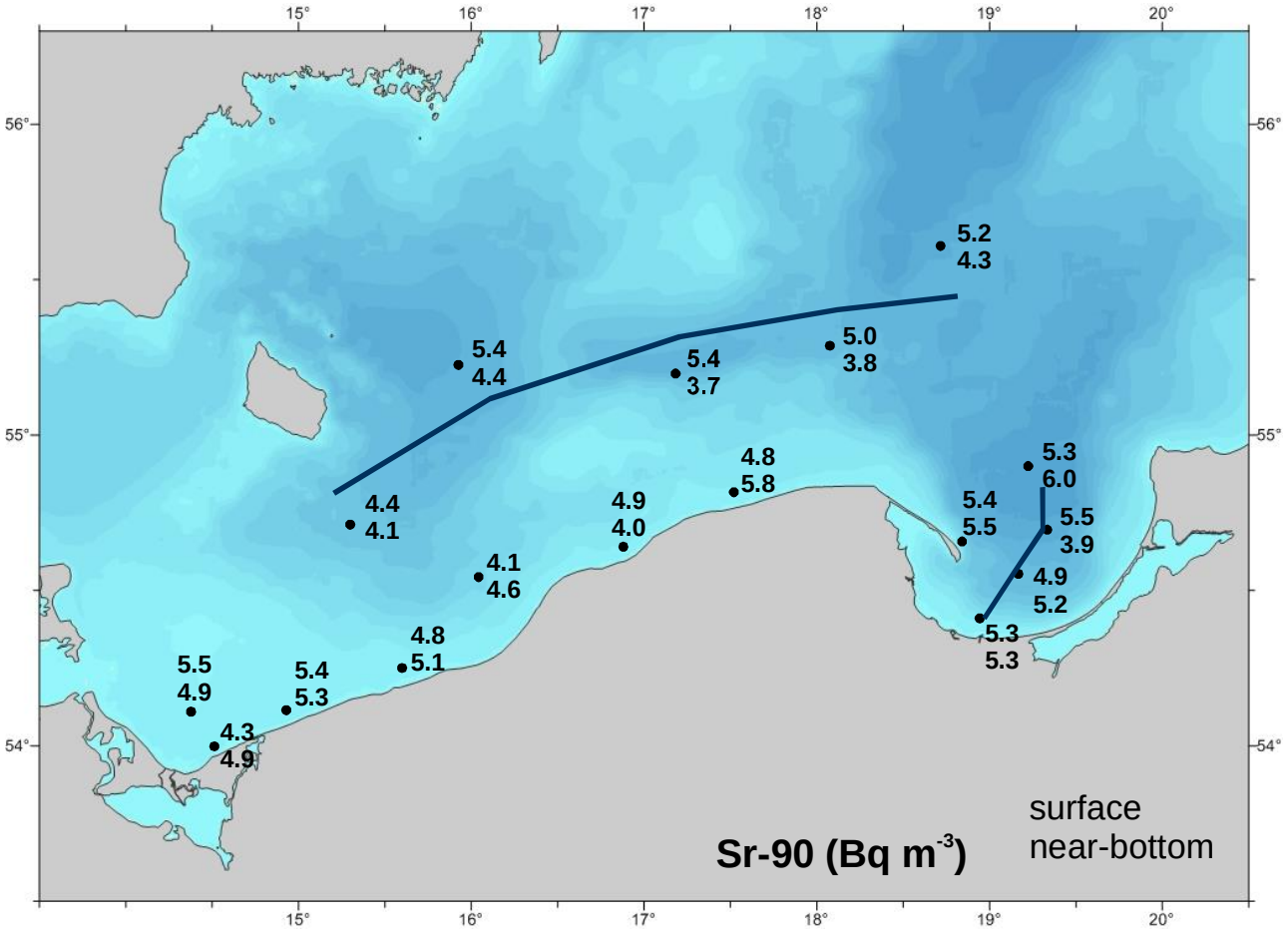

Fig.2 ^{90}Sr activity concentrations in surface and near-bottom water in the Polish sector of the Baltic Sea in 2020, (lines indicate profiles – see Fig. 3).

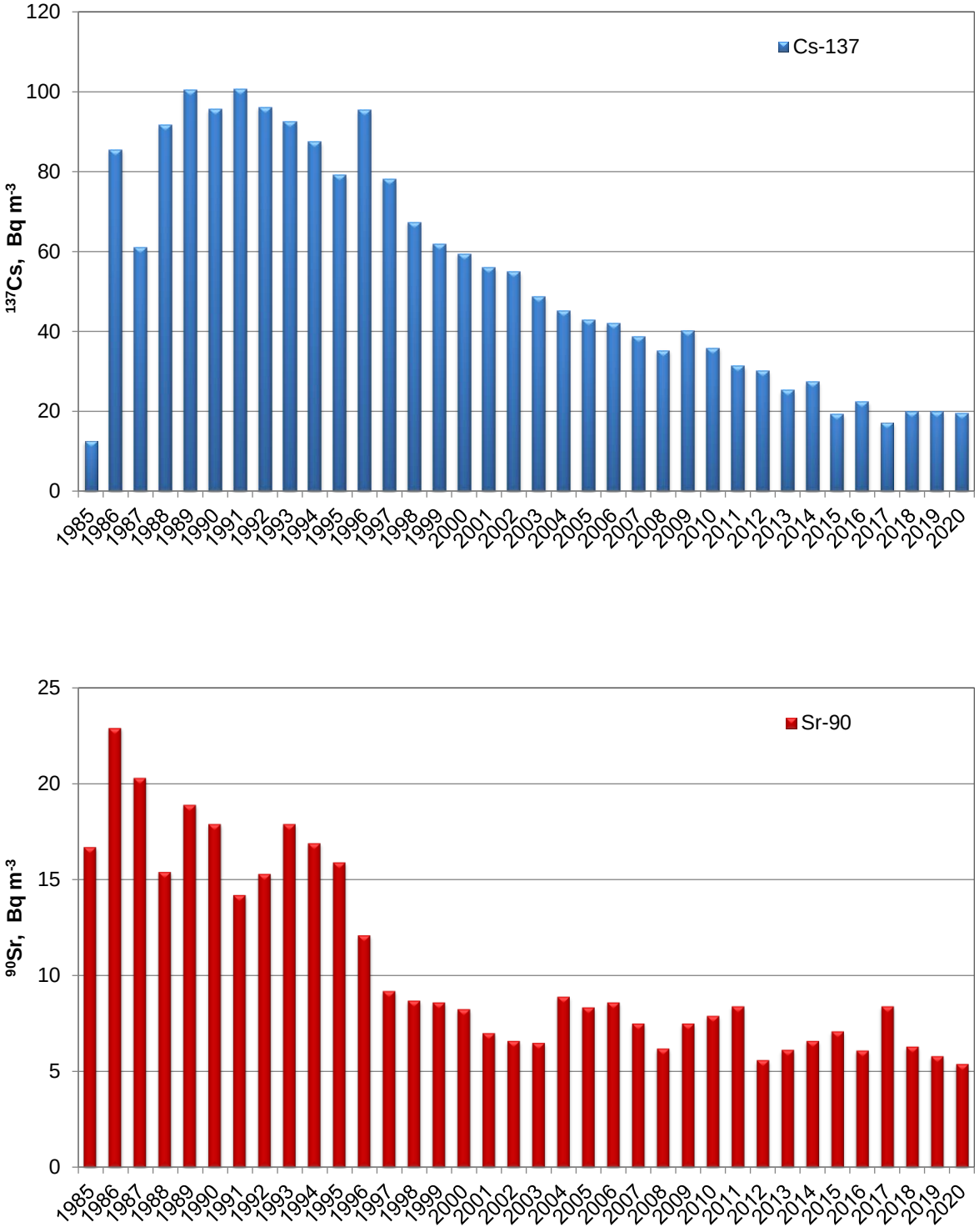

Fig.3 Average activity concentrations of ^{137}Cs and ^{90}Sr in seawater, in the Polish sector of the Baltic Sea in 1985-2020

Changes in ^{137}Cs and ^{90}Sr concentrations and changes in salinity in the water column along two profiles: (i) the Vistula mouth profile and (ii) the open sea profile (Figs. 1 and 2) are presented in Figures 4 – 6. Similarly to the previous years, in the western areas of the open sea, changes in ^{137}Cs concentrations in the water column were related to the salinity, with higher salinity being accompanied by lower concentrations of the isotope (Figs. 4 and 5). This was particularly evident in the Bornholm Deep area, and this is closely related to the fact that the inflowing, more saline waters of the North Sea are characterised by lower

concentrations of the discussed isotope. The vertical distribution in the Gdańsk Deep and in the Eastern Gotland Basin was much more even. However, in the Vistula estuary profile in surface waters, the reverse relationship was observed, because water with lower salinity was also characterised by lower concentrations of ^{137}Cs (Figure 4 and 5), which is associated with a significant share of river waters in this region. In the case of ^{90}Sr, there is no clear relationship between concentrations and salinity and distribution in the water column at the open sea locations was more uniform.

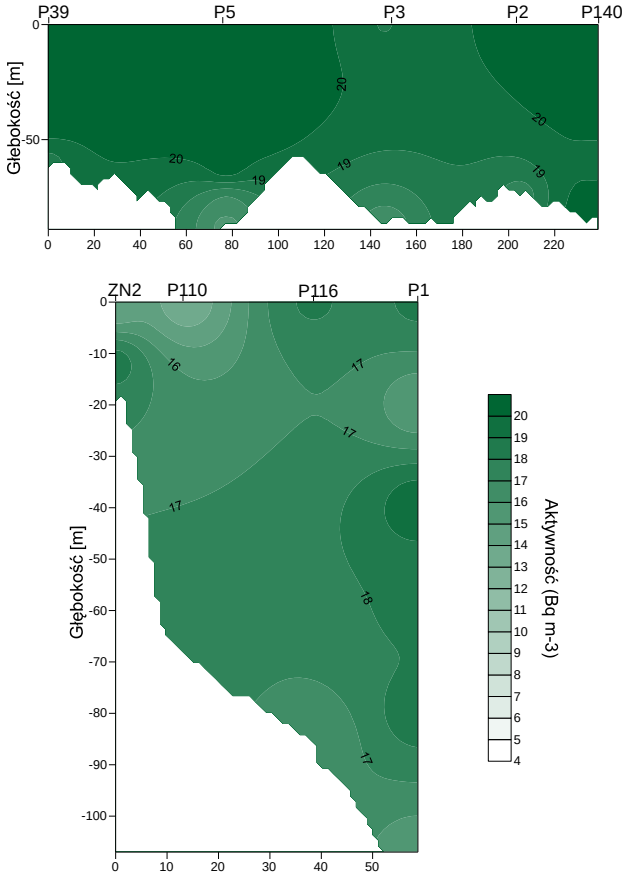

Fig.4 Spatial distribution of ^{137}Cs in seawater in the open sea and Vistula outflow areas in 2020.

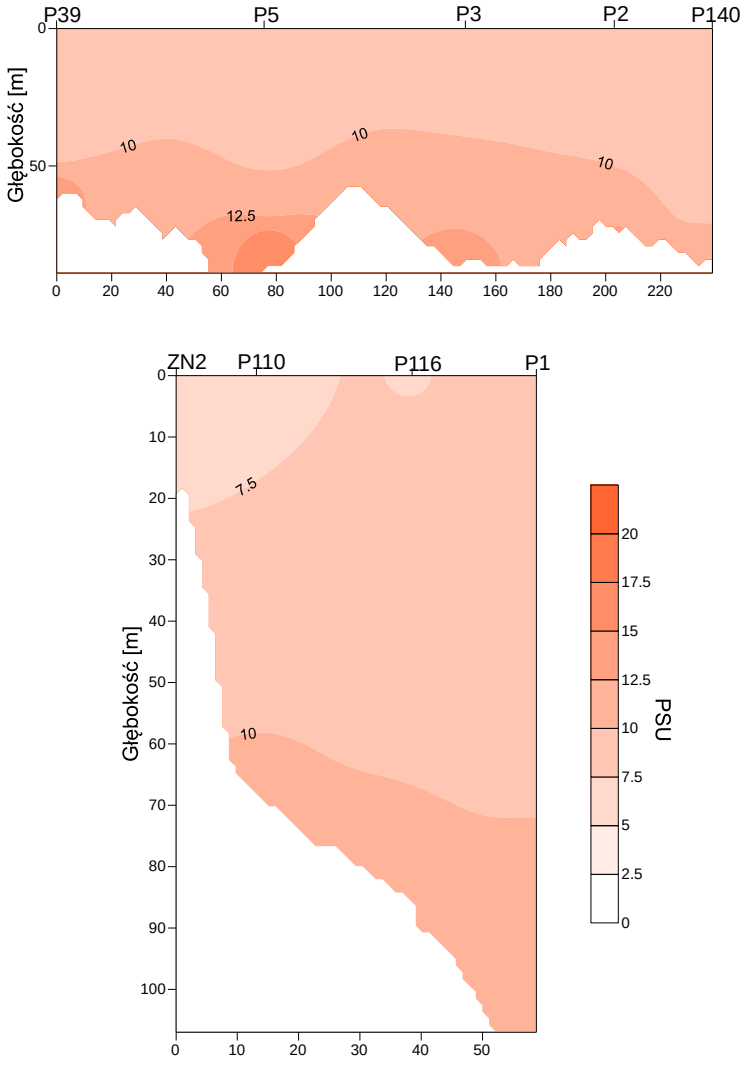

Fig.5 Salinity in the open sea and Vistula outflow areas in 2020.

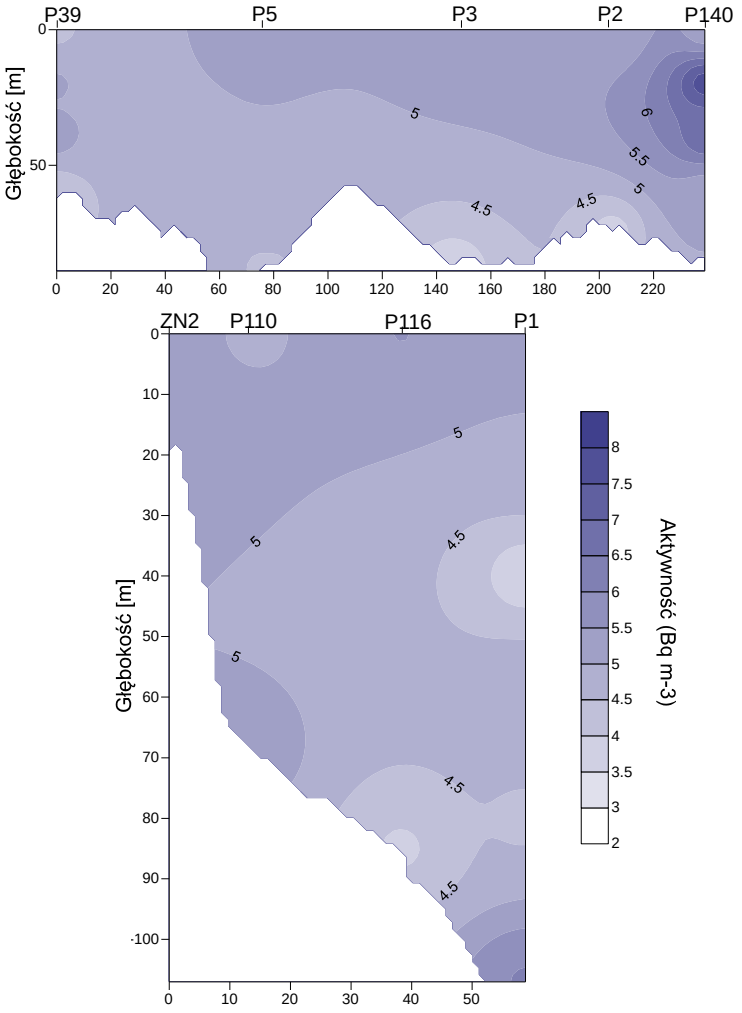

Fig.6 Spatial distribution of ^{90}Sr in seawater in the open sea and Vistula outflow areas in 2020.

In 2020, concentrations of ^{137}Cs in perch from the Szczecin Lagoon varied within a range, from 1.2 to 3.4 Bq kg^{-1} w.w in females and from 0.9 to 7.4 Bq kg^{-1} w.w males (Fig. 7). The mean values were equal to 2.3 Bq kg^{-1} w.w. - females and 2.2 Bq kg^{-1} w.w. – males. In the Vistula Lagoon, concentrations of ^{137}Cs in perch range, from 0.9 to 5.6 Bq kg^{-1} w.w in females and from 0.9 to 5.0 Bq kg^{-1} w.w in males (Fig. 7). The mean values were respectively 2.9 Bq kg^{-1} w.w. (female) and 2.3 Bq kg^{-1} w.w. (male).

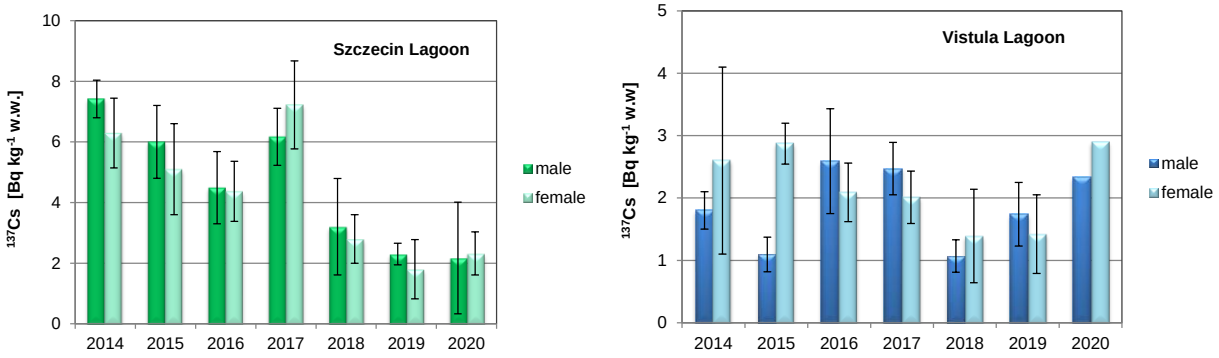

Fig. 7 Concentrations of ^{137}Cs in perch (*Perca fluviatilis*) in the Szczecin Lagoon and Vistula Lagoon in 2014-2020.

Mean concentrations of ^{137}Cs in macrophytobentic plants sampled in June and September 2020 in the southern Baltic stayed in the range from 4.9 Bq kg^{-1} d.w. in *Chara baltica* (Charophyceae) to 13.1 Bq kg^{-1} d.w. in *Vertebrata fucoides* (red alge) (Fig. 7). Changes in ^{137}Cs concentrations in *V. fucoides* observed in 2014 to 2020 showed a noticeable decrease in the last two years and value in 2020 was 10.1 Bq kg^{-1} d.w. (Fig. 8).

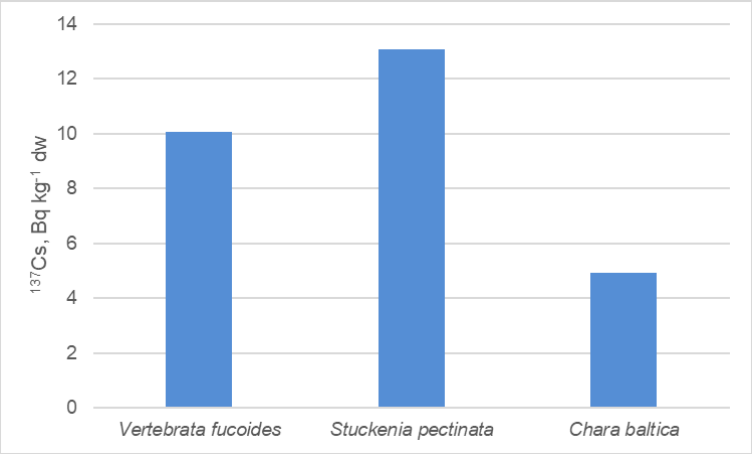

Fig. 7 Concentrations of ^{137}Cs in macrophytobentic plants in 2020.

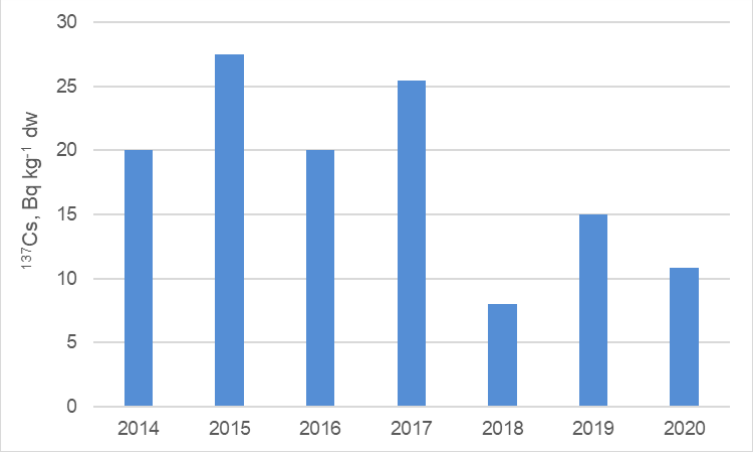

Fig. 8 Concentrations of ^{137}Cs in *Verterbrata fucoides* sampled in Gulf of Gdańsk in 2014 - 2020