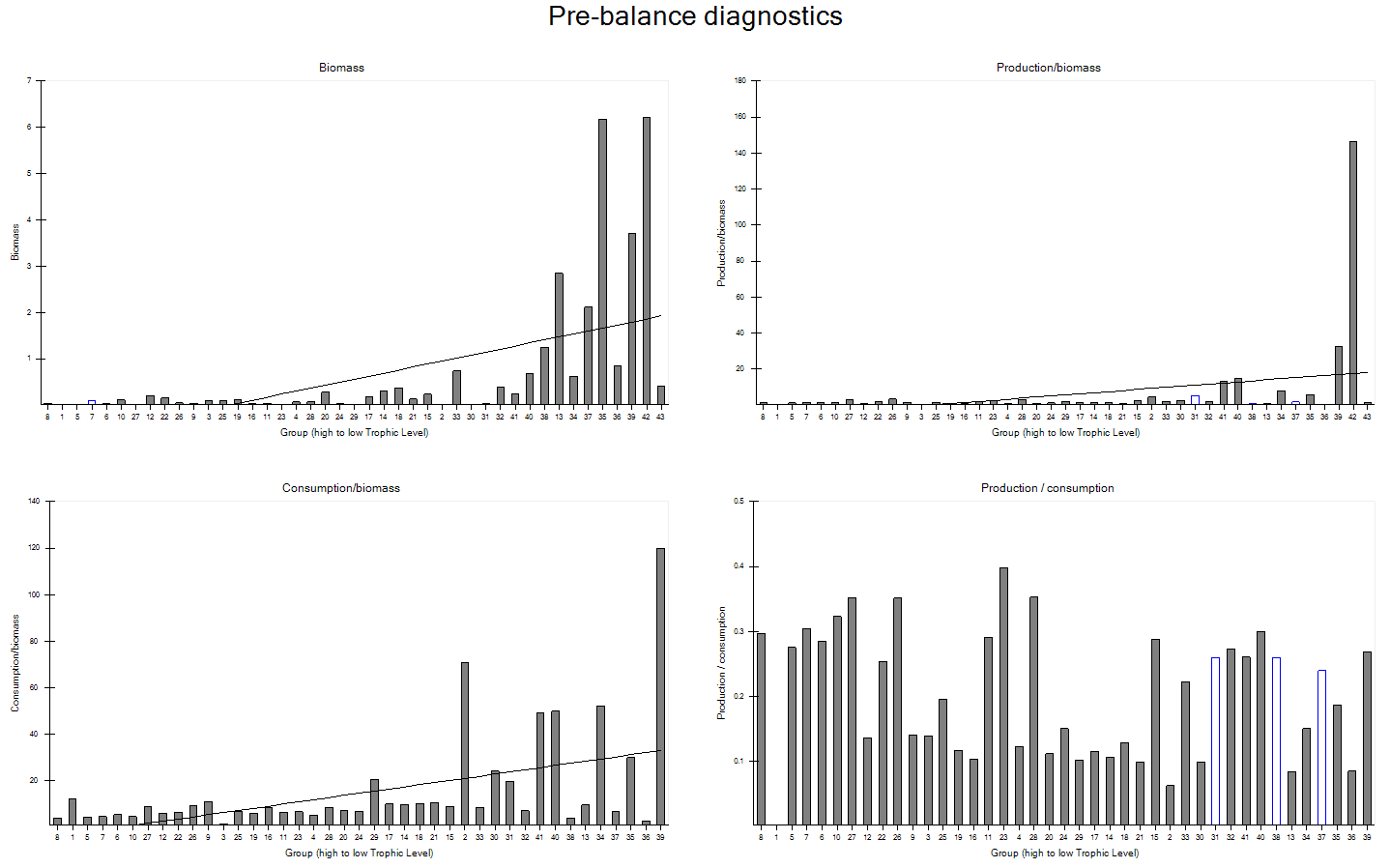
**Balancing procedure**

Model balancing was carried out manually following a top-down strategy (Fig.1). For all modeled groups, Ecotrophic efficiencies were the missing parameter and were estimated by EwE while Biomass, (P/B), and (Q/B) were inputs to the model. One exception concerned the “Pelagic ichthyophagous fishes” group due to the absence of reliable biomass estimations. In this case, we used an input value of 0.47 for EE, following recommendations from Christensen et al. (2005), and we let the model estimate the biomass. In the same way, P/B values for Norway lobster, Bivalves and gastropods and other benthic invertebrates (F.G. 31, 37 and 38, respectively) were estimated by the model. When attempting to balance the model, many of the Ecotrophic Efficiencies were greater than 1 meaning that more of the group was being consumed than produced, and thus had to be reduced. For that reason, inconsistent values were slightly modified following the criteria given by Christensen et al. (2008).

Biomasses were the first parameters modified during model balancing due to they were obtained from scientific surveys, where the sampling method, specifically, the swept-area method (i.e., estimation of biomass per area sampled by trawling), has been reported to underestimate biomass of the sampled species (Sánchez and Olaso, 2004, Tsagarakis et al., 2010, Torres et al., 2013). Thus, their biomass input values were based on a guesstimate to reach the mass balanced ecosystem model requirements. The biomasses of these groups were indeed too low and had to be increased (e.g., F.G. 37. F.G. 18, F.G. 21, F.G. 33, F.G.38, F.G.16 and F.G. 15). This is a common problem in prebalanced EwE models, where invertebrate biomass estimates are frequently too low to support predation mortality (Christensen et al. 2008). In the same way, P/B values were modified according to these criteria. Also and to complete the final mass balance model, we adjusted the diet matrix as a data source with some uncertainty, especially for those groups for which diet information was not from the modeled area.

The resulting input data were tested through ecological and fishery principles used in conjunction with PREBAL diagnostics to identify issues of model structure and data quality before network model balancing. Hence, following Link (2010), a set of diagnostics, i.e., biomasses, biomass ratios, vital rates, vital rate ratios, total production, and total removals (and slopes thereof) across the taxa and trophic levels could be tested through graphical representation. Regarding biomasses, results showed that Worms (F.G 35), Phytoplankton (F.G. 42), Microzooplankton (F.G. 39), Sardine (F.G. 13), Bivalves and gastropods (F.G. 37) could potentially be overestimated (Fig.1) while Flatfishes (F.G 16), Mullets (F.G 11), Sparids (F.G 23), Benthic sharks (F.G 4), Octopuses (F.G 28), Blue and red shrimp (F.G 29) and Norway lobster (F.G 31) could be underestimated. As we mentioned at the beginning of the balancing procedure, the biomass estimations determined with the survey could generate this kind of uncertainty, therefore, some adjustments were necessary to balance the model.

In addition, in the GoA model, the P/B ratios were low for all groups in general, except for Phytoplankton (F.G. 42) and Microzooplankton (F.G. 39). In the case of P/Q ratios, the highest values were detected for Microzooplankton (F.G. 39), Suprabenthos (F.G. 34), Meso- and macrozooplankton (F.G. 40), Gelatinous plankton (F.G. 41) and Seabirds (F.G. 2).



**Fig. 1**. Results of the PREBAL analysis regarding the trends of Biomass, Production/Biomass, Consumption/Biomass and Production/Consumption along the functional groups arranged by trophic level.

**References**

Christensen, V., Walters, C., Pauly, D., 2005. Ecopath with Ecosim: A User’s Guide. Fisheries Centre, University of British Columbia, Vancouver, 154 pp.

Christensen, V., Walters, C., Pauly, D., Forrest, R., 2008. Ecopath with Ecosim Version 6. User Guide - November 2008. Lenfest Ocean Futures Project 2008, 235 pp.

Link, J.S., 2010. Adding rigor to ecological network models by evaluating a set of pre-balance diagnostics: A plea for PREBAL. Ecol. Model. 221, 1580–1591.

Sanchez, F., Olaso, I., 2004. Effects of fisheries on the Cantabrian Sea shelf ecosystem. Ecol. Model. 172, 151–174.

Torres, M.A., Coll, M., Heymans, J.J., Christensen, V., Sobrino, I., 2013. Food-web structure of and fishing impacts on the Gulf of Cadiz ecosystem (South-western Spain). Ecol. Model. 265, 26–44.

Tsagarakis, K., Coll, M., Giannoulaki, M., Somarakis, S., Papaconstantinou, C., Machias, A., 2010. Food-web traits of the North Aegean Sea ecosystem (Eastern Mediterranean) and comparison with other Mediterranean ecosystems. Estuar. Coast. Shelf Sci. 88, 233–248.