Water quality impacts of effluent from land-based abalone farms in South Africa

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Effluent water quality was measured at nine abalone farms in along the South African coastline. Total suspended solids (TSS) concentrations varied markedly as a result of tank cleaning operations (median daytime TSS 10.07 mg l-1 and after-hours 0.56 mg l-1). TSS exceeded the background reference level (80th percentile) for most farms and three did not comply with the 5 mg l-1 standard. The dissolved components show very little difference between working and non-working hours signals for both raw effluent and inflow-corrected effluent (e.g. inflow-corrected NH4+ working 3.44 µmol N l-1 and non-working 3.39 µmol N l-1). NH4+ concentrations were mostly greater than background reference levels but well below the 43 µmol N l-1 standard. Inflow-corrected concentrations of nitrate, nitrite and phosphate, were low compared to NH4+ and would not pose a significant eutrophication risk. Similarly, the biochemical oxygen demand measured at three of the farms was low (median 1.31 mg l-1). At the broader ecosystem level, the annual TSS loads calculated from 2013 production data of 43 mt y-1 (west) and 369 mt y-1 (south) are, respectively, 0.35% and 2.8% of that estimated to be produced by kelp beds through natural erosion of fronds. Similarly, the dissolved inorganic N loads of 1.9 mt N y-1 (west) and 9.4 mt y-1 (south) are trivial by comparison with nitrate advected into the coastal zone during upwelling. Local abalone farms have a relatively high specific C footprint - conservatively about 44 kg CO2 kg-1 production. The present findings support a relatively low potential impact of farm effluents in this coastal upwelling environment.

Biography
Michelle Pretorius has completed her MSc from the University of Cape Town and is currently pursuing her PhD at the University of the Western Cape. She holds a position as an Environmental Officer in Sustainable Aquaculture Management within the Department of Agriculture Forestry and Fisheries.

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