The crustacean *Daphnia magna* is a highly plastic model organism in ecotoxicology. However, the causal relationship between the behavioural plasticity and metabolic changes in reaction to stress in *D. magna* has been understudied and many of the findings regarding the species have not been revisited as new insights on zooplankton behaviour, metabolism and morphology emerged. Here I show that salinity affects both phenotypic and behavioural plasticity in *D. magna* through modification to individual size, pigmentation and behaviour with a swarm. Furthermore, individual *D. magna* in small populations are shown to be physically harmed by their diet causing eutrophication over long time periods. Populations grown in habitats of specific salinities display differences in behavioural and phenotypic plasticity apparent in their swarming behaviour and population dynamics following an exposure. Slight salinity changes were confirmed to increase population sizes as population dynamics are affected by salinity and individual behaviour was shown to be affected more by the swarm structure than the population size. This confirms phenotypic and behavioural plasticity to cause a fitness increase in reaction to environmental heterogeneity. Amino acid expression differences and phosphate decrease suggest an increase energy production in a population stressed prior to exposure and contrast previous studies suggesting a decrease in stress situations. The lack of clear phenylalnine signals in the metabolome suggests alterations to hormones including dopamine. However, the findings do not agree with the previous suggestion that tail length is proportional to salinity stress and that survival in unchanged medium is proportional to salinity tolerance. While the importance of swarm structures to the display of behavioural plasticity in reaction to salinity exposure has been shown here, discrepancies between findings and literature demonstrate that *D. magna* metabolomics should be further investigated to investigate the mechanisms behind the phenotypic and behavioural plasticity of the species.