Supplementary Material

Generalized depletion models were fit to the catch and effort data for flathead lobsters (*Thenus orientalis*) caught in waters of Saudi Arabia in the Arabian Gulf. Out of 32 model fits (16 likelihood models and 2 numerical methods of minimization), 26 models yielded successful convergence results. Elimination of fits with poor numerical quality (maximum absolute gradient >1, undefined standard errors for initial abundance [N_0] and natural mortality rate [M]) reduced the list of candidate models to 11. Results from examination of correlations between parameter estimates (see Supplementary Figure 5) in this short list of model fits indicate that the fit run with the exact normal likelihood in both fleets and the conjugate gradient (CG) numerical method (top-left panel in Supplementary Figure 5) as well as the fit run with the exact lognormal likelihood for the fleet of large boats (called *dhow*), the adjusted profile lognormal approximation for the fleet of small boats (called *tarad*), and the smoothed particle Galerkin (SPG) numerical method, have far less correlated estimates generally. These 2 remaining model fits produced very similar parameter estimates. For instance, they predict an escapement biomass of 3021 and 3472 metric tons, respectively. However, the fit in which the data of both fleets were fit to exact normal likelihoods produced well defined standard errors for 31 of 38 parameter estimates, and the other fit produced well-defined standard errors out for only 13 of 27 parameter estimates. Therefore, the model fit with the normal likelihood for the data of both fleets and the CG algorithm was selected as the best model for the data.