Changes in the freshwater water input from the Antarctic Ice Sheet appears to be driving freshening trends in the water masses around the Antarctic Margin. This study presents the freshening trend of Dense Shelf Water (DSW) in the export region of the Adélie Depression, East Antarctica, from historical data and discusses potential sources/factors, such as a) variability in sea ice production in the local polynyas, b) ocean/ice interactions beneath the Mertz Glacier and c) changes in mass balance of the Antarctic continental ice sheet. Applying a linear fit to the available near-repeat data at ~500m inside the Adélie Sill, we find a consistent freshening trend of ~0.01 dec−1 equivalent to -0.01 kg m−3 dec−1. This is 33% of the freshening reported for the DSW near Ross Island in the western Ross Sea and is equivalent to the freshening reported for the mCDW on the slope of George V and Oates Land. Satellite-derived estimates of sea-ice production show little variability in the Adélie Depression from 1992-2007. Melt rates from the Mertz Glacier would need to increase by 0.08 Gta−1 for the 0.01 dec−1 freshening trend observed. As in Ross sector, we suggest that upstream thinning of the continental ice sheet, i.e., near the Cook Ice Shelf, is the mechanism primarily responsible for the observed long-term freshening of DSW in the Adélie Depression.