7. Micronekton

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Background

Micronekton are the largest sized animals taken in plankton nets, typically having body lengths of 5-10 mm or more. For this study, the micronekton group is considered inclusive of the crustacean groups amphipoda, euphausiacea, mysidacea and similar decapoda captured in plankton nets. Chaetognatha are also included in this group. Compared to copepods, abundance estimates of micronekton from plankton net sampling are relatively low. There are, however, instances of swarming behavior, particularly of gammarid amphipods and euphausiids, when they can dominate plankton biomass. Such events occur on small temporal and spatial scales. It is possible that bongo nets under-sample micronekton due to net avoidance (Angel and Pugh 2000).

Biomass

Micronekton biomass was estimated from abundance estimates from the ECOMON zooplankton time series for the 1996-2000 period. The mean abundances (no./ 10 m^2) of micronekton were calculated for bimonthly subsets (Jan - Feb, Mar - Apr…) distinctly for each of the groups listed above.

These estimates of mean abundance were then converted to biomass based upon established size-biomass relationships. Here we assume that most micronekton were roughly equivalent to a common micronekton taxa, the amphipod *Gamarrus* sp. Mean abundance was converted to dry weight from the relationship established in Avery *et al.* (1996), using a mean length of 6 mm which produced a dry weight estimate of 1.2 mg. This average weight was then multiplied by the abundance estimates to obtain a total biomass for each group (Table 7.1).

However, for the chaetogaths group, dry weight was calculated based on the relationship in Sameoto (1971) for the species *Sagitta elegans*. This formula is:

(EQ 7.1) $$DW = 0.00097\, l^{2.2365},$$

where DW is dry weight (mg) and l = length. A mean length of 4 mm was used based on laboratory observations, giving a mean dry weight of 0.026 mg. *S. elegans* is the most abundant chaetognath in these plankton samples.

After conversions to biomass were done for each micronekton group, the values were then converted to biomass and integrated into an annual estimate. This was then converted to g wet weight per m^{-2}. Estimates for all four regions are given in Table 7.2.

Production and Consumption Estimates

Growth was estimated at 0.04 day^{-1} and consumption at 0.10 day^{-1} based on an assumption growth similar to that of juvenile cod of approximately the same size (Peck *et al.* 2003). These values were then scaled to provide an annual estimate.

References

Angel, MV; Pugh, PR. 2000. Quantification of diel vertical migration by micronekton taxa the northeast Atlantic. *Hydrobiologia* 440:161-179.

Avery, D; Green, J; Durbin E. 1996. Distribution and abundance of pelagic gammarid amphipods in Georges Bank and Nantucket Shoals. *Deep Sea Res. II* 43(7-8):1521-1532.

Peck, M; Buckley, L; Caldarone, E; Bengston D. 2003. Effects of food consumption and temperature on growth rate and biochemical based indicators of growth in early juvenile Atlantic cod (*Gadus morhua*) and haddock (*Melanogrammus aeglifinus*). *Mar. Ecol. Prog. Ser.* 251:233-243.

Sameoto, D. 1971. Life history ecological production and empirical mathematical model of the population of *Sagitta elegans* in St. Margaret's Bay Nova Scotia. *J. Fish. Res. Board. Can.* 28:971-985.

Table 7.1. Estimates of micronekton abundance. Units are in Number 10 m^{-2} unless otherwise noted. The averages are presented for each of six 2-month seasons and as an integrated annual estimate. DW = dry weight, WW = wet weight.

	EMAX Region			
	MAB	SNE	GB	GOM
Amphipods				
Jan - Feb	4432.8	5555.8	1869.9	3413.0
Mar - Apr	2790.7	5198.8	11370.2	9887.2
May - Jun	6294.8	25473.3	33448.5	17289.2
Jul - Aug	-	22783.8	14086.5	48310.7
Sep - Oct	14493.9	39336.3	9717.8	13922.2
Nov - Dec	19212.3	26938.8	11983.4	12563.8
Euphausids				
Jan - Feb	2052.2	1276.6	800.4	334.2
Mar - Apr	4009.8	8424.2	13991.4	24019.8
May - Jun	4347.9	5128.1	4984.4	24726.6
Jul - Aug	-	5722.6	5928.9	8204.9
Sep - Oct	1718.3	4088.6	2625.4	5671.0
Nov - Dec	3135.9	7751.4	2773.6	2251.2
Mysids				
Jan - Feb	131.5	101.9	265.3	12.2
Mar - Apr	60.4	65.1	152.5	5.0
May - Jun	0.0	0.0	907.4	62.8
Jul - Aug	-	118.9	839.0	45.6
Sep - Oct	752.4	371.7	5814.2	12.3
Nov - Dec	170.4	545.7	4466.0	90.6
Decapoda				
Jan - Feb	6381.2	240.2	219.9	50.0
Mar - Apr	309.7	804.6	2903.6	190.2
May - Jun	9237.0	7767.5	15529.2	1551.3
Jul - Aug	-	3461.8	7562.5	2712.4
Sep - Oct	13269.6	1949.2	4336.6	726.4
Nov - Dec	5965.4	882.0	650.9	2582.6
Avg. of all Crustacean Micronekton	4938.3	7249.5	6551.2	7443.1
Avg. Biomass (mg)	5926.0	8699.3	7861.4	8931.8
Avg. DW Biomass (g/10m^2)	5.93	8.70	7.86	8.93
WW g/10 m^2	55.11	80.90	73.11	83.07
Chaetognaths				
Dry Weight (mg/10m^2)				
Jan - Feb	122.8	91.5	39.8	14.7
Mar - Apr	75.1	85.9	132.5	7.8
May - Jun	234.8	315.1	440.5	36.1
Jul - Aug	-	479.4	449.8	25.8
Sep - Oct	585.4	408.7	258.8	80.3
Nov - Dec	549.1	488.0	168.5	84.08
Avg. Chaetognath DW (mg)	313.5	311.4	248.3	41.5
Avg. WW (dw/0.082)	3776.8	3752.0	2991.7	499.6
WW g/10 m^2	3.8	3.8	3.0	0.5