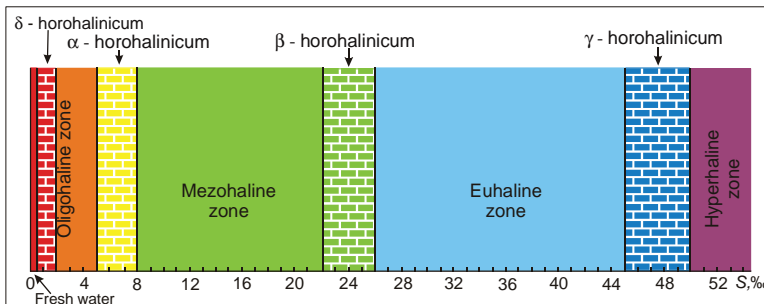


Delta-horohalinićum in the Baltic Sea

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Water salinity is one of the major abiotic environmental factors influencing aquatic animals and plants. According to the concept of the relativity and plurality of barrier salinity zones or horohalinićums:

- 1) they are relative to the degree of the osmoregulatory capacities of hydrobionts and to the water chemical composition;
- 2) there are several zones of barrier salinities which vary in terms of their importance.

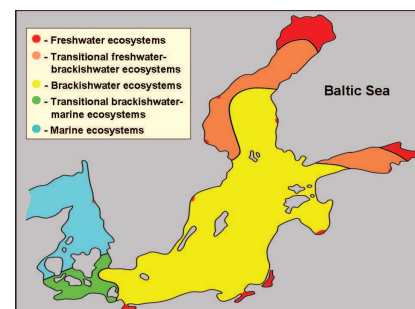


- One of barrier salinities – 0.5–2‰ or **δ-horohalinićum** is the upper limit of stenohaline freshwater species distribution. It divides freshwater and brackish-water ecosystems.
- Absence of pronounced high and low tides in the Baltic Sea contributes to a stable **δ-horohalinićum**.
- Freshwater ecosystems in the Baltic Sea occupy mouths of inflowing rivers and also waste adjoining areas of shallow gulfs.
- This barrier salinity is well distinguished in the eastern part of the Gulf of Finland and the Northern part of the Gulf of Bothnia. Water areas of the Vistula and Curonian lagoons are divided by this salinity barrier into fresh and brackish water zones.
- In the South-Eastern area of the Gulf of Riga, being constantly influenced by riverine water inflow, the **δ-horohalinićum** zone is also well distinguished.

- In the Baltic Sea the freshwater zone area is not large, – only 6% of its total area. Only in small areas does fresh riverine waters mix with brackish waters.
- Salinity here varies from fresh water up to 2‰.
- These areas are shallow, maximal depth does not exceed several tens of meters.
- Many freshwater plants and animals are living only here and are not found in the Baltic Sea proper.
- In Baltic freshwater ecosystems there are about 1200 species of fishes, free-living invertebrates and plants (without bacteria, protozoans and tiny metazoans).
- Restricting zone for freshwater organisms invading Baltic Sea is the **δ-horohalinićum**.



Arvi Järvekülg (1929–2002) from Estonia was the first scientist who in the 1970s clearly described the barrier salinity 0.5–2‰.



- Barrier salinity 5–8‰ or **α-horohalinićum** is the upper limit of freshwater fauna distribution and lower limit of marine fauna distribution. It is also known as critical salinity.
- This barrier salinity divides oligohaline and mesohaline waters. It is a kernel of brackish waters.
- Zone of the **α-horohalinićum** occupies the Baltic Sea proper, Bothnian Sea, Archipelago Sea and the Gulf of Riga.
- It is considered the normal salinity of the Baltic Sea
- This zone is the largest in the Baltic Sea – ~60% of the total area.
- Zone of the **α-horohalinićum** is occupied by brackish-water ecosystems and is the most impoverished in the species number. There are about 700 species of fishes, free-living invertebrates and plants (without bacteria, protozoans and tiny metazoans). Some of them are the descendants of inhabitants of glacial lakes that existed in the Ice Age.



Adolf Remane (1898–1976)



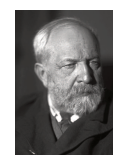
Vladislav Khlebovich



Otto Kinne (1923–2015)

A. Remane, V. Khlebovich and O. Kinne clearly described this barrier salinity 5–8‰.

- Barrier salinity 22–26‰ or **β-horohalinićum** divides mesohaline and euhaline waters.
- Zone of the **β-horohalinićum** is located in the West of Baltic Sea and the Eastern water area of the Danish Straits and strongly influenced by inflow of full-saline waters from the North Sea.
- Zone of the **β-horohalinićum** is occupied by marine ecosystems.
- While the area is only about 4% of the total Baltic Sea area, number of species of fishes, free-living invertebrates and plants (without bacteria, protozoans and tiny metazoans) found here is about 13000.



Sergei Zernov (1871–1945)



Alexander Golikov (1931–2010)

S. Zernov and A. Golikov clearly described this barrier salinity 22–26‰.

- Barrier salinity 45–50‰ or **γ-horohalinićum** divides euhaline and hyperhaline waters.
- Zone of the **γ-horohalinićum** is not directly found in the Baltic Sea. This barrier salinity zone in fact is outside of the sea or at its bounds. This salinity or **γ-horohalinićum** can be found in rock pools or on salted shoals named “salt marshes”.
- Zone of the **γ-horohalinićum** is occupied by hyperhaline ecosystems.
- Hyperhaline ecosystems can be considered as seasonal ecosystems, which occur in summer time when evaporation is highest. This barrier salinity divides inhabitants of full saline Baltic Sea waters from inhabitants of hyperhaline waters where maximal number of plant and animal species including unicellular ones don't exceed 100.



William Williams (1936–2002)

W. Williams clearly described this barrier salinity 45–50‰.