2009/10 AMLR Field Season

Volume 2 2 March 2010

Status Report: Leg II, Part 1

Highlights

- The South and Joinville Areas were successfully sampled.
- Primary productivity was low compared to the historical average; salps were prevalent in both areas.
- A large storm on 27 February damaged the oceanographic equipment and sampling net.

Antarctic Ecosystem Research Division

Southwest Fisheries Science Center

National Marine Fisheries Service

During Leg II of the 2009/10 AMLR Field Season, scientists aboard the R/V *Moana Wave* surveyed the South and Joinville Island Areas. A total of 29 stations were successfully sampled.

Oceanographic Meteorological data

CTD operations commenced on Monday 21 February, west of the Bransfield Strait (Station 17-13) and ended on Thursday 25th in the Joinville Island area. Twenty eight stations were successfully sampled with an additional station included (07-09) en route to Maxwell Bay. In the West Area, a single station (16-10) was completed after dropping supplies at Cape Shirreff late on Saturday. Bad weather along with rough sea conditions prevented further CTD deployments in the area on Sunday.

The weather was moderate at the start of the survey with winds generally ranging between 10 and 35 knots either from the north or, for a short period in the middle of the week, from the south. Barometric pressure decreased steadily from a high of 1010 mb to a sudden sharp low of 960 mb early on Sunday, resulting in high seas and wind speeds gusting up to 60 knots from the south.

CTD deployment aboard the R/v Moana Wave.

The sampling of the southern Joinville Island stations was curtailed by the presence of the seasonal pack ice that was very far north compared to previous years. Indeed, the water column at stations near the seasonal pack ice were highly stratified and exhibited very low surface salinities (<33.7 PSU) compared to historical means (>34.2 PSU). Water samples (9) were collected within this Marginal Ice Zone.

Phytoplankton

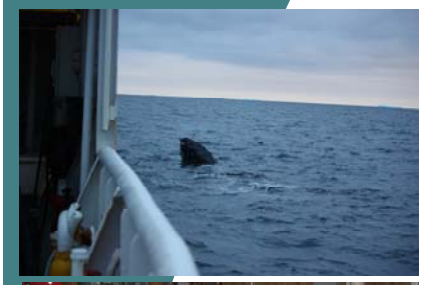
The phytoplankton team has continued to collect water column biological data in the upper water column (surface to 200m) throughout the South and Joinville Areas. Eighteen stations in the Bransfield Strait, comprising 180 Chlorophyll *a* samples, have been processed. Surface (5m) chl-a concentrations ranged between 0.37 - 1.89 mg Chl *a* m^{-3} with a mean concentration of 0.89 ± 0.37 mg Chl *a* m^{-3}. These preliminary values appear slightly lower than historical Chl *a* concentrations for this region.

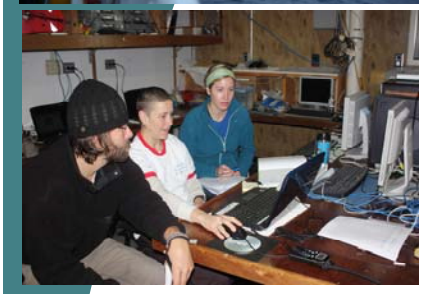
In the Joinville Island Area we sampled 10 stations consisting of 100 Chlorophyll *a* samples with surface (5m) concentrations ranging between 0.40 - 1.53 mg Chl *a* m^{-3} and a mean concentration of 0.69 ± 0.40 mg Chl *a* m^{-3}. These values are similar in magnitude to historical Chl *a* concentrations for this region. However, when the data are pooled into stations within the Marginal Ice Zone, where the water column was highly stratified, the results differed greatly from the average. In the five stratified stations surface (5m) concentrations ranged between 0.40 -0.71 mg Chl *a* m^{-3} with a mean concentration of 0.57 ± 0.12 mg Chl *a* m^{-3}, which is lower than the historical average of 0.7 ± 0.5 mg Chl *a* m^{-3}. The five stations non-stratified stations had a mean value of 0.81 ± 0.56 mg Chl *a* m^{-3} with a range of concentrations between 0.25 - 1.53 mg Chl *a* m^{-3}, appearing higher then historically observed.

Zooplankton and Krill

South Area

Nineteen of 20 stations in the South Area were completed. *Euphausia superba* adults were caught at 16 stations (mean: 371 (sd±1,463) per 1,000 m^3; median 1.5 per 1,000 m^3) although a large catch at station D11-13 caused a highly skewed distribution. Night catches were between an order of magnitude larger (using median) and three orders of magnitude larger (using mean) than day catches. *E. superba* larvae were not observed in the South Area. The male:female ratio was 0.8:1 and 22% of the krill encountered were juveniles (n=826). Of the sub-adults and adults, 60% of the females were sexually mature compared to 15% of the males. Females had a unimodal distribution with median length of 45 mm whereas males were slightly skewed toward smaller lengths but with a median of 46 mm. *Salpa thompsoni* were present at 18 stations and in relatively high abundance (mean: 2,937 (sd±7,284) per 1,000 m^3; median: 647 per 1,000 m^3). Nearly all *S. thompsoni* were the aggregate form with mean and median length at 31 (sd±10) and 32 mm (n=1,875), respectively. *Ihlea racovitzai* occurred at seven stations in low abundance (mean: 4 (sd±9) per 1,000 m^3). Other dominant zooplankton included *Thysanoessa macrura*, copepods (esp. *Metridia gerlachei*), amphipods and chaetognaths. *T. macrura* occurred at every station (mean: 356 (sd±561) per 1,000 m^3; median 253 per 1,000 m3) and night abundance was nearly triple the catch rate during the day (mean: 210 per 1,000 m^3 vs. 585 per 1,000 m^3).





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Joinville Island Area

Nine stations in the Joinville Island area were completed – Station D0709 was added to the normal grid layout. *Euphausia superba* adults were caught at seven (7) stations (mean: 100 (sd±235) per 1,000 m^3; median 3.8 per 1,000 m^3). Similar to the South area, night catches were substantially higher than day. *E. superba* larvae were present at four stations. The male:female ratio was 0.6:1 and 35% of the krill encountered were juveniles (n=462). Of the sub-adults and adults, 63% of the females were sexually mature compared to 37% of the males. Both males and females had a unimodal distribution with median lengths of 43 mm and 45 mm, respectively. *Salpa thompsoni* were present at 8 stations and in relatively high abundance (mean: 2,150 (sd±7,284) per 1,000 m^3; median: 647 per 1,000 m^3). Most (97%) *S. thompsoni* were the aggregate form with mean and median length at 26 (sd±22) and 30 mm (n=528), respectively. *Ihlea racovitzai* occurred at 2 stations. Other dominant zooplankton included *Thysanoessa macrura*, copepods (esp. *Metridia gerlachei*, *Calanoides acutus* and *Paraeucheata spp.*), ostrocods and chaetognaths. *T. macrura* occurred at every station (mean: 356 (sd±561) per 1,000 m^3; median 253 per 1,000 m^3) and night abundance was nearly triple the catch rate during the day (mean: 210 per 1,000 m^3 vs. 585 per 1,000 m^3).

Seabird and marine mammal observations

Seabirds and marine mammals were counted and mapped in the Drake Passage, West, South, and Joinville Island AMLR areas. Transects were conducted on 6 days and a total of 55.2 hours and 1022 km were surveyed. Fin whales were common in the north edge of the survey area and a total of 17 sightings for 50 individuals were mapped. Humpback whales were common in the coastal water of the Bransfield Strait; a total of 63 sightings for 116 individuals were mapped. We encountered 35 humpbacks en route to Station 13-13 and while on station we observed approximately 20 killer whales pursuing a fin whale. One right whale was observed and a photograph of the fluke was captured. There were only two minke whales sighted, which occurred in the brash ice floe in the Joinville Island Area. The Antarctic fur seal was the most frequently sighted pinniped (78 sightings/128 individuals) in the South Area, and in the Joinville Island Area, animals were hauled out on the brash ice floes. Other sightings of pinnipeds include elephant seal (2), and leopard seal (3). The seabird community consisted of (percentage-wise): Antarctic fulmar, chinstrap penguin, Wilson's storm petrel, Antarctic tern, Cape petrel, black-bellied storm petrel, Southern giant petrel, black-browed and grey-headed Albatross and snow petrel. There were few seabird feeding aggregations encountered which may indicate a shortage of krill.

Acoustic estimates of krill biomass

Preliminary estimates of krill biomass for the five transects completed in the Elephant Island Area during Leg I showed a biomass of 626 000 tons with a CV of about 12%. The low biomass and low CV indicate that overall krill were broadly distributed throughout the EI Area during that leg. Mean biomass of krill was 0.7 g/m^2. Estimates of biomass for the South and Joinville Island Areas will be completed for the next and final status report.

Issues and problems

The Captain and crew continue to provide excellent support to the NOAA mission. The ship continues to perform well in winds <25 knots and in moderate seas. However, the lack of shelter for the CTD and the low freeboard on the aft deck of the R/V *Moana Wave* resulted in severe wave damage to 9 of the 11 Niskin bottles mounted on the CTD during a storm on 27 February as we transited through Nelson Passage seeking refuge from the seas. Also lost during that storm were a net and flowmeter, as well as a large number of tools that were stored in fish boxes strapped to the deck.