



SOCIAL, CULTURAL AND ECONOMIC SCIENCE TECHNICAL PAPER FOR NSW MARINE PROTECTED AREAS

**A report commissioned by NSW DPI on
behalf of the Marine Estate
Management Authority**

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ABBREVIATIONS

AIATSIS	Australian Institute of Aboriginal and Torres Strait Islander Studies
BRUVs	Baited Remote Underwater Video Systems
CAR	comprehensive, adequate and representative
CARE	Centre for Agricultural & Regional Economics
GDR	Great Dividing Range
IUCN	International Union for the Conservation of Nature
MEEKP	Marine Estate Expert Knowledge Panel
MEMA	Marine Estate Management Authority
MPA	marine protected area
NSW	New South Wales
TARA	threat and risk assessment

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1. INTRODUCTION

The Marine Estate Management Authority¹ is developing a draft network management plan for the five NSW mainland marine parks (Cape Byron, Solitary Islands, Port Stephens-Great Lakes, Jervis Bay and Batemans marine parks).

To inform this work, this technical paper reviews the social, cultural (Aboriginal and non-Aboriginal) and economic sciences, based on published literature, associated with marine protected areas (MPAs)² in NSW from 2010 to April 2021. This review provides an update on these sciences relevant to NSW since the earlier *Independent Audit of NSW Marine Parks* (Beeton et al. 2012) and the need to provide up-to-date advice to inform the current development of a new network management plan for the five mainland marine parks in 2021.

The review focusses on the objects of the *Marine Estate Management Act 2014* (the Act) and secondary purposes of NSW MPAs as outlined in ss.22 and 33 of the Act³. It is framed within the broader context of the primary purpose of MPAs, also outlined in s22 and s33 of the Act, and assesses their performance towards achieving their secondary purposes. This includes identifying the social, cultural and economic benefits derived from the natural assets within NSW MPAs. The focus of the review is on literature and other evidence from relevant social, economic and cultural studies in NSW from 2010 to early 2021.

An additional focus for this review is considering the capacity of NSW MPAs to mitigate threats to social, cultural and economic benefits in the context of the NSW Marine Estate Management Authority's *Threat and Risk Assessment* (BMT WBM 2017). Recommendations are provided to inform future priority areas of social, cultural and economic research on NSW MPAs and assessments of their effectiveness in achieving the requirements of the Act and *NSW Marine Protected Areas Policy Statement* (MEMA 2017).

The terms of reference for this study are provided in Appendix 1 and a description of the methods used in this study are described in Appendix 2. The remainder of the report is structured as follows:

- Section 2 provides the context to the literature review by describing MPAs in NSW, their current management context and the threats and risks to the marine estate and the capacity of MPAs to mitigate these risks.
- Sections 3 to 5 provide the literature reviews for the economic, social and cultural sciences, respectively, relevant to NSW MPAs.
- Section 6 provides conclusions and recommendations from the literature reviews.

¹ The Marine Estate Management Authority advises the NSW Government on the management of the NSW marine estate. The Authority brings together the heads of the NSW Government agencies with key marine estate responsibilities. These agencies are the Department of Regional NSW (via the NSW Department of Primary Industries), Department of Planning, Industry and Environment and Transport for NSW.

² Namely, marine parks and aquatic reserves. Marine protected areas are parts of the NSW marine estate managed to conserve marine biodiversity and support social, cultural and economic uses, marine science, recreation and education.

³ A description of sections 22 and 33 of the Marine Estate Management Act is provided in Section 2.2.1.

2. MARINE PROTECTED AREAS IN NSW

2.1. General Overview

Marine Protected Areas (MPAs) are a spatial management tool that are a highly regarded and common approach globally to marine conservation. MPAs are an integral part of the management of the NSW marine estate (estuaries, coastline and state marine waters). In NSW MPAs cover approximately 35 per cent of state coastal and estuarine waters including: 20,000 hectares comprising aquatic components of terrestrial national parks and nature reserves; 12 aquatic reserves covering around 2,000 hectares; and six multiple use marine parks covering approximately 345,000 hectares (MEMA 2017).

Approximately 6 per cent of the NSW marine estate is zoned as highly protected or no-take (i.e. sanctuary zones), equivalent to IUCN protected area category II National Park. The remainder of the estate allows varying levels of extractive resource use and other activities, equivalent to Category IV Habitat/ Species Management Area (Beeton et al. 2012).

The primary legislation relating to MPAs in NSW is the *Marine Estate Management Act 2014* (the Act). Under ss.22 and 33 of the Act the purposes of marine parks and aquatic reserves are outlined respectively. In summary, the primary purpose of marine parks is to conserve biodiversity and maintain ecosystem integrity and ecosystem function of bioregions in the marine estate. Aquatic reserves generally conserve smaller areas than marine parks. They are intended to be a flexible and responsive spatial management tool focused on biodiversity conservation of particular components of an ecosystem, community or species important in a specified area of the marine estate.

MPAs currently operate by regulating activities in a prescribed area and implementing a range of non-regulatory programs (education, research etc.) that together aim to reduce the threats and risks to biological diversity, and/or to meet community values of scientific research, public appreciation and enjoyment and/or Aboriginal cultural uses (MEMA 2017).

2.2. Current Management Context and Background

In 2017, the NSW Government released the *Marine Protected Areas Policy Statement* which clarified the future role and purpose of MPAs in the management of the NSW marine estate. The Policy Statement states the NSW Government's aim is to maintain the existing comprehensive network of MPAs in NSW, while improving their management within the holistic management arrangements for the entire NSW marine estate via the application of the Marine Estate Management Authority's five-step evidence based decision-making process (described in Section 2.2.2).

The Policy Statement notes that MPAs are an important management tool to address priority threats to marine and estuarine habitats and biodiversity and to the social and economic benefits derived from the NSW marine estate. Priority threats are identified by an evidence-based marine estate threat and risk assessment.

The Policy Statement builds on the NSW Government Response to the *Independent Scientific Audit of Marine Parks in NSW* (NSW Government 2013) and the Authority's document *Managing the NSW Marine Estate: Purpose, Underpinning Principles and Priority Settings* (MEMA 2013).

2.2.1. Secondary purposes of NSW MPAs

As described in Section 2.1, the primary legislation relating to MPAs in NSW is the *Marine Estate Management Act 2014* (the Act). Under sections 22 and 33 of the Act the purposes of marine parks and aquatic reserves are outlined respectively.

Where consistent with the primary purposes of biodiversity and ecosystem conservation, the secondary purposes under the Act allow for other uses in marine parks and aquatic reserves. These include, for example, use of resources consistent with the principles of ecologically sustainable development, such as fishing, aquaculture, tourism, boating, research, education, appreciation, enjoyment and Aboriginal cultural and maritime heritage uses.

More specifically, sections 22 and 33 of the Act state that the secondary purposes of a marine park (or aquatic reserve), where consistent with the primary purpose of marine parks and aquatic reserves, are:

- to provide for the management and use of resources in the marine park (or aquatic reserve) in a manner that is consistent with the principles of ecologically sustainable development, and
- to enable the marine park (or aquatic reserve) to be used for scientific research and education, and
- to provide opportunities for public appreciation and enjoyment of the marine park (or aquatic reserve), and
- to support Aboriginal cultural uses of the marine park (or aquatic reserve).

2.2.2. Developments in management since 2013

The *Independent Scientific Audit of Marine Parks in NSW*, commissioned by the NSW Government in mid-2011, concluded that management of the NSW marine estate required changes to governance arrangements and policy objectives. These changes were needed particularly to reduce social conflict and improve effective management of coastal and marine resources beyond existing MPAs (Beeton et al. 2012).

The Independent Scientific Audit (Beeton et al. 2012) made a number of recommendations, which included the following relevant to research in the economic and social sciences informing MPA performance:

Research priorities:

- An overarching recommendation (B) on research priorities, in particular “research in the social and economic sciences and the application of these findings to management.”
- Well-directed work is needed to incorporate social and economic data into decision-making in order to help all parties—taxpayers, consumers, industry participants, agencies and the wider NSW community—to better understand the social and economic benefits and costs of marine parks (R4.1).

Incorporating economic sciences, social sciences and Indigenous knowledge into decision-making:

- Rigorous social impact assessments are to be made a central component of the methods used to establish and manage NSW marine parks. The social impact assessment framework needs to analyse, monitor and manage the intended and unintended social consequences (both positive and negative) of marine parks and any social change processes that are invoked (R7).
- [M]arine park ... planning processes should ... allow for a more strategic and cross-disciplinary approach to considering social impacts, which should include specific and targeted consideration of social impacts

(incorporating qualitative research techniques) that is separate from (but informed by) consideration of economic impacts, with particular attention given to key groups within the community (R7.1).

- Local Indigenous knowledge and expertise of land and sea management to be explicitly incorporated into the establishment and ongoing management of NSW marine parks (R10).

Consistent with the Audit recommendations, the NSW Government implemented a new approach to sustainable management of the NSW marine estate, including all marine waters, estuaries and coastal areas and the MPAs.

In response to the findings of the Audit, the Government also established the Marine Estate Management Authority (MEMA), which comprises representation from the main government agencies involved in marine estate management and an independent Chair. It also appointed an independent Marine Estate Expert Knowledge Panel (MEEKP) to provide expert advice spanning ecological, economic and social sciences to underpin evidence based decision making (NSW Government 2013). MEMA has overseen the development of

- the *Marine Estate Management Act 2014* (which provides for strategic and integrated management of the whole marine estate)
- a threat and risk assessment framework to help guide the articulation of the main threats and level of risk to the social, economic and environmental benefits of the NSW marine estate (MEMA 2015)
- a state-wide threat and risk assessment which assessed the threats and risks to environmental assets as well as to the social, cultural and economic benefits derived from the marine estate (BMT WBM 2017)
- a 10-year statutory, state-wide Marine Estate Management Strategy to respond to the priority state-wide threats and to inform marine estate management at the bioregion and local scale (MEMA 2018).

MEMA outlined its new approach to marine estate management via the release of the document, '*Managing the Marine Estate: Purpose, Underpinning Principles and Priority Setting*' (the Principles Paper). The Principles Paper indicated that the NSW marine estate is to be managed as a single continuous system for the greatest well-being of the community. This approach aims to maximise current and future economic, social and environmental benefits (MEMA 2013, BMT WBM 2017).

MEMA (2013) established the vision for the NSW Marine Estate, which is to have a

healthy coast and sea, managed for the greatest well-being of the community, now and into the future

and set out the underpinning management principles which are described in Table 2-1.

Table 2-1 Principles for managing the NSW marine estate

Fact	Implications/challenges	Principles applied
The estate is largely an open access resource	Identify key community benefits (what the community wants) from the estate and threats to those benefits	1. Effective community engagement, to identify and inform key benefits and threats
Management resources are limited	Management effort needs to be directed to where it produces most benefit to the community, for now and into the future	2. Identification of management priorities will be based on threat and risk assessment

Fact	Implications/challenges	Principles applied
Multiple benefits are derived from the estate	Trade-offs between non-complementary uses will be necessary to maximise overall benefits to the community, now and into the future Some access rights have already been assigned	3. To evaluate trade-offs, values will be placed on alternative uses of the marine estate 4. Best available evidence will be used in trade-off decisions, but judgment will still be required 5. The well-being of future generations will be considered 6. Existing access rights will be respected
Knowledge gaps and uncertainty exist about ecosystems, threats and the effectiveness of management	Marine ecosystems can be damaged irreversibly	7. The precautionary principle will be applied
Management should be efficient, transparent and accountable	To maximise community benefits, management programs will align private incentives and behaviours with preferred community outcomes and be as light-handed and least cost as possible Monitoring, measurement and clear reporting of change in community benefits is required Management will need to adjust to new information as it emerges	8. Efficient and cost-effective management to achieve community outcomes 9. Management decisions will be transparent and adjust in response to new information 10. Management performance will be measured, monitored and reported and information pursued to fill critical knowledge gaps

Source: MEMA (2013).

MEMA developed a 5-step decision making framework under the new approach to marine estate management. In summary, these steps are to:

1. Identify key economic, social and environmental benefits that the marine estate provides to the NSW community, preferably using scientifically robust social research methodology
2. Assess threats and assign risk levels to those threats so that management efforts can be focused on the most important issues
3. Assess the adequacy of current management settings and alternative options for addressing priority threats
4. Implement the most efficient management settings. In the context of MPAs, if MPAs are identified as one of the management responses that can best address the priority threats and risks, CAR⁴ principles will be considered in assessing the design options for these areas

⁴ CAR principles - *Comprehensiveness*: MPAs will include the full range of ecosystems recognised at an appropriate scale within and across each bioregion; *Adequacy* - MPAs will have the required level of reservation to ensure the ecological viability and integrity of populations, species and communities; *Representativeness* - those areas selected for inclusion in MPAs should reasonably reflect the biotic diversity of the marine ecosystems from which they derive (ANZECC TFMPA 1999).

5. Be accountable to the NSW community in terms of monitoring the effectiveness of management settings (MEMA 2013, MEMA 2017, BMT WBM 2017).

By applying the 5-step process, the aim is to take account of ecological threats and risks, economic, social and cultural considerations and evaluation, and improve public communication and engagement processes (MEMA, 2013).

This process started in 2014 (Step 1) when MEMA worked with the NSW community and experts, including the Marine Estate Expert Knowledge Panel (MEEKP) to identify the benefits of the marine estate to the community in terms of the environmental, social, cultural and economic values and benefits (Sweeney Research 2014).

A state-wide *Marine Estate Threat and Risk Assessment Report* was completed in 2017 (BMT WBM 2017) (Step 2). It prioritised the key threats to the social benefits of the marine estate (such as public participation and enjoyment of various uses and activities) and economic benefits derived from the marine estate (such as employment and the value of production). It also prioritised stressors on a broad range of natural assets such as clean water, marine habitats and protected species and ecological communities across both estuaries and open coasts.

The outputs of the threat and risk assessment are being used as a key input to inform the development of management responses at a state-wide scale, as well as regional and local scales. The latter primarily being addressed through new marine park management plans (Step 3). At the state-wide scale, a 10-year NSW Marine Estate Management Strategy was released (MEMA 2018) (Step 4). The Strategy establishes the overarching framework for the State government to coordinate management of the marine estate⁵, setting out nine management initiatives (MEMA 2018). These are:

1. Improving water quality and reducing litter
2. Delivering healthy coastal habitats with sustainable use and development
3. Planning for climate change
4. Protecting the Aboriginal cultural values of the marine estate
5. Reducing impacts on threatened and protected species
6. Ensuring sustainable fishing and aquaculture
7. Enabling safe and sustainable boating
8. Enhancing social, cultural and economic benefits
9. Delivering effective governance.

The Strategy outlines 53 management actions to address the priority state-wide threats (Step 4), informed by consultation with key stakeholders and marine estate agencies. Annual implementation plans and reports are provided to inform progress on implementation.

⁵ The *Marine Estate Management Act* states “The purpose of a marine estate management strategy is to set the over-arching strategy for the State government to co-ordinate the management of the marine estate with a focus on achieving the objects of this Act.”

The Marine Estate Monitoring and Evaluation Framework (Step 5) outlines the program logic for the Program and individual initiatives, key performance indicators and monitoring and evaluation requirements to track the performance of the Strategy. It also enables additional evidence to be collected in response to key knowledge gaps identified in the state-wide threat and risk assessment (MEMA 2018).

At the regional scale, MEMA is overseeing the development of a single statutory ‘network management plan’ for the management of the five mainland marine parks. The management plan will replace the current separate zoning and operational plans and be informed by the five-step process outlined above. The management plan will document the management objectives, actions and programs intended to deliver on the management objectives. A stronger emphasis on performance monitoring and assessment of management activities will be included (MEMA 2017).

2.3. Threats and Risks to NSW MPAs and Capacity to Mitigate

The state-wide threat and risk assessment (BMT WBM 2017) identified 25 priority threats to social, cultural and economic values/benefits (Table 2-2) of the marine estate. In Table 2-2 we have identified the priority threats that MPA designation and management can address directly (as a primary tool) or can assist with addressing as part of a suite of tools (that is, as a complementary tool). Our assessment is based on discussions in the MPA Policy Statement (MEMA 2017). MPA management planning is transitioning from an approach focused on Comprehensive, Adequate and Representative (CAR) management of marine biodiversity and ecosystems in marine bioregions via MPAs, based on zoning, to an evidence-based threat and risk assessment focus on conserving the full suite of values (environmental, social, cultural and economic) and threats to those values implemented through MPA management plans. Therefore, the list of threats that MPA management can address, as listed in Table 2-2, are in transition too and could change. However, as the draft plan has not yet been finalised, we are limited to discussing current management approaches as described in published documents.

As highlighted in Section 2.2, MEMA released a marine protected areas policy (MPA policy) statement in October 2017, clarifying their role and purpose (MEMA 2017). The MPA policy states that MPAs are an important management tool for addressing social, cultural, economic and environmental threats, typically those that can be regulated within the boundary of the MPA itself (such as harvesting, wildlife interactions and disturbance, and resource-use conflict). The Policy Statement indicates that MPAs are less effective in dealing with off-site impacts such as land-based runoff, water pollution, litter and marine debris, erosion, marine pests, overcrowding, and legacy issues (including contamination, habitat loss, and reclamation). The Policy highlighted that, depending on their design, MPAs can:

- conserve and enhance ecological function and values of marine ecosystems
- maintain biodiversity in the marine estate
- protect unique habitats and species of high conservation value, including rare, threatened or depleted species
- assist in increasing resilience of biodiversity and habitats to climate change depending on the spatial extent, location and accompanying management regulations within the MPA being appropriate to the task
- help increase ecosystem resilience by limiting extraction and use

- provide reference areas for research or monitoring based on the absence of all or selected extractive activities
- show increased size and abundance of commonly fished species inside no-take zones, which is evidence for a direct benefit to non-extractive recreation in those areas and possible benefit to fisheries outside these zones
- develop community and education opportunities to discover and interact with the marine environment
- conserve indirect economic benefits (intrinsic and bequest benefits) in particular areas of the marine estate
- conserve and protect Aboriginal cultural, geological and heritage sites
- provide economic opportunities for nature-based tourism and recreational activity
- address resource use conflicts by providing designated areas for specific uses such as areas available for recreational fishing and no-take areas for passive users such as snorkelers, divers and swimmers (MEMA 2017, MEMA 2018).

Table 2-2 Priority threats to social, cultural and economic benefits

	Priority threats (numbered in order of significance across the marine estate)	Addressed via current MPA designation and management?
1	Water pollution on environmental values - urban stormwater discharge	No
2	Water pollution on environmental values - agricultural diffuse source runoff	No
3	Water pollution on environmental values - litter, solid waste, marine debris and micro plastics	No
4	Inadequate social and economic information	Yes, complementary tool
5	Lack of compliance with regulations (by users) or lack of compliance effort (by agencies)	Yes, complementary tool
6	Limited or lack of access infrastructure to the marine estate	Yes, complementary tool
7	Reductions in abundances of species and trophic levels	Yes, primary tool
8	Anti-social behaviour and unsafe practices	Yes, complementary tool
9	Climate change stressors 20 year time frame (sea level rise, altered storm/cyclone activity, flooding, climate and sea temperature rise, altered ocean currents and nutrient inputs)	Yes, complementary tool
10	Loss of public access (either by private development or Government area closures)	Yes, complementary tool
11	Inadequate, inefficient regulation, over-regulation (agencies)	Yes, complementary tool
12	Pests and diseases	No
13	Sediment contamination	No
14	Overcrowding / congestion	No

Priority threats (numbered in order of significance across the marine estate)	Addressed via current MPA designation and management?
15 Conflict over resource access and use	Yes, complementary tool
16 Habitat (physical) disturbance (for example from foreshore development, commercial and recreational fishing methods, four wheel driving, and extractive industries (mining).	Yes, complementary tool
17 Loss or decline of marine industries	Yes, complementary tool
18 Seafood contamination	No
19 Modified hydrology/hydraulics and flow regime	No
20 Water pollution on environmental values - septic runoff, point source pollution and sewage overflows (such as outfalls, STPs, etc.)	No
21 Wildlife disturbance (shorebirds, turtles, whales) by dog walkers, 4WD, marine vessels, etc.	Yes, complementary tool
22 Lack of community awareness of the marine estate, associated threats and benefits, regulations and opportunities for participation	Yes, complementary tool
23 Lack of or ineffective community engagement or participation in governance	Yes, complementary tool
24 Other water pollution/contamination affecting human health and safety	No
25 Excessive or illegal extraction	Yes, complementary tool

Source: BMT WBM 2017, BDO EconSearch analysis.

The NSW community has also raised concerns about perceived emerging threats or unassessed threats that had not yet been identified as a state-wide threat during the state-wide threat and risk assessment (TARA) process. These include potential threats to marine historic heritage such as shipwrecks and significant coastal landscapes (MEMA 2018).

The TARA also identified greater knowledge of the tangible and intangible benefits Aboriginal people derive from the marine estate as a key knowledge gap (BMT WBM 2017).

3. ECONOMIC LITERATURE REVIEW

3.1. Economic Effects of NSW MPAs

NSW's coastal and marine ecosystems provide a wide range of services that improve societal welfare, including food provision and public health benefits through regulation of cultural, educational and recreational activities (Gollan et al. 2019, Gollan and Barclay 2020). However, growth in coastal populations and urban development, poses a threat to the sustained health of NSW's coastal and marine environments.

MPAs are utilised among a broad suite of management options for managing coastal and marine ecosystems that support multiple competing economic, environmental, social and cultural outcomes. The primary objective of MPAs is to facilitate effective stewardship, conservation, and restoration of marine ecosystems. Principal among the ecological goals of developing and implementing MPAs is biodiversity protection and coastal and marine ecosystem health.

MPAs can increase environmental use and non-use values, in particular coastal biodiversity and marine habitat ecosystem service values (Pascoe et al. 2019). MPAs can also support growth in the tourism sector and other related sectors by increasing revenues from charter tours through protection of coastal and marine habitats and biodiversity regulation. The total non-market value for NSW's MPAs was estimated at up to \$115 per hectare per household (Pascoe et al. 2019) with 87 per cent of surveyed NSW residents indicating a willingness to pay for MPAs.

However, our review of economic literature revealed wide acknowledgement that development and implementation of MPAs in NSW can impact market use values. Specifically, MPAs can directly influence production and profitability of the fishing business in a number of sectors, including the tourism sector (Mayo-Ramsay 2014) and the commercial wild-catch fisheries sector (UTS 2016). In addition, the reviewed literature shows that MPAs can result in loss of direct use values in the recreational fishing sector (McPhee 2011) and can reduce broader coastal and marine recreational use values (Deloitte Access Economics 2016, Mayo-Ramsay 2014).

Further, there is a strong relationship among the tourism sector, the recreational fishing sector and the commercial fishing sector and attempts to estimate the net economic impact of MPAs ought to adequately consider interdependencies across all three sectors (Voyer et al. 2017). Thus there is need to use estimates of the economic impact of various coastal and marine sectors judiciously to avoid counterproductive cross-sector comparisons that may implicitly assume competition across the sectors.

One example is a study that estimated the contribution of MPAs to regional economies through impacts of buyouts on commercial fishing, regional fish supplies and flow-on impacts on related sectors, in particular, the tourism and real estate sectors (CARE 2011). Several economic indicators were used, including dwelling prices, employment, net migration rate and aggregate annual income and expenditure in Solitary Island, Jervis Bay and Cape Bryon marine parks.

The reviewed economic literature observed that estimates from non-market valuation studies are rarely used by decision makers evaluating planned MPAs and seldom influence coastal and marine policy decisions with the highest level of trust placed on estimates of productive use values (Marre et al. 2016). Estimates of the magnitude of the net economic impact of establishing a MPA can be quantified using a rigorous cost benefit analysis that is underpinned by market and non-market valuation supported by robust spatial ecological modelling and biophysical process modelling (McPhee 2011).

3.2. Summary of the Economic Literature

Table 3-1 provides a summary of findings from our review of published peer-reviewed literature related to the economic performance of NSW MPAs undertaken since 2010. The literature review findings in Table 3-1 reveal the state of progress with economics research related to NSW MPAs since the publication of findings of the Beeton et al. (2012) scientific audit.

Specifically, the following key themes emerged out of the reviewed research studies:

- Several studies have enumerated a broad suite of potential non-market economic, environmental, social and cultural costs and benefits associated with the marine estate, including MPAs, through survey methods, field work and systematic reviews of literature
- Economic valuation studies have largely focussed on quantifying the costs and benefits related with impacts on the most obvious commercial extractive-fishing activities in particular the profitability of the commercial fishing sector.
- Currently most lacking, is research on valuation of several use and non-use non-market ecosystem service benefits of MPAs, including regulation of air and water quality, biodiversity and socio-cultural educational and recreational services.
- Quantifications of the economic impact of MPAs on other ‘non-fishing’ sectors, for example, tourism, mining, real estate, are also relatively scarce.
- Economic research can contribute to advancing assessments of the effectiveness of MPAs as a management option by providing monetised values for a broader set of economic, social, environmental and cultural benefits.

The Beeton et al. (2012) scientific audit indicated that there were significant deficiencies in economic research and discussed a paucity in peer-reviewed economics literature. In addition, the Beeton et al. (2012) scientific audit identified limited economics data as a major challenge faced by coastal managers in their efforts to improve on the application of economics research findings in decision-making involving MPAs management in NSW.

Our search for published peer-reviewed economics literature related to NSW MPAs undertaken since the publication of the Beeton et al. (2012) report found that there has been some research effort to quantify values that can inform coastal management decisions, including:

1. Economic evaluations of the economic contribution of aquaculture and professional wild-catch fisheries in NSW’s coastal regions to inform coastal managers on the potential impacts of resource management decisions on the welfare of coastal communities
2. Application of market- and non-market valuation techniques to estimate the total annual use and non-use values of beach access to Sydney residents and the value of water quality improvements, in particular, clear water at Sydney’s coastal beaches
3. Development of non-market value estimates for a wide range of non-market values relating to NSW coastal and marine environmental assets that can be used in cost-benefit analyses to justify public expenditure on coastal protection.

However, some outstanding research gaps remain unaddressed since the publication of the Beeton et al. (2012) scientific audit. The following sections outline a number of factors that could affect the performance



of NSW MPAs and highlight some outstanding research gaps and research recommendations for improving the performance of NSW MPAs.

Table 3-1 A summary of reviewed economics literature relevant to management of MPAs in NSW

Study Title	Description	Approach	Findings
1. <i>Marine park planning and recreational fishing: Is the science lost at sea? Case studies from Australia (McPhee 2011).</i>	A number of Australian marine park case studies, including Port Stephens-Great Lakes and Batemans marine parks in NSW, were used to examine challenges and contentions faced by decision makers related with evaluations of the economic impact of MPAs to support development and implementation of MPAs. Geographical area: Port Stephens-Great Lakes and Batemans marine parks	Non-empirical qualitative research: reviewed empirical scientific literature to investigate the validity of the assertion that costs and benefits of MPAs to recreational fishing groups are not adequately considered in implementation of MPAs.	MPAs have both potential costs and benefits for the recreational fishery that should be quantified in rigorous cost benefit analyses underpinning business cases for development and implementation of MPAs. Expected environmental benefits should be supported by robust spatial, water quality and ecological modelling.
2. <i>Measuring the economic, social, cultural and environmental value of Marine Protected Areas in New South Wales (Mayo-Ramsay 2014).</i>	This study examined the value of MPAs as a tool for managing biodiversity with a focus on Jervis Bay and Batemans Marine Parks. The economic, social and cultural effect MPAs have on various community and cultural groups such as recreational fishers, divers, surfers and Aboriginal persons was also studied. Geographical area: Jervis Bay and Batemans marine parks	Non-empirical qualitative research: conducted reviews of stakeholder interviews, submissions, grey and empirical scientific literature on the effectiveness of MPAs in NSW to understand competing tourism and recreational fishing sectors.	Recreational fishers oppose MPAs mainly because they are impacted through restricted access. There is a need to invest in the education of recreational fishing groups on the value of balancing current economic benefits whilst protecting the marine environment for the use and enjoyment of future generations through MPAs.
3. <i>Technical Paper 1: Methodologies to Value the Benefits and Costs of Alternative Uses of the NSW Marine Estate (MEEKP 2014).</i>	This technical paper outlines a range of valuation methods for quantifying current and future benefits of MPAs, and the marine estate in general, to the NSW community. Geographical area: NSW marine estate	Non-empirical qualitative research: A review of several methods for monetising non-market social and environmental benefits provided by marine ecosystems was carried out.	A broad range of potential benefits and costs of enhanced management of coastal and marine ecosystems relevant to NSW were enumerated and categorised into direct, indirect use and non-use values. A description of various non-market valuation methods was also provided.
4. <i>Is economic valuation of ecosystem services useful to decision-makers? Lessons learned from Australian coastal and marine</i>	This study investigated whether economic valuation of ecosystem services and its application to coastal and marine ecosystems management, including NSW's MPAs, is useful or not. This is a national study with 28 per cent of	Empirical quantitative research: examined responses to a nation-wide survey of eighty-eight decision-makers (28 per cent from NSW), including policy makers and	Ecosystem service valuation is rarely used and has a weak influence on policy. The highest level of trust is placed on estimates of productive use values. Decision-makers need training and support with using economic value estimates

Study Title	Description	Approach	Findings
<i>management (Marre et al. 2016).</i>	the 88 total survey respondents geographically located in NSW. Geographical area: NSW MPAs	managers representing a diversity of management organizations.	
5. Social and Economic Evaluation of NSW Coastal Professional Wild-Catch Fisheries (UTS 2016).	This study presented results of an economic evaluation of the economic contribution of professional wild-catch fisheries in NSW's coastal regions. The objective of the study was to inform the NSW Government of the potential impacts of resource management decisions on the welfare of coastal communities. Geographical area: Port Stephens-Great Lakes, Jervis and Batemans marine parks	Empirical quantitative research: fishing operator survey responses were used in input-output modelling to estimate primary and secondary economic impacts of professional wild-catch fishing on regional economies in NSW's coastal regions.	The full range of benefits that the wild-catch industry provides in NSW fisheries have not been adequately quantified with most studies concentrating on environmental aspects of fisheries and profitability of the fishing business. Proposed or existing MPAs can inadvertently impact these benefits negatively if not fully quantified and adequately considered.
6. Survey of values, perception of threats and attitudes to Batemans Marine Park (Juntos Marketing 2019).	This quantitative research surveyed users that undertake various recreational activities in the Batemans Marine Park. The objective of the survey was to elicit the value that users of the MPA place on several economic, environmental and social benefits derived from the park. Geographical area: Batemans Marine Park	Empirical qualitative research: A structured survey was designed to enumerate and categorise the most important current and future benefits of the MPA to its users. 370 survey responses from people who visited the park over a period of 12 months in 2018/19.	The most important values and benefits identified relate to economic, environmental and social benefits. The majority of respondents nominated non-market economic bequest, or intrinsic, and environmental values as most important.
7. Estimating coastal and marine habitat values by combining multi-criteria methods with choice experiments (Pascoe et al. 2019).	This study developed non-market value estimates for coastal and marine habitat values that can be used by coastal managers in NSW's coastal regions. This research provides non-market values that can be used in cost-benefit analyses to justify public expenditure on coastal protection. The payment mechanism (cost) was presented as an environmental levy to be included in quarterly rates indefinitely. For renters, it was assumed that this cost would be passed through in terms of higher rent. Geographical area: NSW's coastal regions	Empirical quantitative research: non-market and indirect use values associated with NSW's MPAs were estimated using choice experiments to quantify the value of multiple ecosystem services they provide to the local residents. Multi-criteria approaches were used to extrapolate estimates in quantification of values of a wide range of other similar coastal environmental assets.	A key outcome of the study was that 87 per cent of the residents surveyed indicated a willingness to pay for coastal protection. The willingness to pay net present value estimate for NSW's MPAs was estimated at between \$20 and \$45 per hectare per household for non-Sydney residents and between \$64 and \$115 per hectare per household for Sydney residents.

Study Title	Description	Approach	Findings
<p>8. <i>Willingness-to-pay for coastline protection in New South Wales: Beach preservation management and decision making (Ardeshiri et al. 2019).</i></p>	<p>This study estimates New South Wales residents' willingness to pay to maintain the area of sandy beaches by investing in protective structures to mitigate deterioration of the state's coastline due to coastal erosion.</p> <p>Surveys and choice experiments applied in this study are relevant in quantification of non-market benefit values of securing future use and non-use values of MPAs. For example, the value society places on conserving coastal and marine resources for future generations and the value placed on knowledge of continued existence of endangered species.</p> <p>Geographical area: NSW's coastal regions</p>	<p>Empirical quantitative research: Reviewed economic studies estimating the value of coastal and marine assets and used stated preference techniques and contingent valuation methods to elicit the social willingness to pay value to maintain the quality of coastal beaches that support multiple social, cultural and consumptive and non-consumptive economic values in NSW.</p>	<p>65 per cent of the population would be willing to pay some amount of management levy to prevent beach deterioration. Willingness to pay also varies according to beach type (amongst Iconic, Main, Bay and Surf beaches).</p> <p>There is poor understanding of the full suite of economic values citizens place on coastal and marine environmental assets and the social and cultural values they support.</p>

3.3. Factors Affecting the Performance of NSW MPAs

The following factors that can affect the performance of NSW MPAs were identified through the literature review.

1. A shortage of quantitative empirical research focused at improving decision makers' understanding of the cost effectiveness of incorporating additional complementary interventions that can enhance the effectiveness of existing MPAs as an alternative to establishing new MPAs. One example is joint regulation of coastal development activities to manage effluent and run-off and ensure effective water quality regulation.
2. Inadequate consideration of a broad suite of potential non-market economic, environmental, social and cultural costs and benefits in social benefit cost analyses of MPAs due to lack of quantitative empirical non-market valuation studies.
3. Poor understanding of the link between measurable impacts of MPAs on key ecological health indicators and how these indicators influence the stock and quality of ecosystem services that contribute to use and non-use, direct and indirect, and market and non-market societal benefits.
4. A lack of investment in the education of recreational fishing groups on the value of balancing current economic benefits from use of coastal and marine resources with management and protection of the marine environment for the economic benefit of future generations through MPAs. Understanding the social benefit value of coastal and marine assets ensures that management is in alignment with community values and preferences and that trade-offs are assessed in a transparent manner.
5. Basing management decisions on economic valuations of various sectors conducted in isolation from other related sectors, without adequately considering interconnections between multiple sectors. This may lead to suboptimal resource allocation. Economic impact assessments can inadvertently encourage counterproductive comparisons, or weighing up of one sector against another complementary sector, if related sectors are viewed as competition.

The Beeton et al. (2012) scientific audit also identified three effective ways to enhance the performance of MPAs in NSW: (i) development of a comprehensive understanding of MPA values; (ii) quantification of these values; and (iii) improvements in utilisation of data from economic evaluations in decision making on the design and management of MPAs.

3.4. Knowledge Gaps and Research Recommendations

Knowledge gaps

A number of priority research gaps were identified by Beeton et al. (2012), including lack of:

- robust ecological modelling to estimate impacts of MPAs on coastal and marine ecosystems
- credible cost benefit analyses of NSW MPAs
- estimates of a broad range of economic and community benefit values of MPAs.

Specifically, there were calls to conduct empirical evaluation studies to quantify:

- the relative cost-effectiveness of coastal and marine management options for achieving multiple community outcomes

- multiple economic and community benefits of MPAs
- benefit values of alternative non-complementary uses of MPAs.

Several studies have enumerated a broad suite of potential economic, environmental, social and cultural costs and benefits associated with the NSW marine estate, including MPAs, through survey methods and systematic reviews of literature (CARE 2011, Gollan et al. 2019, Gollan and Barclay 2020, Hoisington 2013, Juntos Marketing 2019, MEEKP 2014, Pascoe et al. 2019).

A few studies have focused on estimating the economic value of the commercial fishing sectors to coastal communities and regional economies (e.g. UTS 2016), society's willingness to pay to maintain coastal and marine assets (e.g. Pascoe et al. 2019 and Ardeshiri et al. 2019) and estimation of the likelihood of adoption and application of economic value estimates in decision making (e.g. Marre et al. 2016).

However, our review of literature published since 2010 also revealed the following outstanding knowledge gaps and recommended areas of focus for future research:

1. There is need to undertake ongoing monitoring of the economic contributions of all sectors that can be impacted by establishment of MPAs. Specifically, quantitative empirical economic studies related with other non-fishing sectors, including tourism, mining and real estate is scarce. This research will enable evidence-based decision making that considers a broad set of trade-offs and interdependencies across key industries sustaining the economic welfare of coastal communities.
2. 87 per cent of NSW residents are willing to pay for coastal protection, yet non-market value estimates for a wide range of coastal and marine habitat values are rarely conducted and used by coastal managers (Pascoe et al. 2019). Non-market values relating to environmental benefits of MPAs, including coastal erosion, marine pollution and need to be included in cost benefit analyses to better justify public expenditure on coastal protection.
3. Decision-makers need training and support with using and interpreting economic value estimates, in particular, non-market value estimates in cost benefit analyses of prospective MPAs or changes in management of existing MPAs. Application of ecosystem service valuation to coastal and marine ecosystems management in Australia, including NSW, is limited by low levels of trust placed on estimates of economic values.
4. The scarcity of peer-reviewed cost benefit analyses of MPAs in NSW persists nearly 10 years since the 2012 scientific audit. This is partly because the links between MPAs, marine and coastal ecological health and measurable improvements in the stock and quality of ecosystem services that provide social welfare benefits is poorly understood.

Research recommendations

The following recommendations were identified based on key themes emerging from the reviewed literature and outstanding knowledge gaps:

1. Market valuation techniques can be employed to estimate impacts on direct uses related to other 'non fishing' sectors. For example, estimates of tourism revenue impacts can be quantified using understanding of how tourist numbers and the average market price of tourism services increase in response to improvements in marine life abundance following establishment of MPAs.

2. The paucity in non-market valuation literature reflects, in part, the difficulty, contentious and resource-intensive nature of the exercise. However, understanding the social benefit value of coastal and marine assets ensures that management is in alignment with community values and preferences and that trade-offs are assessed in a transparent manner.
3. Incorporating non-market valuation estimates into a social benefit cost analyses of MPAs would strengthen the case for MPAs. However, non-market valuation of benefits of MPAs can be resource intensive and ought to be carried out in contexts where exclusion of the non-market benefit value results in inconclusive net benefit value estimates, or where the non-market value estimate is expected to 'tip the balance' of the final decision.
4. Non-market use values can be quantified using revealed preferences elicited through observation of data on travel costs and other expenditures incurred to access MPAs and coastal or marine resources in close proximity to MPAs (e.g. Marine Parks Authority 2010). Alternatively, data on premium prices paid for homes located close to coastal or marine resources neighbouring MPAs can be used to estimate the social benefit value of MPAs using the hedonic pricing method.
5. Surveys and choice experiments can also be utilised to elicit non-market benefit values of securing future use and non-use values, in particular, the value society places on conserving coastal and marine resources for future generations and the value placed on knowledge of continued existence of endangered species. For example, Ardeshiri et al. (2019) used stated preference techniques and contingent valuation methods to elicit the social willingness to pay value to maintain the quality of coastal beaches that support multiple social, cultural and consumptive and non-consumptive economic values in NSW.
6. Economic research focused at estimating monetary values can inform more comprehensive comparisons of social benefits and costs of MPAs across different societal groups, including businesses, consumers, and the community.

Further details of the methods and findings supporting the identified factors affecting the performance of MPAs in NSW, knowledge gaps and recommendations for future research are provided in Table 3-1. In addition, a critical appraisal of the reviewed economics literature is provided in Appendix Table 3-1.

4. SOCIAL LITERATURE REVIEW

4.1. Social Effects of NSW MPAs

Several studies have identified the social effects, or social impacts, of the NSW MPAs since their implementation. The social effects of NSW MPAs can be thought of as being the ways that the community has been affected by the introduction or existence of MPAs. Most of these studies focus quite narrowly in terms of specific user group effects (such as commercial fishers or community members) or specific MPAs. This means that it is difficult to make generalisations about the social effects of MPAs because different user groups in different geographical locations may experience different effects. Moreover, it is important to note that user groups often significantly overlap each other, commercial fishers are often also recreational fishers and tourism operators (Voyer et al. 2017). Additionally, the social effects of MPAs should be understood in the context of the differential restrictions that are placed on different types of protected areas. For instance, Turnbull et al. (2021) found that partially protected areas⁶ along the Great Southern Reef provide no additional social or ecological benefits in comparison to open areas. As such, those studies that are focussed on a specific user group or specific MPA cannot be viewed as representative of a general experience of the social effects of MPAs across NSW.

Nevertheless, some important findings have been made in the literature. Johnston et al. (2017) for instance undertook a qualitative study that interviewed current and retired commercial fishers who fished in the Solitary Island Marine Park during the MPA implementation. This study recognised that commercial fisher livelihoods were impacted by the introduction of the MPA. The study found that some fishers modified operations, some fished elsewhere while others left the industry altogether and were financially compensated by the NSW Government.

Voyer and Gladstone (2017) claim that the social impacts of the Batemans Marine Park fell disproportionately on the smallest user groups in the area. This particularly means that small scale commercial fishers and Aboriginal communities have experienced the most negative social impacts of the Batemans Marine Park.

Gollan and Barclay (2020) conducted a series of semi-structured qualitative interviews with local community members near the Cape Byron Marine Park and Port Stephens-Great Lakes Marine Park. The intention of the interviews was to develop a wellbeing framework to understand the threats to community benefits (social, cultural and economic) derived from of MPAs on the wellbeing of local communities. This study included a broad range of user groups, with a total of 58 people from extractive and non-extractive, active, passive, commercial and community users interviewed. However, the limited geographical scope means that the social impacts identified in the study cannot necessarily be transferred to other MPAs.

The most important positive effects identified by Gollan and Barclay (2020) were the protection of biodiversity, place attachment associated with the MPA, that local threats to the marine environment have been reduced, (for example by regulating extractive users), a sense of identity associated with the MPA, and that the natural beauty and value of the MPA is protected (see Table 4-1). The most important negative impacts identified were that the monitoring and evaluation of MPA effectiveness is unsatisfactory, that people feel ignored or disempowered by the MPA, that there has been poor communication of science and

⁶ Partially protected areas are areas within MPAs which allow some, but not all, extractive uses. Examples within NSW context are habitat protection zones and general use zones in NSW marine parks. These areas are in contrast to fully protected areas (e.g. sanctuary zones in NSW marine parks) and open areas, i.e. areas outside of MPAs.

management, that the MPA creates community division through inequity of use, and that there is a lack of education of the benefits and threats of the MPAs (see Table 4-1).

Table 4-1 Most important social effects of the Cape Byron Marine Park and Port Stephens-Great Lakes Marine Park (Gollan and Barclay 2020)

Domain	Attribute	Impacts	# of coding refs
Environment	Healthy natural environment	Biodiversity protected	80
Governance	Transparency and accountability	Unsatisfactory monitoring and evaluation of MPA effectiveness	80
Governance	Stakeholder engagement	Ignored or disempowered	78
Governance	Transparency and accountability	Poor communication of science and management	66
Governance	Fairness and equity	Creates community division through inequity of use	64
Education and knowledge	Awareness	Lack of education and awareness of the benefits/threats of the MPA	63
Culture and heritage	Contemporary relations to place and culture (Aboriginal and non-Aboriginal)	Place attachment associated with the MPA	63
Environment	Managing the environment sustainably	Local threats to the marine environment reduced, for example by regulating extractive users	57
Governance	Transparency and accountability	Questioning the legitimacy of MPAs	50
Governance	Stakeholder engagement	Inadequate engagement	48
Culture and heritage	Contemporary relations to place and culture (Aboriginal and non-Aboriginal)	Identity associated with the MPA	42
Governance	Transparency and accountability	Lack of confidence in management due to political interference	42
Environment	Healthy natural environment	Natural beauty and value protected	41
Governance	Stakeholder engagement	Local ecological knowledge not valued in decision making	41
Governance	Fairness and equity	Loss of access to marine resources	41
Local economy	Revenue in the local economy	Increases business opportunities or increase in revenue for existing, businesses (for example increased tourist visitation)	40
Social connections	Environmental stewardship	Increases positive attitudes towards the environment and behaviours to protect it	38
Governance	Transparency and accountability	Lack of scientific evidence	36
Governance	Fairness and equity	Reduces conflict between user groups	36
Culture and heritage	Contemporary relations to place and culture (Aboriginal and non-Aboriginal)	Enhances connection to nature	30

Domain	Attribute	Impacts	# of coding refs
Culture and heritage	Contemporary relations to place and culture (Aboriginal and non-Aboriginal)	Pride in the MPA	30
Local economy	Intrinsic and bequest values	Intrinsic and bequest values enhanced by the MPA	30
Local economy	Employment and livelihoods	Loss of business (for example professional fishers)	29
Environment	Healthy natural environment	Enjoy observing marine life at no-take zones	28
Education and knowledge	Awareness	Increases awareness of the marine and coastal environment (including benefits/threats to the MPA)	26
Social connections	Social relations	Facilitates community cohesion	24
Health and safety domain	Safety and security	Antisocial behaviour and unsafe practices	23
Environment	Managing the environment sustainably	Local threats not reduced, for example allowing extractive users	22
Governance	Fairness and equity	Persecution, unfairly punished	22
Health and safety domain	Physical health	Increases physical activity related to MPA (for example snorkelling, surfing)	21
Governance	Stakeholder engagement	Loss of trust	21
Governance	Fairness and equity	Impacts personal rights (for example freedom)	21
Culture and heritage	Aboriginal cultural values and practices	Loss of access to culturally significant places/marine resources	20
Health and safety domain	Mental, emotional and spiritual health	Improves spiritual, emotional and mental health	18
Health and safety domain	Food	Reduces locally sourced seafood from industry	18
Education and knowledge	Awareness	Increased education opportunities and awareness of local ecological knowledge	17
Culture and heritage	Aboriginal cultural values and practices	Protection of cultural values and practices	16
Culture and heritage	Aboriginal cultural values and practices	Loss of values and practices	16
Health and safety domain	Food	Reduces subsistence fishing	14
Education and knowledge	Awareness	Lack of education and awareness of the significance of Aboriginal Sea Country values	14
Governance	Fairness and equity	Increases conflict between user groups	14
Environment	Healthy natural environment	Threatened and protected species protected	13
Culture and heritage	Aboriginal self-determination and leadership	Increases participation in Sea Country management	13

Domain	Attribute	Impacts	# of coding refs
Health and safety domain	Safety and security	Reduces safe fishing spots	12
Education and knowledge	Research	Provides baseline data on unfished systems	12
Social connections	Social relations	Increases socialising with like-minded people	11
Health and safety domain	Mental, emotional and spiritual health	Increases mental health issues and stress	10
Health and safety domain	Safety and security	Requires further travel to fish	10
Education and knowledge	Awareness	Children's enjoyment creating opportunities for education	8
Environment	Managing the environment sustainably	Increased fishing pressure on areas adjacent to no take zones	7
Social connections	Social relations	Reduces socialising with like-minded people	7
Culture and heritage	Aboriginal self-determination and leadership	Lack of self-determination and leadership in management	7
Health and safety domain	Safety and security	Increases safe spots to snorkel	3
Local economy	Employment and livelihoods	Increases employment opportunities	3

Source: adapted from (Gollan and Barclay 2020).

Together these studies provide a general picture of the social effects of the marine estate, however it is important to recognise that these studies do not provide a comprehensive assessment of the social effects of NSW MPAs. To adequately assess the social effects of NSW MPAs a comprehensive social impact assessment is desirable (Voyer et al. 2012).

4.2. Summary of the Social Literature

Since the Beeton et al. (2012) report was published there have been several studies undertaken to gain a better understanding of the social benefits of NSW MPAs. These have included grey literature that was commissioned by the NSW Government as well as scholarly work that has been undertaken independently by researchers.

Social benefits of NSW MPAs and threats to those benefits

Several studies have identified and prioritised the most important social benefits of NSW MPAs. Water quality issues are of particular concern to stakeholders (Sweeney Research 2014, Noble et al. 2020, and Gollan et al. 2019). Non-extractive tourism and recreational stakeholder groups are most concerned, followed by Aboriginal Traditional Owners, commercial fishers and lastly recreational fishers (Noble et al. 2020).

Sweeney Research (2014) undertook extensive qualitative and quantitative techniques across NSW to prioritise the benefits (values) of greatest concern to the NSW community, identify threats to those values

and key opportunities for improved management of the marine estate. They identified benefits, threats and opportunities for management as described below.

Benefits

- The clean waters of the marine estate support a variety of unique and abundant Australian marine life
- Its natural beauty is a major benefit for the NSW community, even if they don't visit it often. It provides a safe space for people and communities (particularly Aboriginal communities) to socialise and lead an active healthy lifestyle
- Economically speaking, the marine estate also provides income for locals through various industries, particularly tourism and seafood related industries

Threats

- Pollution is seen as the major threat to the marine estate. This can be any form of pollution including run-off, marine debris, litter, oil, chemical spills, etc.
- Pollution and loss of natural areas are seen as critical threats to economic outcomes, particularly tourism
- Anti-social behaviour and overcrowding are seen as key social threats to the safety and enjoyment of people that use the marine estate

Opportunities

- The NSW community feel that protecting and rehabilitating coastal wetlands and addressing litter and land-based runoff are leading opportunities to improve the health of the marine estate
- The major economic opportunities identified were marketing and promoting the beauty and biodiversity of the marine estate to promote tourism and addressing coastal hazards
- Socially, the community feel that providing more education programs, improving public access and environmental action support programs are important opportunities for the NSW government.

Vanderkooi Consulting (2015) undertook a literature review for MEMA to provide background information on the economic and social values of the marine estate identified in the Sweeney Research (2014) and to support the threat and risk assessment for the NSW marine estate. Sweeney Research (2014) found that water pollution, litter and marine debris and climate change pose the greatest threats to the economic and social benefits of the NSW marine estate. These threats were found to be likely to impact all recreational activities in the marine estate, including swimming and visiting beaches, wave surfing and windsurfing, diving and snorkelling, driving vehicles on beaches, walking and hiking, picnicking, barbecuing and visiting parks, physical recreation and wildlife watching. Other major threats to deriving social and economic benefits included depleted fish stocks through overfishing and limited access and storage infrastructure.

Juntos Marketing (2019) also undertook a representative survey to understand the community values, perception of threats and attitudes to the Batemans Marine Park. They found that the most important benefit is that the MPA will enable the area to be passed on to future generations in good condition. Other important benefits included enjoyment of the natural environment and clean water. The MPA also facilitates exercise, connecting with other people and the natural environment and enhancing mental health and wellbeing.

Gollan et al. (2019) identified the social benefits that are associated with NSW marine estate. They found that a broad range of social benefits are enjoyed by local communities, including:

- participation (for example, socialising and sense of community)
- enjoyment (for example, enjoying the biodiversity and beauty)
- cultural heritage and use, intrinsic and bequest values
- the viability of businesses and direct economic values.

Threats to community benefits were also identified and prioritised by Gollan et al. (2019), the most important threats were:

- environmental threats (for example, water pollution)
- critical knowledge gaps (for example, inadequate social and economic information)
- governance (for example, lack of compliance)
- resource-use conflict (for example, anti-social behaviour)
- lack of access (for example, loss of fishing access).

Noble et al. (2020) has also undertaken research to identify the ecological priorities and concerns of the community across the Port Stephens-Great Lakes Marine Park. They identified six key species that were perceived as being iconic to the Port Stephens-Great Lakes Marine Park. These were dolphins, sea turtles, Great White Sharks, Grey Nurse Sharks, Nudibranchs and seahorses. These species were valued highly because they were thought to define how people identified their local marine environment and were perceived to be particularly special for these areas (Noble et al. 2020).

Community perceptions, support for and opposition to NSW MPAs

Community perceptions of MPAs in NSW has been a particular focal point for research in the literature. In the context of MPA management planning 'the community' is not an amalgamation of a range of homogenous stakeholder groups but instead a diverse and complex mix of identities and value systems which are not confined to particular interest groups (Voyer et al. 2013b). Conflicts between users and opposition to MPAs affect the social performance of NSW MPAs. Understanding the social and cultural drivers behind conflicts in MPAs may help to provide strategies to minimise them.

A common theme in papers authored by Voyer is the perception that the values of local communities connected to Port Stephens-Great Lakes and Batemans marine parks have not been adequately accounted for in MPA management (Voyer et al. 2013b, Voyer et al. 2014, Voyer 2014, Voyer 2015a). For example, opposition to these MPAs is partly attributed to the perception that the local knowledge of fishers is seen as not being prioritised by MPA management. The reason for this is that MPA objectives centre on biodiversity conservation, not fisheries management. However, Voyer et al. (2014) and Voyer (2014) find that even stakeholders who are actively engaged in the planning process have difficulty differentiating between these objectives. This has led to a perception that the practical knowledge of users was not valued in the management planning of each MPA. Voyer et al. (2015a) concluded that developing a deep understanding of the social, cultural and political landscape of the communities connected to MPAs by introducing and incorporating community objectives and knowledge into planning processes may assist in reducing community opposition.

Voyer et al. (2013b) identified the primacy of “ecological models”⁷ of thinking over “community models”⁸ of thinking in NSW MPA management. They found people who subscribe to a predominantly “ecological model” tend to be more open to advice from science and policy experts and recognise threats beyond the local scale to include global threats such as climate change. In contrast, people who lean towards a “community model” of understanding lack trust in science and policy experts and elevate the importance of local knowledge. Moreover, stakeholders who adhere to a community model of thinking emphasise the value of the role of the community in stewardship of the coast in practical and tangible ways. They are motivated by a desire to maintain the utility of the coast for cultural or heritage use (both Aboriginal and non-Aboriginal) and the feeling of satisfaction that they gain from ‘making a difference’ in conservation of the coast. This is often in direct conflict with the ecological model of thinking which emphasises the need to restrict human use to achieve biodiversity conservation objectives. Moreover, it leads to a perception amongst many stakeholders who adhere to the community model of thinking that their knowledge and values have been overlooked.

Voyer et al. (2015a) suggest that the “ecological model” tends to dominate community engagement strategies but engaging people with a “community model” mindset, including Aboriginal communities, may need tailored communication strategies that do not prioritise scientific knowledge over local knowledge.

Despite this, a representative online survey of the values, perceptions of threats and attitudes to the Batemans Marine Park found that there was strong community support for the MPA (Juntos Marketing 2019). This aligns with other studies that find that community support for MPAs in Australia tends to be high and to increase over time (Navarro et al. 2018, Haensch et al. 2020, Martinez et al. 2016). However, perceptions amongst different user groups can diverge considerably depending on the level of impact people experience and perceptions of legitimacy.

Noble et al. (2019) undertook a study to understand the extent of extractive and non-extractive uses in Port Stephens-Great Lakes Marine Park and any conflicts between users that arise there. They found that water sports users (jet skis and small boat hire) create the most spatial conflicts with other user groups in the marine environment. This is because of perceptions that in certain areas they endanger other users through reckless driving and are generally unaware of spatial zoning. Recreational fishers were the second most targeted group for causing spatial conflicts, mostly due to their general sense of priority of use of a given area over other stakeholder groups. Although recreational fisher attitudes toward the concept of MPAs has been improving, a majority of this group do not believe the collective actions of recreational fishers negatively impact the marine environment (Martinez et al. 2016).

Noble et al. (2019) found commercial fishers and ecotourism users were perceived to create less conflict than other users. This was because commercial fishers actively avoided areas that other users frequented because of the awareness that other users were likely to have negative perceptions of them. Ecotourism operators came into less conflict with other users because they tended to use no-take zones which meant that their activities did not interfere with other users. Finally, Aboriginal Traditional Owners were not

⁷ Ecological models of thinking gives primacy to ecological function and connectivity, prioritising these objectives over other social and economic objectives (Voyer et al. 2013b). In Voyer et al.’s (2013b) study people that adhered to this model thought the best means of protecting the natural world was to remove human influence from it.

⁸ Community models of thinking prioritises the coast as a place of social interaction and community use and emphasises the importance of traditional and cultural use of marine resources to local communities, both Aboriginal and non-Aboriginal (Voyer et al. 2013b).

commonly mentioned as being stakeholders in the area, let alone being sources of spatial conflicts. This reflects the general feeling amongst Aboriginal Traditional Owners that they are not recognised or respected as stakeholders in the marine estate (Noble et al. 2019).

Community perceptions of the legitimacy of MPAs, the level of stakeholder consultation and involvement in planning can influence the likelihood that people will voluntarily comply with restrictions (Read et al. 2011). The capacity of an MPA to achieve its objectives can be significantly reduced if community members do not voluntarily comply. Non-compliance in NSW MPAs has been investigated in the Port Stephens-Great Lakes Marine Park in several studies. Harasti et al. (2019) found that significant illegal recreational fishing occurs in the Seal Rock no-take zone such that snapper populations have been observed to be in decline. However, this may in part be due to inadequate information being available to recreational fishers. Many recreational fishers point to inadequate signage about MPA zoning as a cause of non-compliance (Martin et al. 2015). Read et al. (2011) emphasise the importance of effective engagement of recreational fishers in MPA planning to ensure that they view MPAs as legitimate to maximise voluntary compliance and the manageability of MPAs.

Table 4-2, overleaf, provides a summary of findings from our review of published and peer-reviewed literature related to the social performance of NSW MPAs undertaken since 2010.

Table 4-2 A summary of reviewed social literature relevant to management of MPAs in NSW

Study Title	Description	Approach	Findings
Johnstone et al. 2017	<p>This study sought to gain insights into how long term fishers perceived that their livelihoods were impacted by MPAs</p> <p><i>Geographical area:</i> Solitary Island Marine Park</p>	<p><i>Empirical qualitative research:</i> semi-structured, in-depth oral history interviews were undertaken with seven local commercial fishers between 2012 and 2013.</p>	<p>Increased regulatory framework introduced in Solitary Island Marine Park in combination with fisheries management and external factors has had an impact on fishers' livelihoods. However there is general support for the MPA by several interviewed fishers. Some fishers modified operations, some fished elsewhere or left the industry. Monetary compensation and increased age at the time of implementation influenced positive association with the zoning plan. Fishers' knowledge is important and best considered early and cooperatively in MPA design or rezoning.</p>
Gollan and Barclay 2020	<p>This study explores the development of a wellbeing framework to understand the social aspects, including the impacts of MPAs on the wellbeing of local communities.</p> <p><i>Geographical area:</i> Port Stephens-Great Lakes and Cape Byron marine parks</p>	<p><i>Empirical qualitative research:</i> the research began with a review of the literature, followed by fieldwork, including semi-structured qualitative interviews with community members. Through thematic coding of the interview transcripts in light of the literature on assessing the social impacts of MPAs, a community wellbeing framework of domains and associated attributes was developed to investigate social impacts.</p>	<p>The paper makes four main findings. Firstly, that local perspectives are crucial to understanding social impacts. Second, understanding social impacts gives insight into the nature of trade-offs that occur in decision-making regarding MPAs. Third, the intangible social impacts experienced by local communities are just as significant as the tangible ones for understanding how MPAs operate. Fourth, governance impacts have been the most influential factor affecting the social acceptability of the case study parks. The authors also argue that failure to address negative social impacts can undermine the legitimacy of MPAs. A framework is proposed to support policymakers to work towards more effective, equitable and socially sustainable MPAs by employing much-needed monitoring of human dimensions of conservation interventions at the community level to shape adaptive management.</p>

Study Title	Description	Approach	Findings
Martinez et al. 2016	<p>This study assessed the acceptance and awareness of an Australian MPA (Port Stephens-Great Lakes Marine Park) post implementation by recreational fishers using the MPA, and identified factors that influenced the perception of this group towards the MPA.</p> <p><i>Geographical area:</i> Port Stephens-Great Lakes Marine Park</p>	<p><i>Empirical qualitative research:</i> a semi-structured questionnaire, comprising both closed and open-ended questions, was developed to collect data on a range of topics, and was pilot tested (n=20) prior to implementing the study. The questionnaire took approximately 10-15 min to complete and was divided into five sections. Belief statements were developed to include: topics about marine conservation objectives for NSW MPAs (to conserve biodiversity and maintain ecological processes); the theory that sanctuary zones increase fish stocks throughout the region due to the “spill over” effect; assessment of whether different management zones provide clear rules for activities in these areas; and potential cumulative impact of recreational fishing. Respondents were asked to indicate their degree of agreement or disagreement using a four point Likert scale: strongly disagree, disagree, agree and strongly agree. The wording of some statements was reversed to help prevent response bias.</p>	<p>Almost two thirds of recreational fishers supported the MPA and had positive attitudes towards the concept of MPAs. This is a key result since a similar pre-implementation survey of recreational fishers found only 12% would support the creation of Port Stephens-Great Lakes Marine Park due to fears the MPA would negatively impact their fishing activities and ability to catch fish.</p> <p>However, there was a sub-group of fishers who opposed the MPA and were more inclined to have negative attitudes towards the rationale behind MPAs, despite the common perception that no-take zones were for fisheries management purposes and could increase fish stocks in the MPA. More experienced fishers were inclined to oppose the MPA, as well as fishers who believed management zones did not provide clear rules for activities, penalties for non-compliance were too harsh, or that no-take zones did not increase fish stocks.</p> <p>An important perceived threat to the MPA was from commercial fishing due to perceptions of over-exploitation and issues of non-compliance. In contrast, the majority of recreational fishers did not believe the collective actions of recreational fishers negatively impacted the marine environment and fish stocks, or the number of fish available for capture in the future.</p> <p>Recreational fishers’ overall support for Port Stephens-Great Lakes Marine Park post-implementation was five times greater than it was pre-implementation of the MPA; according to a similar survey of recreational fishers between May 2005 and April 2006.</p>

Study Title	Description	Approach	Findings
<p>Noble et al. 2020</p>	<p>This study sought to identify ecological priorities and concerns across the Port Stephens-Great Lakes Marine Park.</p> <p><i>Geographical area:</i> Port Stephens-Great Lakes Marine Park</p>	<p><i>Empirical qualitative research:</i> participatory mapping and semi-structured interviews were conducted with 52 stakeholders and 22 managers and scientists.</p>	<p>92% of the stakeholders identified 71 species as being iconic, with 19 fauna species (for example, fish, marine mammals, and marine reptiles) repeatedly mentioned as having particular significance across all of the stakeholder groups. These 19 species were identified as essential for supporting economic livelihoods, recreational use, and/or supporting broader cultural and community wellbeing. In particular, six species (for example, dolphins, sea turtles, Great White Sharks, Grey Nurse Sharks, Nudibranchs, and seahorses) were perceived as being particularly iconic to the area because they were thought to define how people identified their local marine environment and were perceived to be particularly special for these areas.</p> <p>The analysis found that water quality issues are proportionally the biggest concern, followed by iconic species impacts (i.e., flora and fauna), sand movement, poor fishing practices, litter and climate change.</p> <p>All of the ecological concerns were perceived to impact the stakeholder groups directly through the potential of the risk undermining iconic species abundance, ruining the aesthetic quality of the marine environment, or presenting a risk to undermine the ecological functions of the aquatic environment.</p> <p>Overall, the non-extractive tourism and recreational stakeholder groups were the most concerned out of the five stakeholders' groups, followed by Aboriginal Traditional Owners, then commercial fisheries, and lastly recreational fishers.</p>

Study Title	Description	Approach	Findings
Noble et al. 2019	<p>This study sought to gain an understanding of the extent of extractive and non-extractive uses and the social dynamics that may be driving patterns of use to support the social resilience of a marine area.</p> <p><i>Geographical area:</i> Port Stephens-Great Lakes Marine Park</p>	<p><i>Empirical qualitative research:</i> a combination of fuzzy-set multi-criteria GIS modelling and negative tie social network analysis were used to explore social uses and conflicts based on sketch-mapping interviews with five key stakeholder groups (ecotourism, Aboriginal Traditional Owners, commercial and recreational fishing, and water sports) within a MPA.</p>	<p>The hotspot maps showed a different pattern of use for each of the stakeholder groups. Ecotourism tends to use smaller areas intensely inside the estuary, especially with the diving and paddle-sports sub-groups along on southern shoreline, with larger areas used outside the headlands by the whale watching and dolphin tourism groups. Water sports had the most extensive use of the inshore and nearshore area, with the boating stakeholder group using most of the area with the greatest intensity around the sailing club and marinas. Recreational fishers used a few small areas very intensely with large areas offshore used for targeting billfish sport-fishing. Commercial fishers utilised larger areas less intensely, particularly offshore, but also had smaller hotspots of use around the north-eastern part of the estuary. Aboriginal Traditional Owners' use of the area was mostly in the western part of the estuary, up to the river, the northwest shoreline, and the southern beaches.</p>

Study Title	Description	Approach	Findings
<p>Gollan et al. 2019</p>	<p>This paper describes the use of qualitative risk assessment as a tool for integrating social, cultural, and economic considerations into coastal and marine decision-making, and focusses on a community-based approach to assessing risk. It describes state-wide threat and risk assessment reported in BMT WBM (2017).</p> <p><i>Geographical area:</i> NSW marine estate</p>	<p><i>Empirical qualitative and quantitative research:</i> qualitative risk assessment using a community-based approach. The process included:</p> <p>Multiple lines of evidence were used to inform benefits, threats and consequence and likelihood scoring, including Feary (2015), Vanderkooi Consulting (2015), MEMA (2017), Origin Communications Australia (2017) and Sweeney Research (2014). Content analysis was performed to assign a preliminary risk ranking. Independent expert workshops (2) and MEEKP contestability workshop to derive risk levels</p> <p>Draft TARA developed and public/stakeholder feedback gathered via:</p> <ul style="list-style-type: none"> Public - online interactive tool to allow public to interrogate risk levels Stakeholders -6 stakeholder and 10 Aboriginal workshops <p>Review evidence from public/stakeholder feedback via expert-based technical workshops (1 social and economic and 2 Aboriginal) to consider submissions and arrive at final risk levels</p> <p>Final state-wide TARA (BMT WBM 2017) which underpins decision-making in the NSW marine estate.</p>	<p>A broad range of benefits were identified including participation (for example, socialising and sense of community), enjoyment (for example, enjoying the biodiversity and beauty), cultural heritage and use, intrinsic and bequest values, the viability of businesses, and direct economic values. Threats to community benefits were categorised as resource use conflict, environmental, governance, public safety, critical knowledge gaps and lack of access. An integrated threat and risk assessment approach found that the priority threats to community benefits were environmental threats (for example, water pollution), critical knowledge gaps (for example, inadequate social and economic information), governance (for example, lack of compliance), resource-use conflict (for example, anti-social behaviour), and lack of access (for example, loss of fishing access).</p>

Study Title	Description	Approach	Findings
<p>Voyer and Gladstone 2017</p>	<p>Although proven to be effective at protecting biodiversity and to be supported by local and wider communities, the implementation of some MPAs has been very contentious especially with fishing stakeholders. This study researched the causes of these issues by examining the experience of implementation of the Batemans Marine Park.</p> <p><i>Geographical area:</i> Batemans Marine Park</p>	<p><i>Non-empirical research:</i> this study was a review of the engagement process. No approach/method outlined.</p>	<p>The social impacts of the Batemans Marine Park fell disproportionately on the smallest user groups in the area - small scale commercial fishers and Aboriginal communities. While consultation with these groups was extensive, these processes appeared to largely follow a 'deficit model' of public engagement. This model aims to build support for a proposal through education, based on the assumption that opposition can be attributed to limited knowledge, rather than alternative, yet rational, interpretations of the available information.</p> <p>So while the public may have had numerous opportunities to 'have their say', stakeholders felt their views had not been heard or considered. In addition, the needs and voices of smaller groups within the community were often overwhelmed by a larger ideological debate between the two biggest stakeholder groups - the recreational fishing and conservation sectors</p>
<p>Voyer et al. 2012</p>	<p>Three Australian MPA planning processes covering three states and incorporating federal and state jurisdictions are reviewed in order to determine how potential social impacts were assessed and considered.</p> <p><i>Geographical area:</i> Batemans Marine Park and Port Stephens-Great Lakes Marine Park</p>	<p><i>Non-empirical research:</i> the paper reviews the social assessment methods used in the planning processes of three case studies and investigates whether these were sufficient tools for measuring and predicting the likely social impacts of these proposals.</p>	<p>These case studies indicate that Social Impact Assessment (SIA) is under-developed in Australian MPA planning. Assessments rely heavily on public participation and economic modelling as surrogates for dedicated SIA and are commonly followed by attitudinal surveys to gauge public opinion on the MPA after its establishment. The emergence of issues around public perception of the value of MPAs indicates the failure of some of these proposals to adequately consider social factors in planning and management. This perception may have potential implications for the long term success of individual MPAs. It may also compromise Australia's ability to meet commitments for MPA targets, made under a range of international agreements, to gazette at least 10% of all its marine habitats as MPAs. This is demonstrated in two of the three case studies where social and economic arguments against MPAs have been used to delay or block the future expansion of the MPA network.</p>

Study Title	Description	Approach	Findings
Voyer et al. 2013a	<p>The media coverage of two marine parks in NSW, Australia was compared to determine the way in which news presented the parks to each community and how this may have influenced public acceptance of the parks. In particular the study examined the role ideology and politics played in the news coverage of each park by investigating the way in which the news was framed and the positions of key media spokespeople.</p> <p><i>Geographical area:</i> Port Stephens-Great Lakes Marine Park and Batemans Marine Park</p>	<p><i>Empirical quantitative and qualitative research:</i> a mix of quantitative and qualitative techniques was used to examine the role of the media in the debate over the Port Stephens-Great Lakes and the Batemans marine parks. The study focused primarily on print media, namely local newspapers within the general marine park area, between January 2005 (1 year prior to the announcement of the proposed declaration of the marine parks) and December 2009 (four years after the announcement).</p> <p>A series of semi-structured interviews were also conducted with prominent media spokespeople identified during the analysis of news articles and letters to the editor.</p>	<p>Media coverage of the Batemans Marine Park appears to have been highly politicised and heavily influenced by the strong convictions of a small handful of prominent spokespeople. By way of contrast media coverage of the Port Stephens Great Lakes Marine Park was more nuanced and drew from a wide range of sources. This research provides insight into how areas of conflict could be reframed as opportunities that enhance MPA planning exercises and highlights how ideology can help shape community sentiment. Acknowledging the role of ideology in contested areas such as these allows for the development of strategies that can accommodate as well as moderate its influence. These strategies may include the incorporation of 'bottom up' approaches into MPA planning, the promotion and support of a range of voices within the community, and seeking out and building upon common ground and shared values.</p>
Voyer et al. 2013b	<p>The project aimed to evaluate the social values attributed to ocean beaches and headlands (hereafter referred to as 'the coast') by exploring the different ways people in NSW use and value the coast using qualitative research techniques.</p>	<p><i>Empirical qualitative research:</i> a series of in-depth, semi structured interviews were conducted with coastal users within the Batemans and Solitary Island marine parks. In total 34 interviews, with 42 individuals, were conducted across a spectrum of use types, including surfers, recreational fishers, professional fishers, spear fishers, passive users, divers, snorkelers, kayakers and coastal community groups.</p>	<p>The research identified the values, images and principles at work amongst coastal users to determine the dominant 'cultural models' within the community and how these models influenced attitudes towards MPAs. This research indicates that traditional consultation models may not be sufficient to address the full spectrum of community needs, and in fact suggests the need to re-conceive the make-up of 'the community' itself.</p>

Study Title	Description	Approach	Findings
<p>Voyer et al. 2014</p>	<p><i>Geographical area:</i> Solitary Island and Batemans marine parks.</p> <p>This study sought a better understanding of the nature of marine park opposition and explored opportunities for addressing principal concerns. Based around research questions:</p> <p>What are some of the social impacts of MPAs on fishers and does impact directly account for opposition?</p> <p>Does motivation to fish influence fisher’s perception of or response to social impacts?</p> <p>Does environmental knowledge influence fisher’s perception of or response to social impacts?</p> <p><i>Geographical area:</i> Port Stephens-Great Lakes and Batemans marine parks</p>	<p><i>Empirical qualitative research:</i> semi-structured interviews were conducted with recreational, professional and Aboriginal fishers. They explored the social impacts of the declaration of Port Stephens-Great Lakes Marine Park and Batemans Marine Park and their link to MPA opposition. The study used purposive sampling to seek out the opponents and explore the drivers of that opposition. It adopted a qualitative, instrumental case study research design, in which examination of case study sites at a localized level were used as an ‘instrument’ to provide insight into a wider social phenomenon - in this case MPA opposition</p>	<p>Opponents felt the MPAs had resulted in a variety of negative impacts ranging from a loss of enjoyment and convenience through to more serious impacts on wellbeing, livelihood and culture. All the MPA opponents interviewed represented themselves as ‘knowledge holders’ about their local marine area. This knowledge - predominately ‘fish’ knowledge - appears to have conflicted with a policy position which places biodiversity conservation as the primary objective of MPAs. This has led to a perception that the practical knowledge of users was not valued in the planning of each MPA.</p> <p>Consultation and engagement exercises which recognize diverse ‘knowledges’ and ‘ways of knowing’ may assist in breaking down the polarized positions so common in these debates and assist communities to build a shared vision for the way their marine environment is managed. This is particularly important for Aboriginal stakeholders who have enormous traditional ecological knowledge and expertise that can enrich planning processes.</p>

Study Title	Description	Approach	Findings
Voyer 2014	<p>The research sought to explain the divergent community responses to the introduction of MPAs</p> <p><i>Geographical area:</i> Port Stephens-Great Lakes Marine Park and Batemans Marine Park</p>	<p><i>Empirical qualitative research:</i> the study used a mixed methods approach including a literature review, document and media analysis, interviews and regional profiling.</p>	<p>The results found that the Batemans Marine Park demonstrated the ‘perfect storm’ of opposition triggers - a community struggling in the transition away from a primary production economy, a highly politicised media dominated by powerful elites with ideological objections to the park, and social impacts sufficiently profound to motivate local citizens to support an active campaign against the park. Opposition to MPAs, however, cannot be explained by impact alone. All the MPA opponents interviewed represented themselves as ‘knowledge holders’ about their local marine area. This knowledge - predominately ‘fish’ knowledge - appears to have conflicted with a policy position which places biodiversity conservation as the primary objective of MPAs. This has led to a perception that the practical knowledge of users was not valued in the planning of each MPA.</p>
Voyer et al. 2015a	<p>The research identified the values, images and principles at work amongst coastal users to determine the dominant ‘cultural models’ within the community and how these models influenced attitudes towards MPAs.</p> <p><i>Geographical area:</i> NSW Marine Estate</p>	<p><i>Empirical qualitative research:</i> a series of in-depth, semi structured interviews were conducted across coastal users in NSW, Australia, including surfers, recreational fishers, professional fishers, spear fishers, walkers, divers, snorkelers, kayakers and other community members.</p>	<p>This research indicates that traditional consultation models may not be sufficient to address the full spectrum of community needs, and in fact suggests the need to re-conceive the make -up of ‘the community’ itself. In the context of MPA planning ‘the community’ is not an amalgamation of a range of homogenous stakeholder groups but instead a diverse and complex mix of identities and value systems which are not confined to particular interest groups. Incorporating consideration of the diverse range of values, images and principles found within and across stakeholder groups will require new and innovative approaches to participation and management.</p>

Study Title	Description	Approach	Findings
Voyer et al. 2015b	<p>The research sought to explain the divergent community responses to the introduction of MPAs in the Port Stephens-Great Lakes Marine Park and Batemans Marine Park.</p> <p><i>Geographical area:</i> Port Stephens-Great Lakes and Batemans marine parks</p>	<p><i>Empirical qualitative research:</i> This research adopted a mixed methods approach, incorporating a range of research techniques and data sources:</p> <ul style="list-style-type: none"> Community profiles - history and demographics Media coverage and campaigns by sectoral interest groups Social and economic impacts <p>A series of semi-structured interviews were conducted with stakeholders determined to be the most likely to be negatively impacted by the parks, namely extractive users (professional, recreational and Aboriginal fishers). Research participants were asked a series of questions relating to their attachment to their place of residence, their motivation to fish, fishing frequency and their perceptions of the impacts of the MPA</p>	<p>Differences in the demographics, history, local media coverage and social impacts of each MPA contributed to these different community responses. The Batemans Marine Park demonstrated the ‘perfect storm’ of opposition triggers - a community struggling in the transition away from a primary production economy, a highly politicised media dominated by powerful elites with ideological objections to the park, and social impacts sufficiently profound to motivate local citizens to support an active campaign against the park. These impacts included loss of access, identity and increased competition for resources. This research points to the importance of developing a deeper understanding of the social, cultural and political landscape of the communities in which MPAs are proposed and a rethink of planning processes to better incorporate community objectives and knowledge.</p>

Study Title	Description	Approach	Findings
Vanderkooi Consulting 2015	<p>This report provides background information on the economic and social benefits of the marine estate, and the threats to those benefits, to support the threat and risk assessments of the NSW marine estate.</p> <p><i>Geographical area:</i> NSW marine estate</p>	<p><i>Non-empirical research:</i> This study was a literature review, which included relevant data provided by a number of agencies responsible for marine estate management, including the NSW Department of Primary Industries, Transport for NSW and the Office of Environment and Heritage.</p>	<p>Based on the analysis contained in the report, Water pollution / Litter and marine debris / Climate change pose the greatest threat to the economic and social benefits of the marine estate.</p> <p>Depleted fish stocks through overfishing is likely to have a moderate impact on the economic and social benefits of recreational fishing and charter fishing, and a major impact on the economic and social benefits of commercial fishing activities.</p> <p>Limited access and storage infrastructure is likely to have a moderate impact on the economic and social benefits of recreational boating and boat building activities.</p> <p>Other threats are likely to have a moderate impact on only one activity. This includes:</p> <ul style="list-style-type: none"> • loss of social licence is likely to have a moderate impact on the economic and social benefits of cruise shipping activities; • it is possible that the availability of land and competing land use, and likely that landside congestion, will have a moderate impact on the economic and social benefits of ports and shipping; • access rights are likely to have a moderate impact on the economic and social benefits of commercial fishing; and • it is possible that pests and diseases, and likely that theft and black marketing, will have a moderate impact on the economic and social benefits of aquaculture.

Study Title	Description	Approach	Findings
Sweeney Research 2014	<p>The purpose of this research was to prioritise those areas of greatest concern to the NSW community and identify key opportunities for improved management of the marine estate.</p> <p><i>Geographical area:</i> NSW marine estate</p>	<p><i>Empirical quantitative and qualitative research:</i> A mixed methods approach was utilised as follows:</p> <p>Stage 1: Knowledge discovery and consultation with Internal Stakeholders - an orientation workshop involving NSW Trade and Investment, MEMA, MEEKP and the Sweeney Research team.</p> <p>Stage 2: Formative Qualitative research - a series of in-depth interviews and focus groups with a range of stakeholders and community members</p> <p>Stage 3a: Representative online survey - 1000 online questionnaires with a fully robust and representative sample of NSW residents</p> <p>Stage 3b: Intercept survey - 700 intercept surveys at 7 locations in NSW with a robust sample of local residents and tourists</p> <p>Stage 4: Analysis and reporting - development of a comprehensive stakeholder map, an evaluation framework for any future programs associated with the marine estate and a final report of the key findings of the research</p>	<p>See section 4.2 for the benefits, threats and opportunities identified in this study.</p>
Turnbull et al. 2021	<p>The study assessed the social perceptions and ecological effectiveness of 18 partially protected areas and 19 fully protected areas compared with 19 open areas along 7000 km of coast of southern Australia.</p> <p><i>Geographical area:</i> Great Southern Reef (Australia)</p>	<p><i>Empirical quantitative and qualitative research:</i> Mixed methods were used, gathering data via semi-structured interviews, site surveys, and Reef Life (underwater visual census) surveys. Qualitative data was analysed in accordance with grounded theory and quantitative data with multivariate and univariate linear mixed effects models.</p>	<p>The study found no social or ecological benefits for partially protected areas relative to open areas. Partially protected areas had no more fish, invertebrates, or algae than open areas; were poorly understood by coastal users; were not more attractive than open areas; and were not perceived to have better marine life than open areas.</p>

Study Title	Description	Approach	Findings
Harasti et al. 2019	<p>This study quantified illegal fishing within the Seal Rocks no-take area between April 2017 - March 2018.</p> <p><i>Geographical area:</i> Port Stephens-Great Lakes Marine Park</p>	<p><i>Empirical quantitative research:</i> Baited Remote Underwater Video Systems (BRUVs) were used to quantify abundance and size of snapper from 2011-2017. BRUVs were also deployed at two nearby fished locations and two other no-take areas to allow comparison.</p>	<p>The study observed a total of 108 recreational vessels illegally fishing within the no-take area during the study period. The abundance of snapper also declined by 55% from 2011 to 2017. The authors conclude that there is a strong likelihood that illegal recreational fishing is causing a reduction in snapper populations in the no-take zone.</p>
Martin et al. 2015	<p>This study evaluated the usefulness of in-situ signage in an existing multiple-use MPA, to determine if signs pertaining to the MPA captured the attention of recreational users, and provided adequate information.</p> <p><i>Geographical area:</i> Port Stephens-Great Lakes Marine Park</p>	<p><i>Empirical qualitative research:</i> Structured interviews with recreational fishers, divers, and other users, were used to determine users' awareness of being in an MPA, their awareness of management objectives and associated zoning scheme, together with levels of agreement or disagreement on whether or not current in-situ signage adequately communicates information about the MPA.</p>	<p>The study found that the types and accessibility of in-situ signs in the MPA may not be effective at capturing the attention of intended audiences and providing relevant information. Many recreational fishers believed existing signage was inadequate and unclear, and expressed frustrations with the complexity of zoning rules and location of their boundaries. Some signs at dives sites were viewed as effective due to their design, size and placement. The study recommends erecting a large billboard sign adjacent to the only main roadway into the Port Stephens area to communicate to visitors and residents that they are entering an MPA where restrictions apply, and a user guide should be obtained for further information.</p>
Read et al. 2011	<p>Planning criteria for optimizing compliance in MPAs was compiled and used to compare the views of recreational fishers and compliance officers for facilitating voluntary compliance.</p> <p><i>Geographical area:</i> Port Stephens-Great Lakes Marine Park</p>	<p><i>Empirical qualitative research:</i> Two working groups were established to assist in Multi-criteria Analysis scoring and ranking of MPA zones against manageability, thus allowing for a comparison between the perspectives of recreational fishers and compliance officers.</p>	<p>Recreational fishers and compliance officers had similar perspectives and recommendations on management, despite weighting the individual planning criteria differently. The majority of no-take zones in the Port Stephens-Great Lakes Marine Park case study were evaluated as being relatively effective in terms of optimising voluntary compliance, however, there remains considerable potential to improve design, management and use of the poorer performing zones. The study also highlighted the value of recreational fisher engagement in MPA planning processes to maximize voluntary compliance and manageability.</p>

4.3. Factors Affecting the Performance of NSW MPAs

The following factors that may be affecting the performance of NSW MPAs were identified through the literature review. It should be noted that the lack of measurable KPIs for the social effects of NSW MPAs makes assessing their performance difficult.

General

- Community knowledge and values need to be incorporated into management plans at an early stage of MPA implementation (Johnstone et al. 2017)
- Engaging local communities needs to go beyond large-scale consultation processes to include more rigorous, integrated social, economic and ecological assessment exercises, involving a collaborative participatory approach (Voyer and Gladstone 2017)
- Specific and targeted consideration of social impacts is needed, separate from (but informed by) consideration of economic impacts (Voyer et al. 2012)
- The development of strategies to compensate for the loss of some fishing enjoyment, such as through the provision of artificial reefs to allow for a continued diversity of experience (Voyer et al. 2014)
- Compensation packages that rely on financial incentives for professional fishers neglect the importance of lifestyle, heritage and social identity in the lives of these fishers (Voyer et al. 2014).
- Incorporating the management objectives of local communities into MPA or marine spatial planning exercises may assist in building support for MPAs, provide communities with a greater sense of ownership and smooth the way for meaningful conservation outcomes (Voyer et al. 2014).

Managing conflicts between users

- Applying spatial buffers to existing areas of conflicts to reduce conflicts between users; for example, spatially restricting water sports users to designated areas, away from non-extractive ecotourism groups. Better education for boat/jet ski hire users would also be beneficial (Noble et al. 2019).
- Managing conflicts between recreational and commercial fishers by educating both groups about their impact on fish stocks. The profile and stewardship of commercial fishers may also be improved by only allowing local commercial fishers to operate in the area (Noble et al. 2019).
- Spatially supporting Aboriginal Traditional Owners' use of MPAs by implementing cultural fishing zones, and special use zones for cultural purposes only. This would raise awareness of their uses with the other stakeholder groups and protect culturally significant sites (Noble et al. 2019).
- Reducing community conflict in the media by incorporating 'bottom up' approaches into MPA planning, the promotion and support of a range of voices within the community, and seeking out and building upon common ground and shared values (Voyer et al 2013a).
- Finding ways to utilise fisher knowledge to reduce polarisation and build a sense of ownership among users (Voyer et al. 2014). This is particularly important for engaging Aboriginal stakeholders to both acknowledge and make use of their valuable traditional ecological knowledge and expertise. This should be more than just a consultative role, instead enabling community knowledge holders to have a role in determining the management approaches best suited to local environmental issues.

- Involve local communities, including Aboriginal communities, as part of the threat and risk assessment approach to MPA planning, by including their perceptions of threats and their ideas about appropriate responses to threats (Voyer et al. 2013b), in addition to ‘expert’ led assessment of risk. This is addressed to an extent in Feary (2015) and Vanderkooi Consulting (2015), however Origin Communications Australia (2017) also recommend that Aboriginal culture must be reflected in all aspects of the state-wide TARA and not relegated to traditionally delineated areas such as ‘tangible’ or ‘intangible’ heritage.

4.4. Knowledge Gaps and Research Recommendations

The literature review revealed a number of knowledge gaps and recommendations for future research.

Knowledge gaps

- There is an overall reliance on qualitative studies in the available literature, however in most cases empirical qualitative evidence is collected to support the findings.
- Studies are focussed on Port Stephens-Great Lakes Marine Park (nine papers, Table 4-3) and Batemans Marine Park (seven papers, Table 4-3), the qualitative nature of many of these studies means that generalisability is limited.
- There have been no social studies undertaken specifically on Lord Howe Island Marine Park or Jervis Bay Marine Park (Table 4-3).
- Much of the literature focussed on community values is led by a single author and based on the PhD research undertaken by Voyer (2014). This means that much of the analysis is subject to similar analytical framing.
- It is not clear which user groups predominantly adhere to ecological or community models of thinking.

Table 4-3 Geographical coverage of literature across NSW MPAs and the marine estate

Geographical rea	Literature coverage
Cape Byron Marine Park	Gollan and Barclay 2020
Solitary Islands Marine Park	Johnstone et al. 2017, Voyer et al. 2013b
Port Stephens Great Lakes Marine Park	Gollan and Barclay 2020, Martinez et al. 2016, Noble et al. 2020, Noble et al. 2019, Voyer et al. 2012, Voyer et al. 2015b, Voyer et al. 2013a, Voyer et al. 2014, Voyer 2014, Voyer et al. 2015b, Harasti et al 2019, Martin et al. 2015, Read et al. 2011
Lord Howe Island Marine Park	None
Jervis Bay Marine Park	None
Batemans Marine Park	Voyer and Gladstone 2015, Voyer et al. 2012, Voyer et al. 2015b, Voyer et al. 2013a, Voyer et al. 2013b, Voyer et al. 2014, Voyer 2014, Voyer et al. 2015b
NSW marine estate	Gollan et al. 2019, Voyer et al. 2015a, Vanderkooi Consulting 2015, Sweeney Research 2014

Source: BDO EconSearch analysis

Research recommendations

- Develop social KPIs for NSW MPAs to enable future social research to inform MPA performance and to address knowledge gaps identified above.
- Encourage social research of the less studied MPAs, in particular Lord Howe Island, Jervis Bay, Cape Byron and Solitary Islands marine parks.
- Encourage studies to understand which user groups predominantly adhere to ecological or community models of thinking. It would be useful to understand whether different user groups in particular communities are more inclined towards one or the other models of thinking so that targeted community engagement strategies can be designed.
- Encourage studies with a diversity of analytical frameworks, particularly around community values analysis.
- Commission consistent, longitudinal social surveys of the community and stakeholder's attitudes towards MPAs conducted over a long-term timeframe.
- Encourage social research covering intergenerational perspectives of MPA management.

5. CULTURAL LITERATURE REVIEW

5.1. Cultural Effects of NSW MPAs

The cultural effects of NSW MPAs that have been identified in the available literature are highly focussed on Aboriginal culture, particularly on cultural fishing. This is understandable because of the centrality of Aboriginal cultural fishing to Aboriginal identity, spirituality and connection to ancestors and Country (AITSIS 2018). Gollan and Barclay (2020) note that NSW MPAs may contribute to non-Aboriginal culture through a person’s sense of and emotional attachment to place and community pride within MPAs. However, the culture domain of the Gollan and Barclay (2020) wellbeing framework remains dominated by issues surrounding Aboriginal culture. The absence of studies relating to non-Aboriginal culture suggests that there has been few cultural effects felt by the non-Aboriginal community.

Although NSW MPAs effect other aspects of Aboriginal culture such as middens, art sites with depictions of the marine environment and a range of other ways (see Table 5-1) these are not a focal point of the literature. We suggest that this is because of the much greater impact that NSW MPAs have on cultural fishing activities and the controversy that restrictions on these activities generates in the Aboriginal community.

In 2015, Feary undertook an extensive literature review to identify the values and benefits of the marine estate to Aboriginal people. She identified the six cultural benefits outlined and described in Table 5-1. However, she concluded that the primary benefit of the marine estate would be cultural connection and cultural identity associated with resource use, or cultural fishing. She found that cultural fishing in the marine estate was not only important for sustenance but also for Aboriginal fisher health and wellbeing and, significantly, for identity as Aboriginal people. Cultural fishing enables people to get out on Country where traditional knowledge can be passed on to the next generation. Other benefits included economic, both in the western market economy and the informal bartering and trade economy. Economic benefits are limited by the restrictions on cultural fishing and due to access to fishing licences as a result of Aboriginal socio-economic disadvantage more broadly.

Table 5-1 Cultural benefits of the NSW marine estate to Aboriginal people identified by Feary (2015)

Benefit	Description
Continuation of cultural traditions/practices/knowledge associated with resource use (intangible cultural heritage)	<p>Knowledge about the natural environment and resource availability passed down orally through generations</p> <p>Customs and technologies associated with management; harvesting /hunting, processing and allocation of resources</p> <p>Use of marine organisms in cultural practices such as in burial sites, or in ceremonial use</p> <p>Traditional knowledge regarding use of certain plants and animals for medicinal purposes</p>
Marine resources	<p>Fin-fish, molluscs and crustaceans throughout the marine estate, are a significant component of the diet of coastal Aboriginal communities. Some species are considered ‘culturally iconic’ e.g. abalone on the NSW south coast and pipis on the north coast</p>

Benefit	Description
Tangible cultural heritage	Middens, art sites with depictions of the marine environment, fish traps, items of material culture, etc. which demonstrate prior custodianship and use, and links to contemporary culture
Religious /spiritual places and landscapes (intangible benefits)	Aboriginal religious beliefs that underpin cultural traditions and behaviours, including use of marine resources, - totems, creation stories, etc.
Practices influenced by white contact	<p>Written and oral records of Aboriginal interactions with the marine environment depicting a mix of traditional and western cultures</p> <p>Historical records of Aboriginal culture and society associated with the marine environment, including commercial fishing</p> <p>Shared and exchanged knowledge of Aboriginal and non-Aboriginal people about the marine environment</p>
Post-contact [historical] tangible and intangible heritage	<p>Post-contact sites of resource gathering and/or associated communal activities, e.g. campsites, meeting places</p> <p>Oral and written records describing environmental change and change in fish and invertebrate ecology</p>

Source: Feary (2015)

Threats to these benefits were also identified by Feary (2015) and included physical threats, such as pollution, loss of habitat or depletion of stocks; legislative, such as restrictions on use; or cultural, such as loss of knowledge about the spiritual values of the seascape. She also identified threats to the cultural benefits of fishing such as damage to physical heritage, or lack of appreciation of the integrated nature of land and sea by government agencies. A major threat to the benefits of the marine estate was identified as not having a strong enough voice in decision making. This report was peer reviewed by Schnierer (2015), an expert in Aboriginal cultural fishing research. His review found that the Feary Report, with some amendments, adequately informs the state-wide threat and risk assessment of Aboriginal connections with the marine estate in NSW.

The Fisheries Research and Development Corporation has also commissioned research that focused more explicitly on the values and benefits of cultural fishing to Aboriginal communities in NSW. This research is not specifically related to NSW MPAs, although it provides some important context about why cultural fishing is such a significant activity for Aboriginal people on the NSW coast. For example, Kennett et al. (2016) provides a case study of the workshop delivered in Bingie on the NSW south coast. This workshop identified the values associated with cultural fishing activities and the aspirations and future directions of the local Aboriginal community members. They outline how cultural fishing is part of the cultural practices of commemorating the region’s ancestors, provides potential employment opportunities and is a favourite pastime for many locals. This study fed into Smyth et al. (2018) which compiles the results of several case studies, including the Far West Coast in SA and Northeast Arnhem Land in NT. Smyth et al. (2018) identified the cultural, social, economic and health values, the barriers and effects of those barriers on cultural fishing and aboriginal aspirations. For coastal communities fishing is also one of the primary ways of living and practicing culture, enabling Aboriginal people to maintain a connection to Country and providing ways to pass on cultural knowledge to the next generation (Smyth et al. 2018). Through these connections, Smyth et al. (2018) have also identified how cultural fishing contributes to wellbeing and overall health, providing a source of healthy food, physical activity and opportunities for children to bond with older community members. Table 5-2 provides a summary of the results of the study.

Table 5-2 Values of fishing to Aboriginal people of the South Coast of NSW (AITSIS 2018)

Value type	Values
Cultural Values	Fishing knowledge, practices and laws are passed down from generation to generation. Cultural laws include only taking as much as you need, taking species when they are in season, and not taking things that are too small. Taking kids fishing is necessary for their cultural education.
Social Values	Fishing is valued as a healthy way to spend time with family and friends. Sharing provides a social safety net for those doing it tough. Cultural-commercial fishing benefits the whole community.
Economic Values	Subsistence fishing and bartering/trading catch help families with low incomes. Many believed that traditional owners had a right to access and use their resources any way they see fit, including bartering, trading and selling their catch if they chose to.
Health Values	Fishing provides cheap, healthy food and keeps people physically active. Some seafoods are used medicinally. Self-esteem and mental health is often tied to providing for family and practicing culture.

Source: AITSIS 2018

Barriers to cultural fishing

Perhaps the most pressing cultural effect of NSW MPAs is that it erects legislative barriers that prevent or restrict Aboriginal cultural fishing. Although the secondary purposes of the *Marine Estate Management Act 2014* include supporting Aboriginal cultural uses of marine parks and aquatic reserves, many Aboriginal people in NSW continue to feel that their cultural practices are unjustifiably curtailed by MPAs (Smyth et al. 2018). Smyth et al. (2018) found that there was a common perception amongst the Aboriginal people who contributed to MPA zoning consultation that they had been taken advantage of and had their knowledge used against them. They felt this way because they had provided information about where they fished and where they went to catch different species in the belief that their cultural fishing would be protected or accommodated within the zoning. Instead, in the case of the Batemans Marine Park, they felt that many of the places that they had previously used for cultural fishing had been placed under sanctuary or habitat protection zoning, excluding them from use.

Although the provisions for cultural fishing in the marine estate specifically excludes fishing for commercial gain, there is a distinct overlap that exists between Aboriginal commercial and cultural fishing (Schnierer and Egan 2012, 2015). For instance, Schnierer and Egan (2012) found that over 90 per cent of Aboriginal commercial fishers give an average of 9.8 per cent of their annual commercial catch to their local Aboriginal communities.

5.2. Summary of the Cultural Literature

Beeton et al. (2012) noted that a lack of emphasis on cultural and heritage research by relevant government departments. This has, to some extent, been rectified in the period to 2021, with significant relevant research being undertaken to understand the importance of Aboriginal cultural fishing. However, non-Aboriginal culture and maritime heritage remains understudied. Additionally, very few of the studies that do exist have focussed on NSW MPAs specifically. Rather, they focus on Aboriginal cultural fishing and

mention the ways that NSW MPAs impacts this important activity. In this section, only the review of the state-wide TARA undertaken by Origin Communications Australia (2017) is specifically focussed on NSW MPAs.

Quantifying Aboriginal cultural catch

Improved data on the species harvested and habitats used by Aboriginal cultural fishers may improve Aboriginal fisher visibility in MPA planning. Although detailed data on commercial and recreational catch in NSW have been collected for use in management decisions for some time, Aboriginal cultural catch has remained unquantified. Schnierer and Egan (2015) suggest that this is likely to be partly due to the investment of time required to build trust with communities to engage in log-book keeping exercises.

To address this gap, Schnierer (2011) and Schnierer and Egan (2015) undertook research using surveys, cultural fishing logbooks and interviews. Schnierer and Egan (2016) then compared these data sets with the only other study of cultural catch in NSW conducted by the Natural Heritage Trust in 1999. This provided a synthesis of current knowledge of cultural catch in Aboriginal fisheries in NSW. These studies were not confined to cultural fishing that took place within MPAs but across NSW coastal and inland waters. Although the studies focus on the overlap with commercial fisheries, some findings, such as information about cultural fisher behaviour and target species are of relevance to MPA management. The studies found that Aboriginal fishers spend more time fishing in estuaries than other aquatic environments (Schnierer 2011). The most favoured fishing method was hook and line, followed by hand collection, diving, traps, spears and nets (Schnierer 2011). Over 150 species of finfish and invertebrates are targeted by Aboriginal cultural fishers, over 90 per cent of which are also harvested by commercial and recreational fishers (Schnierer and Egan 2016). Some species that were solely targeted by Aboriginal fishers were also identified, including various periwinkle species, limpets, freshwater mussel, cobra, black nerite, eel tail catfish, estuary catfish, freshwater herring, pink-eye mullet and kelpfish (Schnierer and Egan 2016).

Analysis of legislation affecting Aboriginal cultural fishers in NSW MPAs

Legislative and management restrictions on Aboriginal cultural fishers has also been a focus in the relevant literature. Aboriginal cultural fishing can be legally protected in NSW under the *Fisheries Management Act 1994* and the *Marine Estate Management Act 2014* and the Commonwealth Native Title Act 1993. All three pieces of legislation are relevant to cultural fishing in MPAs. While the secondary purposes of the *Marine Estate Management Act 2014* sets out to support Aboriginal cultural uses of MPAs, what constitutes cultural fishing, including bag limits, is determined by the *Fisheries Management Act 1994*. Additionally, if a community has native title rights over part of an MPA they can exercise their rights to fish for personal, domestic or non-commercial needs in line with the provisions of the *Native Title Act 1993* regardless of any restrictions set by the other two pieces of legislation.

The *Fisheries Management Act 1994* specifies that Aboriginal cultural fishing includes:

Fishing activities and practices carried out by Aboriginal persons for the purpose of satisfying their personal, domestic or communal needs, or for educational, ceremonial or other traditional purposes, and which do not have a commercial purpose.

It also exempts Aboriginal people from paying a recreational fishing fee. In 2009, section 21AA was proposed and assented to. Under section 21AA, an Aboriginal person would be authorised to exceed recreational bag limits for the purpose of Aboriginal cultural fishing. However section 21AA has not yet come into force, though reasons for this are not apparent (Pain and Pick 2020). In the meantime, the Aboriginal Cultural

Fishing Interim Access arrangement was implemented in 2014 and sets higher bag limits for species of fish for cultural fishing. The bag limits for most species for cultural fishing are twice that allowed for recreational fishing. In recognition of their cultural importance, abalone limits were increased from 2 to 10 per person per day. Additionally, if there are cultural needs in excess of the bag limits set by the Interim Access arrangement, for example catering for large events, an application for authority under section 37 of the *Fisheries Management Act 1994* can be made.

There is significant concern amongst the Aboriginal community that their cultural practices are over-regulated by the *Fisheries Management Act 1994*. This is because between 2009 and 2015 there were over 250 prosecutions of Aboriginal people in NSW for fisheries offences and over 500 regulatory actions such as fines, warnings and gear confiscation (Macey 2015). Many Aboriginal people view the bag limits that apply to them as overly restrictive because they do not take into account the common practice that means a small number of regular fishers provide for many people (Smyth et al. 2018). The most vexed bag limit appears to be for abalone (or mutton fish as it is known locally), which appears to have triggered the most legal action, though reliable data about prosecutions is scant (Pain and Pick 2020).

Of particular concern is the, at times, disproportionate punishment that Aboriginal people bear when they cannot afford to pay for bag limit fines (Pain and Pick 2020). There is concern in the community that people who cannot afford a fine of a few thousand dollars may end up having assets like cars confiscated, or worse, spending time in jail, with the economic and social disadvantages that accompany imprisonment for themselves and their children (Smyth et al. 2018). Additionally, community leaders are more likely to fish to feed many others and are therefore more likely to face prosecution. Imprisonment of community leaders is also likely to have wider implications for the community.

To rectify this, Pain and Pick (2020) recommend immediate implementation of section 21AA to enable Aboriginal input into bag limits for cultural fishing and to provide a legal defence for Aboriginal people prosecuted for exceeding bag limits for cultural use (see Section 5.3 for recommendations).

The Bundjalung People of Byron Bay hold native title rights over some parts of the Cape Byron Marine Park (Pain and Pick 2020). In the Solitary Islands Marine Park the Yaegl people hold native title over the northern islands, while the Githabul / Gumbaynggirr people hold native title over the southern islands (Parks Australia 2021). Native title claims are also pending over the South Coast including Jervis Bay and Batemans marine parks, including marine and estuarine waters. Pain and Pick's (2020) study finds that where native title has been recognised it is likely to improve the ability of Aboriginal fishers to prove a defence of exceeding bag limits for cultural fishing.

Other key papers investigate the ways that various legislation and policy effects Aboriginal cultural fishing. Bauman et al. (2013) explore how provision for co-management for MPAs may provide a workable solution for Aboriginal communities who feel excluded from decision-making processes, as Origin Communications Australia (2017) have found in the NSW marine estate. Schnierer and Egan (2012) also investigated how management changes have impacted the viability of Aboriginal commercial fishers, many of whom are also cultural fishers in the marine estate, and their communities. The most important management changes that impacted Aboriginal fishers were issues around access, cost, culture and tradition and consultation.

Review of the state-wide TARA

A review of the state-wide TARA was carried out by Origin Communications Australia (2017). This involved a series of one-day workshops with peak bodies, advisory groups, Land Councils, Elders Groups, Aboriginal

organisations and community members. The outcomes of the workshops included principles that Aboriginal communities feel must be applied to the TARA framework to ensure that Aboriginal interests are protected (see Section 6.2). Suggestions for inclusive and effective Aboriginal management approaches were also outlined (see Section 6.2). Finally, priority areas regarding Aboriginal cultural heritage and continuing active use in the Marine estate were identified as summarised below.

1. Clear recognition of the deep and continuing Aboriginal involvement with, and responsibility for Sea Country and activities throughout NSW.
2. Protection of, and appropriate relationships with the marine estate are not new to Aboriginal people in NSW - they are fundamental and long-held cultural practice.
3. Aboriginal culture must be reflected in all aspects of the state-wide TARA and not relegated to traditionally delineated areas such as 'tangible' or 'intangible' heritage.
4. Aboriginal rights must be clearly and consistently respected in the marine estate areas. There was ongoing concern non-Aboriginal people make decisions concerning Aboriginal culture, heritage and rights.
5. Culturally authoritative Aboriginal voices must be involved in MEMA decision-making processes and management. This includes Aboriginal membership at senior levels (both executive functions and management levels).
6. Environmental degradation, pollution, and climate change impacts were raised as key issues. More specifically, significant concern was expressed regarding changing migration habits, changes in fish stocks, destruction of seagrass beds, toxic pollution, farm run-off and river discharge.
7. Regulation and enforcement were major areas of concern. These often precipitated a cascade of events which resulted in many Aboriginal people avoiding traditionally practiced activities or even accessing local areas.
8. Aboriginal fishers, both recreational and commercial, experienced a wide range of regulatory and legal hurdles and misunderstandings. This was particularly true around access to abalone and pipi collection.
9. Interactions across many levels of government and regulatory practice are widely held to either exclude Aboriginal people or effectively ignore Aboriginal people from the political and regulatory processes that directly impact upon the marine estate (particularly zoning decisions, development impacts, and contradictory responses to cultural and environmental concerns).
10. Resourcing and capacity issues were paramount for most Aboriginal communities and organisations.

Table 5-3, overleaf, provides a summary of findings from our review of published and peer-reviewed literature related to the cultural performance of NSW MPAs undertaken since 2010.

Table 5-3 A summary of reviewed cultural literature relevant to management of MPAs in NSW

Study Title	Description	Approach	Findings
Origin Communications Australia 2017	<p>The purpose of the workshops was to:</p> <ul style="list-style-type: none"> Explain the findings of the draft state-wide TARA and the processes undertaken to develop and undertake the assessment Seek feedback on the evidence-base used and ask for any additional evidence to inform the final state-wide TARA Outline the online submission process and next steps for finalising the state-wide TARA and related marine estate projects Seek feedback about engagement and feedback mechanisms that will ensure meaningful and continuous engagement for Aboriginal communities in marine estate management processes. <p><i>Geographical area:</i> NSW marine estate</p>	<p><i>Empirical qualitative research:</i> Origin Communications Australia facilitated a series of one-day workshops to review the draft state-wide TARA. Workshop attendees included peak bodies, advisory groups, Land Councils, Elders Groups, Aboriginal organisations and community members.</p>	<p>See Sections 5.1 and 5.3 for a summary of the principles and feedback identified in this study.</p>
Feary 2015	<p>This study provides a background report to identify the values and benefits of the NSW marine estate to Aboriginal people and to also identify existing and potential threats to these benefits. The benefits and threats analysis will feed into a broader threat and risk assessment process being conducted by MEMA at the state-wide scale.</p> <p><i>Geographical area:</i> NSW marine estate</p>	<p><i>Non-empirical research:</i> literature review</p>	<p>The greatest and most important benefits of the NSW marine estate to Aboriginal people are cultural connection and cultural identity associated with resource use. While for most people, going fishing or collecting shellfish are recreational activities, for Aboriginal people, many in low socio-economic circumstances, the resources they harvest from the sea may be essential for not only their sustenance, but also their health and wellbeing and for identity as Aboriginal people.</p> <p>Community harvesting of resources is an integral part of cultural identity as it enables people to get out on Country where traditional knowledge can be passed on to the next generation.</p> <p>Aboriginal economic benefits incorporate both the western market economy and the informal communal economy of sharing</p>

Study Title	Description	Approach	Findings
			<p>and exchange of goods and services. While marine resources are of critical economic importance in the Aboriginal non-market economy, the economic benefit of the marine estate to Aboriginal people in the market economy is currently very limited. Aboriginal commercial fisher numbers are declining and are less than during the mid-20th century. Aboriginal people attribute this decline to the introduction of share management fisheries, depletion of fish stocks and legal restrictions on access and use of some marine resources.</p> <p>Sources of threats to benefits of resources use and the integrity of the cultural/natural landscape, include physical threats, such as pollution, loss of habitat or depletion of stocks; legislative, such as restrictions on use; or cultural, such as loss of knowledge about the spiritual values of the seascape. Heritage/cultural benefits are also subject to other threats such as damage to physical heritage, or lack of appreciation of the integrated nature of land and sea by government agencies.</p> <p>Threats to economic benefits are influenced in part by issues of Aboriginal socio-economic disadvantage that go beyond the marine estate. Insufficient action by governments to improve the situation of Aboriginal people through employment and economic development in relation to the marine estate is one example of a threat to economic benefits.</p> <p>Threats to aspirational benefits are by and large due to not having a strong enough voice in decision making. How native title plays out in NSW in the future will have a profound effect on Aboriginal aspirations, as it may put them be in a more equitable position to achieve desired outcomes in regard to rights and interests over land and water including the NSW marine estate.</p>
Schnierer 2015	Peer review of Feary 2015 <i>Geographical area:</i> NSW marine estate	<i>Non-empirical research:</i> Expert review	The reviewers' overall assessment is that the Feary Report given the comments provided by the reviewer are adopted in whole or in part, will adequately inform the state-wide threat and risk

Study Title	Description	Approach	Findings
			assessment of Aboriginal connections with the marine estate in NSW.
AITSIS 2018	<p>AIATSIS did research with the NSW Aboriginal Fishing Rights Group to find out:</p> <ul style="list-style-type: none"> Different ways that fishing is important to South Coast Aboriginal people (values). Barriers to fishing and the effects they have. What South Coast Aboriginal people wanted for the future (aspirations)? <p><i>Geographical area: Southern NSW Coast</i></p>	<p><i>Empirical qualitative research:</i> survey, interviews and focus groups.</p> <p>A series of meetings and interviews that the NSW Aboriginal Fishing Rights Group and the Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS) held from September 2015 to December 2017.</p> <p>Between March and May 2016, 77 people were interviewed in Nowra, Ulladulla, Batemans Bay, Mogo, Moruya, Narooma, Wallaga Lake, Eden and La Perouse in Sydney.</p>	See Table 5-2 for a summary of the Aboriginal cultural fishing values identified in this study.
Smyth et al. 2018	<p>Purpose of research:</p> <ul style="list-style-type: none"> Identify cultural, social and economic values of Indigenous fishing at selected case study communities. Articulate connections between established Indigenous land and sea management regimes and Indigenous aspirations in fisheries. Support the recognition of Indigenous values and use of aquatic resources in fisheries management. 	<p><i>Empirical qualitative research:</i> the study used semi-structured long-form interviews and short questionnaires to collect qualitative (and limited quantitative) data on the fishing values, barriers and aspirations of Aboriginal people, tailored to each region's context.</p>	<p>Fishing is governed by widely recognised cultural laws and norms. Fishing is one of the primary ways of living and practising culture, maintaining a connection with Country and passing on cultural knowledge. Sharing catch is a strong norm; often a small number of regular fishers provide for many people. Sharing catch strengthens and maintains social ties within and between families and communities. Sharing catch creates a social safety net that supports vulnerable members of the community.</p> <p>Fishing is an important social and leisure activity.</p> <p>Subsistence fishing and the trade and barter of catch increase discretionary incomes by substituting purchased goods.</p>

Study Title	Description	Approach	Findings
	<p>Build Indigenous and non-Indigenous capacity for collaborative fisheries research and management.</p> <p><i>Geographical area:</i> South Coast NSW, Far West Coast SA and Crocodile Islands NT</p>		<p>Certain marine and coastal species are used medicinally. Fishing improves diets, through regular access to healthy foods which are otherwise unavailable or unaffordable. Fishing keeps people physically active. Fishing helps people to relax and deal with stress.</p> <p>Practising culture and providing for their families in this way gives people a sense of pride. Fishing is part of people's individual and cultural identities, and thus their sense of self-worth.</p>
Pain and Pick 2020	<p>This article explores the adequacy of legal protection of cultural fishing under the <i>Fisheries Management Act 1994</i> (NSW) ('FM Act (NSW)'). The authors examine the limits of the defence of native title for Aboriginal defendants charged with offences under the FM Act (NSW) and legislation in other jurisdictions.</p> <p><i>Geographical area:</i> NSW Coast</p>	<i>Non-empirical research:</i> review of legislation and cases	<p>Defendants seeking to establish native title as a defence to charges face a reasonably onerous evidentiary burden. DPis compliance enforcement policy should be amended to ensure that enforcement officers must enquire into the details of the circumstances of fishing before pursuing prosecution. More certainty for Aboriginal defendants would be achieved if section 21AA came into effect together with the necessary regulations to do so. Formal declarations of native title rights over large areas of NSW coastal waters are likely to provide improved protection for cultural fishers in NSW waters.</p>
Schnierer and Egan 2016	<p>Compare and combine data on Aboriginal catch composition from two studies to produce a comprehensive synthesis of current knowledge of Aboriginal fisheries in NSW.</p> <p><i>Geographical area:</i> the north coast, the south coast and the inland of NSW</p>	<i>Non-empirical research:</i> this study combined the findings of a 1999 Natural Heritage Trust study that gathered information on Aboriginal catch in NSW and Schnierer and Egan 2011. The Aboriginal catch composition from these studies was then compared with recreational and commercial target species drawing on data from the National Recreational and Indigenous Fisheries Survey.	<p>The species harvested include more than 150 species of finfish and invertebrates, over 90 % of which are also harvested by commercial and recreational fishers.</p>

Study Title	Description	Approach	Findings
Schnierer and Egan 2015	<p>Used methodology developed in FRDC Project No. 2009/038 to estimate Aboriginal cultural catch in some coastal and inland waters of NSW.</p> <p>Develop a local Aboriginal fisheries management strategy/plan for the Tweed region.</p> <p>Identify other Aboriginal communities that would be willing to develop local fisheries management strategies/plan.</p> <p><i>Geographical area:</i> NSW coast and inland waters</p>	<p><i>Empirical quantitative and qualitative research:</i> two methodologies were used: one for determining Aboriginal cultural catch in NSW, and the other for developing a draft local Aboriginal fisheries management plan.</p> <p>For the cultural catch component of the project, three study regions were chosen. Data collection in each region was based on the deployment of a survey questionnaire developed in the previous pilot project.</p> <p>For the local Aboriginal fisheries management plan component of the project data collection took place over a 12month period starting in 2013 and involved five community workshops as well as fieldwork undertaken between each workshop.</p>	<p>More than 50% of participants indicated they fished on a weekly basis. The average number of hours fished by participants each day was 3.4. The estimated total hours fished by all participants in the 12-month period was 33,506 hours. Most participants fished from the shore but use of boats was also common.</p> <p>Coastal participants showed a preference for fishing in estuaries and near-shore coastal areas including beaches and headlands with a small percentage travelling across the Great Dividing Range to fish in inland waters. Inland participants showed a preference for fishing in freshwater systems west of the GDR including rivers, lakes and dams with a small percentage of fishers travelling across the Great Dividing Range to fish in estuaries, beaches and headlands. Hook and line was the predominant fishing method used by participants in NSW, followed by hand collection, diving, traps, spears and nets. Most participants identified their household as the main destination for their catch followed by immediate family and extended family. However, some indicated that they bartered and/or sold some of their catch. Some catch came from local Aboriginal commercial fishers, highlighting their role in providing their communities with seafood.</p>
Bauman et al. 2013	<p>This paper analyses the implementation of Indigenous Protected Area's and the potential for co-management in Marine Protected Areas</p> <p><i>Geographical area:</i> Australia</p>	<p><i>Non-empirical research:</i> literature review</p>	<p>The study finds that although co-management arrangements can confer some of the rights desirable to Aboriginal people over their land, they often fall short of what traditional owners would consider just compensation for sharing their land. Moreover, the success of institutional arrangements depend upon micro processes of communication and whether they enable Indigenous voices.</p>

Study Title	Description	Approach	Findings
Kennett et al. 2016	<p>Provides a summary of the presentations given by community members, academics and legal experts with regard to cultural fishing and the values associated with cultural fishing activities. The report also details the aspirations and future directions of local Aboriginal community members who hold common values and interests as cultural fishers in the region.</p> <p><i>Geographical area: NSW South Coast</i></p>	<p><i>Empirical qualitative research:</i> data was collected via a gathering of Aboriginal community members to discuss the importance of fishing activities in the area and to devise ways to defend and safeguard the local Aboriginal community's interests and values as cultural fishers.</p>	<p>Members from the local Aboriginal community made various recommendations throughout the gathering which are outlined in section 5.3.</p>
Schnierer 2011	<p>Purpose of research:</p> <p>Determine what aquatic organisms (fish) are of specific cultural relevance to Traditional Owner groups (identify species and their location).</p> <p>Seek to quantify the Aboriginal catch (species, numbers, weight, frequency of fishing) at the level of Traditional Owner groups.</p> <p>Develop an ongoing research partnership with Traditional Owner groups based on trust to be able to move to the documentation of traditional fishing knowledge and the establishment of community owned and controlled data bases.</p> <p>Build capacity of Aboriginal people to conduct fisheries related research.</p> <p><i>Geographical area: far north NSW, the Tweed River Catchment</i></p>	<p><i>Empirical quantitative and qualitative research:</i> Questionnaire and cultural fishing logbook</p>	<p>An important outcome of the study was the development of a culturally appropriate methodology to collect Indigenous cultural fishing data.</p> <p>They also found that cultural fishing in the Tweed region occurs on a regular basis, is predominantly shore-based and focussed around the estuary and adjacent coastal waters. The main gear types used are rods and handlines with nets, traps and spears used to catch some species. The top 10 culturally most important species were also identified. Most of the cultural catch is consumed either by the fisher, their family and extended family or the community as a whole. Some of the catch is also used for bait, bartered or traded.</p>
Schnierer and Egan 2012	<p>Case study of Aboriginal commercial fisheries focusing initially on New South Wales as a basis for a national study.</p>	<p><i>Empirical quantitative and qualitative research:</i> a survey-style questionnaire, Commercial catch data, mini group</p>	<p>The study presents the characteristics of Aboriginal commercial fisheries in NSW including: number of Aboriginal commercial fishers over the past 10 years.</p>

Study Title	Description	Approach	Findings
	<p>Determine the number of Aboriginal commercial fishers in New South Wales.</p> <p>Estimate the percentage of commercial catch made available to Aboriginal communities for personal consumption.</p> <p>Identify management changes likely to impact Aboriginal participation in commercial fisheries and how they will impact.</p> <p>Develop strategies to ameliorate the impacts of management change on Aboriginal participation in commercial fisheries.</p> <p><i>Geographical area:</i> NSW coastal and inland waters</p>	<p>interviews, individual interviews and forums were used to collect the data that formed the case study of Indigenous commercial fisheries in NSW.</p>	<p>number of years in the industry;</p> <p>whether fishers fish on traditional Country;</p> <p>fisheries endorsements (past and present);</p> <p>estimated catch rates;</p> <p>areas fished (both past and present);</p> <p>estimated annual management costs;</p> <p>estimated contribution of their catch to community; and recorded catch history.</p> <p>The also present participants' perceptions and understanding of management changes; perceived impact of management changes on their business; suggested solutions to impacts; and future aspirations.</p>

5.3. Factors Affecting the Performance of NSW MPAs

The following factors that can affect the performance of NSW MPAs were identified through the literature review. It should be noted that the lack of measurable KPIs for the cultural effects of NSW MPAs makes assessing their performance difficult.

Aboriginal cultural fishing

- There is a perception amongst some Aboriginal communities on the NSW South Coast that the NSW Government needs to have a greater understanding of Aboriginal cultural fishing values (Kennett et al. 2016, Smyth et al. 2018). Smyth et al. (2018) identified some aspects of South Coast Aboriginal culture that South Coast Aboriginal communities felt needs greater recognition:
 - South Coast Aboriginal culture is not static and will continue to evolve and change
 - Cultural-commercial fishers provide significant, positive contributions to their communities
 - Women have a significant role as cultural fishers and food providers
 - The South Coast Aboriginal peoples are the traditional owners of the lands, seas and resources of the South Coast
 - Native title rights and interests, including cultural and fishing rights, of South Coast Aboriginal peoples be recognised by the NSW Government in legislation and in its actions.
- Several studies indicated that section 21AA of the Fisheries Management Act should be enacted (Pain and Pick 2020; Smyth et al. 2018; Kennett et al. 2016). This would provide a legal defence for Aboriginal people prosecuted for exceeding bag limits for cultural use without needing to pursue a Native Title defence, which is both costly and difficult to provide the necessary evidence. In addition, it would enable regulations to manage Aboriginal cultural fishing to protect fish stocks and meet MPA objectives, following consultation with the Aboriginal Fishing Advisory Council. Implementation of Section 21AA is also supported by many Aboriginal people (Smyth et al. 2018).
- Section 37 permits, under the Fisheries Management Act, which affect Aboriginal cultural use of MPAs and appear to be a source of conflict and misunderstanding could be amended in the following ways:
 - *Administration*: Less ministerial discretion and more Aboriginal input into where and how they are issued to ensure that access to appropriate sites is provided; reduce the bureaucratic burden and processing time
 - *Communication*: Improved communication with commercial fishers is needed to ensure that it is understood that more than one fisher can be added to section 37 permits. This would assist cultural-commercial fishers to pass on traditional knowledge to the next generation.
 - *Content*: Fishing for subsistence should also be covered by section 37 permits, not just taking of fish for cultural and ceremonial events (Pain & Pick 2020).
- Improved data on the species harvested and habitats used by Aboriginal cultural fishers would enable better decision-making about cultural fishing and an improved balance between the Aboriginal, recreational and commercial harvests (Schnierer and Egan 2016, 2015, Schnierer 2011).

- Consideration of the needs and motivations of Aboriginal fishers requires thinking about the practice of Aboriginal cultural and professional fishing in an integrated way with emphasis on the three main motivational dimensions of culture, food, and community and family relationships (Voyer et al. 2014).
- Ensuring continued access to seafood (regardless of the catch location) to fulfil the dietary and socio-cultural needs of Aboriginal people also requires consideration (Voyer et al. 2014).
- Greater Aboriginal involvement in and control over fisheries management is desirable (AITSIS 2018). One study indicated that Aboriginal people felt they should be allowed to manage their customary fisheries independently of NSW Fisheries and NSW MPAs (Smyth et al. 2018).
- Bauman et al. (2013) suggests that Aboriginal co-management of NSW MPAs would be desirable.

Critical knowledge gaps identified through Aboriginal engagement of TARA for NSW marine estate

The findings from the Aboriginal community and stakeholder workshops held on the state-wide TARA, reported in Origin Communications Australia (2017) with regard to critical knowledge gaps cover the Aboriginal cultural benefits identified by Feary (2015, see Table 5-1). In other words, these benefits are poorly understood or formally recorded by government and society more broadly, and are identified as areas requiring further research and incorporation in marine estate management. The findings were raised in the context of the broader marine estate, but are pertinent to the NSW MPAs.

Further, Origin Communications Australia (2017)) identify that recognising appropriate authority for Aboriginal cultural knowledge on Country and Sea Country remains a significant challenge for authorities (and presumably researchers). They state that there are many instances of people claiming to be a traditional owner of a particular Country when they are not.

The authors also raise that Aboriginal cultural knowledge and ownership (Cultural and Intellectual Property Rights) must be addressed in the TARA and broader marine estate management process as they state that it does not have a clear process. There remains significant work in terms of trust and confidentiality to be established with many Aboriginal communities and their Elders in this respect (Origin Communications Australia 2017).

Whilst not referring to appropriate authority or cultural and intellectual property rights directly, under the *Protecting the Aboriginal cultural values of the marine estate* initiative in the 10-year Marine Estate Management Strategy, the State government indicates that they will ‘work with Aboriginal communities to evaluate current arrangements for Aboriginal involvement in Sea Country management and decision-making and establish and implement a framework to ensure the involvement of Aboriginal people is effective and appropriate’ (MEMA 2018)⁹. Within this framework there is an opportunity to address issues of appropriate authority and cultural and intellectual property rights, which are significant barriers to the effective research of Aboriginal cultural values.

Overarching management principles identified in the literature

The review of the state-wide TARA undertaken by Origin Communications Australia (2017) identified management principles to both ensure Aboriginal interests are protected and to make management approaches more inclusive and effective. Implementation of these principles, they argue, would help to

⁹ Management action 4.1, page 52 of MEMA (2018).

promote more collaborative, inclusive and culturally sensitive management of the NSW marine estate (Sea Country), including NSW MPAs. These principles were:

Principles to ensure Aboriginal interests are protected

1. Aboriginal cultural aspects must be included across all elements of the state-wide TARA.
2. Local and culturally authoritative viewpoints and knowledge are essential in the process to effective engagement and management of Sea Country.
3. Tangible/intangible demarcations of Aboriginal Culture and Heritage in the draft state-wide TARA were widely seen as being arbitrary.
4. Delineations between oceans/ estuaries/ beaches/ coastal rivers/ salt marshes/ sand dunes/ and other elements of the cultural and natural landscape do not reflect traditional or contemporary Aboriginal relationships with and responsibility for Country and Sea Country.
5. A more holistic and culturally appropriate threat and risk assessment framework must be reflected in the updated TARA to ensure that connections and relationships between the notionally separate aspects (such as estuary or ocean) are described, assessed and managed with appropriate cultural authority to ensure a comprehensive landscape and seascape approach is utilised.
6. The notion of 'derived benefit' which underpins the draft state-wide TARA framework must be clearly defined for Aboriginal people as core aspects such as spiritual connection and cultural responsibility for land and sea are not readily reflected in a risk/benefit matrix.

Principles to make management approaches more inclusive and effective

1. There is a need for Aboriginal experts to be included in MEMA - executive, management and research levels especially.
2. Without Aboriginal people being directly and automatically involved in the decision-making processes cultural and personal rights will remain at risk.
3. A specific and clear process for managing and accessing culturally-owned and informed data must be established. This is not a matter of simply knowing the detailed information, rather it is knowing broadly what is permissible and what is not.
4. Monitoring and evaluation of marine estate activities and engagement with Aboriginal people will require appropriate resourcing and support. Focus will be required to ensure that actions are reported, evidence bases are built and best practice examples distributed.
5. The provision of resourcing and capacity support for community-driven and community-led studies and research will be a key element of effective monitoring.
6. Management of cultural information must be specifically addressed in the TARA process and more broadly in MEMA management systems. To be able to adequately address threats and risks there needs to be a cultural protocol for having knowledge holders to be able to share information or to find out what information can be shared or not shared.

5.4. Knowledge Gaps and Research Recommendations

The literature review revealed a number of knowledge gaps and recommendations for future research.

Knowledge gaps

- No published studies about the effects of NSW MPAs on non-Aboriginal culture were found, and consultation with MEMA and MEEKP did not identify any grey literature either.
- Much of the research focusses on Southern NSW Coastal Aboriginal communities and cannot be generalised to other Aboriginal communities along the coast. The focus of the research has been on Aboriginal cultural fishing with minimal analysis of other aspects of Aboriginal cultural values related to the marine estate.
- The effects of MPAs was not the focus of most of the literature. Cultural fishing studies specifically focussed on how MPAs have impacted cultural fishing would be useful. These studies should include both Aboriginal commercial fishers and cultural fishers as there is significant overlap between these groups.
- Improved data on the species harvested and habitats used by Aboriginal cultural fishers would enable better decision-making about cultural fishing in MPA planning; and also assist with an improved balance between the Aboriginal, recreational and commercial harvests (Schnierer and Egan 2016, 2015, Schnierer 2011).
- There is significant overlap between the studies listed. Many of the studies feed into one another meaning that many studies rely on the same datasets, often taken from small samples.
- Detailed, place-based knowledge, using cultural mapping and participatory action research with local Aboriginal communities, may be required for refining benefits and threats as they relate to specific geographical areas (Feary 2015).
- Most of the studies included in the review do not differentiate impacts on Aboriginal fishers by whether they are native title holders or not. It would be useful to make this distinction in future studies.

Research recommendations

- Develop cultural KPIs for NSW MPAs, encompassing both Aboriginal and non-Aboriginal culture, to enable future social research to inform MPA performance and to address knowledge gaps identified above.
- Undertake studies that specifically focus on the Aboriginal cultural effects, benefits and impacts of NSW MPAs. This would expand the focus beyond cultural fishing but also narrow the spatial focus to relevant MPAs. Particular guidance on critical knowledge gaps can be found in Origin Communications Australia (2017)
- Undertake a similar study to Schnierer and Egan (2016, 2015) and Schnierer (2011) to quantify Aboriginal cultural harvest within NSW MPAs
- Undertake research to understand Aboriginal perspectives of MPA management and conservation in NSW
- Undertake studies that specifically focus on the non-Aboriginal cultural effects, benefits and impacts of NSW MPAs.

6. CONCLUSIONS AND RECOMMENDATIONS

The review

This technical paper has reviewed the social, cultural (Aboriginal and non-Aboriginal) and economic sciences, based on published literature, associated with NSW MPAs from 2010 to April 2021. This review provides an update on these sciences relevant to NSW since the earlier Independent Audit of NSW Marine Parks (Beeton et al. 2012) and the need to provide up-to-date advice to inform the current development of a new network management plan for the five mainland marine parks in 2021.

The review focussed on summarising the literature relevant to NSW MPAs and whether they appear to have informed the current management of MPAs and how they have contributed to achieving the objects of the Act and their secondary purposes as described in ss.22 and 33 of the *Marine Estate Management Act 2014*.

The review considered the context of the current approach to management of the NSW marine estate and NSW MPAs since 2013, informed by the NSW Government's response to the Independent Scientific Audit of NSW Marine Parks, the development of the NSW Marine Estate Threat and Risk Assessment, the NSW Marine Estate Management Strategy (2018-2028), the NSW Marine Protected Areas Policy Statement and the requirements of the *Marine Estate Management Act 2014*.

Limitations of this study.

As indicated above, the framing of the review is in context of the key NSW Government documents listed in the preceding paragraph. MPA management planning is transitioning from an approach focused on Comprehensive, Adequate and Representative (CAR) management of marine biodiversity and ecosystems in marine bioregions via MPAs, based on zoning, to an evidence-based threat and risk assessment focus on conserving the full suite of values (environmental, social, cultural and economic) and threats to those values implemented through MPA management plans. However, as the draft network management plan is not yet completed and published, and therefore cannot be referred to, we are uncertain about which management tools will be used in managing and monitoring social, cultural and economic benefits and threats to those benefits. This has limited our ability to assess whether the literature has informed the current performance of MPAs.

There are no key performance indicators, either specific to or tailored for, MPAs that we could refer to with respect to managing social, cultural and economic benefits and threats to those benefits by MPAs. These may be included in the forthcoming MPA management plans, but this remains immaterial for the reasons stated above. A lack of MPA specific performance indicators has limited our ability to assess whether the literature has informed the current performance of MPAs.

Summary of the economic literature, knowledge gaps and research recommendations

Several studies have enumerated a broad suite of potential economic, environmental, social and cultural costs and benefits associated with the marine estate, including MPAs, through survey methods and systematic reviews of literature (CARE 2011, Gollan et al. 2019, Gollan and Barclay 2020, Hoisington 2013, Juntos Marketing 2019, MEEKP 2014, Pascoe et al. 2019).

A few studies have focused on estimating the economic value of the commercial fishing sectors to coastal communities and regional economies (e.g. UTS 2016), society's willingness to pay to maintain coastal and

marine assets (e.g. Pascoe et al. 2019 and Ardeshiri et al. 2019) and estimation of the likelihood of adoption and application of economic value estimates in decision making (e.g. Marre et al. 2016).

However, our review of literature published since 2010 also revealed the following outstanding knowledge gaps and recommended areas of focus for future research:

1. Economic contributions of sectors, in particular non-fishing sectors, that can be impacted by establishment of MPAs. This research will enable evidence-based decision making that considers a broad set of trade-offs and interdependencies across key industries sustaining the economic welfare of coastal communities.
2. The scarcity of peer-reviewed cost benefit analyses of MPAs in NSW, which adequately include non-market values, persists nearly 10 years since the 2012 scientific audit. This is partly because the links between MPAs, marine and coastal ecological health and measurable improvements in the stock and quality of ecosystem services that provide social welfare benefits is poorly understood.
3. Decision-makers need training and support with using and interpreting economic value estimates, in particular, non-market value estimates in cost benefit analyses of prospective MPAs or changes in management of existing MPAs.

The following recommendations were identified based on key themes emerging from the reviewed literature and outstanding knowledge gaps:

1. Market valuation techniques can be employed to estimate impacts on direct uses related to other 'non fishing' sectors. For example, estimates of tourism revenue impacts can be quantified using understanding of how tourist numbers and the average market price of tourism services increase in response to improvements in marine life abundance following establishment of MPAs
2. The paucity in non-market valuation literature reflects, in part, the difficulty, contentious and resource-intensive nature of the exercise. However, understanding the social benefit value of coastal and marine assets ensures that management is in alignment with community values and preferences and that trade-offs are assessed in a transparent manner.
3. Incorporating non-market valuation estimates into a social benefit cost analyses of MPAs would strengthen the case for MPAs. However, non-market valuation of benefits of MPAs can be resource intensive and ought to be carried out in contexts where exclusion of the no-market benefit value results in inconclusive net benefit value estimates, or where the non-market value estimate is expected to 'tip the balance' of the final decision.
4. Non-market use values can be quantified using revealed preferences elicited through observation of data on travel costs and other expenditures incurred to access MPAs and coastal or marine resources in close proximity to MPAs (e.g. Marine Parks Authority 2010). Alternatively, data on premium prices paid for homes located close to coastal or marine resources neighbouring MPAs can be used to estimate the social benefit value of MPAs using the hedonic pricing method.
5. Surveys and choice experiments can also be utilised to elicit non-market benefit values of securing future use and non-use values, in particular, the value society places on conserving coastal and marine resources for future generations and the value placed on knowledge of continued existence of endangered species. For example, Ardeshiri et al. (2019) used stated preference techniques and contingent valuation methods to elicit the social willingness to pay value to maintain the quality of

coastal beaches that support multiple social, cultural and consumptive and non-consumptive economic values in NSW.

6. Economic research focused at estimating monetary values can inform more comprehensive comparisons of social benefits and costs of MPAs across different societal groups, including businesses, consumers, and the community.

Summary of the social literature, knowledge gaps and research recommendations

Studies have investigated community engagement in NSW MPA management planning in terms of timing (Johnstone et al. 2017) and approach (Voyer and Gladstone 2017, Voyer et al. 2014). A number of studies have analysed conflicts, and their management, between MPA user groups (Noble et al. 2019, Voyer et al. 2013a, Voyer et al. 2013b, Voyer et al. 2014, Feary 2015, Vanderkooi Consulting 2015, Origin Communications Australia 2017). One study has investigated compensation strategies for commercial and recreational fishers who have lost access as a result of MPA implementation (Voyer et al. 2014).

The literature review revealed a number of knowledge gaps.

- There is an overall reliance on qualitative studies in the available literature, however in most cases empirical qualitative evidence is collected to support the findings.
- Studies are focussed on Port Stephens-Great Lakes Marine Park and Batemans Marine, the qualitative nature of many of these studies means that generalisability is limited. There have been no social studies undertaken specifically on Lord Howe Island Marine Park or Jervis Bay Marine Park.
- Much of the literature focussed on community values is led by a single author and based on the PhD research undertaken by Voyer (2014). This means that much of the analysis is subject to similar analytical framing.
- From the literature, it is not clear which user groups predominantly adhere to ecological or community models of thinking, which has implications for effective community engagement strategies.

The following recommendations were identified based on key themes emerging from the reviewed literature and outstanding knowledge gaps:

7. Develop social KPIs for NSW MPAs to enable future social research to inform MPA performance and to address knowledge gaps identified above.
8. Encourage social research of the less studied MPAs, in particular Lord Howe Island, Jervis Bay, Cape Byron and Solitary Islands marine parks.
9. Encourage studies to understand which user groups predominantly adhere to ecological or community models of thinking. It would be useful to understand whether different user groups in particular communities are more inclined towards one or the other models of thinking so that targeted community engagement strategies can be designed.
10. Encourage studies with a diversity of analytical frameworks, particularly around community values analysis.
11. Commission consistent, longitudinal social surveys of the community and stakeholder's attitudes towards MPAs conducted over a long-term timeframe.
12. Encourage social research covering intergenerational perspectives of MPA management.

Summary of the cultural literature, knowledge gaps and research recommendations

Much of the literature is focussed on Aboriginal cultural fishing within the NSW marine estate (with passing reference to NSW MPAs) and its central role to Aboriginal identity, spirituality, connection to ancestors and Country and health and wellbeing (AITSIS 2018, Feary 2015, Kennett et al. 2016, Smyth et al. 2018). This has included quantifying Aboriginal cultural catch with a view to improving Aboriginal fisher visibility in MPA planning (Schnierer 2011, Schnierer and Egan 2015, Schnierer and Egan 2016).

A particular focus in the literature has been investigating barriers to cultural fishing within the NSW marine estate and ways to address the issue, again with some reference to MPAs (Smyth et al. 2018, Pain and Pick 2020, Schnierer and Egan 2012, Schnierer and Egan 2015, Macey 2015).

A review of the state-wide TARA was carried out by Origin Communications Australia (2017) with Aboriginal communities and stakeholders, the outcomes of which included critical knowledge gaps (consistent with Aboriginal cultural benefits identified by Feary (2015)) and management principles to both ensure Aboriginal interests are protected and to make management approaches more inclusive and effective. Relatedly, Bauman et al. (2013) explore how provision for co-management for MPAs may provide a workable solution for Aboriginal communities who feel excluded from decision-making processes.

Gollan and Barclay (2020) note that NSW MPAs may contribute to non-Aboriginal culture through a person's sense of and emotional attachment to place and community pride within MPAs. However, the culture domain of the Gollan and Barclay (2020) wellbeing framework remains dominated by issues surrounding Aboriginal culture.

The literature review revealed a number of knowledge gaps:

- No published studies about the effects of NSW MPAs on non-Aboriginal culture were found, and consultation with MEMA and MEEKP did not identify any grey literature either.
- Much of the research focusses on Southern NSW Coastal Aboriginal communities and cannot be generalised to other Aboriginal communities along the coast. The focus of the research has been on Aboriginal cultural fishing with minimal analysis of other aspects of Aboriginal cultural values related to the marine estate.
- The effects of MPAs was not the focus of most of the literature. Cultural fishing studies specifically focussed on how MPAs have impacted cultural fishing would be useful. These studies should include both Aboriginal commercial fishers and cultural fishers as there is significant overlap between these groups.
- Improved data on the species harvested and habitats used by Aboriginal cultural fishers would enable better decision-making about cultural fishing in MPA planning; and also assist with an improved balance between the Aboriginal, recreational and commercial harvests (Schnierer and Egan 2016, 2015, Schnierer 2011).
- There is significant overlap between the studies listed. Many of the studies feed into one another meaning that many studies rely on the same datasets, often taken from small samples.
- Detailed, place-based knowledge, using cultural mapping and participatory action research with local Aboriginal communities, may be required for refining benefits and threats as they relate to specific geographical areas (Feary 2015).

- Most of the studies included in the review do not differentiate impacts on Aboriginal fishers by whether they are native title holders or not. It would be useful to make this distinction in future studies.

The following recommendations were identified based on key themes emerging from the reviewed literature and outstanding knowledge gaps:

13. Develop cultural KPIs for NSW MPAs, encompassing both Aboriginal and non-Aboriginal culture, to enable future social research to inform MPA performance and to address knowledge gaps identified above.
14. Undertake studies that specifically focus on the Aboriginal cultural effects, benefits and impacts of NSW MPAs. This would expand the focus beyond cultural fishing but also narrow the spatial focus to relevant MPAs. Particular guidance on critical knowledge gaps can be found in Origin Communications Australia (2017)
15. Undertake a similar study to Schnierer and Egan (2016, 2015) and Schnierer (2011) to quantify Aboriginal cultural harvest within NSW MPAs
16. Undertake research to understand Aboriginal perspectives of MPA management and conservation in NSW
17. Undertake studies that specifically focus on the non-Aboriginal cultural effects, benefits and impacts of NSW MPAs.

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West LD, Stark KE, Murphy JJ, Lyle JM & Ochwada-Doyle FA 2015, *Survey of recreational fishing in New South Wales and the ACT, 2013/14*, Fisheries Final Report Series, No. 149, NSW Department of Primary Industries. December.

Disclaimer

The assignment is a consulting engagement as outlined in the 'Framework for Assurance Engagements', issued by the Auditing and Assurances Standards Board, Section 17. Consulting engagements employ an assurance practitioner's technical skills, education, observations, experiences and knowledge of the consulting process. The consulting process is an analytical process that typically involves some combination of activities relating to: objective-setting, fact-finding, definition of problems or opportunities, evaluation of alternatives, development of recommendations including actions, communication of results, and sometimes implementation and follow-up.

The nature and scope of work has been determined by agreement between BDO and the Client. This consulting engagement does not meet the definition of an assurance engagement as defined in the 'Framework for Assurance Engagements', issued by the Auditing and Assurances Standards Board, Section 10.

Except as otherwise noted in this report, we have not performed any testing on the information provided to confirm its completeness and accuracy. Accordingly, we do not express such an audit opinion and readers of the report should draw their own conclusions from the results of the review, based on the scope, agreed-upon procedures carried out and findings.

APPENDIX 1 Study Terms of Reference

The terms of reference of this study are:

Prepare a technical paper that reviews the literature on social, cultural (Aboriginal and non-Aboriginal) and economic studies undertaken in NSW marine protected areas (MPAs) since 2010, with a specific focus on the network of five mainland marine parks along the NSW coast.

The review will build on and provide a further assessment of the social, cultural and economic studies undertaken since 2010 and refer to the relevant findings from Beeton et al. (2012). The review will identify key knowledge gaps and make specific recommendations for future research required to support assessment of the social, cultural and economic performance of NSW MPAs.

The review will focus on summarising the literature relevant to NSW MPAs and whether they appear to have informed the current management of MPAs and how they have contributed to achieving the objects of the Act and their secondary purposes as described in ss.22 and 33 of the *Marine Estate Management Act 2014*.

The review will consider the context of the current approach to management of the NSW marine estate and NSW MPAs since 2013, informed by the NSW Government's response to the Independent Scientific Audit of NSW Marine Parks, the development of the NSW Marine Estate Threat and Risk Assessment, the NSW Marine Estate Management Strategy (2018-2028), the NSW Marine Protected Areas Policy Statement and the requirements of the *Marine Estate Management Act 2014*.

APPENDIX 2 Methods

Beginning with the key reference material provided by NSW DPI, we undertook a literature search for policy documents and legislation, academic and grey literature relating to the economic, social and cultural performance of NSW MPAs. The search was carried out using Google, Google Scholar, Scopus and Taylor and Francis Online. Citations and their abstracts were imported into Endnote for screening. Each of the reference lists of the selected documents was then scanned for additional relevant sources. An example of the keywords and search terms used in the literature search is provided in Appendix Table 2-1.

Appendix Table 2-1 Key search terms used in the literature search

Literature review section	Example keywords and search terms used
Economic	“economic performance of MPAs in NSW” “economic analysis of coastal sectors in NSW” “benefit value of coastal management in NSW” “economic contribution of coastal sectors in NSW” “benefit cost analysis of marine parks in NSW” “Valuation of MPAs and their services”
Social	“social values of MPAs in NSW” “community benefits of MPAs in NSW” “social assessment of NSW marine estate” “social performance of NSW marine protected areas”
Cultural	“Aboriginal culture in MPAs in NSW” “cultural fishing in NSW” “cultural fishing in NSW marine estate” “cultural aspects of MPAs”

Source: BDO EconSearch

Following initial screening, each of the documents remaining in the literature sample was critically appraised for internal validity (how well the study was conducted) and the risk of bias. Given that a range of types of studies were included in the review the critical appraisal was guided by a selection of standardised checklists¹⁰. The questions that were used to appraise the included literature are provided below.

Critical appraisal of economic studies

1. Is the choice of study design justified?
2. Were costs and outcomes measured accurately?

¹⁰ For example: Critical Appraisal Skills Programme (2018). CASP Qualitative Checklist. Available at: https://casp-uk.b-cdn.net/wp-content/uploads/2018/03/CASP-Qualitative-Checklist-2018_fillable_form.pdf Accessed: 27/05/2021. Drummond, M. F., and Jefferson, T. O. (1996). Guidelines for authors and peer reviewers of economic submissions to the BMJ. British Medical Journal, 313(7052), 275-283.

3. Were costs and outcomes valued credibly?
4. Were costs and outcomes adjusted for differential timing?
5. Is there an incremental analysis of costs and consequences?
6. Were sensitivity analyses conducted to investigate uncertainty in estimates of cost or consequences?

Critical appraisal of social and cultural studies

1. Was there a clear statement of the aims of the research?
2. Is a qualitative methodology appropriate?
3. Was the research design appropriate to address the aims of the research?
4. Was the recruitment strategy appropriate to the aims of the research?
5. Was the data collected in a way that addressed the research issue?
6. Have ethical issues been taken into consideration?
7. Was the data analysis sufficiently rigorous?
8. Is there a clear statement of findings?

Results of the critical appraisal can be found in Appendix 3.

APPENDIX 3 A Critical Appraisal of Reviewed Literature

Appendix Table 3-1 A critical appraisal of reviewed economic studies

Study Title	1. Is the choice of study design justified?	2. Were costs and outcomes measured accurately?	3. Were costs and outcomes valued credibly?	4. Were costs and outcomes adjusted for differential timing?	5. Is there an incremental analysis of costs and consequences?	6. Were sensitivity analyses conducted to investigate uncertainty in estimates?
McPhee 2011	Reviewed MPA case studies across Australia	Qualitative study	Qualitative study	Qualitative study	Qualitative study	Qualitative study
Mayo-Ramsay 2014)	Stakeholder consultation to identify economic considerations with MPAs	Qualitative study	Qualitative study	Qualitative study	Qualitative study	Qualitative study
MEEKP 2014	Yes. Review of economic theory and economic non-market valuation literature	Qualitative study	Qualitative study	Qualitative study	Qualitative study	Qualitative study
Marre et al. 2016	Surveyed 88 decision-makers from various management organizations	Qualitative study	Qualitative study	Qualitative study	Qualitative study	Qualitative study
UTS 2016)	Yes. Surveyed different fisheries businesses in 2012/13	Yes. Traditional economic contributions indicators and metrics utilised	Yes. Anecdotal information was supported by business data	2012/13 data used	Yes. Marginal coefficient approach utilised	N/A

Study Title	1. Is the choice of study design justified?	2. Were costs and outcomes measured accurately?	3. Were costs and outcomes valued credibly?	4. Were costs and outcomes adjusted for differential timing?	5. Is there an incremental analysis of costs and consequences?	6. Were sensitivity analyses conducted to investigate uncertainty in estimates?
Juntos Marketing 2019	Yes	Qualitative study	Qualitative study	Qualitative study	Qualitative study	Qualitative study
Pascoe et al. 2019	Willingness-to-pay elicitation approaches through survey of residents	Yes. Stated preference approach methods were utilised	Differences in environmental quality across areas not considered	Discounting approached utilised to standardise values	Marginal and total willingness-to-pay estimates provided	Yes. Sensitivity analysis conducted and results provided
Ardeshiri et al. 2019	Yes	Yes	Yes	Discounting approached utilised to standardise values	Discounting approached utilised to standardise values	Yes.

Appendix Table 3-2 A critical appraisal of reviewed social studies

Reference	Was there a clear statement of the aims of the research?	Is the methodology appropriate?	Was the recruitment strategy appropriate to the aims of the research?	Is the sample adequate?	Were any weaknesses identified?	Have ethical issues been taken into consideration?
Johnstone et al. 2017	This study sought to gain insights into how long term fishers perceived that their livelihoods were impacted by MPAs	Yes, this aim could not be met with other methods	Yes, purposive sampling	Small number of participants, all older fishers, many retired	No overarching framework of analysis used, data was presented uncritically, limited in its generalisability due to its focus on	None mentioned

Reference	Was there a clear statement of the aims of the research?	Is the methodology appropriate?	Was the recruitment strategy appropriate to the aims of the research?	Is the sample adequate?	Were any weaknesses identified?	Have ethical issues been taken into consideration?
					mainly retired commercial fishers	
Gollan & Barclay 2020	This study explores the development of a wellbeing framework to understand the social aspects, including the impacts of MPAs on the wellbeing of local communities.	Yes, this aim could not be met with other methods	Yes, purposive sampling	Only from two MPAs, purposive method may mean people without strong community connections were not included	Identified in paper: not generalisable, small sample size, only Cape Byron Marine Park & Port Stephens-Great Lakes Marine Park	Yes, The research project received full ethics clearance
Martinez et al. 2016	This study assessed the acceptance and awareness of an Australian MPA (Port Stephens-Great Lakes Marine Park) post implementation by recreational fishers using the MPA, and identified factors that influenced the perception of this group towards the MPA.	Yes, this aim could not be met with other methods	Yes, purposive sampling using anonymous questionnaires administered on site through personal interviews of both boat-based and shore-based fishers at public boat ramps and along the shoreline in the study site.	Yes A total of 79 fishers completed the questionnaire and were considered to be representative of recreational fishers.	None discussed. May not be generalisable to other MPAs - only assessed Port Stephens-Great Lakes Marine Park	Oral consent was obtained from participants prior to commencing the survey in accordance with human ethics protocols
Noble et al. 2020	This study sought to identify ecological priorities and concerns across Port Stephens-Great Lakes Marine Park.	Mixed methods used: GIS spatial modelling that created fuzzy-set species distribution	Yes, purposive sampling followed by snowballing	Yes, good coverage of stakeholders A total of 83 people interviewed	No	Yes, Human Research Ethics Committee approved

Reference	Was there a clear statement of the aims of the research?	Is the methodology appropriate?	Was the recruitment strategy appropriate to the aims of the research?	Is the sample adequate?	Were any weaknesses identified?	Have ethical issues been taken into consideration?
		models (SDMs) were overlaid with ecological concerns of the stakeholders to create a spatial understanding of local threats, and priority areas for targeted management.		with 52 local stakeholders.		
Noble et al. 2019	This study sought to gain an understanding of the extent of extractive and non-extractive uses and the social dynamics that may be driving patterns of use to support the social resilience of a marine area.	Mixed methods used: mixed-methods approach using participatory GIS sketch-mapping protocols and semi-structured interview methods	Yes, purposive sampling	60 stakeholders included, covering most stakeholder interest groups	Spatially limited to part of the Port Stephens-Great Lakes Marine Park. The northern extent of the marine park (past the Myall lake systems) was not explored	Human Ethics Committee approved and New South Wales Department of Primary Industries, Marine Parks Permit
Gollan et al. 2019	This paper describes the use of qualitative risk assessment as a tool for integrating social, cultural, and economic considerations into coastal and marine decision-making, and focusses on a community-based approach	Yes	Yes	Yes - see Sweeney Research 2014	The limitations of the threat and risk assessment include: limited information on aspects of social, cultural, and economic stressors and values; a lack	None mentioned

Reference	Was there a clear statement of the aims of the research?	Is the methodology appropriate?	Was the recruitment strategy appropriate to the aims of the research?	Is the sample adequate?	Were any weaknesses identified?	Have ethical issues been taken into consideration?
	to assessing risk. It describes state-wide threat and risk assessment reported in BMT WBM (2017).				of research on the cumulative impacts of social, cultural, and economic threats; and the large amount of data associated with determining consequence and likelihood resulting in difficulties for both management agencies and the public to understand and engage with.	
Voyer & Gladstone 2015	The implementation of some MPAs has been very contentious especially with fishing stakeholders. This study researched the causes of these issues by examining the experience of implementation of the Batemans Marine Park.	Evaluation of the engagement process - no primary data	NA	NA	Review and analysis	NA
Voyer et al. 2015	Three Australian MPA planning processes covering three states and incorporating federal and	Review of planning processes - no primary data	NA	NA	Review and analysis	NA

Reference	Was there a clear statement of the aims of the research?	Is the methodology appropriate?	Was the recruitment strategy appropriate to the aims of the research?	Is the sample adequate?	Were any weaknesses identified?	Have ethical issues been taken into consideration?
	state jurisdictions are reviewed in order to determine how potential social impacts were assessed and considered.					
Voyer et al. 2013a	The media coverage of two MPAs in NSW, Australia was compared to determine the way in which news presented the parks to each community and how this may have influenced public acceptance of the parks.	Yes, content analysis.	Yes, purposive	Yes, case studies used	Not generalizable, only Batemans Marine Park and Port Stephens-Great Lakes Marine Park.	None mentioned
Voyer et al. 2013b	The project aimed to evaluate the social values attributed to ocean beaches and headlands by exploring the different ways people in NSW use and value the coast.	Yes	Purposive sampling.	Yes, coverage of user categories: active, passive, commercial and community.	Not generalisable, only Batemans Marine Park and Solitary Island Marine Park. Only local residents included, no coverage of tourism market.	Yes, human ethics approval.
Voyer et al. 2014	This study sought to understand: 1. What are some of the social impacts of MPAs on fishers and does impact	Yes, semi-structured interviews were conducted with recreational,	Snowballing.	Participants were selected so that they represented a diversity of ages, gender, length and place of residence	Not generalizable, only Batemans Marine Park and Port Stephens-	None mentioned

Reference	Was there a clear statement of the aims of the research?	Is the methodology appropriate?	Was the recruitment strategy appropriate to the aims of the research?	Is the sample adequate?	Were any weaknesses identified?	Have ethical issues been taken into consideration?
	<p>directly account for opposition?</p> <p>2. Does motivation to fish influence fisher's perception of or response to social impacts?</p> <p>3. Does environmental knowledge influence fisher's perception of or response to social impacts?</p>	professional and indigenous fishers.		and fishing methods. Interviews continued until 'theoretical saturation' was reached, when no new theories were likely to be introduced by the continuation of further interviews.	Great Lakes Marine Park.	
Voyer 2014	The research sought to explain the divergent community responses to the introduction of MPAs in the Port Stephens-Great Lakes Marine Park and Batemans Marine Park.	Yes, semi-structured interviews	Yes, purposive	Yes, total of 53 fishers (24 rec, 15 pro, 14 Aboriginal).	Not generalizable, only Batemans Marine Park and Port Stephens-Great Lakes Marine Park.	Yes, human ethics approval granted.
Voyer et al. 2015b	The research identified the values, images and principles at work amongst coastal users to determine the dominant 'cultural models' within the community and how these models influenced attitudes towards MPAs.	Yes, interviews are suitable for identifying values	Yes, purposive	Yes, interview participants were purposefully selected to cover the range of relevant stakeholders.	Not generalizable, only Batemans Marine Park and Solitary Island Marine Park.	Yes, taken into consideration and explained to participants.

Reference	Was there a clear statement of the aims of the research?	Is the methodology appropriate?	Was the recruitment strategy appropriate to the aims of the research?	Is the sample adequate?	Were any weaknesses identified?	Have ethical issues been taken into consideration?
Voyer et al. 2015a	The research sought to explain the divergent community responses to the introduction of MPAs in the Port Stephens-Great Lakes Marine Park and Batemans Marine Park.	Yes, mixed methods using community profiling, content analysis and semi-structured interviews	Recruitment not discussed	Stakeholders determined to be the most likely to be negatively impacted by the parks, namely extractive users (professional, recreational and Indigenous fishers).	Not generalizable, only Batemans Marine Park and Port Stephens-Great Lakes Marine Park.	None mentioned
Vanderkooi Consulting 2015	This report provides background information on the economic and social benefits of the marine estate, and the threats to those benefits, to support the threat and risk assessments of the NSW marine estate, as well as to support a threat and risk assessment of the Hawkesbury Shelf marine bioregion.	Literature review	NA	NA	The scope of work did not include any primary research, which means that there are information gaps where relevant data has not been located. These gaps have been noted in the report. In particular, limited information was available on social benefits and the threats to those benefits.	None mentioned

Reference	Was there a clear statement of the aims of the research?	Is the methodology appropriate?	Was the recruitment strategy appropriate to the aims of the research?	Is the sample adequate?	Were any weaknesses identified?	Have ethical issues been taken into consideration?
Sweeney Research 2014	The purpose of this research was to prioritise those areas of greatest concern to the NSW community and identify key opportunities for improved management of the marine estate.	Yes, mixed methods, beginning with exploratory qualitative phase followed by a quantitative community survey	Yes	Sample of n=1,000 respondents from across NSW along with an additional sample of n=727 respondents from seven communities in NSW.	None discussed	None mentioned
Brooks et al. 2013	This study provides an assessment of risk to the ecological values from shore-based recreational fishing activities over the next five years on ocean beaches and headlands in sanctuary zones, as well as risks to the social and economic benefits provided by the marine estate.	Yes, mixed methods, interviews with coastal users combined with two online surveys	Yes	Yes, nearly 7000 people responded to the surveys.	No	None mentioned in summary report
West et al. 2015	To provide detailed 'big picture' information for recreational fishing in NSW and ACT waters, by residents aged five years and older.	Yes, random telephone survey	Yes	Regionally-stratified, random telephone survey of over 9,400 NSW/ACT households - comprising over 22,000 residents	Some statistical uncertainties were compensated for (non-response bias)	None mentioned

Reference	Was there a clear statement of the aims of the research?	Is the methodology appropriate?	Was the recruitment strategy appropriate to the aims of the research?	Is the sample adequate?	Were any weaknesses identified?	Have ethical issues been taken into consideration?
				aged five years and older.		
Voyer et al. 2017	This research examined the relationships between professional fishing, recreational fishing and tourism	Used economic valuations, qualitative interviews and a large-scale representative questionnaire of the general public.	Yes, purposive sampling of industry bodies, cooperatives and community groups, opportunistic sampling (e.g. via advertising 'drop in sessions' through local media or industry channels) and 'snowball' sampling.	More than 160 interviews were conducted including licensed fishers, partners, or fish merchant/co-operative), representatives from government and tourism bodies and recreational fishers.	Unknown respondent bias due to low response rate to survey, 57 responses, or 5.8% response rate.	None mentioned
Turnbull et al. 2021	The study assessed the social perceptions and ecological effectiveness of 18 partially protected areas and 19 fully protected areas compared with 19 open areas along 7000 km of coast of southern Australia.	Yes, mixed methods using both qualitative and ecological surveys.	Yes, purposive sampling used	Yes, large sample including 190 structured observation social surveys, 439 interviews and 625 underwater Reef Life surveys.	The specific MPAs included in the study were not made clear in the article.	Yes
Harasti et al. 2019	This study quantified illegal fishing within the Port Stephens-Great Lakes	Yes, underwater cameras used to observe numbers of	NA	NA	None	NA

Reference	Was there a clear statement of the aims of the research?	Is the methodology appropriate?	Was the recruitment strategy appropriate to the aims of the research?	Is the sample adequate?	Were any weaknesses identified?	Have ethical issues been taken into consideration?
	Marine Park Seal Rocks no-take area between April 2017-March 2018.	illegal vessels and fish stocks				
Martin et al. 2015	This study evaluated the usefulness of in-situ signage in an existing multiple- use MPA, to determine if signs pertaining to the MPA captured the attention of recreational users, and provided adequate information.	Yes, evaluation of signage and assessment of respondent's awareness about MPAs	Yes, convenience sampling used. Participants were approached at public access boat ramps.	Yes, a total of 166 people were surveyed	Convenience sampling is known to introduce biases into research and is not generalisable to other MPAs.	Yes
Read et al. 2011	Planning criteria for optimizing compliance in MPAs was compiled and used to compare the views of recreational fishers and compliance officers for facilitating voluntary compliance.	Yes	Yes, expert working groups used	Seven recreational fishing experts and six marine compliance officers	No	None mentioned

Appendix Table 3-3 A critical appraisal of reviewed cultural studies

Reference	Was there a clear statement of the aims of the research?	Is the methodology appropriate?	Was the recruitment strategy appropriate to the aims of the research?	Is the sample adequate?	Have ethical issues been taken into consideration?	Were any weaknesses identified?
Origin Communications Australia 2017	The purpose of the workshops was to explain the findings of the draft state-wide TARA and the processes undertaken to develop and undertake the assessment, seek feedback on the evidence-base used and ask for any additional evidence to inform the final state-wide TARA, outline the online submission process and next steps for finalising the state-wide TARA and related marine estate projects and seek feedback about engagement and feedback mechanisms that will ensure meaningful and continuous engagement for Aboriginal communities in marine estate management processes.	Yes	Yes	Yes	Yes	No
Feary 2015	This study provides a background report to identify the values and benefits of the NSW marine estate to Aboriginal people and to also identify existing and potential threats to these benefits.	Yes	NA	NA	NA	Some references missed, as identified in Schnierer 2015 peer review, though subsequently rectified.
Schnierer 2015	Peer review of Feary 2015	Yes	NA	NA	NA	None
AITSYS 2018	AIATSIS did research with the NSW Aboriginal Fishing Rights Group to find out the different ways that fishing is important to South Coast Aboriginal people (values), the barriers to fishing and the effects they have and	Yes	Yes	Small but adequate	Yes	No

Reference	Was there a clear statement of the aims of the research?	Is the methodology appropriate?	Was the recruitment strategy appropriate to the aims of the research?	Is the sample adequate?	Have ethical issues been taken into consideration?	Were any weaknesses identified?
	what South Coast Aboriginal people wanted for the future (aspirations).					
Smyth et al. 2018	<ol style="list-style-type: none"> 1. Identify cultural, social and economic values of Indigenous fishing at selected case study communities. 2. Articulate connections between established Indigenous land and sea management regimes and Indigenous aspirations in fisheries. 3. Support the recognition of Indigenous values and use of aquatic resources in fisheries management. 4. Build Indigenous and non-Indigenous capacity for collaborative fisheries research and management. 	Yes, culturally sensitive, using Aboriginal interviewers	Yes, purposive snowballing to ensure the right people were recruited	As above	Yes	No
Pain & Pick 2020	This article explores the adequacy of legal protection of cultural fishing under the Fisheries Management Act 1994 (NSW) ('FM Act (NSW)'). The authors examine the limits of the defence of native title for Aboriginal defendants charged with offences under the FM Act (NSW) and legislation in other jurisdictions.	No primary data collected	NA	NA	Yes	No
Schnierer & Egan 2016	Compare and combine data on Aboriginal catch composition from these two studies to produce a comprehensive synthesis of current knowledge of Aboriginal fisheries in NSW.	Yes	NA	NA	Yes	Data sets used are small and one is from 1990s
Schnierer & Egan 2015	<ol style="list-style-type: none"> 1. Use methodology developed in FRDC Project No. 2009/038 to estimate Aboriginal cultural catch in some coastal and inland waters of NSW. 2. Develop a local Aboriginal fisheries management strategy/plan for the Tweed region. 3. Identify other Aboriginal communities that would be 	Yes, culturally sensitive, using Aboriginal interviewers	Yes, use of Community liaison, purposive snowballing	For the cultural fishing component of the project 123 participants. Small sample of	Yes	Very small sample of only 20 log book records

Reference	Was there a clear statement of the aims of the research?	Is the methodology appropriate?	Was the recruitment strategy appropriate to the aims of the research?	Is the sample adequate?	Have ethical issues been taken into consideration?	Were any weaknesses identified?
	willing to develop local fisheries management strategies/plan.			only 20 log book records		
Bauman et al. 2013	This paper analyses the implementation of Indigenous Protected Area's and the potential for co-management in Marine Protected Areas	No primary research	NA	NA	Yes	No
Kennett et al. 2016	Provides a summary of the presentations given by community members, academics and legal experts with regard to cultural fishing and the values associated with cultural fishing activities. Also details the aspirations and future directions of local Aboriginal community members' values and interests as cultural fishers.	Yes	Yes	Yes	Yes	No
Schnierer 2011	<ol style="list-style-type: none"> Determine what aquatic organisms (fish) are of specific cultural relevance to Traditional Owner groups (identify species and their location). Seek to quantify the Indigenous catch (species, numbers, weight, frequency of fishing) at the level of Traditional Owner groups. Develop an ongoing research partnership with Traditional Owner groups based on trust to be able to move to the documentation of traditional fishing knowledge and the establishment of community owned and controlled data bases. 	Yes	Snowballing	Adequate for the case study.	Yes	This study uses a small sample and is not transferrable to other geographical areas.
Schnierer & Egan 2012	<ol style="list-style-type: none"> Case study of Aboriginal commercial fisheries focusing initially on New South Wales as a basis for a national study. Determine the number of Aboriginal commercial 	Yes	Yes	Small sample - not	Yes	This study uses a small sample and is not transferrable to

Reference	Was there a clear statement of the aims of the research?	Is the methodology appropriate?	Was the recruitment strategy appropriate to the aims of the research?	Is the sample adequate?	Have ethical issues been taken into consideration?	Were any weaknesses identified?
	<p>fishers in New South Wales.</p> <p>3. Estimate the percentage of commercial catch made available to Aboriginal communities for personal consumption.</p> <p>4. Identify management changes likely to impact Aboriginal participation in commercial fisheries and how they will impact.</p> <p>5. Develop strategies to ameliorate the impacts of management change on Aboriginal participation in commercial fisheries.</p>			representative or transferrable		other geographical areas.



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