



NAFO Northwest Atlantic
Fisheries Organization

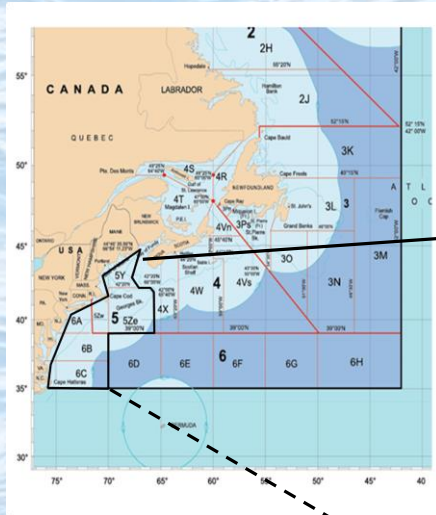


The 2022 Overview of hydrographic conditions on the Northeast U.S. Shelf – NAFO Subareas 5 and 6

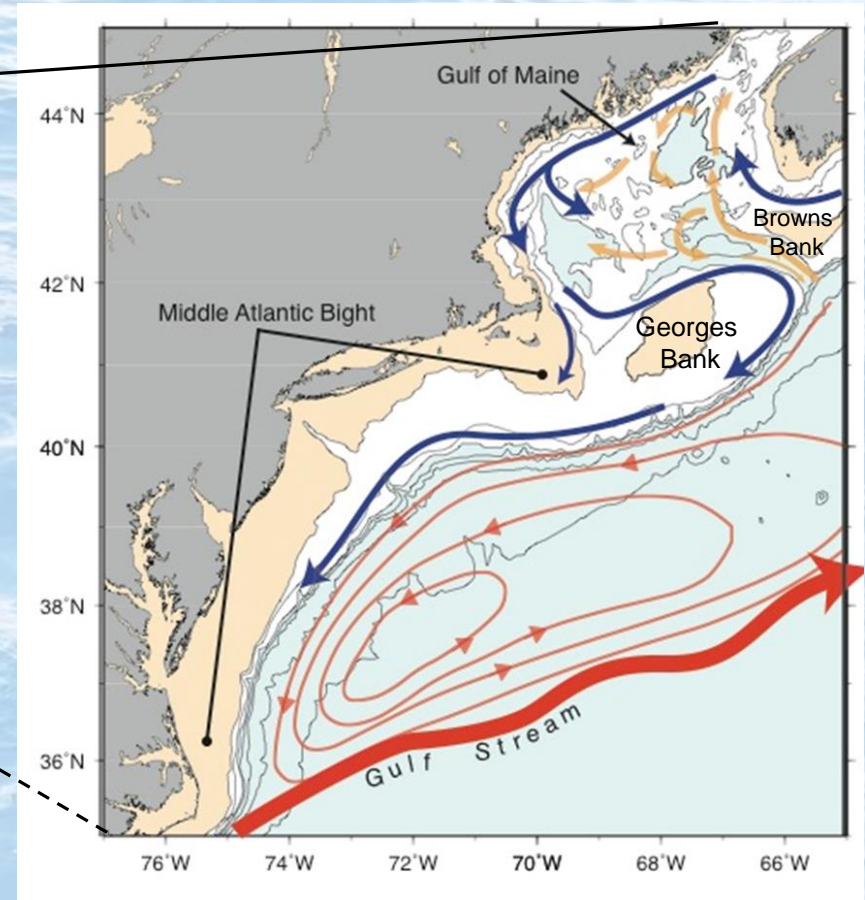


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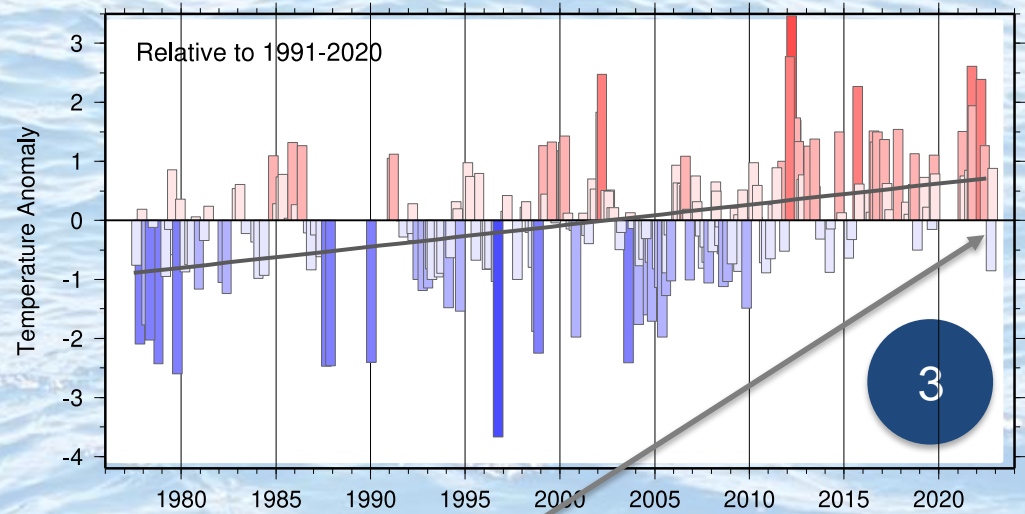
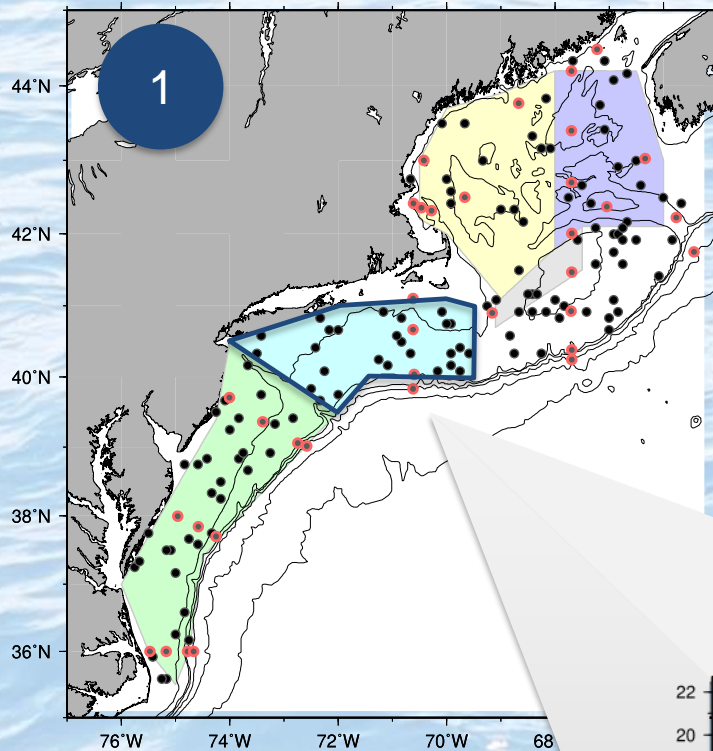
NAFO Subareas 5 & 6 – Main features and general circulation



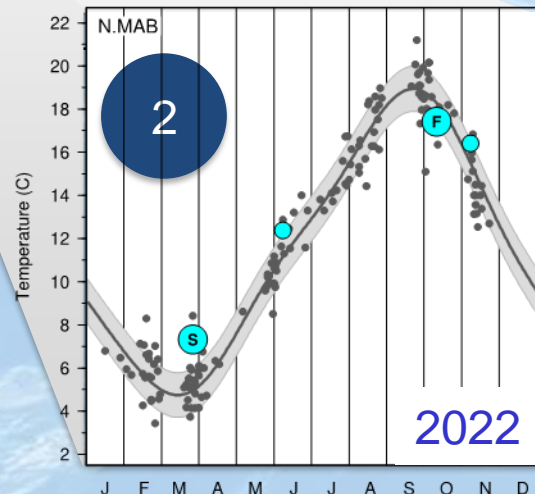
- Hydrography connected to both the Subpolar and Subtropical Atlantic.
- The tail end of boundary current carrying arctic-origin waters.
- At the confluence of two major western boundary currents.
- Hydrography influenced by basin-scale variability.



NAFO Subareas 5 & 6 – Oceanographic sections and methodology



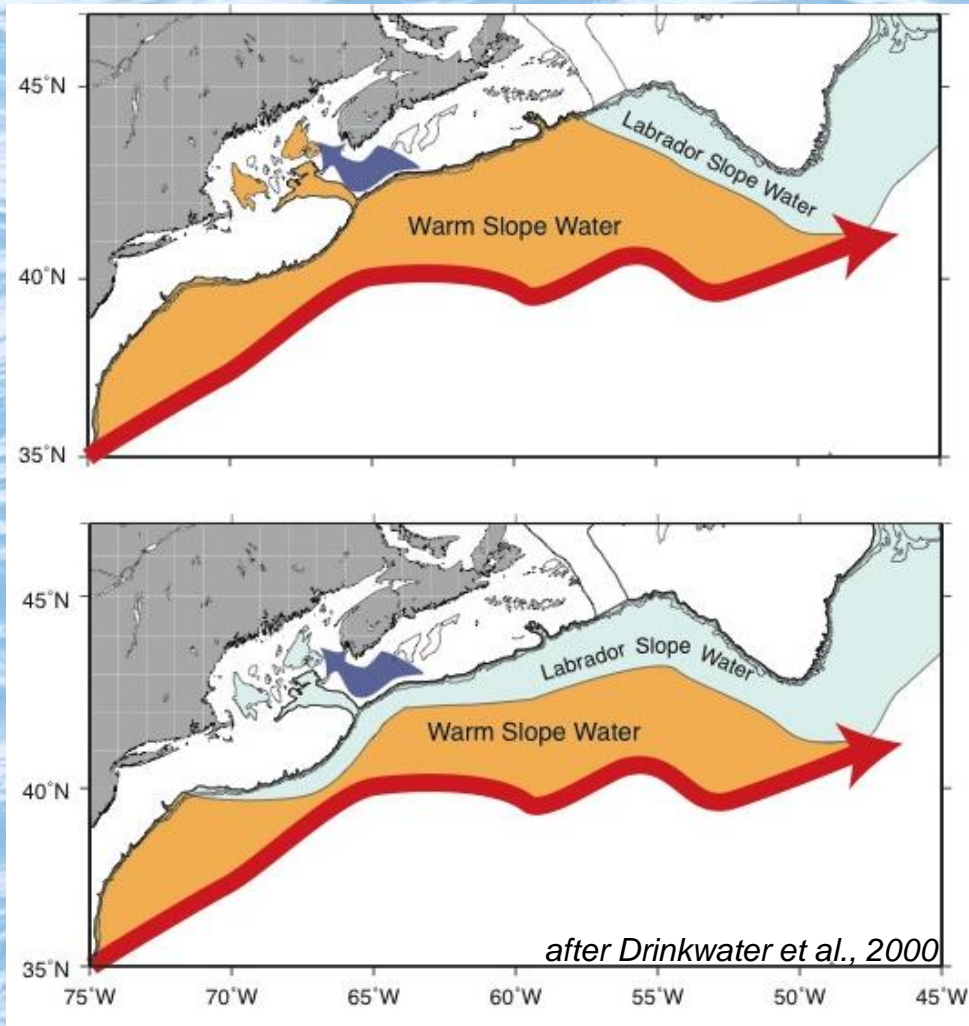
- For each survey Identify stations in polygon.
- Calculate regional average T,S and associated date



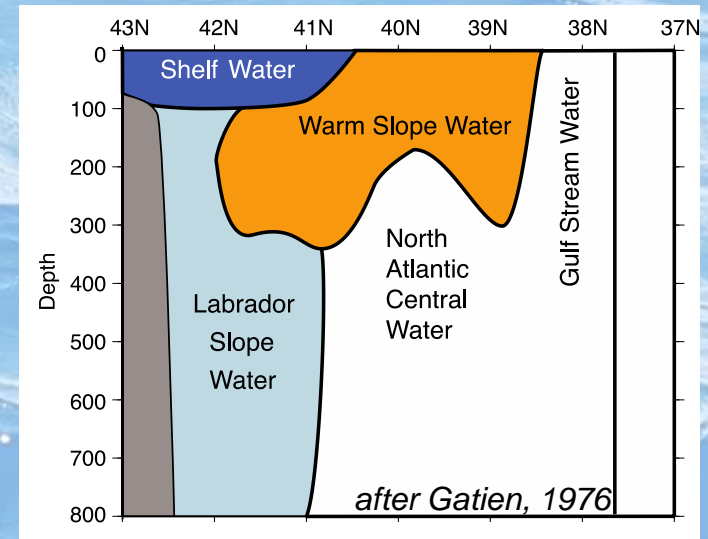
- Construct reference annual cycle as harmonic fit to regional average values between 1991-2020
- Compare regional average in 2022 to reference T,S for that time of year



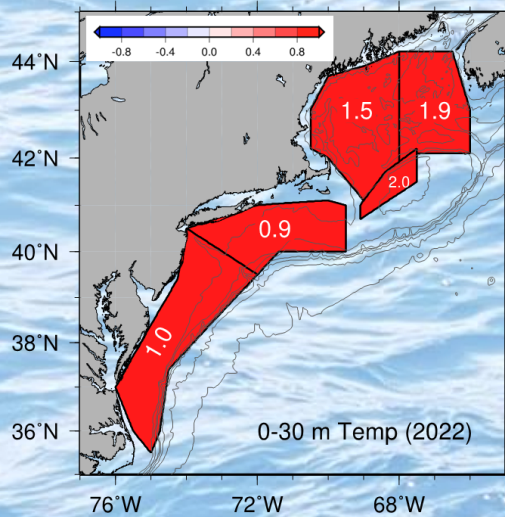
Hydrographic variability: Changes in proportion/property of source waters



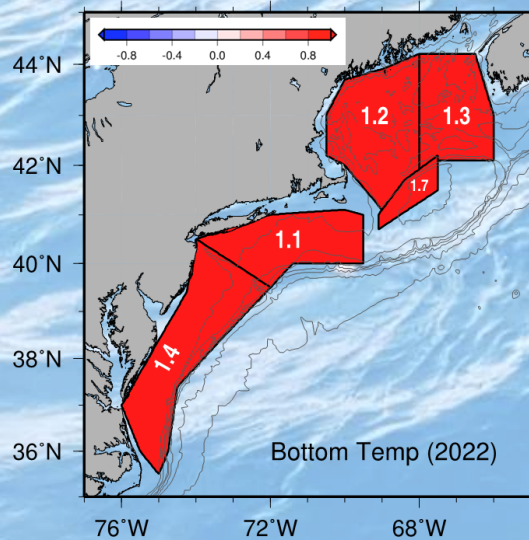
- Periods of increased shelf water inflow coincide with periods of decreased slope water
- The composition of slope water in the NE Channel is correlated with Gulf Stream position and the NAO



Temperature – Annual anomaly

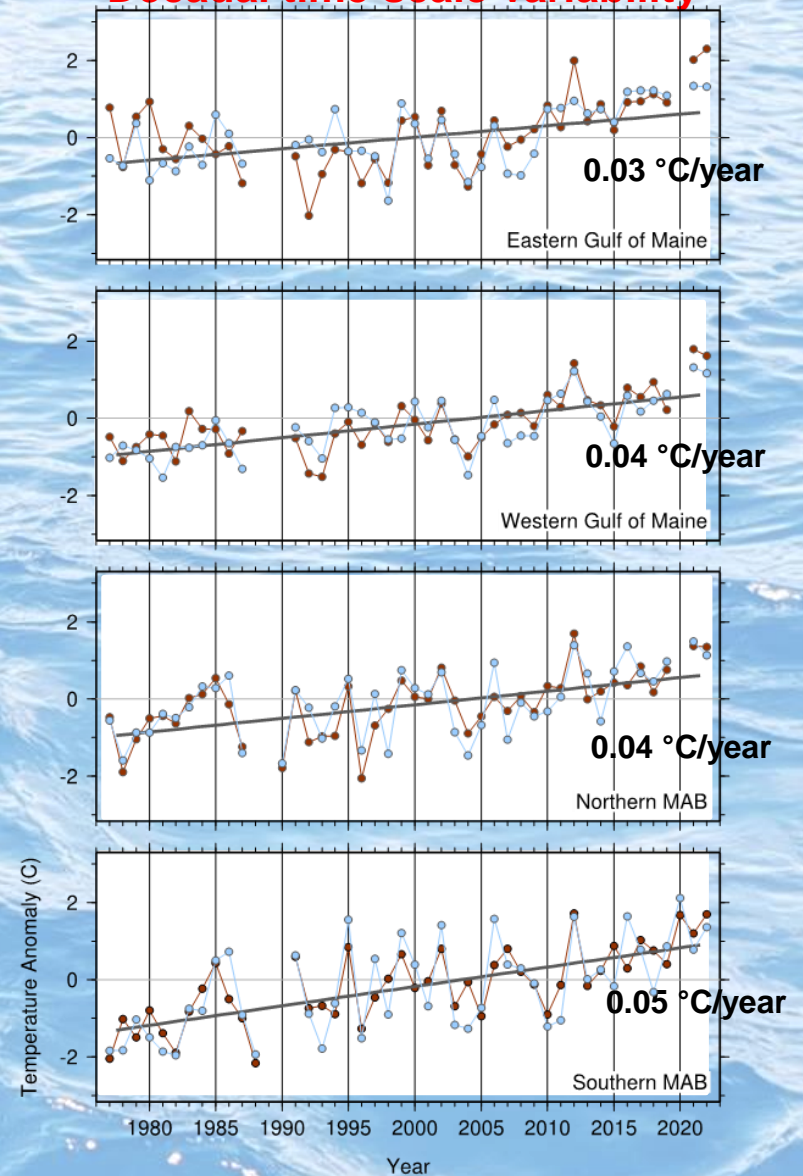


The **upper ocean** (0-30 m) was **warmer** than normal across the region in 2022, but anomalies were twice as large in the north



Warming extended to the **bottom**.

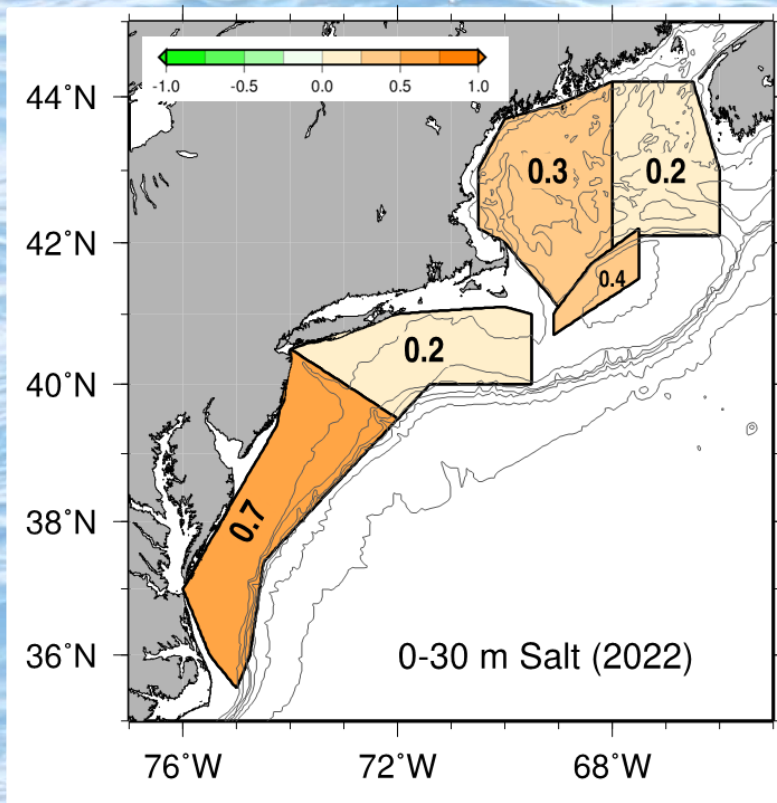
Decadal time scale variability



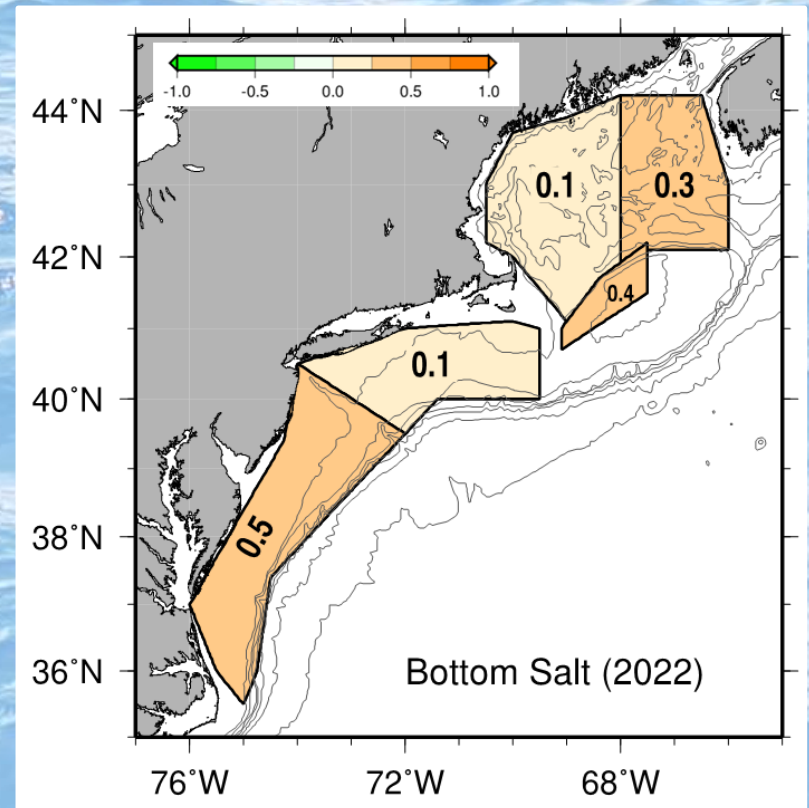
- **Long term (1977-2021) gradual warming.**
- Significant interannual variations superimposed on this trend



Salinity – Annual anomaly



Saltier conditions were observed in 2022, particularly in the **south**

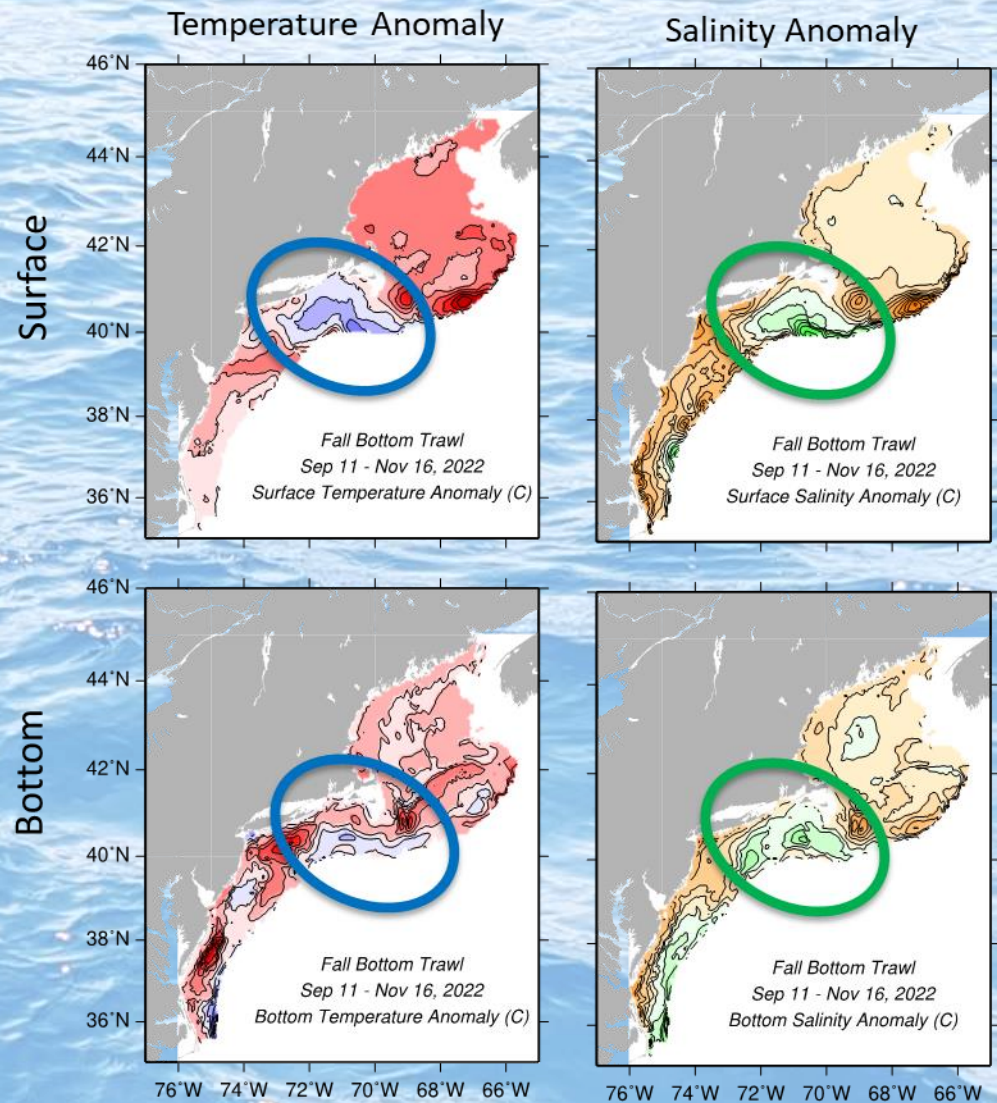
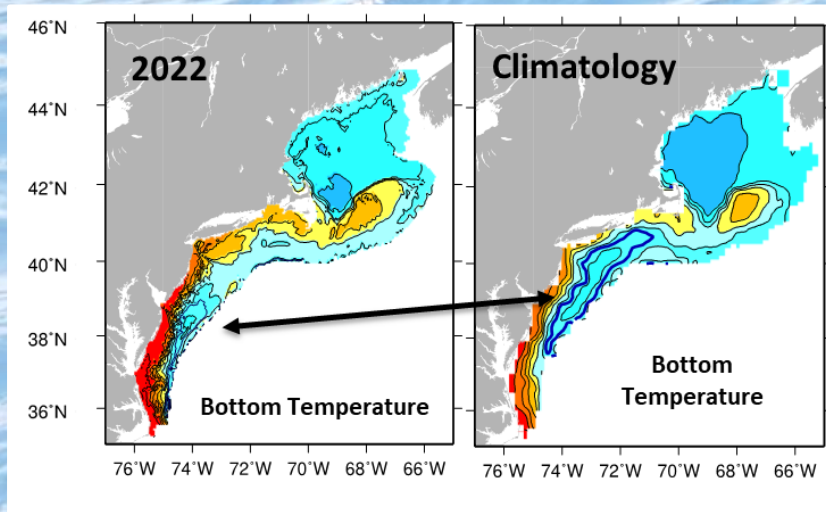


Salinities were **higher** than normal at the bottom, particularly in the **southern region**



Synoptic Fields

- Saline conditions were pervasive during spring across the Northeast Shelf.
- Fresh anomalies were prevalent in the northern MAB during Fall, coincident with the cold anomalies.



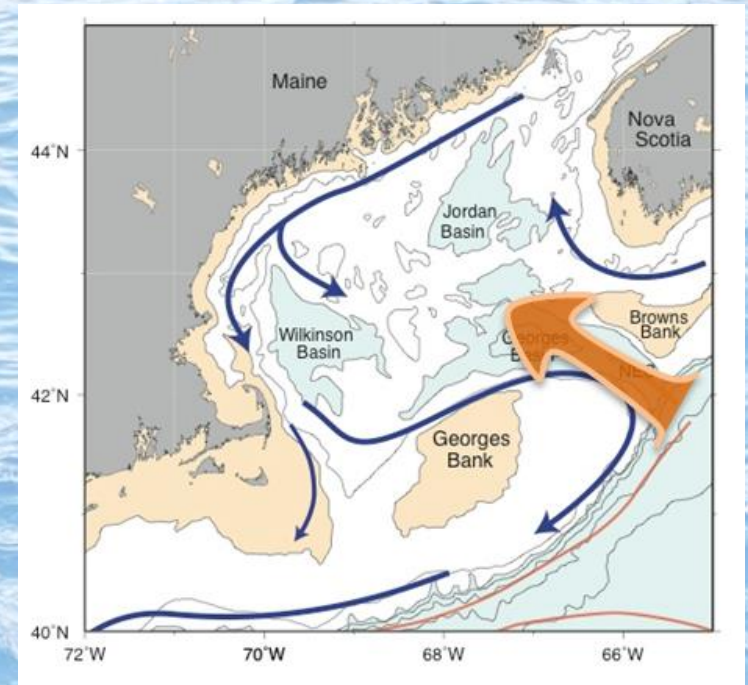
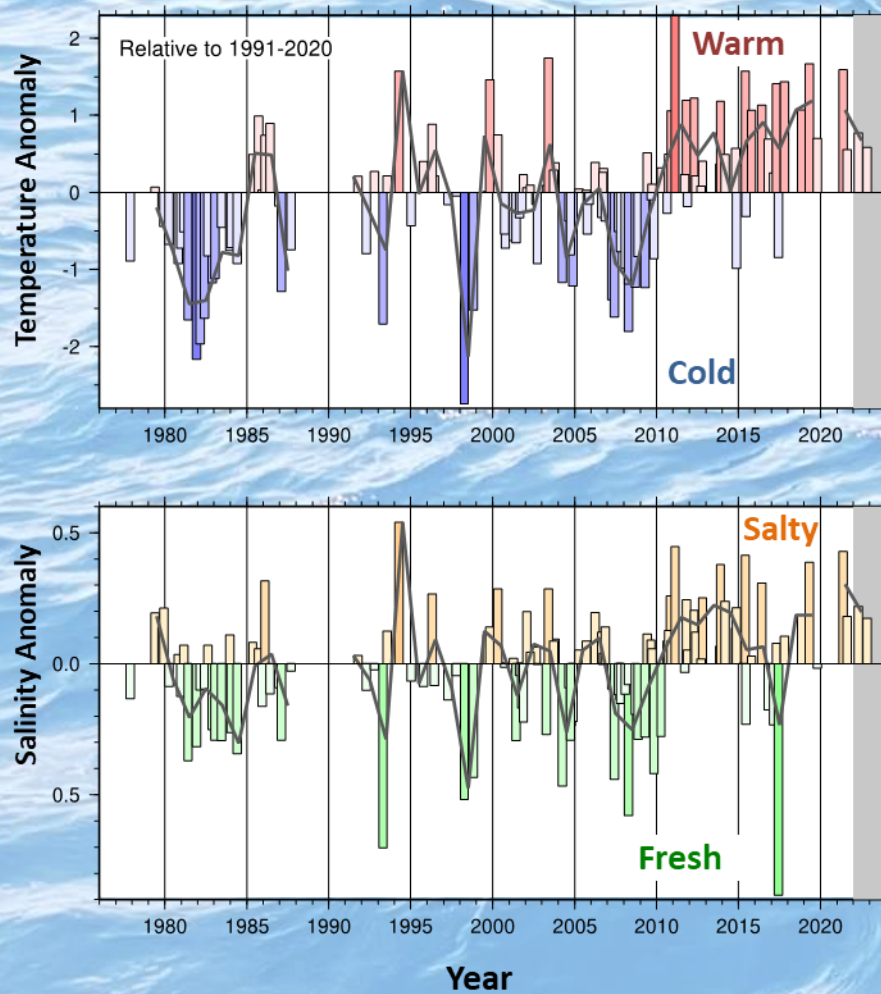
Cold and Fresh anomalies dominate the northern MAB.

Shrinking of Cold Pool footprint is likely a consequence of the Warm Core Ring Influence



Deep Inflow to Gulf of Maine

Slope Water in the Northeast Channel



- Deep inflow to Gulf of Maine continues warmer and saltier

Warmer Cold Intermediate Layer is warmer than normal and capped by very warm surface waters



Highlights

- The **Northeast US Shelf** reached record **warm values** across the entire shelf in 2022.
- Notable **cold anomalies** were observed in the **northern MAB** during Fall, likely caused by the influence of a **Warm Core Ring** filament and **distortion** of the **shelf-slope front**.
- The **MAB Cold Pool footprint** was significantly smaller.
- In the western Gulf of Maine, the **Cold Intermediate Layer** was **warmer** than normal, and the underlying water mass in **Wilkinson Basin** was **warmer and saltier** than normal
- Deep waters entering the **Gulf of Maine** continue to be **warm and salty**, marking **a full decade** that southern source waters have dominated the slope water composition in the region





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Source:

Fratantoni, P. (2023). Hydrographic Conditions on the Northeast United States Continental Shelf in 2022 – NAFO Subareas 5 and 6, NAFO SCR Doc. 23/018.



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