Scientific papers and reports that informed preliminary sanctuary zoning scenarios

Numerous papers, reports and spatial information were used to develop the preliminary sanctuary zoning scenarios. In addition, information was also provided by the local community through the Marine Park Local Advisory Groups (MPLAGs).

The following is a list, and where available links, to many of the primary reports and documents used in the design of the preliminary sanctuary zoning scenarios. Also included are some references and links to: design papers (with a more extensive list in Attachment B); Marxan modelling papers and reports; and, links to on-line spatial information.

Attachment A is a fact sheet outlining the steps taken in the design process. This fact sheet lists the spatial layers used in the modelling.

Scientific Papers and Reports

Baker JL, 2004. *Towards a system of ecologically representative marine protected areas in South Australian marine bioregions* – Technical report, prepared for Coast and Marine Conservation Branch, Department for Environment and Heritage, South Australia.
http://www.environment.sa.gov.au/Conservation/Coastal_Marine/Marine_Parks/Science/Scientific_reports

Bryars S, 2003. *An inventory of important coastal fisheries habitats in South Australia*. Fish Habitat Program, Primary Industries and Resources, South Australia.
(not available via web link)

Department for Environment and Heritage (2009). *A technical report on the outer boundaries of South Australia's marine parks network*. Department for Environment and Heritage, South Australia
http://www.environment.sa.gov.au/Conservation/Coastal_Marine/Marine_Parks/Science/Scientific_reports

Edyvane KS, 1999. *Conserving marine biodiversity in South Australia - Part 2 - Identification of areas of high conservation value in South Australia*. South Australian Research and Development Institute, Aquatic Sciences, Adelaide.
http://www.sardi.sa.gov.au/__data/assets/pdf_file/0005/94595/marine_biodiversity_part2_full_version.pdf
And to view part 1 of the report,
http://www.sardi.sa.gov.au/aquatic/marine_environment__and__ecology_program/environmental_assessment,_mitigation__and__rehabilitation_subprogram/marine_biodiversity

Environment Australia (2001). *A Directory of Important Wetlands in Australia*, Third Edition, Environment Australia, Canberra.
(not available via web link)

Goldsworthy, S.D., Page B, Shaughnessy, P. D and Linnane A (2010). *Mitigating Seal Interactions in the SRLF and the Gillnet Sector SESSF in South Australia.* Report to the Fisheries and Development Institute. South Australian Research and Development Institute (Aquatic Sciences), Adelaide. SARDI Research Report Series No. 405
http://www.frdc.com.au/_literature_52654/Mitigating_Seal_Interactions_in_the_SRLF_and_the_Gillnet_Sector_SESSF_in_South_Australia_-_2007-041

Goldsworthy, S.D., McKenzie J, Shaughnessy P.D, McIntosh R.R, Page B, Campbell R (2009). An *Update of the Report: Understanding the Impediments to the Grown of Australian Sea Lion Populations.* South Australian Research and Development Institute (Aquatic Sciences), Adelaide, SARDI Publication No F2008/00847-1
http://www.sardi.sa.gov.au/__data/assets/pdf_file/0007/116269/No_356_Update_to_the_report_ASL_impediments_to_recovery.pdf

Goldsworthy, S.D., Page, B. (2009). A *Review of the Distribution of Seals in South Australia.* South Australian Research and Development Institute (Aquatic Sciences), Adelaide, SARDI Publication No.F2009/00368-1, 21pp.
http://www.sardi.sa.gov.au/__data/assets/pdf_file/0019/115723/No_373_Review_of_the_Distribution_of_seals_in_SA.pdf

Shepherd S, 1983. Benthic communities of upper Spencer Gulf, South Australia. *Transactions of the Royal Society of South Australia,* **107**:69–85.
(not available via web link)

Roediger L, 2006, *Determinants of Parvulastra parvivipara (Asteroidea: Asterinidae) distribution and the influences of tide pool characteristics on adult, offspring and brood size* – Manuscript submitted to the School of Biological Sciences, Flinders University, Adelaide.
(not available via web link)

Rumbelow, K., Speziali, A. and Bloomfield, A (2010). *Working Towards a Statewide Inventory of Estuaries: Advancing the Inventory of Estuaries in Five NRM Regions of South Australia*, Department of Environment and Natural Resources, Adelaide.
http://www.environment.sa.gov.au/Conservation/Coastal_Marine/Marine_Parks/Science/Scientific_reports

Short AD, 2001. *Beaches of the South Australian coast and Kangaroo Island. A guide to their nature, characteristics, surf and safety.* Australian beach safety and management program. University of Sydney Printing, Sydney.
(not available via web link)

Stock Assessment reports – found on the SARDI website
DENR referred to numerous stock assessment reports that can be found on the SARDI website at the following link:
http://www.sardi.sa.gov.au/information_and_news/publications/research_report_series/research_report_series2009

Design

Department for Environment and Heritage, 2008. *Design principles guiding the development of South Australia's marine park boundaries.* Coast and Marine Conservation Branch, Department for Environment and Heritage, South Australia.
http://www.environment.sa.gov.au/Conservation/Coastal_Marine/Marine_Parks/Science/Scientific_reports

*please refer to Attachment B for a further list of papers used to assist in the development of the design criteria.

Marxan modelling

Ardron, J. H.P. Possingham and C.J. Klein (Eds.), 2008. *Marxan good practices handbook.* University of Queensland, St. Lucia, Queensland, Australia, and Pacific Marine Analysis and Research Association, Vancouver, British Columbia, Canada.
http://www.uq.edu.au/marxan/docs/Marxan%20Good%20Practices%20Handbook%20v2%202010.pdf

Ball, I.R., and H.P. Possingham, 2000. MARXAN (V1.8.2): *Marine Reserve Design Using Spatially Explicit Annealing, a Manual.*
http://www.uq.edu.au/marxan/docs/marxan_manual_1_8_2.pdf

Game, E.T. and H.S. Grantham, 2008. *Marxan User Manual: For Marxan version 1.8.10*. University of Queensland, St. Lucia, Queensland, Australia, and Pacific Marine Analysis and Research Association, Vancouver, British Columbia, Canada.
http://www.uq.edu.au/marxan/docs/Marxan_User_Manual_2008.pdf

Stewart, R. & Possingham, H.P. (2005) *Efficiency, costs and trade-offs in marine reserve system design,* Environmental Modeling & Assessment, 10, 203-213.
http://www.uq.edu.au/spatialecology/docs/Publications/2005_StewartandPoss_EfficiencyCostsAndTrade-offs.pdf

Further references used as guideance, but not listed can be found at the following site:
http://www.uq.edu.au/marxan/index.html?page=80365&p=1.1.6.3

Spatial Information

Electronic Maps showing the spatial data used to assist in the development of zoning scenarios can be found at the following link:
Atlas's
http://www.data-environment.sa.gov.au/marineparks/

SAMPIT maps
http://www.environment.sa.gov.au/Conservation/Coastal_Marine/Marine_Parks/About_the_marine_parks/Customise_a_map/2010_SAMPIT_Maps

In addition, many of the layers can also be accessed through the DENR interactive on line mapping tool NatureMaps: http://www.naturemaps.sa.gov.au/

Attachment A

Fact Sheet: Development of Preliminary Zoning Scenarios for South Australia's Marine Parks Network

Target Inputs, Decision Rules and Performance Results

A number of steps were taken in the development of the preliminary sanctuary zoning scenarios:

- Information collection and review
- Marxan modelling
- DENR workshops
- Across Government consultation
- South Australian Marine Parks Council and Scientific Working Group review/feedback
- Performance review

Marxan modelling, Target Inputs and Decision Rules

A decision support tool (Marxan) was used to help inform the selection of preliminary sanctuary zoning scenarios. The outputs from Marxan provided DENR teams with a starting point that was then used to build in other information and non-spatial details.

A state-wide database of spatial features to be used in the Marxan modelling was created, including108 environmental features, 33 social and economic features, and 6 existing managed area layers. Not all features were represented in each park. Appendix A, Tables 1, 2 and 3 lists the spatial features that were used in the Marxan modelling.

To run Marxan, a number of parameters are required to be set and one of these is setting a target area or count for each environmental feature represented within the park. For the first round of outputs, DENR set targets of 20% for each feature, with the exception of mapped potential habitats, e.g. reef fish habitat and potential pipefish habitat (refer to Appendix A) which were set at 10%.

For the South Australian process the Marxan outputs only provided half the story. The outputs successfully identified representative habitats and, as such, areas that could be considered as possible preliminary sanctuary zone scenarios. But the modelling did not consider all the Design Principles (see list below) if they were not spatially represented or if a measurable had not been determined (e.g. connectivity and linkages, ease of compliance). Nor can Marxan consider all additional factors (e.g. South Australian Whole of Government Commitments for Marine Parks).

Using the Marxan outputs as a guide and considering other factors (e.g. all 14 design principles, policy commitments, some ecological processes and features that were not included in the modelling) areas were selected as possible preliminary sanctuary zoning scenarios. The Marxan target table was used to show which features were under a minimum 20% target. However, a guide representing each habitat at 25 to 30% was used when applying the Delphic approach in the workshops. We sought to represent certain features at 100% or over 50% depending on their area or count within each park. For example, if there were two Australian sea lion breeding colonies in a park the aim was to seek to include both of these within the preliminary sanctuary zoning scenarios. Or, if features were identified, such as shoals that were not mapped and therefore not included in the modelling, the aim was to represent the feature within the preliminary zoning scenarios. Furthermore, where a target had not been met, more investigation occurred to identify potential areas where the feature could be represented.

Design Principles for the development of preliminary sanctuary zoning scenarios

Biophysical design principles

- Precautionary
- Comprehensive
- Adequate
- Representative
- Connectivity & Linkages
- Resilience and Vulnerability
- Ecological Importance

Community design principles

- Seek synergies with existing protected areas
- Seek to complement existing terrestrial and marine management practices and conservation agreements
- Give consideration to the full diversity of marine uses
- Respect Indigenous interests and culture
- Give consideration to natural and cultural heritage
- Ensure ease of identification, compliance and enforcement
- Provide for research, education, appreciation and recreation

In some cases it was not always possible to reach a target where there was only a single or small number of locations where that habitat or feature was recorded, particularly if that feature was in close proximity to towns or known uses.

Workshops were held consisting of a number of staff with expertise in various fields including community engagement, science, planning, GIS modelling and industry. At the workshops, the 14 Design Principles were used as the basis for all the deliberations. The selection criteria

listed in Appendix B were used as a guide for the biophysical principles during the development of the preliminary zoning scenarios. In addition, a number of tools and information sources were used, including Marxan modelling outputs, the Park Atlases showing social, environmental, economic, cultural information for each park, SAMPIT outputs, local knowledge of the area provided by MPLAG members and from those living and working in the regions.

Performance Results

Performance results were thoroughly tested. They were tested in workshops to ensure all habitats were represented as well as possible. Performance results were run at park scales, bioregional scales and a whole of network scale.

A series of tables are produced to show the amount and proportion of each habitat or feature within each preliminary sanctuary zoning scenario, for all preliminary zones per park, and for all preliminary zones for each bioregion. The statistics are used to identify features which were under-represented either at a park, bioregional or network level.

Appendix A

Table 1 Marxan Ecological Inputs

Feature	Data Layer	Marxan Target
Habitat		
Boulder Beach (Exposed)	Shoreline x exposure	20%
Boulder Beach (Moderate)	Shoreline x exposure	20%
Boulder Beach (Sheltered)	Shoreline x exposure	20%
Bedrock Platform (Exposed)	Shoreline x exposure	20%
Bedrock Platform (Moderate)	Shoreline x exposure	20%
Bedrock Platform (Sheltered)	Shoreline x exposure	20%
Cliff (Exposed)	Shoreline x exposure	20%
Cliff (Moderate)	Shoreline x exposure	20%
Cliff (Sheltered)	Shoreline x exposure	20%
Coarse Sand Beach (Exposed)	Shoreline x exposure	20%
Coarse Sand Beach (Moderate)	Shoreline x exposure	20%
Coarse Sand Beach (Sheltered)	Shoreline x exposure	20%
Fine-medium Sand Beach (Exposed)	Shoreline x exposure	20%
Fine-medium Sand Beach (Moderate)	Shoreline x exposure	20%
Fine-medium Sand Beach (Sheltered)	Shoreline x exposure	20%
Mudflats and Sandflats (Sheltered)	Shoreline x exposure	20%
Mixed Beach (Exposed)	Shoreline x exposure	20%
Mixed Beach (Moderate)	Shoreline x exposure	20%
Mixed Beach (Sheltered)	Shoreline x exposure	20%
Pebble Cobble Beach (Moderate)	Shoreline x exposure	20%
Pebble Cobble Beach (Sheltered)	Shoreline x exposure	20%
Sand Dunes (Sheltered)	Shoreline x exposure	20%
Seagrass (Sheltered)	Shoreline x exposure	20%
Upwelling	Upwelling	20%
Sea Surface Temperature (Winter Extremes)	Sea Surface Temperature Winter Extreme	20%
Sea Surface Temperature (22 plus)	Sea Surface Temperature Summer Extreme	20%
Bare Sand (0 to -10m)	Coarse benthic x depth	20%
Bare Sand (-10 to -30m)	Coarse benthic x depth	20%
Bare Sand (-30 to -50m)	Coarse benthic x depth	20%
Bare Sand (-50m plus)	Coarse benthic x depth	20%
Dense Seagrass Patches (0 - 10m)	Coarse benthic x depth	20%
Dense Seagrass Patches (-10 to -30m)	Coarse benthic x depth	20%
Seagrass, 0 to -10m (includes dense, medium and sparse)	Coarse benthic x depth	20%

Feature	Data Layer	Marxan Target
Seagrass, -10 to -30 (includes dense, medium and sparse)	Coarse benthic x depth	20%
Seagrass, -30 to -50 (includes dense, medium and sparse)	Coarse benthic x depth	20%
Granite Reef (0 to -10m)	Coarse benthic x depth	20%
Granite Reef (-10 to -30m)	Coarse benthic x depth	20%
Granite Reef (-30m to -50m)	Coarse benthic x depth	20%
Granite Reef (-50m plus)	Coarse benthic x depth	20%
Heavy Limestone or Calcarenite Reef (0 to -10m)	Coarse benthic x depth	20%
Heavy Limestone or Calcarenite Reef (-10 to -30m	Coarse benthic x depth	20%
Heavy Limestone or Calcarenite Reef (-30m to -50m)	Coarse benthic x depth	20%
Heavy Limestone or Calcarenite Reef (-50m plus)	Coarse benthic x depth	20%
Low Profile Platform Reef (0 to -10m)	Coarse benthic x depth	20%
Low Profile Platform Reef (-10 to -30m)	Coarse benthic x depth	20%
Low Profile Platform Reef (-30m to -50m)	Coarse benthic x depth	20%
Low Profile Platform Reef (-50m plus)	Coarse benthic x depth	20%
Unmapped (0 to -10m)	Coarse benthic x depth	20%
Unmapped (-10 to -30m)	Coarse benthic x depth	20%
Unmapped (-30m to -50m)	Coarse benthic x depth	20%
Unmapped (-50m plus)	Coarse benthic x depth	20%
Offshore Islands	Offshore Islands	20%
Emergent Land	Emergent Land	20%
Saltmarsh	Saltmarsh	20%
Mangrove	Mangrove	20%
Saltmarsh Environs	Saltmarsh Environs	20%
Winter Temperature (<12)	Winter Temperatures	20%
Winter Temperature (12 to 13.5)	Winter Temperatures	20%
Winter Temperature (13.5 to 15.5)	Winter Temperatures	20%
Winter Temperature (15.5 plus)	Winter Temperatures	20%
Summer Temperature (<17.5)	Summer Temperatures	20%
Summer Temperature (17.5 to 19)	Summer Temperatures	20%
Summer Temperature (19 to 22)	Summer Temperatures	20%
Summer Temperature (22 plus)	Summer Temperatures	20%
Cobble Fine-Scale Mapping (0 to -10m)	Fine benthic x depth	20%
Invertebrate Community Fine-Scale Mapping (0 to -10)	Fine benthic x depth	20%

Feature	Data Layer	Marxan Target
Invertebrate Community Fine-Scale Mapping (-10 to -30)	Fine benthic x depth	20%
Invertebrate Community Fine-Scale Mapping (-30 to -50)	Fine benthic x depth	20%
Macroalgae Fine-Scale Mapping (0 to -10m)	Fine benthic x depth	20%
Macroalgae Fine-Scale Mapping (-10 to -30m)	Fine benthic x depth	20%
Macroalgae Fine-Scale Mapping (-30 to -50m)	Fine benthic x depth	20%
Reef Fine-Scale Mapping (0 to -10m)	Fine benthic x depth	20%
Reef Fine-Scale Mapping (-10 to -30m)	Fine benthic x depth	20%
Reef Fine-Scale Mapping (-30 to -50m)	Fine benthic x depth	20%
Seagrass Fine-Scale Mapping (0 to -10m)	Fine benthic x depth	20%
Seagrass Fine-Scale Mapping (-10 to -30m)	Fine benthic x depth	20%
Seagrass Fine-Scale Mapping (-30 to -50m)	Fine benthic x depth	20%
Unconsolidated Bare Substrate Fine-Scale Mapping	Fine benthic x depth	20%
Unconsolidated Bare Substrate Fine-Scale Mapping	Fine benthic x depth	20%
Unconsolidated Bare Substrate Fine-Scale Mapping	Fine benthic x depth	20%
Unmapped Fine-Scale Mapping (0 to -10m)	Fine benthic x depth	20%
Unmapped Fine-Scale Mapping (-10 to -30m)	Fine benthic x depth	20%
Unmapped Fine-Scale Mapping (-30 to -50m)	Fine benthic x depth	20%
Unmapped Fine-Scale Mapping (-50m plus)	Fine benthic x depth	20%
Marine Estuary Extents	Estuaries	20%
Ecological Importance		
Potential Pipefish Habitat	Potential Pipefish habitat	10%
Australian Sealions (breeding)	Australian Sealion	20%
Australian Sealions (haulout)	Australian Sealion	20%
Australian Fur Seals (breeding)	Australian Fur Seals	20%
New Zealand Fur Seals (breeding)	NZ Fur Seals	20%
Sea Bird Sites	Sea Bird Sites	20%
Coastal Wader Bird Sites - Resident	Coastal Wader Birds	20%
Coastal Wader Bird Sites - Regular Migrant	Coastal Wader Birds	20%
Coastal Wader Bird Sites - Vagrant	Coastal Wader Birds	20%
Sponges	Sponge gardens	20%
Reef Fish - Harlequin Fish (reef habitat unsearched)	Reef fish	10%

Feature	Data Layer	Marxan Target
Reef Fish - Harlequin Fish	Reef fish	20%
Reef Fish - Western Blue Devil (reef habitat unsearched)	Reef fish	10%
Reef Fish - Western Blue Devil	Reef fish	20%
Reef Fish - Western Blue Groper (reef habitat unsearched)	Reef fish	10%
Reef Fish - Western Blue Groper (Unknown size)	Reef fish	20%
Reef Fish - Western Blue Groper Mature	Reef fish	20%
Reef Fish - Long-snouted Boarfish (reef habitat unsearched)	Reef fish	10%
Reef Fish - Long-snouted Boarfish	Reef fish	20%
COSEMA (Endangered Macroalgae)	COSEMA (Endangered Macroalgae)	20%
Cuttlefish Dense Aggregation Area	Cuttlefish	20%

Table 2 Marxan Weighting Layers

Layers used in weighting parameters in Marxan
Rock Lobster Sanctuary
NPWSA Reserves
Aquatic Reserves
Netting Closures
Cuttlefish Aggregation Area
Southern Right Whale Aggregation Areas

Table 3 Marxan Cost Layers

Type	GIS layer	Cost weight
Infrastructure	Jetties	3
	Boat Ramps	3
	Breakwaters	3
	Coastal Shacks	2
	Harbours	2
	Mooring locations	2
	Marina Extents	2
	Industrial Areas	2
	Underwater Cables	2
Extractive - Commercial	Active Aquaculture licences	3
	Haul Net Fishers	3
	Aquaculture Zones	2
	Abalone Data (SE Fisher)	1-3
	High Value Abalone Western	2
	High Value Abalone Central	2
	High Value Abalone Southern	2
	High Value Blue Crab Blocks GSV 100%	2
	High Value Blue Crab Blocks SG 100%	2
	High Value Charter Boat Blocks	1
	High Value Marine Scale Blocks	1
	High Value Prawn Blocks Spencer Gulf	2
	High Value Prawn Blocks Gulf St Vincent	2
	High Value Prawn Blocks West Coast	2
	High Value Rock Lobster Blocks (Nth)	1
	High Value Rock Lobster Blocks (Sth)	1
	High Value Sardine Fishing Blocks	2
	PIRSA Shellfish harvesting	2
Extractive - Recreational	Recreational Fishing Sites	2
Other Extractive - Commercial	Mineral Exploration Licences	1
	Petroleum Exploration Licences	1
	Geothermal Exploration Licences	1
	Mine Tenements	1
Point Source Pollution	Stormwater Drains	1
	EPA Point Source Pollution	1
SAMPIT Commercial Fishing	SAMPIT (Analysed Separately)	1-3
SAMPIT Recreational Fishing	SAMPIT (Analysed Separately)	1-3

Appendix B

Biophysical selection criteria for applying zoning to South Australia's Marine Parks

Design Principle	Ecological goals for zoning	Criteria for zone selection
Precautionary	*Will the area:* • Provide refuge for habitats and ecosystems from the impacts of climate change for decades to come? • Include areas for which biodiversity data are currently lacking e.g. unmapped or unsurveyed areas, from all depth ranges? • Provide for replication in case of loss of the habitat?	• Vulnerable areas included in highly protected zones • Unmapped areas included in SZ • Unmapped areas across all depths included in SZ • Multiple areas of each type included
Comprehensive	*Does the area:* • Add to the coverage of the full range of ecosystems occurring with the marine park?	• Examples of all broad-scale benthic and shoreline habitats included in SZ and HPZ
Adequate	*Will the area:* • Avoid fragmentation of habitats? • Provide for replication? • Provide long-term protection? • Provide buffering for highly-protected areas from external impacts?	• Entire or whole habitats included in given zones • Multiple examples of each habitat included in SZ • Aim for all SZ to be at least 7 to 10 km in linear extent • SZ and RAZ in place for minimum of 30 years (pending 10-yearly assessment & review of Management Plan?). • Aim for all SZ to be buffered by HPZ at least 5-7 km in linear extent
Representative	*Will the area*: • Reflect the biodiversity and variability of habitat types and environmental gradients? • Represent habitats as they naturally occur within the marine park?	• Examples of all broad-scale benthic habitats across their depth and temperature ranges, and all shoreline habitats across their exposure ranges included in SZ • Habitats are included in SZ in the proportions that they naturally exist

Design Principle	Ecological goals for zoning	Criteria for zone selection
	• Represent heterogeneous seascapes?	• Locations with multiple habitat types and the transitions between them are included in SZ and HPZ
Connectivity and Linkages	*Does the area*: • Maximise opportunities for species dispersal between and within sanctuary zones? • Provide for successful settlement and recruitment of fish and invertebrate larvae? • Maximise protection of non-dispersive animals? • Incorporate benthic-pelagic linkages?	• Size and spacing between SZs based on the dispersal ranges for a variety of marine organisms (10s-100s km) • Ensure both 'source' and 'sink' populations, and any critical habitats for recruitment are included • RAZ and SZ include known breeding or nursery areas, and associated foraging grounds • SZ extend from sea surface to sea floor and habitat are juxtaposed within them
Resilience and Vulnerability	*Will the area*: • Spread the risk of threats across the wider area? • Preserve the natural condition of habitats and features? • Be able to absorb shocks? • Provide refuge for habitats and biota that are easily disturbed and slow to recover from impacts?	• Multiple examples of vulnerable habitats included in SZ and HPZ. • Minimally disturbed areas included in SZ • Resilient habitats included in SZ • Priority given to vulnerable habitats and vulnerable life stages (e.g. breeding and nursery) of species, populations or communities to be included in SZ. Those less vulnerable included in HPZ or GMU
Ecological Importance	*Does the area:* • Contain species of conservation significance or biodiversity hotspots? • Contain unique habitats or features? • Sustain biotic assemblages through the provision of ideal habitat condition?	• Priority given to critically-endangered and endangered species and habitats • 100% included in SZ and or RAZ • High priority for inclusion given to special features, e.g. known nursery areas included in SZ, portions of upwellings included in multiple SZ or HPZ

Design Criteria References

References used to develop the criteria for applying the design principles. This is not an exhaustive list. There were other sources of information, such as Scientific Working Groups advice and other technical information that was used.

Airame, S. et al (2001). How large should marine reserves be? Technical report to the Science and Statistical Committee of the Pacific Fishery Management Council. Portland Oregon, USA.

Airame, S., Dugan, J.E., Lafferty, K.D., Leslie, H., McArdle, D.A., and Warner, R.R. (2003). Applying ecological criteria to marine reserves design: A case study from the California Channel Islands. Ecological Applications **13 (supplement)**: 170-184.

Agardy, T., Bridgewater, P., Crosby, M.P., Day, J., Dayton, P.K., Kenchington, R., Laffoley, D., McConney, P., Murray, P.A., Parks, J.E. and Peau, L. (2003) Dangerous targets? Unresolved issues and ideological clashes around marine protected areas. Aquatic Conservation: marine and Freshwater Ecosystems **13:** 353-367.

Almany, G.R., Connolly, S.R., Heath, D.D., Hogan, J.D., Jones, G.P., McCook, L.J., Mills, M., Pressey, R.L. and Willimason, D.H. (2009) Connectivity, biodiversity conservation and the design of marine networks for coral reefs. Coral Reefs **28:** 339-351.

ANZECC – See Australian and New Zealand Environment and Conservation Council

ANZECC TFMPA (1998). *Guidelines for Establishing the National Representative System of Marine Protected Areas. .* Environment Australia, Canberra.

Australian and New Zealand Environment and Conservation Council Task Force on Marine Protected Areas. (1999) *Strategic Plan of Action for the National Representative System of Marine Protected Areas: public comment draft.* Environment Australia, Canberra.

Babcock, R.C., Kelly, S., Shears, N.T., Walker, J.W. and Willis, T.J. (1999). Changes in community structure in temperate marine reserves. Marine Ecology Progress Series **189:** 125-134.

Babcock, R.C., Shears, N.T., Alcala, A.C., Barrett, N.S., Edgar, G.J., Lafferty, K.D., McClanahan, T.R. and Russ, G.R. (2010). Decadal trends in marine reserves reveal differential rates of change in direct and indirect effects. PNAS

Baker J.L. (2004). *Towards a system of ecologically representative marine protected areas in South Australian marine bioregions* – Technical report, prepared for Coast and Marine Conservation Branch, Department for Environment and Heritage, South Australia.

Ballantine B. (1997). *The design and monitoring of marine reserves (Ed, workshop).* Fisheries Centre, University of Vancouver, Canada.

Barrett, N.S., Buxton, C.D. and Edgar, G.J. (2009). Changes in invertebrate and macroalgal populations in Tasmanian marine reserves in the decade following protection. Journal of Experimental Marine Biology and Ecology **370:** 104-119.

Bohnsack, J.A., Causey, B., Crosby, M.P., Griffis, R.B., Hixon, M.A., Hourigan, T.F., Koltes, K.H., Maragos, J.E., Simons, A. and Tilamant, J.T. (2000). A rationale for minimum 20-30% no-take protection. Proceedings 9th International Coral Reef Symposium, Bali, Indonesia **2:** 615-619.

Bustamante, R. H., P. Martinez, F. Rivera, R. Bensted-Smith & L. Vinueza. (1999). A Proposal for the Initial Zoning of the Galapagos Marine Reserve. Charles Darwin Research Station Technical Report, October 1999.

Buxton C., Barret N., Haddon, M., Gardner C. and Edgar G. (2006). *Evaluating the Effectiveness of Marine Protected Areas as a Fisheries Management Tool*. FRDC Project No. 1999/162. Tasmanian Aquaculture and Fisheries Institute, University of Tasmania, Hobart, Tasmania.

Byers J.E. and Noonburg E.G. (2007). Poaching, enforcement, and the efficacy of marine reserves. *Ecological Applications*, **17**: 1851-1856.

Claudet J., Osenberg C.W., Benedetti-Cecchi L., Domenici P., Garcia-Charton J., Perez-Ruzafa A., Badalamenti F., Bayle-Sempere J., Brito A., Bulleri F., Culiol J., Dimech M., Falcon J.M., Guala I., Milazzo M., Sanchez-Meca J., Somerfiled P.J., Stobart B., Vendeperre F., Valle C. and Planes S. (2008). Marine reserves: size and age do matter. *Ecology Letters*, **11**: 481-9.

Commonwealth of Australia (1992). Intergovernmental Agreement on the Environment, Department of Environment, Water, Heritage and the Arts, Commonwealth of Australia, Canberra.

Convention on Biological Diversity (2004) UNEP/CBD/SBSTTA/10/8.

Dahlgren, C.P. and Sobel, J. (2000). Designing a dry Tortugas ecological reserve: how big is big enough?...to do what? Bulletin of Marine Science **66:** 707-719.

Day, J., Fernandes, L., Lewis, A., De'ath, G., Slegers, S., Barnett, B., Kerrigan, B., Breen, D., Innes, J., Oliver, J., Ward, T. and Lowe, D. (2000). The representative areas program for protecting biodiversity in the Great Barrier Reef world heritage area. Proceedings 9Th International Coral reef Symposium, Bali, Indonesia 23-27 October 2000.

Day J.C. and Roff J.C. (2000). *Planning for representative MPAs: A framework for Canada's oceans.* Report prepared for the World Wildlife Fund, Canada, Toronto.

Day J., Fernandes L., Lewis A. and Innes J. (2003). *The Representative Areas Program for protecting biodiversity in the Great Barrier Reef World Heritage Area*. In: Paper for ITEMS: manilla, Philippines, march 2003.

Day J. (2006). *Marine Protected Areas*. pp 603-633 in: IUCN, Lockwood M, Worboys GL, Kothari A (eds.) *Managing protected Areas: A Global Guide.* Earthscan UK and USA.

Department for Environment and Heritage (2009). A technical report on the outer boundaries of South Australia's marine parks network. Department for Environment and Heritage, South Australia.

Department for Environment and Heritage. (2008). *Design principles guiding the development of South Australia's marine park boundaries.* Coast and Marine Conservation Branch, Department for Environment and Heritage, South Australia.

Edgar, G.J. and Barrett, N.S. (1999). Effects of the declaration of marine reserves on Tasmanian reef fishes, invertebrates and plants. Journal of Experimental marine Biology and Ecology **242**:107-144.

Edgar, G.J., Barrett, N.S. and Stuart-Smith, R.D. (2009). Exploited reefs protected from fishing transform over decades into conservation features otherwise absent from seascapes. Ecological Applications **19**: 1967-1974.

EPA/QPWS. (2007). Moreton Bay Marine Park Zoning Plan Review: Scientific Guiding Principles. Recommended by the Expert Advisory Panel. Environmental Protection Agency and Queensland Parks and Wildlife Service

Fernandes, L., Day, J., Lewis, A., Slegers, S., Kerrigan, B., Breen, D., Cameron, D., Jago, B., Hall, J., Lowe, D., Innes, J., Tanzer, J., Chadwick, V., Thompson, L., Gorman, K., Simmons, M., Barnett, B., Sampson, K., De'ath, G., Mapstone, B., Marsh, H., Possingham, H., Ball, I., Ward, T., Dobbs, K., Aumend, J., Slater, D., and Stapleton, K. (2005). Establishing representative no-take areas in the Great Barrier Reef: Large-scale implementation of theory on marine protected areas. Conservation Biology **19**:1733-1744.

Fraschetti, S., D'Ambrosio, P., Micheli, F., Pizzalante, F., Bussoti, S. and Terlizzi, A. (2009). Design of marine protected areas in a human-dominated seascape. Marine Ecology Progress Series **375:** 13-24.

Friedlander, A., Sladek Nowlis, J., Sanchez, J.A., Appeldoorn, R., Usseglio, P., McCormick, C., Bejarano, S. and Mitchell-Chui, A. (2003). Designing effective marine protected areas in Seaflower biosphere reserve, Colombia, based on biological and sociological information. Conservation Biology **17:** 1769-1784.

Gillanders B.M., Able K.W., Brown J.A., Eggleston D.B. and Sheridan P.F. (2003). Evidence of connectivity between juvenile and adult habitats for mobile marine fauna: an important component of nurseries. *Marine Ecology Progress Series*, **247**: 281-295.

Goodyear, C.P. (1993). Spawnig stock biomass per recruit in fisheries management: foundation and current use. In: Smith, S.J., Hunt, J.J. and Rivard, .D. (eds) Risk evaluation and biological reference points for fisheries management. Can. Spec. Publ. Fish. Aquat. Sci. **120:** 67-81.

Graham, N.A.J., McClanahan, T.R., MacNeil, M.A., Wilson, S.K., Polunin, N.V.C., Jennings, S., Chababnet, P., Clark, S., Spalding, M.D., Letourneur, Y., Bigot, L., Galzin, R., Ohman, M.C., Garpe, K.C., Edwards, A.J. and Sheppard, C.R.C. (2008). Climate warming, marine protected areas and the ocean-scale integrity of coral reef ecosystems. PLos One **3(8):** e3039. doi:10.1371/journal.pone.0003039.

Grober-Dunsmore, R., Woonick, L., Field, J., Ainsworth, C., Beets, J., Berkeley, S., Bohnsack, J., Boulon, R., Brodeur, R., Brodziak, J., Crowder, L., Gleason, D., Hixon, M., Kaufman, L., Lindberg, B., Miller, M., Morgan, L. and Wahle, C. (2008). Vertical zoning in marine protected areas: ecological considerations for balancing pelagic fishing with conservation of benthic communities. Fisheries **33:** 598-610.

Halpern, B.S. and Warner, R.R. (2002). Marine reserves have rapid and lasting effects. Ecology Letters **5:** 361-366.

Halpern B.S. (2003). The impact of marine reserves: do reserves work and does size matter? *Ecological Applications*, **13**:117-137.

Hastings, A. et al (1999). Equivalence in yield from marine reserves and traditional fisheries management. Science. **284:** 1537-1538.

IUCN World Commission on Protected Areas (IUCN-WPCA) (2008). *Establishing Resilient Marine Protected Area Networks – Making it happen*: IUCN-WCPA, National Oceanic and Atmospheric Administration and The Nature Conservancy, 118p. Washington, D.C.

Jennings, S. (2001). Patterns and prediction of population recovery in marine reserves. Reviews in Fish Biology and Fisheries **10**: 209-231.

Kelleher G. and Kenchington R. (1992). *Guidelines for Establishing Marine Protected Areas*. A Marine Conservation and Development Report, IUCN, Gland, Switzerland.

Kinlan B.P. and Gaines S.D. (2003). Propagule dispersal in marine and terrestrial environments: a community perspective. *Ecology*, **84:** 2007-2020.

Kramer, D.L. and Chapman, M.R. (1999). Implications of fish home range size and relocation for marine reserve function. Environmental Biology of Fishes **55:** 65-79.

Laurel, B.J. and Bradbury, I.R. (2006). "Big" concerns with high latitude marine protected areas (MPAs): trends in connectivity and MPA size. Canadian Journal of Fisheries and Aquatic Sciences **63:** 2603-2607.

Leslie H., Ruckelshaus M., Ball I.R., Andelman S. & Possingham H.P. (2003). Using siting algorithms in the design of marine reserve networks. *Ecological Applications,* **13(Supplement),** 185-198.

Lester, S.E., Halpern, B.S., Grorud-Colvert, K., Lubchenco, J., Ruttneburg, B.I., Gaines, S.D., Airame, S. and Warner, R.R. (2009). Biological effects within no-take marine reserves: a global synthesis. Marine Ecology Progress Series **384:** 33-46.

Mangel, M. (2000). On the fraction of habitat allocated to marine reserves. Ecology Letters **3:** 15-22.

Marine Biodiversity Decline Working Group (2008). A National approach to addressing marine biodiversity decline. A report to the Natural Resource Management Ministerial Council.

Marine Parks Authority Marine Protected Areas Strategy Working Group (2001). Developing a representative system of marine protected areas in NSW – An overview. NSW Fisheries, NSW National Parks and Wildlife Service and NSW Marine Parks Authority.

Mora, C., Andrefouet, S., Costello, M.J., Kranenburg, C., Rollo, A., Veron, J., Gaston, K.J. and Myers, R.A. (2006). Coral reefs and the global network of marine protected areas. Science **312**:1750-1751.

McClanahan, T.R., Cinner, J.E., Maina, J., Graham, T.M., Stead, S.M., Wamukota, A., Brown, K., Ateweberhan, M., Venus, V. and Polunin, N.V.C. (2008). Conservation action in a changing climate. Conservation Letters **1:** 53-59

McClanahan, T.R. (2000). Recovery of a coral keystone predator, *Balistapus undulatus* in East African marine parks. Biological Conservation **94:** 191-198.

McCook, L.J., Almany, G.R., Berumen, M.L., Day, J.C., Green, A.L., Jones, G.P., Leis, J.M., Planes, S., Russ, G.R., Sale, P.F. and Thorrold, S.R. (2009). Management under umcertainty: guide-lines for incorporating connectivity into the protection of coral reefs. Coral Reefs **28:** 353-366.

Mcleod, E., Salm, R., Green, A., and Almany, J. (2009). Designing marine protected area networks to address the impacts of climate change. Frontiers in Ecology and the Environment **7**: 362-370.

Molloy, P.P., McLean, I.B. and Cote, I.M. (2009). Effects of marine reserve age on fish populations: a global meta-analysis. Journal of Applied Ecology **46**: 743-751.

Mora, C., Andrefouet, S., Costello, M.J., Kranenburg, C., Rollo, A., Veron, J., Gaston, K.J. and Myers, R.A. 2006. Coral Reefs and the global network of marine protected areas. Science **312:** 1750-1751.

National Research Council. (2000). *Marine Protected Areas: tools for sustaining ocean ecosystems.* Washington, D.C. USA, National Academy Press.

Palumbi S.R. (2004). Marine reserves and ocean neighbourhoods: the spatial scale of marine populations and their management. *Annual Review of Environment and Resources*, **29:** 31-68.

Pressey R.L. and Cowling R.M. (2001). Reserve selection algorithms and the real world, *Conservation Biology*, **15**: 275-277.

Roberts, C.M. and Hawkins J.P. (2000). *Fully-protected marine reserves: a guide*. WWF

Roberts, C.M., Halpern, B., Palumbi, S.R. and Warener, R.R. (2001). Designing Marine reserve networks: why small, isolated protected areas are not enough. Conservation Biology in Practice **2:** 10-17.

Roberts, C.M., Andelman, S., Branch, G., Bustamnate, R.H., Castilla, J.C., Dugan, J., Halpern, B.S., Lafferty, K.D., Leslie, H., Lubchenco, J., McArdle, D., Possingham, H.P., Ruckelshaus, M., and Warner, R.R. (2003a). Ecological criteria for evaluating candidate sites for marine reserves. Ecological Applications **13 (supplement)**: 199-214.

Roberts, C.M., Branch, G., Bustamnate, R.H., Castilla, J.C., Dugan, J., Halpern, B.S., Lafferty, K.D., Leslie, H., Lubchenco, J., McArdle, D., Ruckelshaus, M., and Warner, R.R. (2003b). Application of ecological criteria in selecting marine reserves and developing reserve networks. Ecological Applications **13 (supplement)**: 215-228.

Rodrigues A.S.L. and Brooks T.M. (2007). Shortcuts for biodiversity conservation planning: the effectiveness of surrogates. Annual Review of Ecology, Evolution & Systematics, 38: 713-737.

Russ, G.R. and Alcala, A.C. (2004). Marine reserves: long-term protection is required for full recovery of predatory fish populations. Oecologia **138:** 622-627.

Russ, G.R., Stockwell, B. and Alacala, A.C. (2005). Inferring versus measuring rates of recovery in no-take marine reserves. Marine Ecology Progress Series. **292:** 1-12.

Salm, R.V., Done, T. and McLeod, E. (2006). Marine protected area planning in a changing climate. In: Phinney, J.T., HoeghGuldberg, O., Kleypas, J. et al (Eds). Coral reefs and climate change: science and management. Washington, DC: American Geophysical Union.

Salomon, A.K., Waller, N.P., McIlhagga, C., Yung, R.L. and Walters, C. (2002). Modeling the trophic effects of marine protected area zoning policies: a case study. Aquatic Ecology **36:** 85-95.

Shanks, A.L., Grantham, B.A. and Carr, M.H. (2003). Propagule dispersal distance and the size of and spacing of marine reserves. Ecological Applications **13:** S159-169.

Shanks, A.L. (2009). Pelagic larval duration and dispersal distance revisited. Biology Bulletin **261:** 373-385.

Shears, N.T. and Babcock, R.C. (2003). Continuing trophic cascade effects after 25 years of no-take marine reserve protection. Marine Ecology Progress Series **246**: 1-16.

Starr, R. (2005). Species movements and implications for marine protected area (MPA) network design. MLPA Central Coast Regional Stakeholder Group Meeting October 5-6 handout#4.

Stewart R.R. and Possingham H.P. (2002). *A framework for systematic marine reserve design in South Australia: a case study*. pp. 132–143 in: Beumer JP, Grant A and Smith DC, (Eds.) *Proceedings of the World Congress on aquatic protected areas: What works best and how do we know?* Australian Society for Fish Biology, Brisbane, Australia.

Stewart R.R., Ball, I.R. and Possingham H.P. (2006). The effect of incremental reserve design and changing reservation goals on the long-term efficiency of reserve systems. Conservation Biology **21:** 346-354.

Stewart R.R., Noyce T. and Possingham H.P. (2003). The opportunity cost of ad-hoc marine reserve design decisions - An example from South Australia. *Marine Ecology Progress Series,* **253**: 25-38.

The Ecology Centre, The University of Queensland (2009). Scientific principles for design of marine protected areas in Australia: A guidance statement. 29pp. Available at Http://www.uq.edu.au/ecology/index.html?page=102441&pid=108450

The Scientific Peer Review Panel for the National Representative System of Marine Protected Areas. (2006). *Guidance on Achieving Comprehensiveness, Adequacy and Representativeness in the Commonwealth waters component of the National Representative System of Marine Protected Areas.* http://www.environment.gov.au/coasts/mpa/publications/pubs/nrsmpa-guidelines.pdf

Turpie, J. K., L. E. Beckley & S. M. Katua. (2000). Biogeography and the selection of priority areas for conservation of South African coastal fishes. Biological Conservation 92: 59-72.

UNEP-WCMC (2008). National and Regional Netwroks of Marine Protected Areas: A review of progress. UNEP-WCMC, Cambridge.

United Nations (1993). Agenda 21: Earth Summit-The United Nations Programme of Action from Rio de Janeiro, United Nations Division for Sustainable Development, Rio de Janeiro

Ward, T.J. Vanderklift, M.A., Nicholls, A.O. and Kenchington, R.A. (1999). Selecting marine reserves using habitats and species assemblages as surrogates for biological diversity. Ecological applications **9:** 691-698.

WCPA/IUCN (2007). Establishing networks of marine protected areas: a guide for developing national and regional capacity for building MPA networks. Non-technical summary report.

Wood L.J., Fish L., Laughren J. and Pauly D. (2008). Assessing progress towards global marine protection targets: shortfalls in information and action. Review in *Fauna and Flora International*, **42**, 340-351.