

## **Supplementary Information**

### **Eastern Bering Sea shelf environmental and lower trophic level responses to climate forcing: Results of dynamical downscaling from CMIP6**

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This document contains supplementary figures (Figures S1-S4) and table (Table S1).

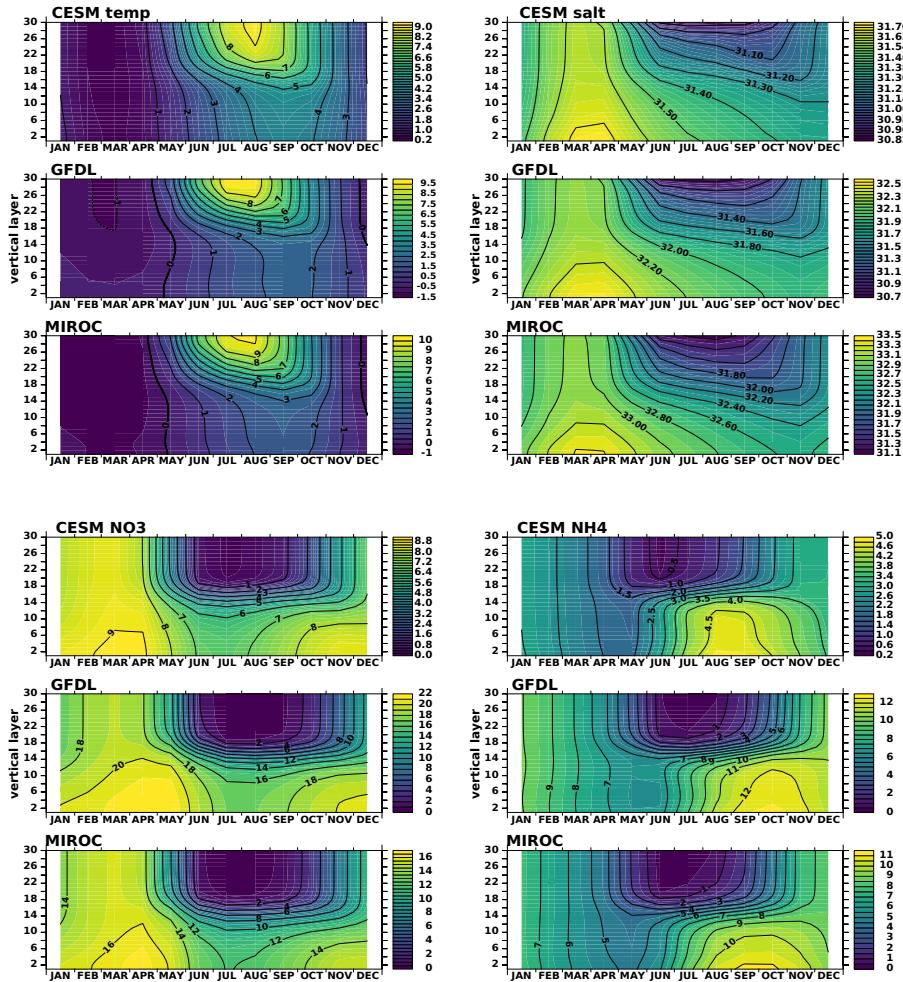


Figure S1. Monthly climatology displayed as a function of vertical coordinate layer (y-axis) and month (x-axis) for ocean potential temperature ( $^{\circ}\text{C}$ ), salinity (g/kg), nitrate (mmol/m $^3$ ) and ammonium concentration (mmol/m $^3$ ) from Bering10K historical (1980-2014) simulation forced by three global ESMs. Data is averaged over the Bering Sea shelf and displayed as a function of month and model vertical coordinate layer where k=30 is at the sea surface.

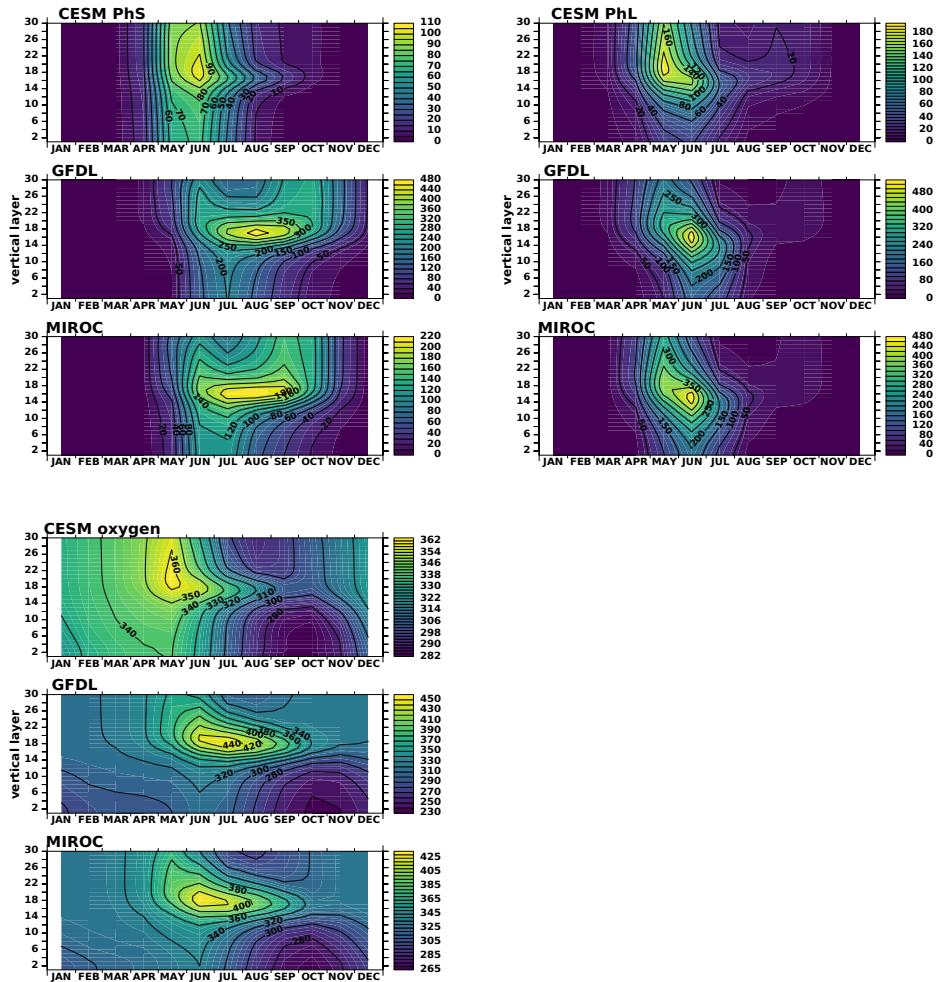


Figure S2. As in Figure S1 but for small phytoplankton (PhS), large phytoplankton (PhL) biomass (unit: mg C/m<sup>3</sup>), and oxygen concentration (mmol/m<sup>3</sup>).

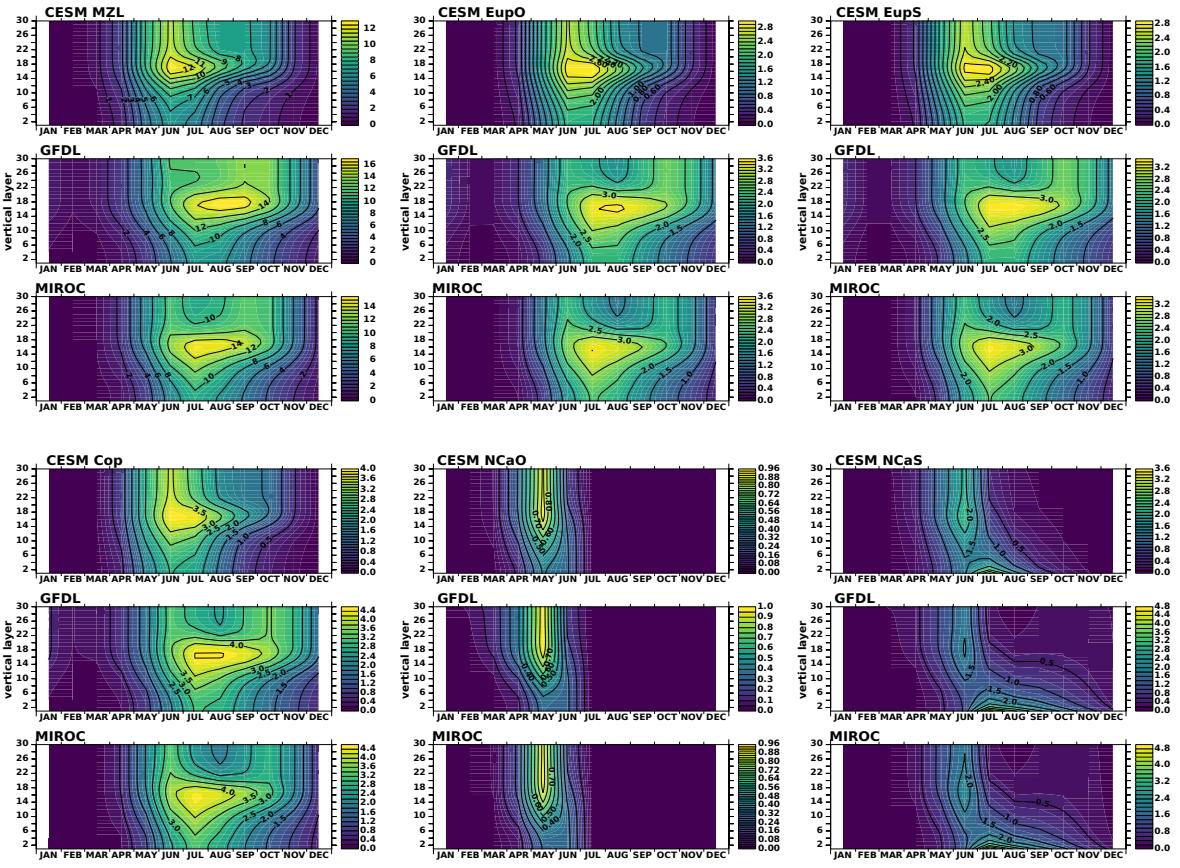


Figure S3. As in Figure S2 but for biomass (unit: mg C/m<sup>3</sup>) of microzooplankton (MZL), small-bodies copepods (Cop), oceanic euphausiid (EupO), shelf euphausiid (EupS), oceanic large-bodied copepods (NCaO) and shelf large-bodied copepods (NCaS). Note the different ranges in the color bars for each panel.

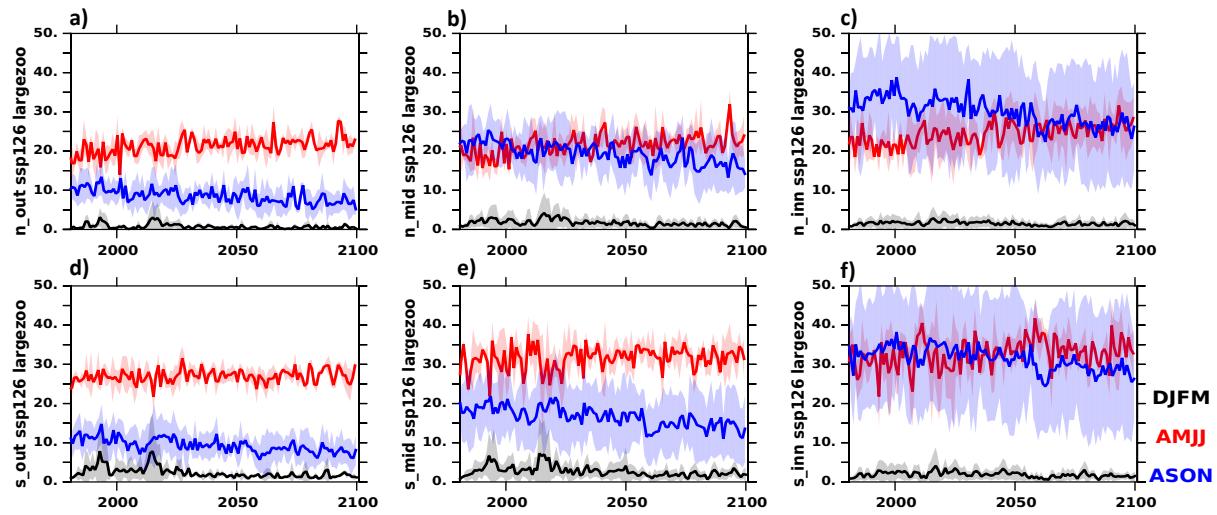


Figure S4. Annual time series from 1980 to 2100 of vertically averaged large zooplankton biomass (units: mg C/m<sup>3</sup>) on the Bering Sea shelf biophysical domains. Solid lines are ensemble means and shading represents  $\pm$  one standard deviation of ensemble spread around the ensemble mean. Future projections are forced by the SSP1-26 scenario. Black, red, and blue color corresponds to December-to-March (DJFM), April-to-July (AMJJ), and August-to-November (ASON) averages, respectively.

Table S1. Summary of ensemble variant label and data reference (including data DOIs) of the CMIP6 output used in this study. Version number refers to creation date denoted as YYYYMMDD, so Version 20190530 means data was created on May 30, 2019.

Model Name	ensemble variant label	Data Citation
CESM2-CAM6	r2i1p1f1	Danabasoglu, Gokhan (2019). <i>NCAR CESM2 model output prepared for CMIP6 CMIP historical</i> . Version 20190530. Earth System Grid Federation. <a href="https://doi.org/10.22033/ESGF/CMIP6.7627">https://doi.org/10.22033/ESGF/CMIP6.7627</a>
GFDL-ESM4	r1i1p1f1	Krasting, John P.; John, Jasmin G; Blanton, Chris; McHugh, Colleen; Nikonorov, Serguei; Radhakrishnan, Aparna; Rand, Kristopher; Zadeh, Niki T.; Balaji, V; Durachta, Jeff; Dupuis, Christopher; Menzel, Raymond; Robinson, Thomas; Underwood, Seth; Vahlenkamp, Hans; Dunne, Krista A.; Gauthier, Paul PG; Ginoux, Paul; Griffies, Stephen M.; Hallberg, Robert; Harrison, Matthew; Hurlin, William; Malyshev, Sergey; Naik, Vaishali; Paulot, Fabien; Paynter, David J; Poshay, Jeffrey; Reichl, Brandon G; Schwarzkopf, Daniel M; Seman, Charles J; Silvers, Levi; Wyman, Bruce; Zeng, Yujin; Adcroft, Alistair; Dunne, John P.; Dussin, Raphael; Guo, Huan; He, Jian; Held, Isaac M; Horowitz, Larry W.; Lin, Pu; Milly, P.C.D; Shevliakova, Elena; Stock, Charles; Winton, Michael; Wittenberg, Andrew T.; Xie, Yuanyu; Zhao, Ming (2018). <i>NOAA-GFDL GFDL-ESM4 model output prepared for CMIP6 CMIP historical</i> . Version 20190619. Earth System Grid Federation. <a href="https://doi.org/10.22033/ESGF/CMIP6.8597">https://doi.org/10.22033/ESGF/CMIP6.8597</a>
MIROC-ES2L	r1i1p1f2	Hajima, Tomohiro; Abe, Manabu; Arakawa, Osamu; Suzuki, Tatsuo; Komuro, Yoshiaki; Ogura, Tomoo; Ogochi, Koji; Watanabe, Michio; Yamamoto, Akitomo; Tatebe, Hiroaki; Noguchi, Maki A.; Ohgaito, Rumi; Ito, Akinori; Yamazaki, Dai; Ito, Akihiko; Takata, Kumiko; Watanabe, Shingo; Kawamiya, Michio; Tachiiri, Kaoru (2019). <i>MIROC MIROC-ES2L model output prepared for CMIP6 CMIP historical</i> . Version 20191229. Earth System Grid Federation. <a href="https://doi.org/10.22033/ESGF/CMIP6.5602">https://doi.org/10.22033/ESGF/CMIP6.5602</a>