European sea bass, *Dicentrarchus labrax* L., groups reared under different conditions during larval stages (mesocosm and intensive rearing) were monitored during on-growing in sea cages until marketable size (350–400 g). Four caged groups were followed for a period of 17 months each at a pilot scale farm, where vertical distribution behaviour was monitored. This was performed while fish were under calm conditions, during feeding and when stress events occurred. Also during two specific periods: (i) spawning and (ii) high water temperature. Clear differences in the behavioural pattern of swimming depth, displacement and used space between the groups were observed. The individuals from the mesocosm rearing were more sensitive to human presence, showing stronger reactions (speed of displacement and vertical distribution). Most pronounced differences were observed during the ‘extreme’ warm period and the reproductive season. Within the seasons, European sea bass responded during feeding and stress showing a tendency to move deeper compared to calm conditions. The increased displacements were longer during feeding and stress.