Reef habitats of Gulf St Vincent.

Autumn progress report to Adelaide Aqua

Bayden Russell & Sean Connell

Southern Seas Ecology Laboratories

School of Earth & Environmental Sciences, DX650 418

The University of Adelaide, Adelaide, SA 5005

Email: sean.connell@adelaide.edu.au

Phone: 08 8303 6125

Background

The desalination plant at Port Stanvac will discharge brine concentrate (above oceanic salinity levels) into the waters adjacent to the plant site. In order to detect any environmental impact (if any) of this discharge, baseline data needs to be collected on the current state of subtidal reefs (specifically the biological community) adjacent to the discharge and at reference sites at a distance from the discharge site.

The data collected as part of this survey needs to form a baseline before the plant begins operation as well as being part of any ongoing monitoring program. As such, all data need to be collected using standard procedures (Turner *et al*. 2007) and site locations that were used for the initial desalination plant site assessment (Theil & Tanner 2009).

To construct a "baseline" for assessment of potential impacts, data need to be collected across a number of seasons before the plant begins operation. The survey should include reefs that will potentially be impacted (i.e. close to the plant) and reference sites at a distance from the plant. As such, the survey should involve seasonal surveys (autumn, winter, spring, summer) throughout 2009 at two near-shore reefs adjacent to Port Stanvac and 4 reference reefs along the coast (both north and south). The timing of these surveys means that they will be completed before the marine construction phase of the plant commences (planned for January 2010).

Methods

The methods used in gathering the data in the current report were the same as those used for the initial environmental assessment (Theil & Tanner 2009) to ensure comparability, consistency and commensurability with past (e.g. EIS surveys) and future work (e.g. ongoing monitoring). The full complement of surveys will involve seasonal surveys (autumn, winter,

spring, summer) throughout 2009. Data presented here are for the autumn surveys, with a brief description of methods below.

Surveys of benthic algae, invertebrates and fish were done at two shallow subtidal reefs adjacent to the Port Stanvac desalinisation plant discharge, as well as on each of 5 reference reefs (Hallet Cove, Marino Rocks, Noarlunga, Horseshoe and Moana reefs). Two sites were surveyed at each of Noarlunga, Horseshoe and Moana reefs, with one site at each of Hallet Cove, Marino Rocks and the two Port Stanvac sites (Figure 1, Table 1). Surveys were conducted using the Reef Health survey protocols (Turner *et al*. 2007, Appendix A & B). Each site consisted of a pair of transects that were surveyed for macroalgae, benthic invertebrates, mobile invertebrates and fish. Along each transect, mobile fish were first enumerated by a SCUBA diver (50 × 5 m belt transect). Benthic invertebrates were then counted by this same diver returning along the transect (50 × 1 m belt transect). Both fish and invertebrates were identified to the lowest taxonomic resolution possible. Meanwhile, another diver identified the percentage cover of different types of algae along a 20 m transect using the line intercept transect method (LIT) and collected specimens of all algae to be identified to species (samples currently at the SA Herbarium).

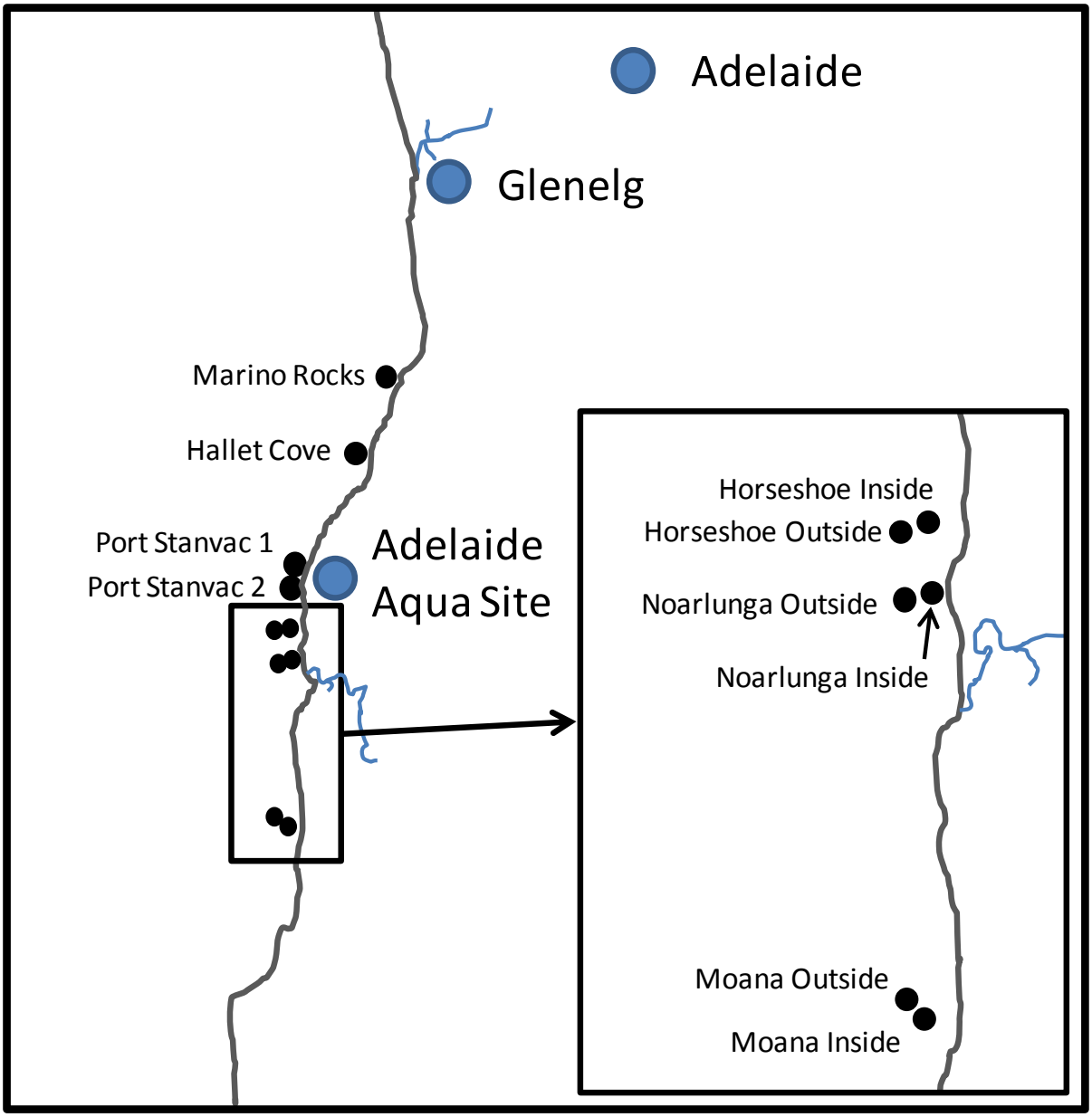

Figure 1. Map of the study sites.

Table 1. GPS coordinates of the study sites.

Site name	**GPS Coordinate**
Hallet Cove	35.0736° S 138.4943° E
Marino Rocks	35.0525° S 138.5027° E
Port Stanvac 1	35.0976° S 138.4775° E
Port Stanvac 2	35.1034° S 138.4742° E
Horseshoe Reef Inside	35.1379° S 138.4629° E
Horseshoe Reef Outside	35.1394° S 138.4580° E
Noarlunga Reef Inside	35.1474° S 138.4630° E
Noarlunga Reef Outside	35.1474° S 138.4630° E
Moana Reef Inside	35.2065° S 138.4622° E
Moana Reef Outside	35.2091° S 138.4643° E

Results

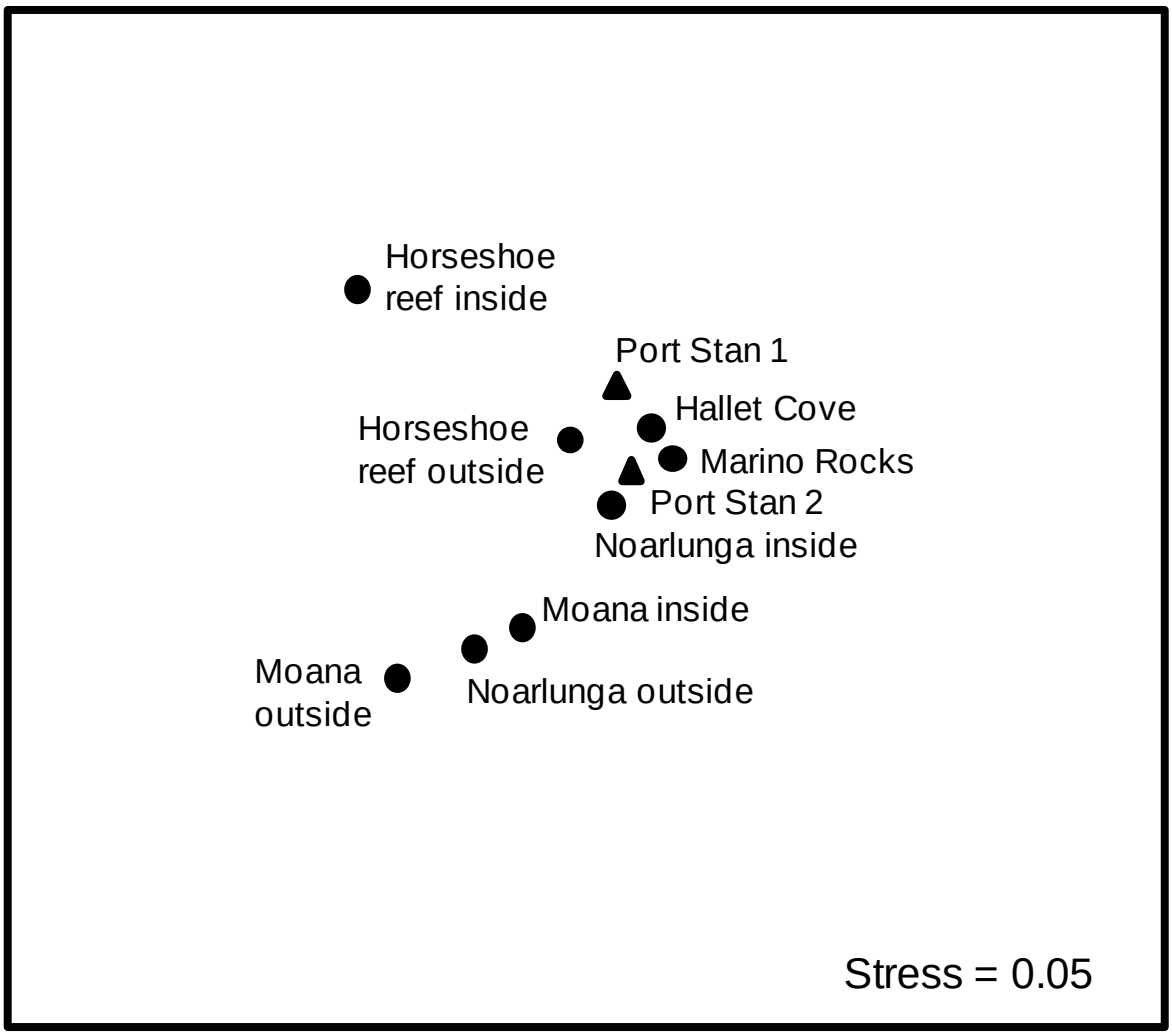

Figure 2. Multi-dimensional scaling (MDS) plot of the benthic assemblages (based on percentage cover) at the 10 study sites in autumn 2009.

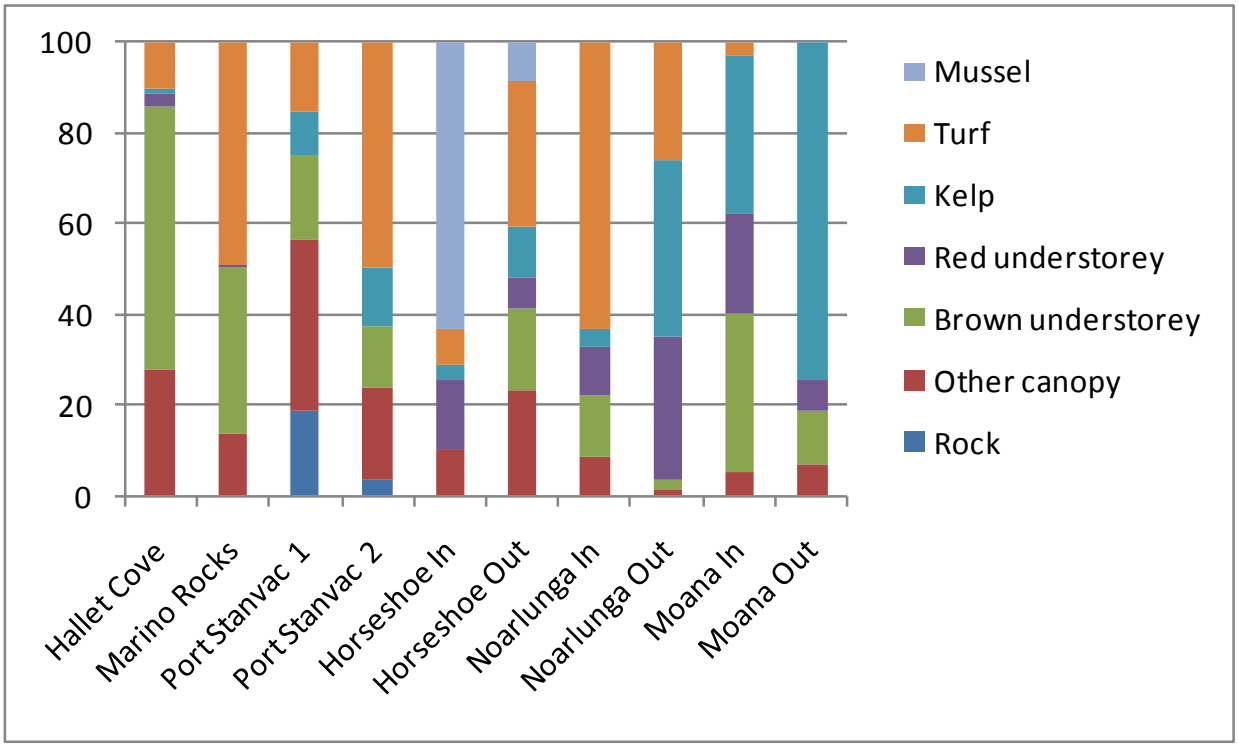

Figure 3. The percentage cover of algae (functional groups) and mussels present at the 10 study sites in autumn 2009.

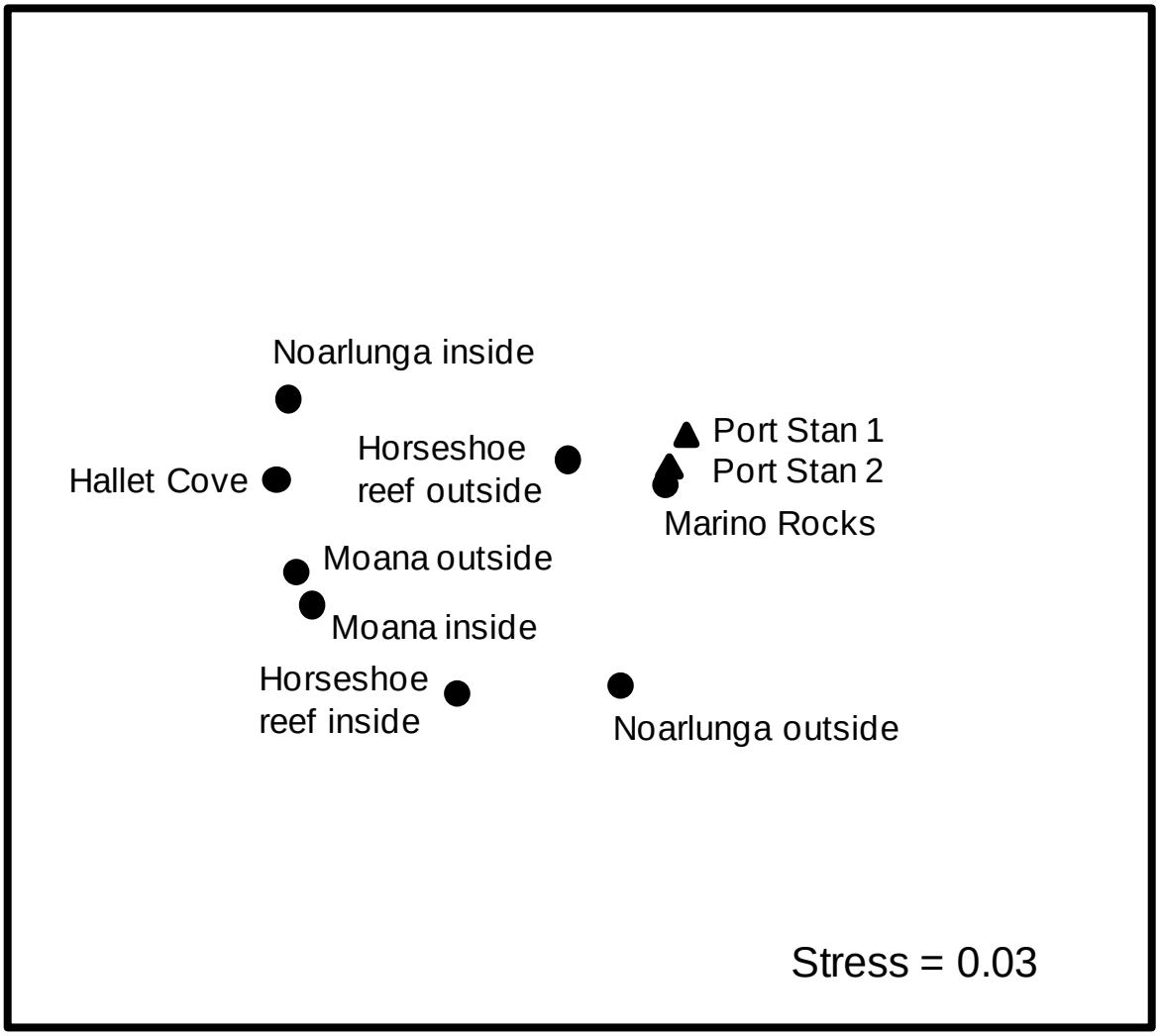

Figure 4. Multi-dimensional scaling (MDS) plot of the fish assemblages (based on total number) at the 10 study sites in autumn 2009.

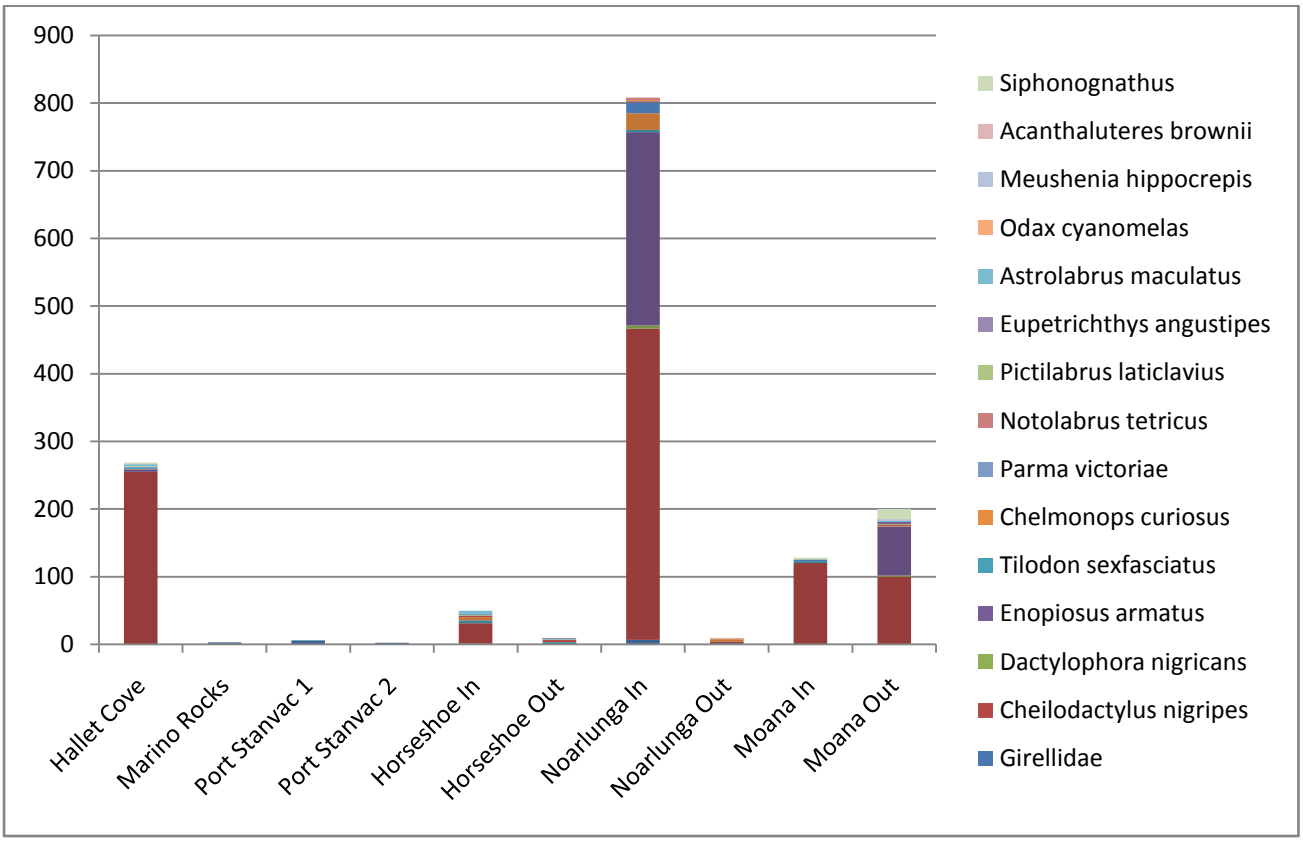

Figure 5. Total count of fish present within survey transects at the 10 study sites in autumn 2009. Note: poor visibility at Marino rocks and Port Stanvac 2 mean that the abundance at these two sites are likely to be underestimated.

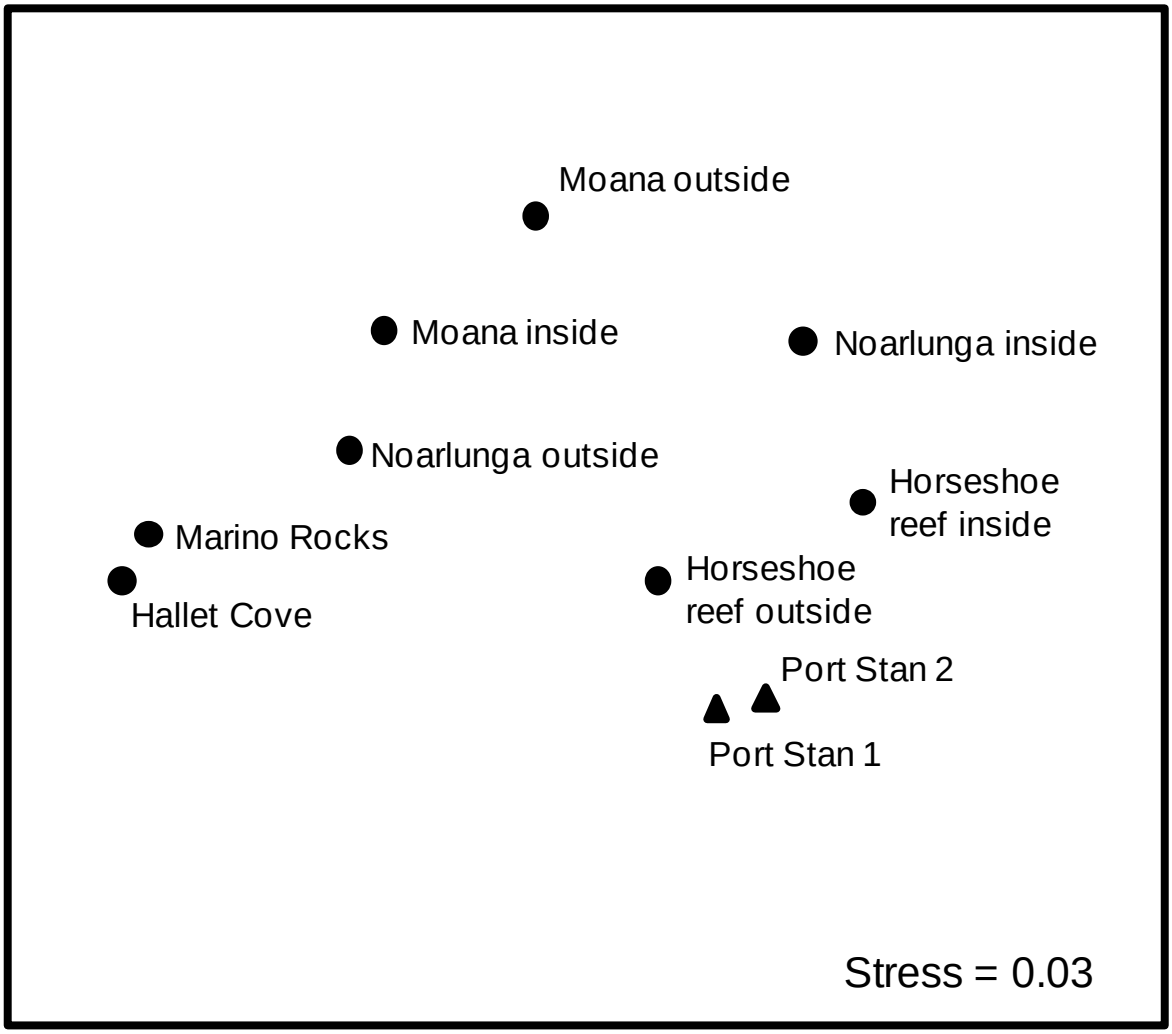

Figure 6. Multi-dimensional scaling (MDS) plot of the invertebrate assemblages (based on total number) at the 10 study sites in autumn 2009.

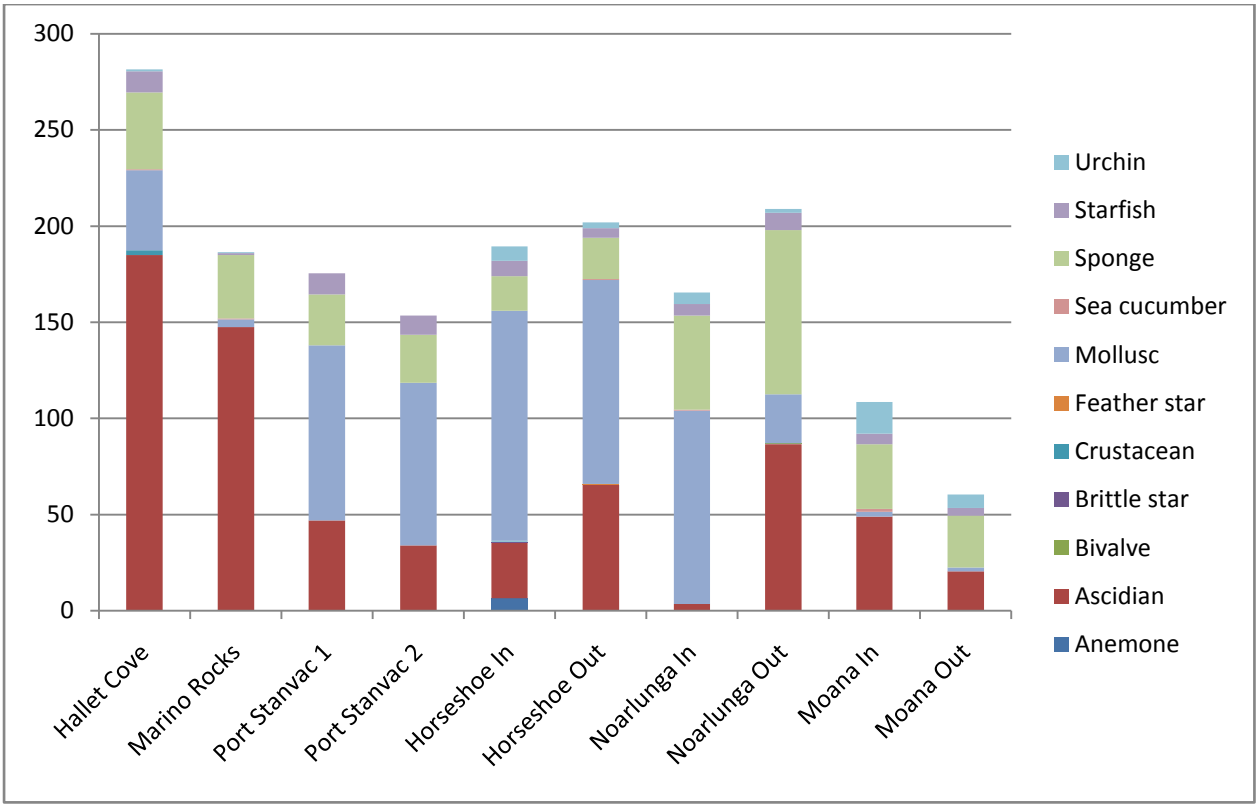

Figure 7. Total count of invertebrates present within survey transects at the 10 study sites in autumn 2009.

References

Theil MJ, Tanner JE (2009) Marine characterisation study for possible seawater desalination plant to supply Adelaide, final report prepared for South Australian Water Corporation. SARDI publication number F2008/001128-1. South Australian Research and Development Institute (Aquatic Sciences), Adelaide. 66 pp.

Turner DJ, KildeaTN, Westphalen G (2007) Examining the health of subtidal reef environments in South Australia, Part 2: Status of selected South Australian reefs based on the results of the 2005 surveys. South Australian Research and Development Institute (Aquatic Sciences), Adelaide, 97pp. SARDI Publication Number RD03/0252-6.