Direct and indirect effects of warming, eutrophication and overexploitation in a semi-natural food web

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The global ocean is warming and terrestrial run-off has led to an increase in the concentration of nutrients for coastal waters. Additionally, the over-exploitation of biological resources has led to the restructuring of natural body size distributions within species and this phenomenon is likely to be exacerbated by future warming. Predicting the consequences of these disturbance scenarios for the way ecosystems will function is important for future management, yet little is known about the community-scale effects of these stressors. Here we determine the direct metabolic response of various sizes of European shore crab, *Carcinus maenas* to warming and nutrient enrichment. Using semi-natural food webs in mesocosms containing red, green and brown algae and a random assemblage of meso-predators and grazers we also determine the direct and indirect effects of temperature, eutrophication and top-predator body-size distribution on *C. maenas* growth and mortality. Warming had a direct and indirect effect on *C. maenas* metabolism, growth and mortality, while nutrient enrichment caused an indirect effect only. Alteration of top-predator body-size shows early signs of a trophic cascade.

Survival rates for the Australian sea lion

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The Australian sea lion (ASL) population at Seal Bay Conservation Park, SA, is estimated to be declining by 1.14% per breeding season. Over 110,000 tourists visit Seal Bay each year and the demersal gillnet fishery is considered a threat to the population. To better understand this decline, survival rates were examined for seven pup cohorts (859 individuals) marked by Passive Integrated Transponders (PITs) from 2003 to 2009, monitoring survival from 0.17 to 7 years of age. Resights were obtained during surveys using a hand-held PIT reader; solar powered automated scanners were also employed and their effectiveness tested. Potential effects on survival were examined including age, sex, time and cohort. The most parsimonious model represented pup survival to weaning (0.17–1.5 years) varying over time with constant survival in two older age classes (1.5–2.5 and 2.5+ years). Model averaged survival ± S.E. was 0.862 ± 0.036, 0.949 ± 0.021 and 0.957 ± 0.010 for the three age classes respectively. Data from the automated scanners alone was too sparse to determine reliable survival estimates but further engineering of the technology should improve the method. Overall, survival was high from 0.17 to 7 years of age in the ASLs at Seal Bay. This was unexpected because of the potential threats and the population decline. Additionally, the age range covers weaning and recruitment, two typically difficult survival periods for oratiids. With a lactation period of 18 months, it is plausible that the extended period of maternal care and learning enhances survival in the ASL.

Long-term effects of major climatic events on the resilience and capacity for recovery of a tropical seagrass habitat

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In the summer of 2010/2011 Queensland experienced severe Tropical Cyclone Yasi and some of the worst floods on record. Cyclones and plumes associated with flooding have the potential to negatively impact seagrass habitats physically and/or physiologically. Many seagrass communities on the east coast of Queensland were already in decline prior to the floods due to strong La Niña conditions for several years meaning that these communities were likely to be less resilient to further impacts and have a reduced capacity for recovery. Significant losses of coastal and deep water seagrasses near Bowen and Abbot Point were observed after the floods and TC Yasi. Results of long-term seagrass monitoring have shown evidence of recovery of deep water seagrass however, the coastal inshore meadows have not recovered. Experimental investigations of the potential for seagrass recovery at Abbot Point indicated that coastal seagrass species have a strong reliance on vegetative growth for recovery, while deep water species at Abbot Point recover through both vegetative growth and seeds within the sediment seed bank. Seed bank assessments of the coastal species at Abbot Point only found a very small store of seeds in the sediment. The lack of seeds combined with the complete loss of inshore adult plants may mean that the potential for these coastal species to recover may be restricted. The scale and longevity of the 2010/11 La Niña events were unprecedented and may have potentially resulted in a state change for Abbot Point coastal seagrasses.