23. Respiration

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Background and Approach

Two approaches were used to estimate metabolism in the EMAX project. Unless otherwise noted in each previous section, the default values for respiration were 65% of the assimilated consumption. Otherwise, where appropriate, values or formulae from the literature were used for the network nodes.

When appropriate literature values were lacking we assumed that assimlated energy was divided: 65% to respiration and 35% to secondary production (Parry 1983). The assimilated energy was estimated using the International Biological Program (IBP) approach where C - E = Assimlation = P + R. C represents consumption, E is egestion + excretion, P is secondary production and R represents respiration. There is a vast literature on the respiratory metabolism of individual organisms and many review papers with regressions or allometric equations which relate respiration to body size and temperature. Since field respiration values are influenced by feeding status, activity level, life history stage, body size, water tempreature, etc., this extrapolation process generates a crude estimate. Since we did not have any respiration measurements for many of the nodes, and many of the nodes represent a composite of species, we decided to utilize this indirect approach to estimate the metabolic energy loss in most instances.

The EMAX network energy budget was interested in linking secondary production of the prey to either harvest or consumption by predators, so we did not focus on the metabolic energy losses from the system. The secondary production estimates were done independently and thus provided a reasonable estimate of the ecological transfer efficiency. Since the majority of the metabolic losses in the pelagic and benthic communities occur in the smaller size classes, this influences the base of the food web, leading to living marine resources (LMRs) and not the energy transfer effciency within this chain.

References

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