MERP pelagic minicruise PQ2/16; Feb 24 2016.

RV Plymouth Quest.

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After being unable to run a MERP pelagic minicruise in January due to adverse weather conditions, the weather allowed a cruise on the night of February 24th 2016.

Plymouth Quest departed from Mayflower Marina, Plymouth at 14:00 due to work being carried out on the lock gates of Sutton Harbour. Weather conditions were not as good as had been forecast, but did not affect the sampling programme. At station L4 there was a good 1m swell, with offshore winds of F3-4. The sea had cleared to a turquoise colour after the January rains, but was still a relatively warm 9.9 ^{o}C with 35 ppt salinity and Chlorophyll around 0.6. Gannets were present near L4, but no dolphins were sighted, despite reports of them being seen at E1 earlier in the day.

Sampling at L4 got underway on time at 15:00 by deploying the 1 m^2 500 µm mesh Jelly Net. This had a single depth logger (PML logger 1) fixed to the top left corner of the net. From the first pair of jelly nets no obvious fish larvae or jellies were observed, but there were plenty of large (10-20 mm long) Chaetognaths and a spiky larval crustacean which got caught in the sieves and were probably barnacle larvae. Vertical 63 µm (with PML depth logger 2) and 200 µm WP2 nets were collected twice as usual with moderate abundances of plankton. There certainly seemed to be more plankton than observed in November and would suggest that the Spring Bloom is not far away. The vertical nets were followed by another two jelly nets (1/2 frozen and the rest discarded with the exception of one very large (circa 5 cm) fish larva (transparent, elongated). This larva was not measured, but frozen whole in an eppendorf tube for gut content analysis. The remaining two vertical net pairs were half frozen in liquid Nitrogen as usual and the other half of the samples discarded. The last samples came on deck by 17:00 on schedule with sunset at 17:45.

It was noted that there were a considerable number of large Chaetognaths which might well be an important predator at L4. ML had been thinking about whether this would be an important species for including in the genetic foodweb analysis as part of MERP. While picking out these individuals at sea would be very challenging, particularly at the smaller life stages, it was noted that plenty of individuals could be obtained from the ethanol samples as long as they had not evacuated their guts on preservation. This is work for the future.

A relaxed break was taken between the two halves of the sampling, while both crew and scientists had their evening meal.

Sampling resumed at 19:00 by starting with a jelly net and 100 µm ring net for Madie to try and capture some fish larvae for microplastics work. This was hauled at 19:20. In the net were masses of

small euphausiids about 1 cm long (see photo) and a few fish larvae. The first MERP jelly net of the night was retrieved at 19:42 and held some further individual fish larvae similar to the one preserved during daylight. It seems likely that these were the same species and four were preserved individually (566-569) with another two small individuals frozen together (570). Given the difference in depth between these two samples (25m max and 40m max) the fish larvae may have been in the middle to bottom part of the water column. The large fish were 25-50 mm in length and would have sufficient DNA to be analysed individually as long as their guts were not empty. The second jelly net and two pairs of vertical nets were preserved as per normal with half frozen and the other half put into formalin or ethanol.

Once again a jelly net and 100 µm WP2 net were shot for Madie at the start of the last round of sampling, yielding some fish larvae. Jelly net 3 (NJ3) for MERP also produced some fish larvae of the same species (samples 571-573) and a small transparent hydromedusa bell (Aglantha-like) which didn't appear to have any gut or other distinguishing features, but was frozen nonetheless (574). The final jelly net (NJ4) was half frozen and half preserved in ethanol, but we also took the opportunity to grab three more fish larvae to bring the total up to 13 individual fish larvae across 12 tubes and giving the potential to use those as a set of replicates for genetic analysis of gut contents. Possible prey items will of course be limited to the diversity in the water column at present. The similarity in abundance of fish larvae between these jelly nets suggests they were present in the area of the water column sampled by both nets, not below 25m. The final vertical nets were collected and half the sample frozen as normal.

The return to Mayflower Marina was made at around 22:30 with samples left on board and returned to the laboratory the following morning.

Overall the sampling went very smoothly and is now a well-polished machine. Even the addition of jelly nets with 100 µm pony nets for Madie is taken in the stride of the crew. Despite adverse weather conditions there were no problems with seasickness. Cold was more of an issue with the air temperature dropping to 2.2 ^{o}C, according to the onboard data. Various measures were employed to keep warm including hand warmers, hot drinks and elaborate exercises.

Diversity samples were stored in the -80 ^{o}C freezer alongside the PQ11/15 samples, with fish larvae eppendorfs also added to the couple of tubes collected during PQ11/15.

Depth loggers were placed on each of the net frames (jelly net as per usual and WP2 for the first time). They confirmed that the vertical ring net samples cover the whole of the water column with

some small variation (3-5m) between pairs of samples. One set of nets only sampled to 35m, compared to 45-50m for the other sets, and it must be assumed that a stronger current was running, meaning that the nets actually sampled an oblique, rather than a vertical profile with the usual cable amount run out. A heavier weight on the frame would address this, but also put more strain on the net mesh.

The jelly net samples were similar to previous events, showing a regular sampling of the top 30m, and some nets that spent time as far down as 45m if the current and speed were conducive. Nets taken consecutively would commonly have one net sampling as much as 15m deeper than the other net. These jelly-net samples should not be treated in a very quantitative way given the inconsistencies in depth strata sampled, and potentially the volume of water sampled. Working on a fixed speed through the water, cable length and deployment time makes for variable depth samples, but is convenient for working of the boat. Nets which had a 100 um WP2 added further up the cable experienced additional lift again and only sampled the top 25m of the water column at the 53m L4 site.