



COMMONWEALTH MARINE RESERVE NETWORK: WHAT THE SCIENTIFIC REVIEW SHOULD DELIVER

CONTEXT STATEMENT

The Commonwealth Government has undertaken a marine reserves planning process over a period of 15 years that resulted in a network of Commonwealth Marine Reserves (CMRs) throughout Australia's Exclusive Economic Zone (EEZ). The management plans for the CMRs within the network, completed in 2013, provided detail on how these new marine reserves and their zoning would operate. These zones regulate activities in the parks, ranging from areas of high protection that exclude extractive activities (IUCN Protected Area Categories I & II) through to zones that allow a range of continuing uses (i.e. IUCN III- VI). Before the 36 new marine reserves could become operational (scheduled for 1 July 2014), the Abbott Government set aside the new management plans, commenced a Review and issued orders that there would be no change of management on the water in the meantime (that is, the new marine reserves would not be operational). In undertaking a review, the Abbott Government cited the need to consider the scientific evidence supporting the CMR network. The Review is now due to report to the Minister for the Environment on their findings.

The Ocean Science Council of Australia (OSCA) is a group of independent marine researchers in the fields of law, ecology, economics and social science, with direct expertise in relation to the development of Australia's CMR network. We have seen little evidence that the review process has focussed on scientific evidence, rather it appears to have largely been an exercise in appeasing stakeholders with extractive interests. We further note that there has been no formal consultation with OSCA despite our significant capacity to provide input to a *scientific* review. Thus the following document reflects a science-based vision of what ocean protection should achieve. Our concerns are based on informal feedback rather than direct consultation, suggesting that the exercise has largely focused on modifying the zoning by eroding the critically important areas of high protection for lesser protection without scientific basis. It is essential that the review does not seek marginal improvements for extractive users whilst further undermining the network's potential to deliver conservation benefits on the scale required in a rapidly changing world.

In this context, we provide a series of recommendations on what would be delivered by a scientific review of the CMR network. These relate to (1) a reflection of the vast recent increase in scientific evidence with respect to the benefits of Marine National Parks (also referred to as sanctuary zones, green zones, or highly protected "no-take" marine reserves) and (2) a balanced consideration of economic and other impacts on stakeholders.

SCIENTIFIC EVIDENCE AND INTERNATIONAL TRENDS

Marine national parks generate conservation benefits

The scientific evidence for the general benefits of marine national parks (IUCN I and II) continues to grow globally and in Australia. The Commonwealth Government can have confidence in the level of consensus that now exists within the marine research community with respect to the importance of marine national parks in delivering important conservation and economic outcomes. Initial research showed increases in the number of species, abundance of fish, and the size of fish in most marine national parks, and spill-over of larval and adult fish into adjacent areas (Lester et al. 2009; Harrison et al. 2012; Butcher et al. 2014). Indeed, the Great Barrier Reef Marine Park is an exemplar of the benefits with respect to enhanced biodiversity following protection of 33% of the region in no-take MPAs (McCook et al. 2010). The clear recognition of the role of highly protected marine reserves is well established, as reflected in the scientific consensus across the following documents:

- SCIENTIFIC CONSENSUS STATEMENT ON MARINE RESERVES AND MARINE PROTECTED AREAS, Annual Meeting of the American Association for the Advancement of the Sciences, 2001. 161 signatories.
- AUSTRALIAN MARINE SCIENCES ASSOCIATION (AMSA), Statement on Marine Protected Areas, 2002. AMSA has ~1500 members.
- SCIENTIFIC CONSENSUS STATEMENT ON MARINE ECOSYSTEM-BASED MANAGEMENT, Prepared by scientists and policy experts to provide information about coasts and oceans to U.S. policy-makers, 2005. 198 signatories.
- IN SUPPORT OF NO-TAKE ZONES AND OTHER MARINE PROTECTED AREAS, a Policy Statement by the Pew Fellows in Marine Conservation, 2005. 39 signatories.

Additional developments in the scientific evidence for marine national parks include recognition that:

(1) Partial protection (e.g. “habitat protection zones” that allow some forms of fishing) does not generate biodiversity benefits to the extent of marine national parks (Denny and Babcock 2004; Shears et al. 2006; Lester and Halpern 2008; Franco et al. 2009; Sciberras et al. 2015). In particular, the most recent review by Sciberras et al. (2015) concluded that “*while [partially protected areas] PPAs significantly enhance density and biomass of fish relative to open areas, [no-take reserves] NTRs yielded significantly higher biomass of fish within their boundaries relative to PPAs*” concluding that “*Marine protected areas with partial protection confer advantages, such as enhanced density and biomass of fish, compared to areas with no restrictions, although the strongest responses occurred for areas with total exclusion.*” This something-is-better-than-nothing argument needs to be considered in light of costs where management of partially protected areas may be comparable or exceed that of marine national parks. Indeed, Edgar et al. (2014) concluded that “no-take” is a critical driver of marine reserve success in generating biodiversity outcomes. The Australian Marine Sciences Association (AMSA) makes clear in its submission to the CMR review that “*Any rezoning to include more habitat protection, even if ‘better’ than general use, is still not no-take and therefore cannot be considered to satisfy CAR principles.*” (AMSA 2015)

(2) Marine national parks generate significant fisheries benefits (Roberts et al. 2001; Gell and Roberts 2003, Bohnsack 2011, Harrison et al. 2012). Ecological theory predicts that the accumulation of biomass (and breeders) within marine national park areas will lead to spill-over (the movement of adults from the marine national park areas to areas open to fishing) and increased larval recruitment (the flow of young fish from adults within the marine national park area to settle in areas open to fishing). Perhaps the best example from a recreational fishing perspective remains Bohnsack's (2011) demonstration that spill-over of large highly prized sport fish from two marine national parks generated 74% of the recreational fishing records in Florida despite comprising 11% of the coast. Similarly, the use of parentage genotyping allowed Harrison et al. (2012) to demonstrate that coral trout inside no-take zones generate 83% of the recruits to areas open to fishing, despite the former only comprising 28% of the region. A recent modelling study suggested that a hypothetical 'well-managed' fish stock (with perfectly understood, stable biological characteristics in a similar idealised environment) would benefit from spill-over where fishing effort was 50% in excess of maximum sustainable yield (MSY) (Buxton et al. 2014). There are recent examples of Australian fisheries where fishing effort is likely to have exceeded MSY by at least 50% given management decisions to reduce fishing mortality by 50% (c.f. the western rock lobster, demersal reef fish and Australian herring fisheries in Western Australia) which consequently would likely have benefited in real social and economic terms from closed areas, were this model's predictions to hold. Indeed, Grafton (2006) found that "in a stochastic environment, an optimal-sized marine reserve in this [Atlantic cod] fishery would have prevented the fishery's collapse and generated a triple payoff: raised the resource rent even if harvesting had been 'optimal'; decreased the recovery time for the biomass to return to its former state and smoothed fishers' harvests and resource rents; and lowered the chance of a catastrophic collapse following a negative shock."

Importantly, fisheries management is an inexact science (Pitcher et al. 1998) as evidenced by the fact that about 13% of Australian fish stocks remain overfished (ABARES 2015). Indeed, the inexactness of fisheries management has led to substantial upheaval for fisheries stakeholders where catches were substantially reduced, as was the case for the Western Australia's Western Rock Lobster fishery in 2007, with recruitment in 2015 still well below long-term averages.¹ The recent documentation by Pauly and Zeller (2016) of global fisheries based on reconstructed catches shows that fisheries landings are significantly higher than reported by nations and declining faster than previously thought, likely putting existing estimates of MSY in doubt, and suggesting that conventional fisheries management is failing to halt the decline in the abundance of the world's fishes. Even in Australia, reconstructed catch is nearly double that reported to the FAO (Kleisner et al. 2015), raising concerns about fisheries resilience.

Researchers have failed to find evidence for negative impacts on fisheries due to displaced effort. Indeed, the only empirical review of marine national parks demonstrated that spill-over more than compensated for any reduction in abundance of fish outside the reserve given potential for increased fishing mortality in areas adjacent to the reserve (Halpern et al. 2009).

(3) Marine national parks generate resilience in the face of a rapidly changing climate (Bates et al. 2014; Olds et al. 2014). As Australia grapples with fires, bleaching events, drought and floods, with weather more variable than previously experienced, ecosystem resilience is a key concern. It is critical that ecosystems recover quickly from climate-driven pressures, so ecosystem services (and the economic benefits derived from them) continue to be delivered. Recent research from marine national parks near Brisbane demonstrated that the fully-protected reefs recovered from flooding damage faster than reefs open to fishing (Olds et al. 2014). Similarly,

¹ <http://www.fish.wa.gov.au/Species/Rock-Lobster/Lobster-Management/Pages/Puerulus-Settlement-Index.aspx>

research from Tasmania's Maria Island marine national parks demonstrates that fully-protected reefs are more resilient to climate invaders such as the *Centrostephanus* urchin, which is devastating kelp forests in unprotected areas (Bates et al. 2014). Recent research also suggests that marine habitats with healthy predator populations, such as those found in marine national parks contribute to carbon sequestration and thus climate change mitigation (Atwood et al. 2015).

(4) Marine national parks provide essential scientific reference points. All of the above examples of marine national park benefits were only understood because they have been established. Such opportunities will be partly or largely foregone if marine national park protection is replaced by partial protection. Our ability to be agile in responding to the challenges of the 21st century and beyond is underpinned by knowledge and understanding. If we are to understand the human impacts on the ocean, we must reserve areas of intact ecosystems. Even for the Australian fisheries with the most available science for management, such as the western rock lobster fishery, meeting the requirements of ecosystem based fisheries management, spatial closures – particularly no-take – provides the most feasible and cost effective tools for understanding the ecosystem-level effects of fishing (Bellchambers and Pember 2014).

(5) Marine national parks provide social, cultural and tourism benefits. The above-mentioned ecological benefits of marine national parks create a cascade of benefits to the broad community. These include educational and recreational benefits for school children and the community who are able to experience directly and understand a healthy, fully functional marine ecosystem. Cultural and lifestyle benefits accrue as visitors to marine national parks recharge their energies and reconnect with the natural world. Indigenous coastal and marine values are highly significant and often promote a deep relationship with the natural world; Indigenous values can support and be supported by no-take marine reserves. Economic spin-offs of marine national parks include the development of ecotourism ventures. These operations draw directly on marine reserve visitors for their clientele and include glass bottom boats, dive/snorkelling tours, dive gear rentals and tank filling as well as associated cafes, shops and accommodation. These benefits and others are detailed in Stocker and Burke (2000) Chae et al. (2012), Hoisington and Eadie (2012), Hoisington (2013), and Costello (2014) amongst others.

RECOMMENDATION 1: The Review should recommend meeting the international standard for ocean protection. The appropriate standard is the World Parks Congress (Sydney, 2015) target to deliver “protection of both biodiversity and ecosystem services [that includes] at least 30% of each marine habitat ... [with] no-extractive activities”², with this target also supported by analyses from the University of Queensland.³ Critical to this target is the protection of representative habitats in a fully replicated design (i.e. multiple examples of each habitat with full protection) across our oceans. Meeting these targets also addresses Australia's Comprehensive Adequate and Representative CAR⁴ policy. Any recommendations within the Review that move Australia further from this target than the Commonwealth Marine Reserves network declared in 2012, which already fell short, should be rejected.

RECOMMENDATION 2: The Review should reject the temptation to further diminish the representation of marine national park IUCN II zoning in bioregions and key ecological features that are already significantly under-represented in the 2012 plans, as has been clearly identified in peer-

² <http://worldparkscongress.org/downloads/approaches/ThemeM.pdf>

³ http://ecology.uq.edu.au/filething/get/39100/Scientific_Principles_MPAs_c6.pdf

⁴ ANZECC Guidelines for Establishing the National Representative System of Marine Protected Areas, 1998 <http://www.scew.gov.au/system/files/resources/378b7018-8f2a-8174-3928-2056b44bf9b0/files/anzecc-gl-guidelines-establishing-national-representative-system-marine-protected-areas-199812.pdf>

reviewed scientific assessments of the CMR network. The location of marine national parks should be done according to the full National Representative System of Marine Protected Areas (NRSMPA) principles, without undue emphasis on avoiding areas that are of interest to extractive use. The 2012 declaration of the CMR network was seriously criticised by the Australian and international scientific community for its clear bias towards minimising impacts on extractive uses, impacting, for instance, only 1.1% of annual Australian fishery production (Hunt 2012; Barr and Possingham 2013; Devillers et al. 2014; McGowan and Possingham 2015⁵). While there is utility in locating marine national parks where they cause least impact to fishing activity providing that conservation goals are achieved through ensuring CAR principles are met, there is no case to relegate protected areas to residual habitat of limited conservation value.

Large marine national parks support ocean conservation

A very significant conclusion of science with respect to marine reserves is the support for “Very Large marine national parks” to protect relatively mobile species such as tunas and oceanic sharks (Koldewey et al. 2010; Wilhelm et al. 2014) and turtles (Scott et al. 2012), as well as the recognition that such protected areas are necessary to achieve CAR principles for the oceans. Furthermore, there is recognition that management costs are inversely correlated to reserve size, i.e. larger, and more simple, is cheaper. International policy momentum amongst our key regional and trading partners is towards progressing the establishment of large marine national parks, not reducing them. Australia has held a role as a global leader in management of its oceans. A review recommendation to significantly downgrade and/or fragment marine national park protection in the Coral Sea marine reserve, at a time when Australia is well placed to protect a near intact coral and tropical pelagic ecosystem with relatively well resourced and stable governance, would certainly tarnish that reputation and our ability to influence regional efforts towards sustainable marine resource management.

The consensus around the importance of large marine national parks is reflected in general statements as well as statements specific to particular areas:

- SCIENTIFIC RATIONALE FOR THE DESIGNATION OF VERY LARGE MARINE RESERVES: 245 scientists from 35 countries as signatories.
- GREAT BRITISH OCEANS: Statement of support for the creation of marine reserves in the UK Overseas Territories of the Pitcairn Islands, Ascension Island, and the South Sandwich Islands, 44 signatories.
- A CONSENSUS STATEMENT FROM THE AUSTRALIAN AND INTERNATIONAL SCIENCE COMMUNITY ON THE PROPOSED CORAL SEA COMMONWEALTH MARINE RESERVE: Over 300 eminent scientists from 21 countries as signatories⁶.

The establishment of very large marine national parks in offshore environments is on the rise both within national EEZs and on the high seas. Very large marine national parks within the Pacific and Indian Ocean regions now include the Marianas Islands, Northwest Hawaiian Islands, Pitcairn Island, Ascension Island, the expanded Kermadec marine reserve, Palau (Fig. 1), with New Caledonia’s also progressing towards establishing a marine reserve that would directly bound the Coral Sea Marine Reserve. Nowhere among these considerable international initiatives has government favoured marginally economic commercial fishing fleets such as the Coral Sea Tuna longline fishery over conservation. Their establishment is supported by the recognised failure of regional fisheries arrangements to stem the decline of oceanic species (Letessier et al. 2015) in addition to the

⁵ See also: <https://www.youtube.com/watch?v=11DeKJJO7s8> for a how-to of systematic planning.

⁶ <http://www.coralcoe.org.au/news/scientists-call-for-no-take-coral-sea-park>

recognised value of reserving intact ecosystems (or allowing their recovery). Additionally, increasing evidence suggest that even mobile species can benefit from spatial protection (Gunn 2005) and that there is greater than expected pelagic-benthic coupling, necessitating full protection of both seabed and mid-water habitats (Allain et al. 2012, Tsai et al 2015).

RECOMMENDATION 3: The Review should recommend the inclusion of very large marine national parks within the CMR network in line with international approaches (e.g. US, UK, NZ, Chile and Pacific Island nations). Specifically, the Review should recommend retention of the Coral Sea CMR's large marine national park (IUCN II) zone with no reduction in areal coverage or location, since it is one of the few locations within Australia's EEZ where a very large marine national park is currently possible.

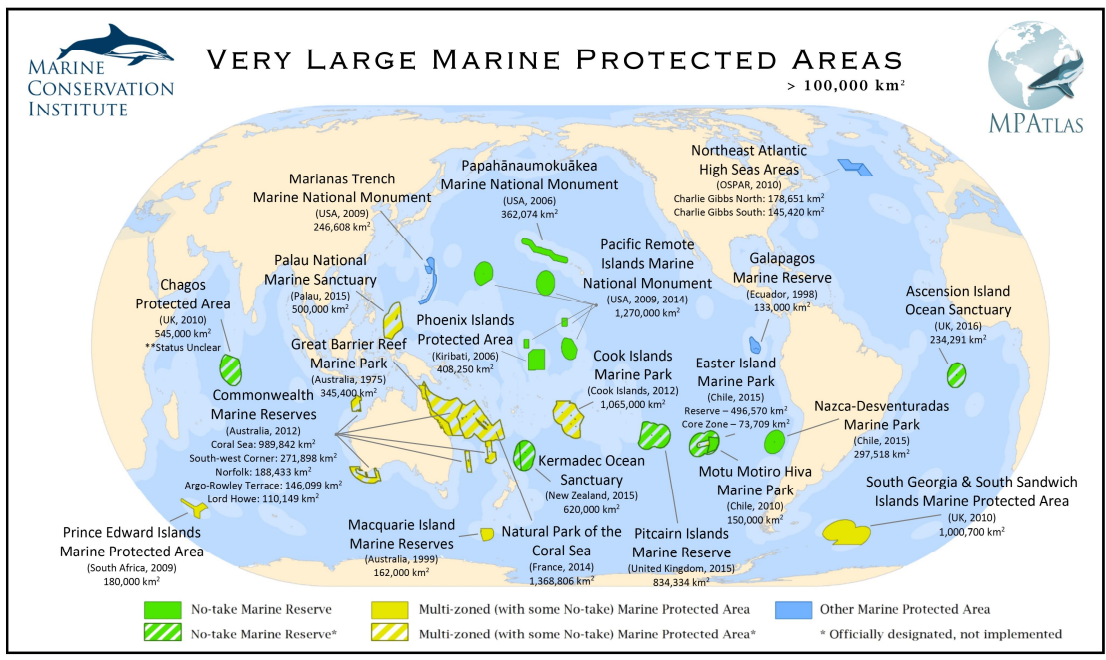


Figure 1: Very large (>100,000 km²) marine reserves (www.mpatlas.org)

STAKEHOLDER CONCERNS

The history of establishing marine national parks demonstrates initial resistance from some extractive users accustomed to access, that was then followed by a demonstration that marine national parks did not have significant negative outcomes for these sectors, particularly compared to the scale of impacts predicted by these sectors before establishment. However, there is strong evidence to suggest there are benefits of marine national parks afforded high levels of protection, both in terms of commercial fisheries (Goñi et al. 2010), recreational fisheries (Pascoe et al. 2014, Arias and Sutton 2013) and other sectors such as tourism (Vianna et al. 2012), education and other benefits (Angulo-Valdes et al. 2010). Principles for a collaborative approach to coastal and marine management including establishment of marine national parks are well established (Stocker, Collard and Rooney 2015).

There is a considerable and growing body of scientific evidence that suggests that if partial protection, as would occur if marine national park zones were replaced with habitat protection zones (seafloor protection only) in the CMR network, it would still accrue much of the management

costs while adding much less in the way of meaningful, measurable conservation outcomes (Ban et al. 2011, Sciberras et al. 2015).

Changes that reduce protection level, reduce coverage of key ecological features, or increase residuality in the location of protected areas may also mean that all or nearly all significant extractive uses that would have occurred under a 'business as usual' scenario continue, effectively as if no marine reserve protection was established at all. Such a scenario leaves the CMR network open to the charge that it is comprised of "paper parks" with associated management costs but few conservation outcomes.

RECOMMENDATION 4: An evidenced-based review considers the benefits, including management, economic and social benefits, of a CMR Network with a strong backbone of IUCN II zoning across representative habitats and explicitly incorporates these benefits (along with costs) into its recommendations. Specifically, the Review would:

- (1) Assess the direct and indirect benefits of IUCN II zoning for extractive users, from marketing advantages to management, including for instance, the value of a CMR network in supporting ecosystem based fisheries management, by providing scientific reference areas to adequately understand and manage the environmental effects of fishing.
- (2) Quantify the reduced benefit/cost ratio where protection is downgraded relative to the increased benefit to extractive uses.
- (3) Evaluate the effects of the marine reserve network on recreational fishing based on the empirical and peer-reviewed data available from the existing extensive marine reserves around Australia.

IN SUMMARY

The Review's terms of reference require it to make recommendations to the Minister that are science- and evidence-based. To this end, zoning recommendations must be consistent with the full range of goals and principles of the NRSMPA, and should not further skew the emphasis towards only a subset of those goals and principles – particularly those around minimizing socio-economic costs. It is essential that the Review takes into account the risk of incentivising extractive sectors with ambit claims of impact that are not supported by evidence. There is a tremendous opportunity for the Review to apply empirical evidence from Australia's existing suite of marine reserves to identified areas of contention in an objective analysis of whether extractive stakeholder concerns around predicted impacts with specific zoning are in line with 'lived experience' of similar stakeholders elsewhere in Australia's existing marine reserve network. The full range of Australian recreational and commercial fisheries and other extractive industries is operational within and around existing marine reserves, in many cases over more than a decade, providing essential information that must be explicitly incorporated into a review based on objective science.

It is our strong view that a Review that recommends further biasing zoning outcomes to avoiding short-term impacts on industry, rather than principles of CAR (Comprehensive, Adequate and Representative), could not do so from a scientific, legitimate, and lasting standpoint. Such an outcome – as elsewhere in Australian conservation management – would provide neither an adequate balance for achieving Australia's marine conservation objectives, nor a durable operating environment of investment certainty for extractive stakeholders.



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