

A review by the Scientific Working Group on Professor Bob Kearney's document 'Comments on the document "Science shows marine park benefits" (Marine Parks, Government of South Australia, undated) as requested by David Hall'.

SWG has reviewed the Prof. Kearney report and comprehensively rejected his commentary. The Kearney critique is fundamentally flawed due to:

- 1. A failure to acknowledge the actual objectives of the South Australian Marine Parks program** coupled with a myopic focus on fisheries management issues that are largely irrelevant in the context of marine parks. This combination results in a failure to deal with the fundamental objective of marine parks which is to provide for biodiversity conservation. Importantly some of the comments represent bad advice, even in the context of fishery management (see below re his comments on intermediate disturbance regimes); if such advice were to be taken it would present a gross threat to the environmental sustainability of South Australia's fisheries.
- 2. Errors of fact** – Prof. Kearney argues that the focus on fishing as a threat is inconsistent with both international and SA norms. The SWG counters that the recognition that fishing is a threat to ecosystem integrity is entirely consistent with national and international environmental best practice. AMSA in its summary identified fishing as one of the three most important threats along with climate change and marine pollution and this is reinforced in the Federal Government's "*A National Approach to Addressing Marine Biodiversity Decline –Report to the Natural Resource Management Ministerial Council*". Furthermore, the SA approach is consistent with international best-practice in that world-wide the impacts of fishing are widely acknowledged as a key threatening process in the management of marine environments; this has been extensively reported by the Food and Agriculture Organisation of the United Nations (e.g. <http://www.fao.org/fishery/topic/12273/en>).
- 3. Errors of fact** – Kearney argues that there is no evidence of the threats posed by fishing. This argument is incorrect as the threats from fishing have been acknowledged in the international scientific literature and they do not need to be re-iterated. The fact that these impacts are being realised in South Australia is clear in the light of recent advice to the SA Government provided by PIRSA fisheries. This states that six out of 16 fisheries in South Australia are over-fished or depleted. Support for this contention exists in the detailed fishery and stock assessments provided by SARDI which includes, for example, evidence on the nature of by-catch in the SA prawn fishery including impacts on rare species of pipe-fish as well as giant cuttlefish and berried blue-crabs.
- 4. Errors of fact** – Kearney argues that Buxton *et al.*, 2006 concluded "Such a negative outcome from a marine reserve fishing closure has been shown to occur with lobster and abalone fisheries in Tasmania in areas where reasonable traditional fisheries management was in operation (Buxton *et al.*, 2006)." This is incorrect—Buxton *et al.*, 2006 predicted that this would occur based on a model of the system and they did not present any data to support this conclusion. Furthermore, Kearney fails to note that Buxton *et al.*, 2006 went on to state that "... this is not to suggest that MPAs do not have a place in marine and coastal management ... this study clearly demonstrates their value for understanding the ecological effects of fishing thus leading to a greater fisheries resource security .."
- 5. Out-dated mode of thinking in relation to issues that have been widely debated in the science community 20–30 years ago and dismissed.** Prof. Kearney makes reference to Connell (1978) who was one of the great ecological thinkers of the 20th century. Connell's theorem referred to as the "intermediate disturbance hypothesis" argues that in some ecosystems higher levels of disturbance can lead to increased biodiversity. Kearney then goes on to make the same argument as the Queensland logging industry made "fishing (or logging) is good for the environment because increased disturbance will result in increased biodiversity". This argument fails in that Connell was referring to natural disturbance regimes and relating this to the diversity of natural systems. Secondly, the objective of biodiversity conservation is to ensure ecological integrity which is not about "maximising

biodiversity” but rather to ensure that we maintain the biodiversity at a natural level. For example one consequence of increased levels of disturbance is that habitats become more susceptible to invasion by weeds. This advice from Prof. Kearney is dangerous because if it is followed it has the capacity to lead to catastrophic failure of ecosystems due to a loss of ecological integrity.

6. **Use of emotive language to divert attention from the key objectives:** Prof. Kearney’s attempts to dismiss the overwhelming scientific support for marine parks as “wishful advocacy”. Such comments have no place in this debate but rather reflect a fundamental lack of appreciation that there is more than just fish in the sea and that it is reasonable to develop a strategy around biodiversity conservation that goes beyond simply maximising fish catches. Examples include his use of the term “fishery closures” when referring to sanctuary zones which is a blatant attempt to divert attention away from the fact that sanctuary zones will prohibit all activities that threaten the ecological integrity of these environments (not just fishing).

These issues are picked up in more detail in the material provided below.

Detailed comments:

Extract from Professor Kearney’s report	Response from the Scientific Working Group
<p>Introduction. Although there is a great deal of literature on marine parks there remains a serious lack of in-depth evaluation of the efficacy of area management of fishing in areas where there is effective regulation of fishing by more traditional techniques, such as catch and effort controls .</p>	<ul style="list-style-type: none"> • Prof Kearney’s opening statement is irrelevant: SA’s MPs are not being set up as a tool for fisheries management. This reflects a fundamental misunderstanding across almost the entire commentary provided by Prof. Kearney in that he seems to assume that the only role for MPAs is as a fishery management tool. This is not the case; in South Australia MPAs are being established as a tool to promote biodiversity conservation. Fishery management issues are not an objective of the MPA program. • Notwithstanding this SA context, the SWG has reviewed a wealth of literature that demonstrates a wide range of flow on benefits from the use of Protected Areas for fisheries purposes. • Evidence around the benefits of spatial closures as an adjunct to fisheries management as used in SA are summarised in the following: <ul style="list-style-type: none"> ○ Due to concerns about commercial over-fishing on the giant cuttlefish breeding aggregation at Point Lowly in Spencer Gulf, a spatial closure was used to manage the commercial take in 1998. This closure has remained in place ever since and the cuttlefish aggregation is still intact. ○ Due to commercial overfishing of western king prawns in Gulf St Vincent, a spatial closure across the entire gulf was used to halt commercial take from June 1991 to Feb 1994 inclusive. The fishery was then re-opened and has remained open since (it is currently considered to be fully-fished). ○ Due to suspected recreational overfishing of western blue groper a spatial closure for the take of this species was implemented in 1980 across the central part of SA. The closure remains in place today and continues to help protect groper in the region. ○ In order to manage the recreational take of western king prawns a spatial closure applies to all State waters <10 m depth. ○ A spatial closure is used to manage the take of Goolwa cockles along the Coorong beaches. ○ A large number of netting spatial closures has been implemented across SA. The most recent of these, in 2005, was due mainly to concerns of overfishing of garfish (N.B. other management measures were also utilised). ○ Seven Aquatic Reserves that are spatial closures to all fishing or some types of fishing have been implemented around the State to protect nursery areas for fished species. ○ Four lobster sanctuary zones that are spatial closures to lobster fishing have been

	<p>implemented around the State.</p> <ul style="list-style-type: none"> ○ The rocky intertidal zone across all of SA is a spatial closure to the take of benthic organisms on rocky reefs down to a depth of 2 m. This measure was implemented to prevent overfishing by recreational fishers but suffers from too little enforcement. ○ Temporally-limited spatial closures also exist for snapper (State-wide during Nov each year) and black bream (upper reaches of Onkaparinga River estuary, Sept/Nov each year). <ul style="list-style-type: none"> ● Note also that the SWG fully understands the role of fisheries management tools in managing fisheries. From the technical report for the outer boundaries (DEH, 2009): <i>“Although MPAs may lead to increased population sizes for some species of fish and invertebrates, it is important to note that they cannot replace fisheries management as a sole mechanism for managing fish stocks. In fact, MPAs are likely to be more effective in achieving their overall biodiversity conservation objectives if they work in conjunction with effective fisheries management. Buxton et al (2006) argue that implementing MPAs alone for fisheries management may actually lead to negative impacts on fish stocks. While MPAs may provide some benefit for fisheries in terms of protecting mature biomass, spawners and egg production; their greatest service is likely to be through increased knowledge (Buxton et al., 2006). Studying protected areas increases our understanding of the ecological effects of fishing and ecosystem based fisheries management.”</i> These seem to be overlooked by Prof. Kearney.
<p>Well managed fisheries, by their very definition, do not seriously threaten resources or the ecosystems that support them.</p>	<ul style="list-style-type: none"> ● Incorrect: the impacts of fishing, even in ‘well managed’ fisheries are acknowledged worldwide as a potential threat to the marine environment. ● In SA, the 2006 PIRSA Fisheries stock status report lists a number of environmental issues associated with SA’s fisheries including bycatch, benthic impacts, habitat disturbance, seal interactions, interactions with endangered or protected species. ● Furthermore, and Prof. Kearney seems to acknowledge this fact, the management response may be ideal but that doesn’t mean that the status of any given fishery will reflect this, e.g. six out of our sixteen fisheries are listed as either over-fished or depleted. ● What is missing in this is Prof. Kearney’s definition of a well managed fishery? ● His commentary appears to confuse the existence of a good management regime with delivering a good outcome in terms of stock status. ● If Prof. Kearney’s definition of well managed fisheries is merely “maximum sustainable yield” then his statement is false. There are numerous examples of ecosystem impacts from managed fisheries, and in most cases the ecosystem effects have never been properly assessed. For example, in Australia under the EPBC Act the ecosystem effects of fishing are assessed through a checklist rather than through measurement of changes in ecosystem function. As

	<p>another example, the FAO of the UN has been trying to broaden fisheries management to be more ecosystem-based since at least 2002 and as yet there has been precious little new data collection on these wider impacts of fishing.</p> <ul style="list-style-type: none"> • The SWG is concerned that Prof. Kearney may be relying on the absence of evidence of an impact whereas that is not the same as having evidence of the absence of any impact. • The most recent advice from PIRSA is that six out of sixteen fisheries are over-fished or depleted which is clear evidence that even the best fisheries management regimes can lead to poor outcomes for the target stock (and this does not even begin to address issues associated with non-target species or the broader habitat / ecosystem effects).
<p>Where there is excessive fishing effort and/or destructive fishing practices and no effective fisheries management, (such as continues to occur in numerous developing countries and/or areas where international cooperation is required, but has proven illusive) closing areas to all extractive and destructive activities is often the only politically achievable action. In such circumstances fishing closures can have spectacular results in localised areas.</p>	<ul style="list-style-type: none"> • This is again missing the main point of the purpose of MPAs in SA – the objective of which is for biodiversity conservation <u>not</u> fisheries management. • The SWG strongly agrees with the broad sentiment but notes that spatial closures may also play a role in areas with effective fisheries management, as is done in SA with aquatic reserves • Specific examples include American River, Whyalla-Cowleds Landing, Yatala Harbor and Coobowie Aquatic Reserves, which have all been established as sanctuaries for the protection of nursery areas for fish and other marine organisms.
<p>Transposition of these results to regions or areas with relatively pristine environments and with well managed fisheries is inappropriate and illogical.</p>	<ul style="list-style-type: none"> • Incorrect, irrelevant and again missing the main point: MPs in SA are being designed for biodiversity conservation to allow some areas to persist at or return to their natural state so as to maintain ecosystem integrity. This is not about fisheries management. • The Buxton <i>et al.</i>, 2006 report provides considerable evidence of the benefit of marine parks even in well-managed fisheries. The empirical data in their report (i.e. the majority of it, viz. ~240 pages of data versus ~120 pages of modelling) seems to be ignored by Prof. Kearney.
<p>There remains an almost complete lack of evidence of effectiveness of area management for the control of major threats to marine environments, such as pollution and introduced organisms, even from areas where the impacts of these threats are obvious.</p>	<ul style="list-style-type: none"> • Regardless, SA’s framework provides for the mitigation of external threats to marine parks • Area management needs to be defined (esp. in the context of biodiversity conservation). • To address this, MPAs in SA will provide a more comprehensive management framework by integrating 12 other Acts and thereby providing a management framework to achieve the conservation outcomes by controlling activities such as aquaculture, mining, discharge, development, dredging, ship anchorage, trawling, other fishing, collecting and motorised water sports. • The GBR provides good illustration of the effectiveness of area management. Illustrated by management of land based pollution of GBR lagoon. • Note that the <i>SA Act</i> provides legislative support to achieve this sort of outcome rather than

	<p>merely relying on political and community goodwill.</p> <ul style="list-style-type: none"> • Area management allows us to manage specific threats through controls over activities (dredging, discharge, fishing, deballasting, etc). • By protecting the ecological integrity of environments you can increase the capacity of the environment to resist invasions, and build resilience to climate change by allowing for unfettered response to the changed climate by populations that are not already stressed by anthropogenic impacts. • Marine parks in SA are not primarily about rehabilitation of degraded areas but rather are about enhancing management regimes to prevent ongoing and future impacts.
<p>The marine environment is extremely volatile, interconnected and even mobile and the transposition of terrestrial management analogies is seldom appropriate; it must only be done with great caution.</p>	<ul style="list-style-type: none"> • Agreed and that is why the South Australian <i>Marine Parks Act 2007</i> was developed. This provides a legislative tool that is designed to deal with the particular context of the marine environment and is not based upon terrestrial management, e.g. national parks.
<p>Most threats to marine environments should be addressed at their source</p>	<ul style="list-style-type: none"> • Agreed, and so the <i>Act</i> strengthens that resolve and provides a way of achieving that, via its influence over 12 other <i>Acts</i> and decisions made under them.
<p>and claims that marine areas can be protected merely by management within those areas themselves are usually wishful and most often misleading</p>	<ul style="list-style-type: none"> • Incorrect: Professor Kearney is obviously unaware that SA’s Marine Parks legislation influences external as well as internal impacts. • As stated above, the <i>Marine Parks Act 2007</i> obligates other marine and terrestrial resource managers to consider the objects of the Act when planning activities within, adjacent to or in the catchments of marine parks.
<p>Wishful advocacy dominates science and independent analysis right from the opening sentence, “Marine parks are internationally recognised as an effective tool to manage and conserve marine resources and biodiversity”. The truth is that marine parks can make a contribution to some, but not all, components of resource and biodiversity management, particularly in areas where there is no other management. But this contribution to conservation is largely determined by the degree to which such parks are properly designed and managed to address clearly defined management needs, such as the amelioration of well described, specific threats. The contribution of marine parks to the management of marine resource use is</p>	<ul style="list-style-type: none"> • Professor Kearney is being emotive in his use of terms such as “wishful advocacy” which contributes nothing to the debate. • What is needed is a clear focus on the objective which is biodiversity conservation. He cannot rebut the statement that “<i>Marine parks are internationally recognised as an effective tool to manage and conserve marine resources and biodiversity</i>” and given that this is our objective then marine parks are a tool to help us achieve this outcome. • In recognising that Marine Parks may coincidentally provide substantial benefit to the status of some fishery stocks—the SWG would argue that this is the icing on the conservation cake and not an objective in and of itself, rather than its aim. • The recognition that fishing is a threat to ecosystem integrity is entirely consistent with best-

<p>most commonly to the allocation of resources between user groups. Like most tools, in the hands of a craftsman they can be used to great effect but in the hands of the poorly trained or misguided they can be useless, or even destructive. Marine parks are certainly not always an appropriate tool and seldom are they the most effective tool to manage collective problems from a variety of threats, such as usually occur in marine environments. Traditional methods of fisheries management usually represent superior alternatives for controlling the effects of fishing.</p>	<p>practice. The Australian Marine Sciences Association, in its summary statement on MPAs, identified fishing as one of the three most important threats along with climate change and marine pollution and this perspective is reinforced in the Federal Government's "<i>A National Approach to Addressing Marine Biodiversity Decline –Report to the Natural Resource Management Ministerial Council</i>" http://www.environment.gov.au/coasts/publications/marine-diversity-decline/pubs/marine-diversity-decline.pdf</p>
<p>The second paragraph confirms that as far as the Government of South Australia is concerned "protection" is to be achieved simply by having "no take" marine reserves which are wishfully called "sanctuary zones". Significantly the activities which have been assumed to have negative effects on South Australia's marine ecosystems, and presumably against which "protection is needed" are defined in DENR, 2011 to include "fishing, mining, pollution, urban stormwater run off, marine pests etc.". Internationally accepted definitions of threats to marine environments invariably include pollution, inappropriate coastal development and introduced organisms and normally include "over-fishing", but not just all "fishing", as has been done in DENR, 2011. For example the International Union for the Conservation of Nature (IUCN) states, "marine and coastal biodiversity is under increasing stress from intense human pressures, including rapid coastal population growth and development, over-exploitation of commercial and recreational resources, loss of habitat, and land-based sources of pollution"(IUCN WCPA, 2005) and the United Nations, Our Common Future (United Nations, 1987) lists overexploitation, pollution and land-based development as threats to marine life. Significantly, even the South Australian State of the Environment Report (EPA, 2008) acknowledged that "degradation of [marine] environments as a result of poor water quality, overexploitation, pollution, introduced pest species, unsustainable development and other factors will diminish the</p>	<ul style="list-style-type: none"> • Incorrect: DENR does not emphasise fishing as a threat. As written above, Professor Kearney is obviously unaware that SA's marine parks legislation influences a wide range of external as well as internal impacts • Scientific literature abounds with examples of the impact of fishing on ecosystem integrity, e.g. cascade effects on trophodynamics, changes in genetic structure of populations, by-catch impacts on Threatened, Endangered Protected species (TEPS), habitat destruction, and other potential impacts that will not occur in areas closed to fishing.

<p>value of our coastline”. The emphasis in DENR, 2011 on fishing as a threat is not consistent with international or South Australian norms.</p>	
<p>As protection has already been stated in DENR 2011 to be the establishment of “no take” areas, not prevention of over-fishing, the unsubstantiated assumption that all fishing is the principal threat has already been made and is being acted upon. But absolutely no evidence is given of what threat fishing poses to any part of any ecosystem and what form of fishing poses that threat. “Fishing” covers a huge variety of activities from bottom trawling for an amalgam of species to fly-fishing for single target species, such as garfish and to assume that all are threats in all areas is ludicrous. To imply that one, non-specific management action, marine parks, is a necessary, appropriate and cost-effective measure that will make a worthwhile contribution to the management of all forms of fishing is wishful advocacy.</p> <p>Logic would dictate that if some form of fishing is a significant threat then it should be managed in all of South Australia's waters where that threat is real. Closing part of the total area to all forms of fishing in the absence of identification of what the threat is and where it is a problem is a seriously inappropriate response. In the absence of proper identification of threats and assessment of options it could never be any more than an extremely imprecise option (a blunt and inefficient tool). Furthermore it is extremely unlikely to be a cost-effective response in any area where good fisheries management is already in place.</p>	<ul style="list-style-type: none"> • Professor Kearney misses the point that all forms of fishing can change the natural structure of fish populations, and that sanctuary zones, which have a biodiversity conservation objective, aim to restore the natural balance and therefore maintain ecosystem integrity. • Where is the evidence for his assertion that this is unlikely to be cost-effective? • There is a wide range of studies that demonstrate the cost of rehabilitation is substantially greater than the cost of protection. Chesapeake Bay provides a classic example where there has been massive expenditure to try and recover the ecological function through rehabilitation of degraded habitat. In Adelaide coastal waters attempts are being made to restore seagrass destroyed by eutrophication, yet they are minimally successful and will be extremely expensive for the large areas involved. So the strategy here in SA is to protect small areas in the best condition now so that costly rehabilitation is not needed in the future.
<p>Blanket bans on fishing have been found to provide conservation benefits in those parts of the world where traditional fisheries management has been absent or not properly applied, normally because of inadequate, or a complete lack of, governance. South Australia has stable Government and “fishing” is already managed by another Government agency (PIRSA), extremely effectively by international standards. The</p>	<ul style="list-style-type: none"> • There is no bias against fishing. The MPA strategy explicitly provides for continued productive use of fishery resources (as required under the <i>Act</i>) and either all or most forms of fishing are to be allowed in general managed use and habitat protection zones, respectively. The issue here is about management arrangements for sanctuary zones, which are likely to comprise only a small proportion (10–15%) of State waters. • Adequate arrangements have been made for the ongoing productive use of coastal waters through the policy commitments made by DENR to various stakeholder sectors. The

<p>projection in DENR, 2011 of “fishing” as a primary threat appears little more than confirmation of unjustified bias against all forms of fishing, no matter whether or not there is a threat or how well that threat may be managed already.</p>	<p>socioeconomic design principles are designed to ensure that during the zoning design phase. Thus appropriate application of the socioeconomic design principles will also ensure that fisheries impacts are minimised.</p>
<p>The extreme priority given to fishing closures in DENR, 2011 is even inconsistent with the subsequent statement in the same document: “One of the main objectives of sanctuary zones is to manage the activities that impact on ecosystems and habitats”. Some forms of fishing may be potential threats if poorly or inadequately managed, but none has been identified by DENR that is currently poorly managed in South Australia.</p>	<ul style="list-style-type: none"> • The placement of sanctuary zones is intended to provide for biodiversity conservation in areas that are currently in good condition and not to try to rehabilitate degraded areas of the environment. Other programs ,e.g. run by the EPA in SA, are designed to rehabilitate degraded areas. • The intention is to ensure that good-conditioned areas now continue to be good to excellent in 10, 20 or 50 years, when the population and technological reach of many human activities will be much greater. Hence sanctuary zones serve a purpose that is separate from other forms of environmental or natural resource management, including for fisheries.
<p>On the other hand, pollution, urban and agriculture runoff and marine pests are well known, current threats (see for example EPA, 2008) that continue to have serious impacts, most obviously near Adelaide and other urban, industrial or agricultural areas. If South Australia’s “sanctuary zones” are to “manage the activities that impact...” then they must be designed and managed to address those activities that are real threats and truly impact. Fishing is the only current activity that is proposed to be prohibited in “sanctuary zones”.</p>	<ul style="list-style-type: none"> • Incorrect – all activities that will impact on biodiversity conservation will be prohibited in sanctuary zones, as detailed in the draft zoning regulations. • The aim is to pre-empt activities that will impact on biodiversity conservation—in essence protect areas that are currently in good condition and manage activities that would present future threats including aquaculture, mining, discharge, development, dredging, ship anchorage, trawling, other fishing, collecting, energy generation, and motorised water sports.
<p>Yet fishing is an assumed but unproven threat that is the only suggested threat already managed by another Government agency (PIRSA) to the highest independently assessed international standards. Such selective action appears more consistent with preconceived bias than scientific assessment or proper precautionary management. Distortion of the fundamental concepts of good resource conservation and management is further displayed in DENR, 2011 in the four key “benefits” defined on the first page: “The positive benefits are significant and include:</p> <ul style="list-style-type: none"> ▪ Increases in the abundance, individual sizes, diversity and overall biomass of sea life 	<ul style="list-style-type: none"> • Prof. Kearney continually argues from a perspective that the only use for marine parks is to manage fisheries—this is patently wrong and fundamentally distorts the debate. • In South Australia we are using marine parks to provide a biodiversity conservation outcome. • Prof. Kearney then takes exception to the fact that numerous authors have reported that there may also be ancillary fisheries benefits. These ancillary benefits are not an objective in and of themselves and whether or not they occur is not of fundamental concern. Where they do occur, they will be welcomed. • In fishery management, maximum sustainable yield represents the point at which a fishery is most productive. • Prof. Kearney seemingly defines a well-managed marine system as one in which the fishery stock is being harvested at its most productive level. This seems to be an overly narrow view

- Increased ability of local marine life to reproduce.
- Spill-over of larvae and / or adults into unprotected areas, and;
- Improvements in ecosystems and habitats (i.e. healthy natural balances restored).”

I will deal with each of these asserted “benefits” in turn:

1. The comments on the scientific literature that are given in DENR, 2011 to support the first dot point are grossly biased by selective reporting of increases in areas that had been seriously overfished or by claiming that any increase in abundance of selected species in one area was actually a benefit and is relevant to South Australia. In many of the areas represented by the papers cited in DENR, 2011 alternative forms of management, such as catch and effort controls, could have been expected to have been more beneficial than marine parks, had they been applied. But the alternatives were not even considered in the Marine Parks” document. Furthermore the basic principles of whether an increase in abundance or size of individuals of a particular species was actually a benefit or merely a change, have been totally neglected.

In well managed marine systems there is usually an optimum number and size of individuals at which the population is at its most productive level (in fisheries management terminology this is usually referred to as the biomass that produces the maximum sustainable yield). Because of density dependent interactions within and between species, this level is usually somewhat below the maximum levels for most individual species.

Furthermore, there are usually much more efficient and cost-effective ways to increase or optimise diversity and overall biomass than marine parks of the type proposed for South Australia, which do little more than prohibit all forms of fishing. Proper analyses of the threats and the cost-effectiveness of alternatives for addressing them is the normal and common-sense way of evaluation of potential benefits from proposed actions. Such analyses have been completely neglected in DENR, 2011. Well managed fishing not only produces well

solely from a fisheries perspective.

- This is irrelevant to the management of marine biodiversity, in which the objective is to ensure ecological integrity.
- Fishery management is not the objective of marine parks, which is to conserve biodiversity. PIRSA will continue to manage fisheries within SA.

<p>defined and easily demonstrated social and economic benefits, such as quality food, jobs and recreation, but it can also actually be good for biodiversity more generally (discussed further below).</p>	
<p>2. The claim in DENR 2011 that the ability of South Australia’s marine life to reproduce will be enhanced by marine parks is unsubstantiated: it appears contrary to reality. I am not aware of any species of fish in South Australia that has been fished to the point where recruitment has been diminished to the detriment of the species. No evidence is provided that the ability of any species to reproduce has been significantly impacted by fishing. If there is evidence of reproduction of any species having been significantly impaired due to fishing then analyses are necessary to confirm that marine parks represent the most appropriate or cost-effective means of addressing this. It is not disputed however, that nursery habitats, such as those associated with seagrass beds around population centres such as Adelaide have been seriously depleted, primarily by activities other than fishing. Such degradation may well have impacted the ability of some species to reproduce, at least in these areas. But these areas are deliberately left out of South Australia’s marine parks, as discussed below.</p>	<ul style="list-style-type: none"> • Error of fact: PIRSA categorises 6 out of the 16 fisheries in SA as being overfished or depleted. Historically there have been recruitment overfishing issues in relation to garfish, King George whiting, snapper, native flat oyster and ocean leatherjacket. • Uncertainty remains about the cause of declines in rock lobster but note that the northern zone fishery is now listed as depleted with current catch quota set at only 25% of what it was 20 years ago and a third of what it was 10 years ago. • More importantly the issue is not always about larval supply <i>per se</i> but also about the genetic diversity of heavily exploited populations. This is a biodiversity-conservation issue because management by size limits alone will drive genetic selection (and hence evolution of fished stocks, Darimont et al., 2009) which can result in stunted populations (e.g. abalone fishery – Worthington & Andrew, 1997). • There are numerous examples in South Australia where the status of fisheries is sub-optimal (by the Prof. Kearney definition). We acknowledge that management has the capacity to address this through limiting catch rates (input or output controls) but it should be noted that such intervention will not provide a biodiversity conservation outcome.
<p>3. A spill-over of larvae would only be a benefit if and where there was a shortage of larvae: As noted above this has not been reported to be the case for even a single fished species in South Australia. Spill-over of adults “into unprotected areas” is one of the common claims of benefits for fisheries by uncritical advocates of marine parks, but there is a complete lack of evidence of this being a benefit in areas where there is well managed fishing, such as in the waters of South Australia. While some movement or “spill-over” undoubtedly occurs between some areas it must not be assumed this is automatically a benefit. In South Australia the areas outside the so called “sanctuary zones” are not “unprotected” as implied in DENR, 2011, except in the heavily polluted areas adjacent to high</p>	<ul style="list-style-type: none"> • Prof. Kearney’s definition of benefit seems to be largely restricted to an increase in fishable biomass across the whole of the fishery. This ignores the benefit of improved ecosystem integrity or the fundamental importance of preserving the condition of habitats including spawning or nursery habitats. • There is a lot more in the sea than just fish. The forests of the sea (kelp), the grasslands of the sea (seagrass) and many other habitats are critical in providing habitat and ecosystem services that range far beyond fishing benefits. • There are many areas throughout the state where the marine environment is subject to existing anthropogenic influences that have led to the degradation of coastal ecosystems. These may increase with future development.

<p>human population densities, such as near Adelaide.</p>	
<p>There may also be some relatively small areas where comparatively sedentary and highly targeted species such as lobsters have been subjected to excessive localised depletion and where tighter management controls may be required. However, the waters of South Australia are generally the subject of good fisheries management and have populations of species deliberately maintained around the optimum levels for maximising Ecological Sustainable Development (ESD, Australia's goal for all natural resource management). As such the surplus production from the populations in the total area of distribution of the species is close to the maximum. If there is spill-over into already well managed areas it is most unlikely to be a net benefit to the total population or to fisheries based on it. When the negative impacts of the redistribution of fishing effort, that are inevitably associated with closing areas to fishing, are taken into account the end result will more likely be negative than positive.</p> <p>Such a negative outcome from a marine reserve fishing closure has been shown to occur with lobster and abalone fisheries in Tasmania in areas where reasonable traditional fisheries management was in operation (Buxton <i>et al.</i>, 2006). These species and areas are more relevant than most considered in DENR, 2011 and, as later discussed, they are given particular prominence in the concluding comments in DENR, 2011.</p>	<ul style="list-style-type: none"> • Incorrect: The effectiveness of an MPA in SA is not measured by its fishery benefit. • Effectiveness is determined by the effectiveness of conservation of biodiversity and maintenance of ecological integrity (<i>sensu</i> Fairweather, 2010). • Buxton <i>et al.</i> (2006) did not demonstrate an adverse effect occurring in reality but rather predicted this as an outcome using a model of the system. No data were presented therein as a test of that prediction.
<p>4. "Improvements in ecosystems and habitats (i.e. healthy natural balances restored)" can only be a benefit to areas that have been degraded in some way, unless there is intent to change systems to what is deemed to be "improved". Here it is most significant that the South Australian Government has deliberately avoided using the process of marine parks to address problems with degraded areas. Marine parks in this State have been specifically designed not to address this issue, as stated by Allan Holmes, "Quite simply the aim of marine parks is to preserve good examples of marine environments, not</p>	<ul style="list-style-type: none"> • Incorrect: We are not looking to use MPAs to rehabilitate extensively degraded habitats. • The central aim of the MPA program in SA is to identify those habitats in the best possible condition and protect them. Prof. Kearney cannot just unilaterally redefine the aim of the relevant <i>Act</i> to fit something he would prefer to argue about.

<p>restore degraded ones” (Allan Holmes, Correspondence with the Victor Harbor Times, February 1, 2011). Thus by this admission alone, South Australia’s marine parks are not intended to contribute to this fourth espoused benefit. Therefore, as for the other three, it is completely false and misleading to claim it represents a benefit that can be anticipated from marine parks in South Australia.</p>	
<p>What follows in DENR 2011 is a series of comments on numerous publications from around the world that are claimed to support the incorrectly asserted benefits discussed above. These comments collectively represent biased advocacy for marine parks that is contrary to the conclusions that should be drawn from the appropriate available literature. It is not the individual papers that are at fault here, but rather it is the selective misinterpretation in DENR, 2011 of what they contain and/or the disregard for the context in which the papers have been written. Accordingly, it is consideration of the impact of the comments on these papers collectively that is important, not discussion of each paper. However, as the collective impact is summarised in the final section of DENR, 2011 under the pertinent heading “Are these studies relevant to South Australia?”, the few papers considered in this concluding section warrant special consideration.</p> <p>The penultimate paragraph in DENR, 2011 states, “To reduce the effect of poor fisheries management on the study, Fairweather <i>et al.</i> (2009) examined a subset of the Lester <i>et al.</i> (2009) dataset that came from countries with temperate waters and efficient fisheries management of the kind found in New Zealand, Canada and Australia”. It is then concluded that “the researchers found an even stronger effect than Lester <i>et al.</i> (2009) with a mean biomass increase of 975% in sanctuaries. Thus it can be concluded that international experiences of the effects of marine sanctuaries are relevant to South Australia”. First, it must be noted that this reference to Fairweather <i>et al.</i> (2009) and the statement that “researchers found”, are both incorrect. The Fairweather analysis that contained these results was actually a minority report by Fairweather alone (this is not</p>	<ul style="list-style-type: none"> • Professor Kearney’s comment is irrelevant: Irrespective of his particular comments upon this case, all of these data were available in the on-line appendix to the original paper by Lester <i>et al.</i> (2009) and it is legitimate to make use of that data in any meta-analysis. The SWG would much rather argue about fact than mere opinion. • Opponents of MPA systems like Prof. Kearney seem to rest a lot of their faith that MPAs only “work” in areas where fisheries management is poor, and hence should not be considered at all in countries like Australia. In fact, there are many data showing responses in places with the supposedly “well-managed” fisheries status— thus these many reports cannot be ignored with a gross generalisation about inappropriateness. • Likewise arguing away individual papers as being ‘special cases’ seems to be an odd tactic. Even discounting any studies (like in all of science, including fisheries) where the design, data collection and analysis leave something to be desired, there is a lot of evidence about what MPAs have resulted in for places comparable to SA.

<p>obvious in the accreditation of Fairweather's document but it is stated in the text) that was an appendix to Fairweather <i>et al.</i> (2009). It appears the other two scientists did not wish to be associated with Fairweather's conclusions.</p> <p>But, it the statement in DENR, 2011 that the Fairweather analysis was to “reduce the effect of poor fisheries management on the study” by Lester <i>et al.</i> (2009) that most warrants analysis. Only one of the data points used by Fairweather is actually specifically mentioned in Lester <i>et al.</i> (2009) where it is stated “the second highest biomass datum is the subject of a study that examined a single economically important species;</p>	
<p>in the Governor Island reserve in Australia, rock lobster biomass was documented to be 2300% higher inside the reserve, due to very low biomass levels of lobster outside the reserve (Edgar & Barrett 1999)”. The very low biomass levels for a single species outside the reserve were because the study area had been seriously overfished for this species prior to the study. It would seem obvious that it must have been if the levels were so low they could be increased by 2300%! Thus the analysis used in DENR 2011 to supposedly account for the effects of overfishing was fatally flawed: data that were used to supposedly represent an area with good fisheries management were from a seriously overfished area. Once again the assumed “benefits” of marine parks in South Australia have been exaggerated by wrong interpretation and biased misuse of the available science.</p>	<ul style="list-style-type: none"> • Thus an area that has good fishery management can still be over-fished. • Marine parks therefore provide an insurance policy against management failure. • The re-analysis was not done “to supposedly account for the effects of overfishing “ – instead it was done to examine the effect of MPAs in areas that might be ‘well managed’ versus not – this seems to be a very biased mis-reading of the meta-analysis.
<p>It is surprising that any analysis that predicted a beneficial increase in biomass of 975% that was independent of the quality of existing fisheries management would not be questioned by anybody intending to use it: how could such a high figure actually be achieved in areas where resources are well managed? The figure of 975% is not just most unlikely for areas that have well managed fisheries it is outstandingly irrelevant to South Australian marine parks which are to be established in relatively “pristine” areas (see for example the Allan Holmes reference above). An increase in overall biomass, or indeed of</p>	<ul style="list-style-type: none"> • This comment is taken out of context from the Buxton <i>et al.</i> (2006, p346) report which states that “IF” [our emphasis] fisheries are managed according to ESD principles then ... fishing should not be a key threatening process. This report goes on to state that “... this is not to suggest that MPAs do not have a place in marine and coastal management ... this study clearly demonstrates their value for understanding the ecological effects of fishing thus leading to a greater fisheries resource security ..” • Thus the points preceding and following on from the quote that Prof. Kearney provides are crucial to seeing that Buxton <i>et al.</i> (2006) is much more balanced in its assessment of MPAs than Prof. Kearney would like readers to believe. We have had that confirmed by Drs Edgar and Barrett (<i>pers. comm.</i>).

<p>any significant component of it, in these areas of 975% would not only be virtually impossible, but it would probably be devastating if it was achieved.</p> <p>It is also most interesting that the authors, Edgar and Barrett, of the paper that has been used by Lester <i>et al</i> (2009) and subsequently Fairweather, to report tremendous increases in lobster populations in a marine reserve (Edgar and Barrett 1999), combined with three colleagues in 2006 to report on areas that by then had relatively good fisheries management. They concluded from studying predominantly lobsters and abalone in and around Tasmanian marine reserves that good fisheries management by traditional techniques (in accordance with Australia’s accepted principles of Ecologically Sustainable Development) not only offers benefits for fisheries that are superior to those derived from marine parks but, equally importantly, also “offers a potentially better outcome than no-take MPAs (even) for biodiversity conservation” (Buxton, Barrett, Haddon, Gardiner and Edgar 2006).</p>	
<p>The Lester et al. (2009) paper that is given prominence in the DENR, 2011 conclusion on the relevance of their many citations to the situation in South Australia, when carefully examined, contains further statements that are completely contrary to the DENR claim that marine parks will bring great benefit even in areas with good fisheries management. A key statement in Lester et al. (2009) actually corroborates the suggestion of better biodiversity outcomes from well managed fishing than from marine reserves reported by Buxton et al. (2006). On this subject it states, “Whether we would predict an increase or decrease in species diversity in response to reserve protection likely depends on the level of human disturbance (i.e. fishing pressure) and predation in the system. As expected from the intermediate disturbance hypothesis and community succession theory (Connell, 1978), diversity is likely to increase in reserves when fishing outside is more intense but may decrease in reserves when fishing is moderate to light outside the reserve”. In other words in areas where fishing is well managed by traditional techniques marine reserves were likely to actually</p>	<ul style="list-style-type: none"> • Outdated mode of thinking: As Joseph Connell himself has noted, many resource managers have mis-interpreted his Intermediate Disturbance Hypothesis as some sort of “licence to disturb” – in fact every disturbance that is put in by humans tends to add to the overall disturbance of the natural regime. Therefore no disturbance is “just like in nature”; more likely it is imposed on top of what naturally occurs. • IDH was not developed in relation to logging but foresters tried to apply it to justify their particular activity as just another disturbance. • The combined effect of this additional disturbance is often a negative impact on ecosystems. i.e. the declining side of the hump-shaped curve under increased disturbance overall. • In any case, an increase in diversity <i>per se</i> is not necessarily a benefit—of this <i>Act</i> is to maintain ecological integrity and hence ensure biodiversity. Many highly disturbed and exploited systems have higher diversity due to the profligate development of r-selected vs. K-selected species (i.e. fast-growing weedy species might be favoured over slower species that persist for longer in the system—hence a natural balance might be upset).

<p>have a negative effect on biodiversity. This is additional to the likely negative effects on fisheries discussed above</p>	
<p>Obviously the conclusions drawn by DENR from even the papers selected in its own document, DENR, 2011, are biased and misrepresent and distort the likely outcomes of marine parks to the people of South Australia.</p>	<ul style="list-style-type: none"> • The conclusion drawn by DENR is simply that— international experiences on the effect of marine sanctuaries are relevant to South Australia. This is a responsible and conservative approach whereby knowledge from elsewhere is evaluated as a basis for considering likely outcomes from a marine parks program. • Prof. Kearney proffers this opinion fails to take account of the intricacies of the relevant <i>Act</i>; indeed he seems to display no understanding of the SA <i>Marine Parks Act</i>. His comments also reflect a lack of understanding of biodiversity conservation principles in conservation planning or the prime goal of marine parks in SA—to conserve marine biodiversity.

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