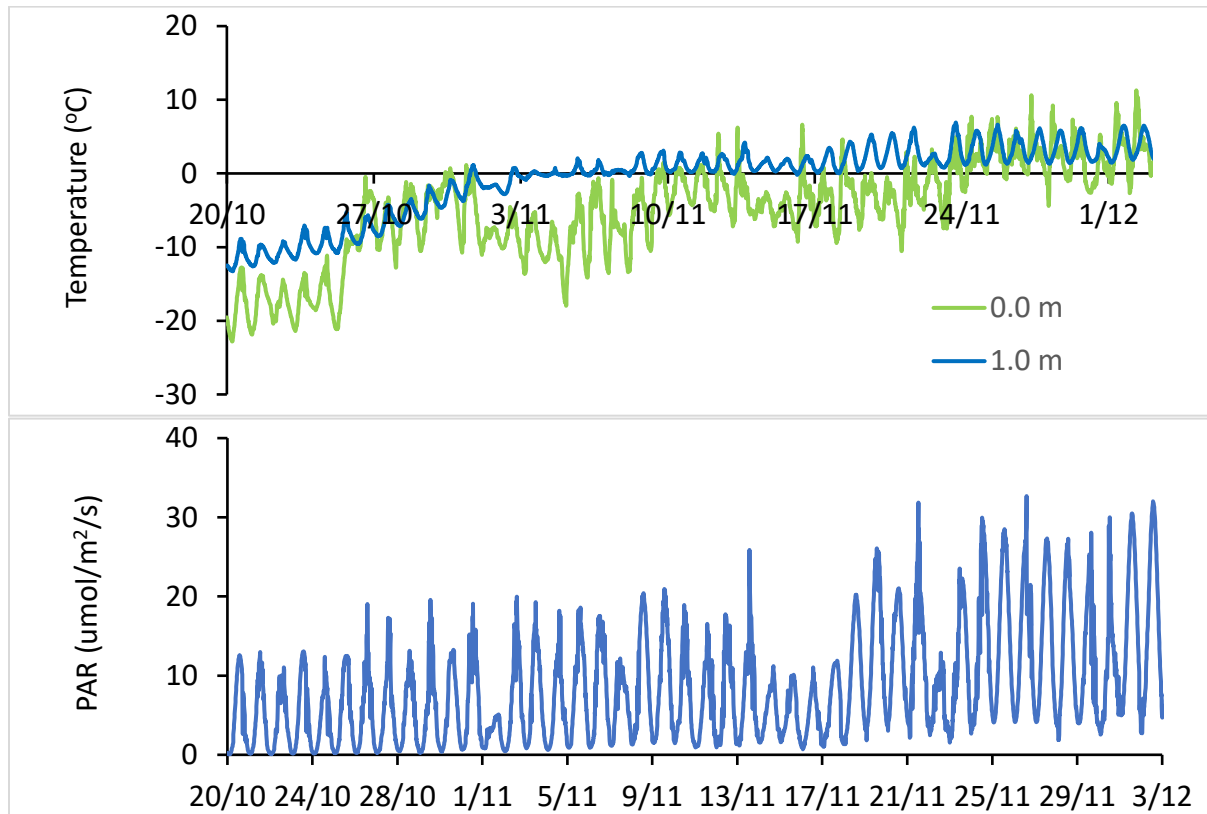
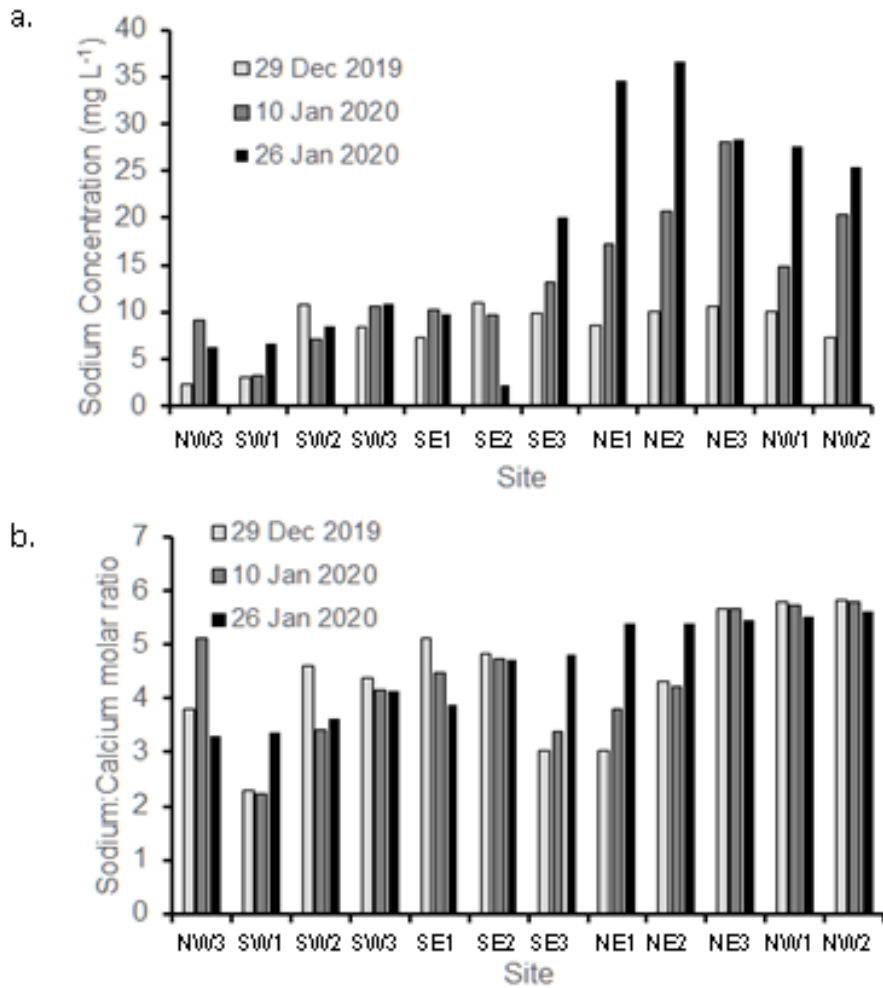


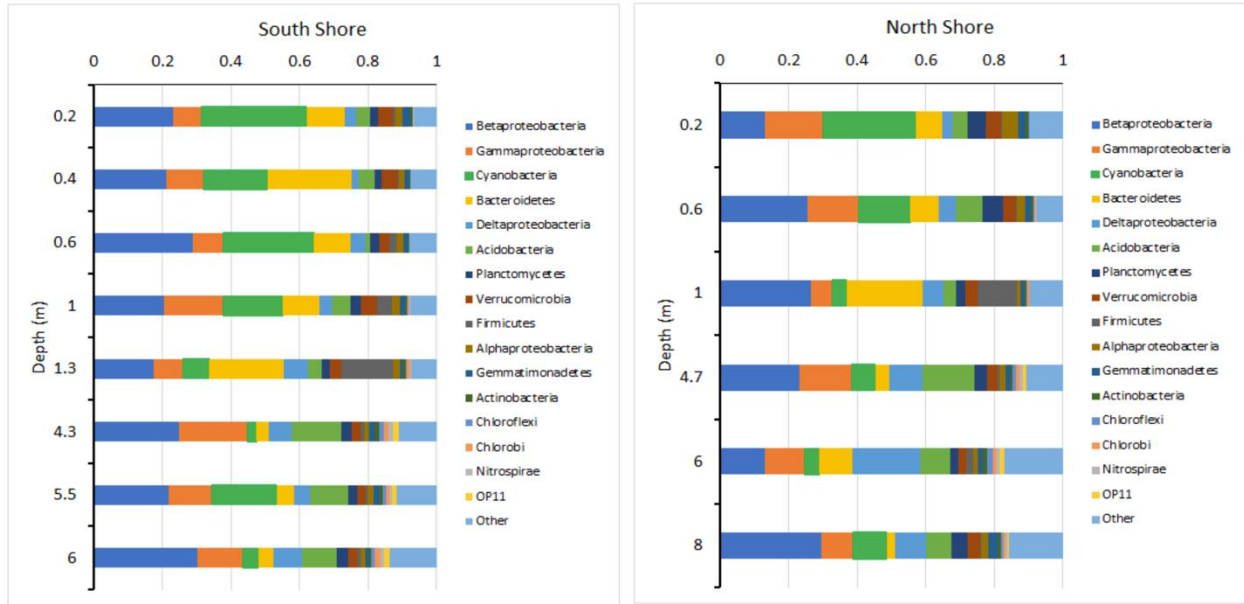
SUPPLEMENTAL



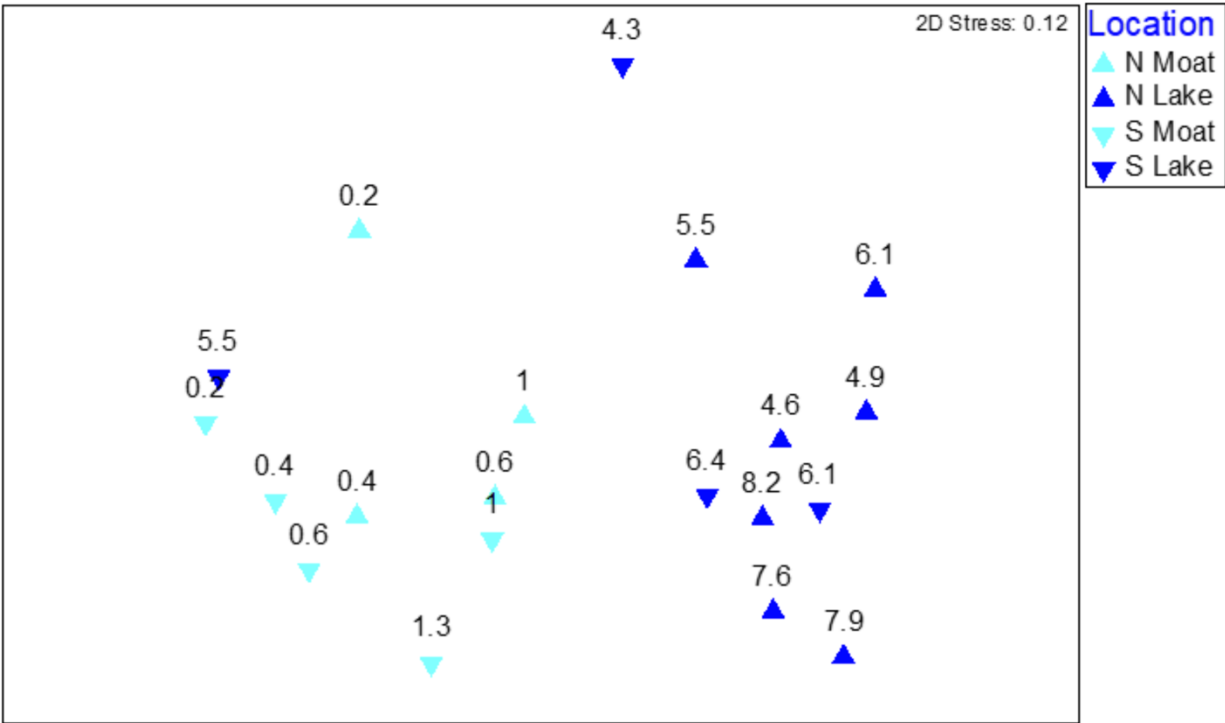
Supplemental Figure 1. a Moat temperature at the water/ice surface (0.0 m) and at 1m depth and **b** photosynthetically active radiation (PAR) measured at 0.5 m depth from 20 October 2018, to 3 December 2019. Diel variation in temperature and PAR are correlated, however, the magnitude of daily variance in temperature is strongly damped at depth compared to surface temperatures.



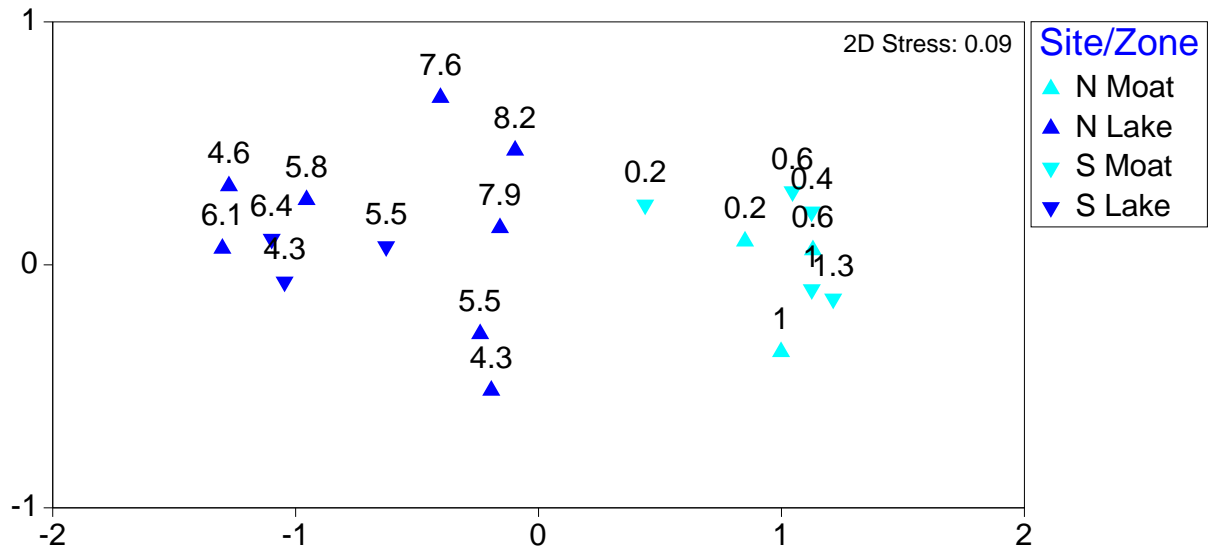
Supplemental Figure 2. Sodium concentrations and molar ratios of sodium to calcium of moat waters collected from individual synoptic sampling sites on three occasions over the course of the 2019/2020 summer season. Site names correspond to sampling sites shown in Fig. 1.



Supplemental Figure 3. Bacterial phyla in benthic mats along two depth transects in Lake Fryxell.



Supplemental Figure 4. Non-metric multi-dimensional scaling plot for cyanobacterial ASVs grouped by site (north and south) and zone (moat and lake). Annotations indicate collection depth. With the exception of the 5.5 m sample from the southern shore site, which may be an analytical artefact, there is a clear separation of community by zone, but not by site. This was confirmed using PERMANOVA. In both the under ice and moat communities, there was a tendency for samples to be ordered by depth, particularly along the second (vertical) axis of the plots. Insufficient data is available to test this possibility.



Supplemental Figure 5. Non-metric multidimensional scaling plots for eukaryotic community resemblance, based on 18S rRNA gene abundance (square root transformed) in Lake Fryxell in January 2018, at phylum level. Upwards pointing triangles indicate the north shore site, and downward pointing arrows south shore site. Dark blue indicates main lake and pale blue moat samples. Annotations show sample collection depth in meters. PERMANOVA indicated that the samples from moat and main lake were significantly different ($p < 0.001$) while the north and south sites were not ($p = 0.131$).