**Supplementary File 1: Methods from Maas et al. in prep.**

**Methods:**

**MOCNESS net sampling**

To provide samples , a 1 m Multiple Opening/Closing Net and Environmental Sensing System (MOCNESS; Wiebe et al. 1985) equipped with 150 µm nets was deployed during the mid-day and mid-evening on cruises carried out in July of 2016, 2017, and 2018 as well as October 2018, in the vicinity of the Bermuda Atlantic Time Series (BATS; six casts in total, 48 discrete nets; Table 1). The net sampling plan used adaptive profiling, modifying the depth of closure to capture eight distinct ecological zones from surface to 1000 m depth: e.g. the thermocline, deep chl-*a* maximum (DCM), above the O2 minimum, within the O2 minimum core, and below the O2 minimum (Steinberg et al. 2008, Maas et al. 2014). The actual tow depths were set on a cruise-by-cruise basis, using CTD profiles to determine the depths of each ecological zone. Upon retrieval, the catch from each of the eight discrete nets were divided into splits. Half were preserved in 95% undenatured ethanol and the remainder preserved in buffered 4% formalin in seawater.

Table 1: MOCNESS net tow metadata. The top net (0-50) typically captured the mixed layer, while the second net (50 to ~200 m) captured the deep chlorophyll a max. The second net from the bottom typically captured the local oxygen minima.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cruise | Year | Month | Day | D/N | Cast # | Lat dec | Long dec | Net depths (m) |
| AE1614 | 2016 | July | 11 | N | 3 | 32°10.930 N | 64°28.521 W | 0, 50, 225, 300, 450, 600, 750, 900, 1000 |
|  |  |  | 11 | D | 4 | 32°10.846 N | 64°28.811 W | 0, 50, 225, 300, 450, 600, 750, 900, 1000 |
| AE1712 | 2017 | July | 7 | D | 8 | 31°42.347 N | 64°12.654 W | 0, 50, 200, 275, 400, 550, 700, 850, 1000 |
|  |  |  | 11 | N | 9 | 31°42.161 N | 64°12.941 W | 0, 50, 200, 275, 400, 550, 700, 850, 1000 |
| AE1819 | 2018 | July | 3 | D | 10 | 31°39.961 N | 64°09.535 W | 0, 50, 175, 250, 400, 550, 700, 850, 1000 |
|  |  |  | 4 | N | 11 | 31°40.133 N | 64°10.212 W | 0, 50, 175, 250, 400, 550, 700, 850, 1000 |
| AE1830 | 2018 | October | 28 | N | 12 | 31°49.798 N | 64°03.727 W | 0, 50, 200, 300, 400, 550, 700, 900, 1000 |
|  |  |  | 30 | D | 13 | 31°48.319 N | 64°07.294 W | 0, 50, 200, 300, 400, 550, 700, 900, 1000 |

**Image Analysis**

To characterize the abundance and size class distributions of organisms, the zooplankton community from each net were imaged from the formalin-preserved samples, measured and broadly taxonomically classified, using a ZooSCAN ver. 3 at 4,800 dpi (following the methods in: Gorsky et al. 2010, Vandromme et al. 2012). Briefly, all individuals larger than 2 cm were selected by eye and scanned separately from all the others. The remainder of the sample was sieved through a 1-mm mesh, and both size fractions were individually scanned. From these smaller size fractions, at least 1500 particles were scanned after subsampling using a Motoda splitter (Motoda 1959), requiring generation of two separate scans for both size classes. This resulted in a total of 5 images per net. Raw images were then processed in ZooProcess (Gorsky et al. 2010, Vandromme et al. 2012), and vignettes and measurements and metadata file uploaded to Ecotaxa for machine-assisted identification, using a training set developed by the authors.

Individual biovolumes were calculated for all “live” particle images (i.e. excluding threads, detritus, bubbles, etc.) and scaled to biovolume per volume of water (mm3 m-3) based on # of splits and volume filtered. From these histograms of particle size class distribution were generated for each depth. When daytime distributions are subtracted from night time these provide the extent of vertical migration for each size class. The smaller of the paired day and night abundances provides a rough estimate of the resident midwater species within a size class at a particular depth interval (but does not account for reverse migrators).

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