Marine Estate Management Authority

DRAFT STATEWIDE THREAT AND RISK ASSESSMENT FOR THE NSW MARINE ESTATE

Community and Stakeholder Engagement Report

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Community and Stakeholder Engagement Report – Draft Statewide Threat and Risk Assessment for the NSW Marine Estate

More information

NSW Marine Estate Management Authority

www.marine.nsw.gov.au

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- NSW Office of Environment and Heritage
- Transport for NSW
- NSW Department of Planning and Environment.

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EXECUTIVE SUMMARY

The Marine Estate Management Authority's (the Authority) vision for the NSW marine estate is *a healthy coast and sea managed for the greatest wellbeing of the community, now and into the future*. To achieve this vision, the Authority has assessed the threats and risks to the environmental assets and community-identified social and economic benefits derived from the marine estate in 2014[1]. The Authority will use these findings to focus management on the priority moderate and high threats and associated risks in NSW to protect or restore the environmental assets, and to maximise the social and economic benefits we all derive from the NSW marine estate through development of the Marine Estate Management Strategy (the Strategy).

This report provides an overview of engagement on the draft statewide threat and risk assessment report for the NSW marine estate (statewide TARA). It outlines how community and stakeholder feedback was used to finalise the statewide TARA. This report summarises the techniques used for engagement, provides a qualitative analysis of stakeholder and community submissions, and documents changes from the draft to the final statewide TARA report.

Community engagement on the draft statewide TARA report was conducted from 18 January to 30 April 2017.

The draft statewide TARA was available for comment for a total of 14.5 weeks

Stakeholder and community engagement included a mix of targeted and public announcements to publicise the submissions period and encourage feedback. In addition to targeted engagement with key stakeholders and Aboriginal communities, public feedback was sought through the TARA online tool. This web-based tool allowed users to navigate, interrogate and provide general feedback or comment on individual risk levels reported in the draft statewide TARA.

Stakeholders and the community were encouraged to provide any evidence that could better inform the final statewide TARA. Assessment of any new evidence that accompanied submissions was a key component of the analysis that informed changes to risk levels.

More than 70 individuals and organisations submitted over 150 unique entries on specific risk levels or provided general feedback through the TARA interactive tool. In addition, more than 55 unique submissions were received from individuals and organisations to the marine estate email address contact.us@marine.nsw.gov.au. This included two campaign email submissions that generated more than 1,500 emails to the *contact.us* email address.[2]

Submissions received during the community engagement process were submitted by the TARA interactive tool, the *contact.us* email address, stakeholder workshops, Aboriginal workshops or via community engagement on the Hawkesbury Shelf marine bioregion threat and risk assessment in early 2016. They were analysed and assessed for feedback on:

- specific risk levels within the environmental TARA (including the coastal and marine TARA and estuaries TARA findings) as well as the social and economic TARA
- the statewide TARA generally and the TARA process
- knowledge gaps and key studies required
- management suggestions.

[1] *Marine Estate Community Survey Final Report* (Sweeney Research, for MEMA 2014)
[2] Campaign emails refer to multiple submissions that are substantially similar in content or language. They are usually developed by an interested organisation or advocacy group to encourage their members or stakeholders to lodge individual submissions.

The environmental TARA generated the most amount of feedback, with the 'resource use' category of activities attracting the greatest number of comments. This included submissions from users and peak user groups such as recreational fishers, commercial fishers and boaters raising concerns about their activity being rated as moderate and high. Land-use intensification activities were also frequently commented on, specifically water quality issues.

Submissions also raised a number of issues relating to stressors rather than an activity or threat in the environmental TARA (e.g. marine debris or pests and disease). Other submissions included comments specific to an asset category such as threatened and protected species, seagrass, or shallow reefs.

The most commented on stressors in the social and economic TARA were the effect of water pollution on environmental values, inadequate, inefficient regulation or over-regulation (agencies), and conflict over resource access and use. Feedback from submissions was readily adopted into the risk levels for the final TARA.

Aboriginal workshops provided the main source of feedback on the benefits of cultural heritage and use in the social and economic TARA. Risk levels across most threats and stressors impacting on cultural heritage and use have increased, and a few key changes were made to the final TARA to better present and recognise consideration of Aboriginal cultural heritage in the threat and risk assessment process.

Other feedback about the statewide TARA report and process more generally, key knowledge gaps, and management suggestions have also been identified and assessed. These are used in finalising the statewide TARA and development of the Strategy, including future issues for consideration during the five year-health check and the ten-year review.

Stakeholder and community feedback has been carefully considered in order to finalise the statewide TARA and inform development of the draft Strategy.

BACKGROUND

The Authority was established by the NSW Government in 2013 in response to the recommendations from the Independent Scientific Audit of Marine Parks in NSW (the Audit). The NSW Government accepted all recommendations from the Audit, including a statewide TARA to guide future management actions in the marine estate.

A Threat and Risk Assessment Framework was developed by the Authority in 2015 to guide how to identify and assess threats and their level of risk to the marine estate. The draft statewide TARA has been completed in accordance with this framework and international risk assessment standards (AS/NZS ISO 31000:2009).

The draft statewide TARA was an initiative of the Authority, which comprises an independent chair, the chair of the Marine Estate Expert Knowledge Panel, and the heads of the four NSW state agencies involved in managing the NSW marine estate: Department of Primary Industries; Department of Planning and Environment; Office of Environment and Heritage; and Transport for NSW. Input from the Marine Estate Expert Knowledge Panel, other relevant experts, stakeholders and the community also informs the statewide TARA.

The NSW Marine Estate Threat and Risk Assessment Draft Report and a range of supporting material was released on the marine estate website for public feedback from 18 January to 30 April 2017. Feedback and evidence gathered during the engagement period is outlined in this report and has been considered and assessed to finalise the statewide TARA report.

Previous consultation on the threat and risk assessment and proposed management initiatives for the Hawkesbury Shelf marine bioregion occurred in early 2016. Through the recent statewide threat and risk assessment we developed a better approach to assessing risk levels through a formal risk evaluation. We also have new evidence, which has better informed the risk levels. In addition, the Marine Estate Expert Knowledge Panel (MEEKP) also advised us on how to improve the social and economic threat and risk assessment. Rather than take a sector-based approach, for example how the activities of shipping could impact on recreational boating, we now looking at threats and risks through the lens of impacts on community wellbeing. This means we have considered the benefits and costs to the community as a whole rather than for a particular user group, sector or industry. In a couple of cases, risk levels within the Hawkesbury Shelf marine bioregion, now covered by the Central region, have changed as a result. Where the risk levels differ between the Hawkesbury TARA and the draft statewide TARA, the draft statewide TARA report takes precedence.

The final statewide TARA report informs the NSW Government's management directions for the marine estate over the next ten years through the new Strategy. The Strategy focuses on reducing the priority threats and risks identified in the statewide TARA and looks to maximise the economic, social, cultural and environmental benefits we all derive from the marine estate.

The statewide TARA and the Strategy will be key to delivering the Authority's vision for the NSW marine estate.

The Authority's vision for the marine estate

A healthy coast and sea, managed for the greatest wellbeing of the community, now and into the future.

THE AUTHORITY'S FIVE STEP DECISION MAKING PROCESS AND THE STATEWIDE TARA

The Authority's approach to marine estate management involves five steps – the first two steps are directly relevant to the development of the statewide TARA:

Figure 1 – The Authority's five-step decision-making process

STEP 1 – IDENTIFY COMMUNITY BENEFITS AND THREATS

Through the 2014 Marine Estate Community Survey and stakeholder and community engagement on the Hawkesbury Shelf marine bioregion assessment in 2015, the Authority asked the community to identify the environmental, social and economic benefits derived from the marine estate in NSW. The community told us these included the clean waters of the marine estate that support a variety of unique and abundant Australian marine life, its natural beauty, and that it provides a safe space for people and communities (particularly Aboriginal communities) to socialise and lead an active healthy lifestyle. The NSW marine estate also provides income to regional communities through various industries, particularly trade (via regional and international ports), tourism and seafood-related industries. We also asked about threats and how they should be managed. Pollution was identified as a major threat, as well as loss of natural areas, antisocial behaviour and overcrowding.

STEP 2 – ASSESS THE THREATS AND RISKS TO BENEFITS

Threats and risks to each of the benefits from the marine estate were assessed in accordance with the 2015 Threat and Risk Assessment Framework. The draft statewide TARA identified and assessed threats and risks to the identified 'community benefits' from Step 1, which include:

- environmental assets, which are the natural attributes, components and living resources of the marine estate such as water quality, fish stocks, saltmarsh and subtidal reefs individually in 'estuaries' and 'coastal and marine' areas
- social and economic benefits the NSW community derives from the NSW marine estate, such as going to the beach, running a scuba diving business or the peace of mind from knowing we have healthy marine life and Aboriginal cultural heritage and use benefits.

Threats and their associated risks were assessed at a state and regional scale. The regions are:

- northern region (from Tweed Heads to Stockton)
- central region (from Stockton to Shellharbour, which includes the State waters of the Hawkesbury Shelf marine bioregion)
- southern region (from Shellharbour to the NSW–Victorian border).

Figure 2 – Regions defined in the draft statewide TARA report

This report provides an overview of engagement on the draft statewide TARA findings and outlines how community and stakeholder feedback was used to finalise the statewide TARA report.

ENGAGEMENT PROCESS

The NSW Marine Estate Threat and Risk Assessment Draft Report and a range of supporting material were released by the Authority for comment on 18 January 2017. We engaged with the community and stakeholders until 30 April 2017.

The purpose of the engagement on the draft statewide TARA report was to:

1. engage with the community and stakeholders on the draft statewide TARA report

2. provide the community and targeted stakeholders with the opportunity to identify omissions or inaccuracies in the draft statewide TARA, review the evidence base used, and provide additional evidence to inform the finalisation of the statewide TARA report.

Under the *Marine Estate Management Act 2014* (Part 4, Clause 21, Section 3), there is a legislated requirement to consult on the draft statewide TARA report by giving public notice that a draft report has been prepared and making it publicly available.

Feedback in the form of new evidence on the draft statewide TARA was sought from peak marine estate stakeholder groups, the general public, as well as relevant state and local government agencies. This helped to ensure the Authority considered the most up-to-date and comprehensive set of evidence in finalising the statewide TARA report.

Detailed information about the methods used for this engagement, and who provided public feedback, is in Appendix 1.

ANALYSIS PROCESS

Submissions received during the public engagement period via the TARA interactive tool, the *contact.us* email address, stakeholder workshops, and Aboriginal workshops have been analysed and assessed for feedback on:

- specific risk levels within the coastal and marine TARA, estuaries TARA, and the social and economic TARA
- the TARA generally and the TARA process
- knowledge gaps and key studies required
- management suggestions.

Submissions to the Hawkesbury Shelf marine bioregion assessment in 2016 were also reconsidered alongside the draft statewide TARA submissions to inform the central region's risk levels.

During the public engagement period, the Authority's member agencies were also invited to provide feedback and any additional evidence available to inform the finalisation of the statewide TARA via internal processes.

All submissions were initially analysed, categorised and sorted to identify the information in a consistent way.

Following analysis, submissions were provided to the relevant TARA technical team (comprising experts from across the MEMA agencies) for further analysis and review of evidence. Three technical teams were established (environmental, cultural and social and economic). A workshop for each technical team was held and independently facilitated to assess whether changes in risk levels or supporting evidence were warranted. This process also involved the transparent documenting of proposed changes between the draft and final statewide TARA reports, which is described in this report.

Submissions were systematically considered by technical teams to arrive at suggested changes to the draft statewide TARA. Recent evidence was more forthcoming from the Authority's affiliated agencies and academics than it was from peak groups or individuals for the environmental TARA. This was largely anticipated as these sources were more likely to have access to published papers, unpublished data and reports.

The NSW Government manages natural resources for the public good and is required to hold relevant scientific evidence or reports. In contrast, social and economic data for the marine estate is noted as a knowledge gap that the NSW Government seeks to improve in consultation with the community and stakeholders. Therefore, evidence from the Authority's affiliated agencies and academics tended to influence the risk level changes to the environmental TARA more than community views. Where feedback from the public and peak groups did not provide evidence, but raised credible information or concerns, this information was investigated further by technical teams to link to relevant evidence, including new Authority agency evidence, to assist in any decisions to change risk levels.

Other feedback was also noted at the technical workshops. Comments regarding knowledge gaps and key studies are being used to inform development of the Marine Integrated Monitoring Program for the NSW marine estate and management suggestions will be considered as part of the process to develop management responses for the draft Strategy (due in late 2017).

Contented risk levels arising from the technical teams' review were considered by the independent Chairs of the Authority and the Marine Estate Expert Knowledge Panel. The Chairs met in June to review 22 contested risk levels and evaluated the proposed changes, based on any new evidence submitted between the draft and the final statewide TARA. As a result of their review, the contested risk levels remain unchanged from the draft statewide TARA risk levels, and no contested risk levels remain in the final statewide TARA report.

ENGAGEMENT OUTCOMES

WHO PROVIDED PUBLIC FEEDBACK

TARA INTERACTIVE TOOL

The TARA interactive tool was the formal method for stakeholders and the community to provide feedback on the draft statewide TARA. More than 70 individuals and organisations submitted feedback, with over 150 comments on specific risk levels or general feedback submitted through the TARA tool.

Organisations that submitted through the tool included:

- Advanced Marina Management
- Australian Marine Conservation Society and NSW Nature Conservation Council
- Australian Museum Research Institute
- Ballina Fishermen's Cooperative Ltd
- Boat Owners Association of NSW Inc.
- Boating Industry Australia
- Clarence River Fishermen's Cooperative Ltd
- Clarence Valley Council
- Environmental Defenders Office NSW
- Eurobodalla Greens
- Eurobodalla Shire Council
- Gordons Bay Scuba Diving Club
- Marine Industries Association
- National Parks Association – Illawarra Branch
- Nature Coast Marine Group
- Northern Beaches Council
- NSW Aboriginal Land Council
- NSW Farmers' Association
- NSW Fisheries Scientific Committee
- NSW Fishermen's Cooperative Association Ltd
- NSW Greens
- NSW Seafood Industry Council
- NSW Wild Caught Fishers Coalition
- OceanWatch Australia
- Professional Fisherman's Association
- Recreational Fishing NSW Advisory Council
- Solitary Islands Underwater Research Group
- Sydney Coastal Councils group
- Sydney Fish Market Pty Ltd
- Sydney Institute of Marine Science and Australian Marine Science Association – NSW Branch
- Sydney Water.

CONTACT.US

In addition to the TARA interactive tool, over 55 submissions were received from individuals and organisations to the marine estate email address contact.us@marine.nsw.gov.au.

Organisations that submitted through the email address included:

- Byron Bay Deep Sea Fishing Club
- National Parks Association NSW
- Narooma Port Committee
- Recreational Fishing Alliance of NSW
- Underwater Skindivers and Fishermen's Association.

Included in the submission totals were two campaign email submissions, which generated more than 1,500 support emails to the *contact.us* email address. The campaigns originated from the Australian Marine Conservation Society and advocated for a Sydney Marine Park. Further information about the 'I love our ocean and support a Sydney Marine Park' and 'I fish and support a Sydney Marine Park' campaign emails are provided in Appendix 3.

FEEDBACK ON THE ENVIRONMENTAL TARAS

Extensive feedback on the environmental asset risk levels was received, analysed and assessed. A summary of the comments received for each of the priority threats is included in this section, along with a comment to show how the feedback was used to finalise the statewide TARA. Revised risk matrices, with changes highlighted from the draft to the final statewide TARA, are included in Appendix 4.

Submissions were also used to improve the evidence base of a number risk levels, but the risk levels themselves did not change. New evidence has been included in an updated version of the TARA Background Environmental Report[3].

Some general concerns were raised throughout the submission process. These were noted but did not inform changes to the final risk levels (Table 1).

Table 1 – General concerns raised through submissions and responses

Stakeholder concerns	Response
Stressors are missing from the assessment (e.g. air pollution from boating)	While all stressors associated with an activity were considered during the assessment of risk levels, only the stressors with the most impact on the environmental asset are listed in the final scoring tables in the TARA report. Full lists of stressors and detailed descriptions are included in the method section of the TARA Background Environmental Report.
Local issues drive statewide risk scores	For every stressor-asset interaction, the scale was noted as either 'local' or 'regional'. The final list of 'statewide' risks is based on only those interactions listed as regional risks where moderate or high risk occur in the northern, central and southern regions.
Scoring justifications require greater emphasis on the management around certain activities, (e.g. fishing)	The management around activities is addressed in detail in the TARA Background Environmental Report.
A single species could influence the risk rating for an activity (e.g. Grey Nurse Shark)	Scoring of risk levels is based on the most sensitive or threatened components of the assets. This precautionary approach is standard practice for ecological risk assessments. Species and communities protected under the *Biodiversity Conservation Act* (BCA) and the *Fisheries Management Act* (FMA) (e.g. Grey Nurse Shark) are scored independently of their habitats to avoid skewing scoring for a habitat type.
Secondary impacts are not included in the assessment, (e.g. disturbed feeding of seabirds during hand gathering)	Many submissions suggested the inclusion of secondary impacts when scoring certain interactions. Secondary impacts cannot be included at this level because of the need to maintain scoring consistency and for managers to accurately determine which activities and stressors have the greatest direct impact on the environmental assets.
General feedback based on social and economic benefits	Several submissions suggested risk scoring changes based on the impacts of stressors on social and economic assets and benefits. This was outside the scope of the environmental risk assessment and was not included.
Positive impacts or benefits from activities and stressors were not taken into consideration in the scoring	Most of the benefits suggested were related to social and economic benefits and are not relevant to the environmental assessment (e.g. benefit to boating from dredging). Generally, ecological risk assessments do not offset the risk of harm to the environmental asset by the potential environmental (or social and economic) benefit they may provide.
Climate change appears to only examine future scenarios (20- and 50-year	The 20-year climate change projection is scored in the same time scale as the other activities, that is, present day to 20 years from now. The 50-year projection extends that snapshot to 50 years

[3] *Background Environmental Report - statewide TARA for the marine estate* (MEMA 2017)

Stakeholder concerns	Response
projections), rather than current impacts	into the future.
Why weren't all activities scored against fish assemblages? Were they left out?	Fish were captured under each environmental asset as part of the ecological community associated with each asset type. 'Fish assemblages' specifically addresses the impacts of fishing and bycatch on specific fish assemblages.
The assumption that quantitative or qualitative data were not used in scoring process	Detailed quantitative and qualitative data, as well as many peer-reviewed publications, were used during the risk-scoring process. These are outlined in the TARA Background Environmental Report.
The deliberate introduction of plant and animal species that become pests should be addressed in a separate threat category	This is now a separate threat category under land-based impacts and has been scored for all environmental assets where appropriate.

RESOURCE USE

Shipping

Feedback on shipping related to specific stressors that arise from small and large commercial shipping operations, management measures, and the scale of the impacts across the regions.

Feedback included:

- plastic debris on beaches from passing large vessels
- anchor scouring on deep reefs and deep soft sediments from large vessels
- impacts from small commercial vessel wash to mangroves and threatened species.

Submissions noted the assessment of ports and the management differences both in and outside a port; the mitigation measures in place in the event of a spill; and a shift in vessel traffic from cargo ships to cruise ships that may reduce risks; and some evidence to suggest shipping traffic is limited in the northern and southern regions. Changes to one of the risk levels for shipping are noted below as a result of the submissions review and technical team analysis process.

Estuarine
Review of large commercial vessels and associated port activities and industries (trade ships, cruise ships, etc.) in estuaries on **species protected under the *Biodiversity Conservation Act* (BCA)** in localised areas in the northern region resulted in an increase to low risk.
minimal  low 

Commercial fishing

Submissions on commercial fishing related to:

- the legacy cumulative impacts of fishing, particularly on shallow reefs and near shore algal beds
- the quality and use of the data used to determine risk levels (including catch data and accuracy of the commercial logbooks)
- concern over the influence of a single species on risk levels for fishing
- the lower risk from bycatch in the southern than in the central and northern regions
- assessing individual environmental assets rather than the broader ecological impacts of commercial fishing
- the recovery of NSW fish stocks from earlier periods of overfishing
- consideration of cumulative impacts (e.g. water pollution)
- the information around current management processes in place for fishing.

Questions were raised about perceived missing stressors or activities, including commercial hand gathering, the potential separation of the spanner crab fishery as a separate activity, and how the impact of commercial versus recreational fishing was determined for shared stock (e.g. snapper). Submissions addressing bycatch were focused around current management measures; using the term 'by-product' instead of bycatch; and discussions around whether bycatch should be treated as an asset or a threat. Changes to several risk levels for commercial fishing are noted below as a result of the submissions review and technical team analysis process.

Coastal and marine

Review of **ocean trap and line** impacting **fish assemblages** – the dominance of two or three species in most years, the lower catches in the southern inshore region compared to the northern region in most years, and the stock status of Kingfish resulted in a moderate risk level in the southern region.

high → moderate

Review of **ocean haul** impacting **fish assemblages** – the dominance of Sea Mullet and Australian Sardine, the relatively stable landings through time, no evidence that current sardine harvest levels are unsustainable, and absence of overfished species in the dominant landings (catch) resulted in a moderate risk level in the northern region.

high → moderate

Review of **ocean haul** on **species protected under BCA** resulted in low risk levels in both the central and southern region.

minimal → low

Estuarine

Review of **estuary general** on **fish assemblages** – the composition of the landings in the northern and southern regions in all years, the significantly lower catches in the southern inshore region compared to the other two regions, the relatively stable landings of key species through time, the dominance of fully fished species and absence of overfished species in the dominant landings resulted in a moderate risk level in these two regions.

high → moderate

Charter fishing

Submissions on charter fishing questioned why the relative risk of line fishing from a charter boat would be lower than fishing from a private recreational boat. Changes to several risk levels for charter fishing are noted below as a result of the technical team analysis process.

Estuarine

Review of **charter fishing** in estuaries on **seagrass** in all regions resulted in minimal risk levels.

low → minimal

Review of **charter fishing** in estuaries on **species protected under the BCA** in the northern and southern regions resulted in low risk levels in these regions.

minimal → low

Recreational fishing

Many submissions presented conflicting opinions of recreational fishing activities and suggested that risk levels were either overstated or understated.

Submissions relating to overstated risk can be summarised as relating to:

- strong and effective management in place
- inaccurate and biased use of the available data
- the validity of the data collected by Department of Primary Industries
- the evidence of marine debris from recreational fishing and lack of acknowledgment of improved recreational fishers' attitudes and practices
- the lack of evidence presented for trampling during hand gathering
- the issue of regional versus local scale impacts in different regions
- strong support for the current risk rating for spearfishing
- the suggestion to separate line fishing from trapping in the assessment.

Submissions relating to understated risk can be summarised as:

- the efficiency of recreational fishers with increasing technology (e.g. fish finders)
- the risk from spearfishing should be higher (particularly in relation to threatened species)
- there are broader ecological impacts (cumulative risks) that have not been assessed in the draft statewide TARA
- recreational catch is poorly monitored and likely to be underestimated, such as the impacts of hand gathering in seagrass and shallow rocky reefs
- ghost fishing by abandoned traps and nets
- general disagreement with the view that the trend of recreational fishing is decreasing when looking at population growth.

There were many submissions relating to recreational fishing interactions with threatened and protected species. These related to the evidence provided on trampling during hand gathering and wildlife disturbance attributed to recreational fishers versus other shoreline users. The Grey Nurse Shark was also raised in submissions as influencing the higher risk levels in relation to several activities. Secondary impacts on threatened shorebirds from hand gathering were raised as an issue (e.g. disturbance to feeding habits). Changes to several risk levels for recreational fishing are noted below as a result of the submissions review and technical team analysis process.

Coastal and marine

Review of **hand gathering** on **ocean beaches** in the northern region noted impacts are consistent with those in the central and southern regions, resulting in low risk levels in the northern region.

moderate → low

Review of **hand gathering** on **coastal species protected under BCA** in the central region resulted in low risk levels in this region.

minimal → low

Estuarine

Review of **hand gathering** on **estuarine beaches and mudflats** in the northern and central regions noted that impacts are consistent with that in the south, resulting in low risk levels in these regions.

moderate → low

Review of **hand gathering** on **estuarine species protected under BCA** in the central and southern regions resulted in low risk levels in these regions.

minimal → low

Charter activities

Submissions on charter activities questioned if whale and dolphin watching had any significant impact on the marine environment; conversely, concern was raised about the impact of charter activities on marine mammals, particularly where charter businesses do not abide by a specified code of conduct (e.g. maintaining distances between the vessel and animals). Changes to several risk levels for charter activities are noted below as a result of the submissions review and technical team analysis process.

Estuarine				
Review of **whale and dolphin watching in estuaries** on **species protected under BCA** resulted in a low risk level in the central region and moderate risk level in the southern region.				
Central	minimal			low
Southern	low			moderate

Aquaculture

Feedback on aquaculture focused on oyster farming and fish farming. Submissions on oyster farming suggested the inclusion of potential positive ecological impacts from oyster farming (e.g. sea floor stabilisation, improvements in water quality). Several submissions focused on the improved management and methods of oyster farming (e.g. floating-basket oyster cultivation techniques replacing tray and stick cultivation). Submissions also highlighted the threat to biodiversity posed by the spread of the invasive Pacific Oyster (*Crassostrea gigas*).

Submissions on fish farming suggested a higher risk rating for coastal water quality and nutrient loads due to the effluent and undigested foods that are associated with high-density fish farms. Additionally, submissions highlighted the risk of creating dead zones, contaminated plumes or disease centres, as well as the potential threat of wildlife entanglement. No changes were made to risk levels as a result of the submissions review and technical team analysis process.

Bait and aquarium trade

Submissions relating to the bait and aquarium trade focused on the impact of disease on wild stocks as well as aquaculture species. This is a secondary impact and not considered in the draft statewide TARA. No changes were made to risk levels as a result of the submissions review and technical team analysis process.

Research and education

Submissions were related to the social and economic impact of research and education, including the absence of research and education and the secondary impact of this as a threat to environmental values. No changes were made to risk levels as a result of the submissions review and technical team analysis process.

Recreation and tourism

Submissions presenting conflicting opinions about recreational users and dog walking on beaches were received; they suggested risk levels were either overstated or understated. Both views were based on exposure (the number of walkers), rather than the impact of the activity on the environmental assets. Feedback highlighted the higher risk to species protected under the BCA in the northern region from dogs due to the presence of critically endangered species such as Beach Stone Curlew and Little Tern.

Several stressors were suggested for inclusion under recreation and tourism, including illegal camping and four wheel driving, and the recent proposal for wreck diving within the marine estate. There were several detailed submissions from the boating industry challenging the impacts associated with recreational boating. Numerous submissions on boating and boating infrastructure presented opposing views: risks were seen as overstated or understated.

Submissions with the view of overstated risks included:

- no measureable impacts on overall species populations from vessel strikes on wildlife and the claim that protected species' population numbers are increasing
- some risk ratings were assigned with historical industry practices or legacy contamination issues and without full consideration of current regulations and public awareness
- the lack of information, knowledge gaps and statistics relating to user behaviour
- the argument that boating is not a risk to environmental assets, but it is the behaviour of the boat users that manifests as a threat
- boating impacts on seagrass are highly localised
- relatively low boating use in the northern region does not correspond with reported vessel strike when compared with other regions
- there is less boating infrastructure in the south than in the northern and central regions.

Submissions with the view of the risks being understated included:

- a higher risk for vessel strikes on BCA listed species (e.g. Loggerhead Turtle) in the northern region, as well as for disturbance, noise and marine debris
- recreational boating increases visitor accessibility to coastal and island nesting sites for shorebirds and seabirds
- impacts from wakeboarding and high-speed boats on estuary foreshores.

Submissions related to shark meshing noted the trial netting on the north coast and the risk to threatened and protected species.

Changes to risk levels for recreation and tourism activities are noted below as a result of the submissions review and technical team analysis process.

Coastal and marine

Review of **recreational boating and boating infrastructure** on **species protected under BCA** resulted in low risk levels in each region.

moderate → low

Review of **snorkelling and diving** on **shallow rocky reef** in the northern region resulted in an increase in the risk level from minimal to low.

minimal → low

Review of **passive recreational use** on both **ocean beaches** and **rocky shores** in the central region, and to **species protected under BCA** in the northern and southern, resulted in an increase in the risk level from low to moderate in these regions, reflecting the increased level of impacts from physical disturbance and marine debris due to higher levels of activity.

low → moderate

Review of **four wheel driving** on **species protected under BCA** in the central region resulted in an increase in the risk level from low to moderate in this region, reflecting the increased level of impacts from physical and wildlife disturbance due to higher levels of activity.

low → moderate

Estuarine

Review of **passive recreational use** on estuarine **beaches and mudflats,** and to **species protected under BCA** in all regions resulted in an increase in the risk level to moderate. This reflects the review of levels of activity and associated higher level of impacts in these regions from physical disturbance and marine debris, with risks at a regional scale on beaches and mudflats in the central region, and the local scale in the northern and southern regions.

Beaches & mudflats minimal → moderate

Estuarine				
BCA species	low	→		moderate

Dredging (includes placement)

Submissions presenting conflicting opinions about dredging, suggesting risk levels were either overstated or understated. Several submissions emphasised a higher impact from dredging on the marine and estuarine environments (particularly from water pollution issues), while others stated the frequency of dredging activities is low and this should be reflected in the risk score. The issue of potential beneficial environmental effects of dredging was raised (e.g. flushing of estuaries after drought). The influence of management on the severity of dredging impacts and legacy issues was included in several submissions. One submission stated that river dredging has no impact on the encroachment of mangroves. A change to one risk level for dredging as a result of the submissions review and technical team analysis process is noted below.

Estuarine				
Review of **navigation and entrance management and modification, harbour maintenance**, and other activities on **subtidal reefs** in central region estuaries resulted in a moderate risk level in this region due to water pollution issues.				
	low	→		moderate

Modified freshwater flows

Submissions suggested a higher risk rating for estuarine assets (e.g. estuarine waters, soft shallow sediments, planktonic assemblages) based on the potential impact of catastrophic and chronic water quality events as a result of modified freshwater flows. It was noted that this then impacts the health of the marine estate and fisheries production via changes in recruitment and catchability. Submissions noted that wetland drainage is responsible for the loss of nursery habitat for many species and the discharge of acidic and deoxygenated water into NSW estuaries after rainfall, which is a catalyst for regular large-scale kills of fish (and associated biota), particularly in northern NSW. Submissions expressed concern for the secondary impacts on species protected under BCA, such as shorebirds and waterbirds, from a reduction in food sources.

Estuarine				
Review of **modified freshwater flows** on **estuarine waters** resulted in a high risk level. A review of **modified freshwater flows** on **seagrass and BCA species** and on **estuarine shallow soft sediments** resulted in moderate risk levels. These increased risk levels were consistent across all regions.				
Estuarine waters	moderate	→		high
Seagrass and BCA species	low	→		moderate
Shallow soft sediment	minimal	→		moderate

Mining and extractive industries

Submissions on mining and extractive industries suggested a higher risk rating, and raised the issue of both future and historic mining activities (e.g. Macleay River, Dargues Reef Gold Mine). Activities associated with mining activities were identified, including seismic testing and port activities. No changes were made to risk levels as a result of the submissions review and technical team analysis process.

Service infrastructure

Submissions asked for clarification if power lines were included as part of this activity (details provided in the TARA Background Environmental Report) and flagged the projected population growth in the southern region and subsequent infrastructure for consideration in future assessments. Submissions questioned if the risk levels for mangroves and saltmarsh should be higher. No changes were made to risk levels as a result of the submissions review and technical team analysis process.

LAND-BASED IMPACTS

Land-use intensification

Numerous submissions were made on land-use intensification stressors, indicating that the collective threat from multiple forms of pollution was understated for some marine environmental assets. Many submissions were made specifically on marine debris, including the suggestion that plastic pollution be treated as a separate stressor; a perception it was one of the largest threats to the marine estate; plastic as a legacy stressor; and microplastics (including microfibres) as a specific stressor, and the effects on the food web.

Submissions on other marine pollutants from land-use intensification were extensive and included:

- the significance of stormwater as a primary source of pollution
- cumulative impacts of water pollution with threats from fishing and boating
- the proximity of urban and industrial development to marine environments
- the lack of information on the impact of sediment run-off on coastal waters
- the impact of sedimentation, turbidity and other pollutants on inshore communities
- the knowledge gap of chemical and endocrine stressors, highlighting the need for further investigation
- a concern that urban stormwater is largely unmonitored
- short- and long-term impacts from estuary entrance modifications
- the significance of the proposed increase in urban and regional development outside the central region
- the physical destruction of the habitats in addition to the impacts on species within the habitats
- clarification for the inclusion of reclamation of acid sulfate soils, bioaccumulation (e.g. heavy metals) and addressing the changing hormonal levels of fish
- questions on the impact of land-use intensification in the central region, which is already highly developed
- the impact from intensive blueberry farming.

Changes to risk levels for land-use intensification are noted below as a result of the submissions review and technical team analysis process.

Coastal and marine
Review of the impacts of **foreshore development** on **species protected under BCA** found that this activity in the northern and southern regions resulted in a moderate risk level. low  moderate
Review of the impacts of **beach nourishment and grooming** on **species protected under BCA** in the northern and southern regions found that the likelihood of minor consequences should be increased to likely and resulted in a low risk level. minimal  low
Review of the impacts of **clearing riparian and adjacent habitat including wetland drainage** on **species protected under BCA** in the northern and southern regions found that the likelihood of minor consequences should be increased to likely and resulted in a low risk level. minimal  low

Coastal and marine

Review of the threats under land-use intensification identified that the **deliberate introduction of plants and animals** should be added as a separate threat category. This stressor was found to apply to environmental assets: **ocean waters**, **beaches**, **rocky shores** and **species protected under BCA.** A minimal risk level was attributed throughout to this new category, except **species protected under BCA,** which was attributed a high risk level.

Ocean waters, beaches, rocky shores → minimal

Species protected under BCA → high

Estuarine

Review of the impact of **urban stormwater discharge** on **mangroves** in all regions found that the likelihood should be increased to likely, increasing the overall risk level to moderate. The impacts on **species protected under BCA** were found to be moderate in the northern and southern regions.

low → moderate

Review of the impact of **foreshore development** on **mangroves** found that the consequence level should be increased to moderate in the northern and southern regions and decreased from major to moderate-but-likely in the central region, resulting in a moderate risk level. Conversely, the likelihood was decreased for **seagrass** to possible in all regions and resulted in a low risk level. The impacts on **saltmarsh** in the central region were found to be likely, increasing the overall risk level to high. The consequence level for **species protected under BCA** was increased to moderate, increasing the overall risk level to moderate in the northern and southern regions.

Mangroves and BCA species: low → moderate

Seagrass: moderate → low

Saltmarsh: moderate → high

Review of the impact of **agricultural diffuse source run-off** on **rocky shores and subtidal reefs** found that the likelihood should be increased to likely in the central and southern regions. The consequence for species protected under BCA was increased to moderate in all regions, resulting in a moderate risk level**.**

low → moderate

Review of the impact of **beach nourishment and grooming** on **species protected under BCA** found that the consequence was minor and likely in all regions, resulting in a low risk level.

minimal → low

Review of the effect of **clearing riparian and adjacent habitat including wetland drainage** on **subtidal reefs** resulted in an increase in the consequence level from low to moderate in the northern and southern regions, resulting in a moderate risk level; and insignificant to moderate but from likely to possible in the central region, resulting in a low risk level. Similarly, **shallow soft sediments** were increased to a consequence level of moderate, from minor, in all regions.

Subtidal reefs (northern and southern regions) & shallow soft sediments: low → moderate

Subtidal reefs (central region): minimal → low

A stressor was identified as missing from land-use intensification: **deliberate introduction of plants and animals**. This stressor was found to apply to environmental assets: **estuarine waters, saltmarsh, mangrove, seagrass, beach and mudflats, shallow soft sediments, rocky shores, species and communities protected under FMA,** and **species protected under BCA**.

Estuarine		
Estuarine waters, mangrove, seagrass, shallow soft sediments, rocky shores	→	minimal
Saltmarsh, beaches and mudflats, species and communities protected under FMA	→	low
Species protected under BCA	→	high

Point discharges

Submissions raised the issue of a considerable number of sewage treatment plants that discharge into the Hawkesbury River system, although the risk associated with these has been identified as a moderate threat. Additionally, there is a potential emerging issue of perfluorooctane sulfonate (PFOS) pollution – Albatross Military Base (industrial pollution). Submissions asked if newer stressors, such as chemical and endocrine stressors on the marine environment, were included in the assessment or should be included as a knowledge gap. The issue of separating sewage and septic into two activities was raised. Changes to risk levels for point-source discharges are noted below as a result of the submissions review and technical team analysis process.

Coastal and marine		
Review of **sewage effluent and septic run-off** on **shallow rocky reefs (coast and marine)** resulted in a low risk level.	moderate →	low

Estuarine		
Review of **sewage effluent and septic run-off** on **saltmarsh** determined a consequence level of moderate and likelihood of possible in the northern and southern regions, resulting in a low risk level.	minimal →	low

Hydrologic modifications

Submissions requested further clarification between 'estuary entrance modifications' and 'navigation and entrance management and modification, harbour maintenance'. Sediment contamination was noted in several areas in NSW. Submissions highlighted the proposal to allow North Coast landholders to increase harvestable water rights as a future risk. Changes to risk levels for hydrologic modifications are noted below as a result of the submissions review and technical team analysis process.

Coastal and marine			
Review of the impact of **estuary entrance modifications** on **species protected under BCA** found that minor impacts are likely in all regions, resulting in a moderate risk level.			
BCA species (central region)	minimal	→	moderate
BCA species (northern, southern regions)	low	→	moderate

CLIMATE CHANGE

There were many submissions related to climate change, the majority of which related to cumulative impacts, the interaction with other activities or stressors, and secondary impacts from climate change. Feedback was also provided for specific interactions between climate change stressors and environmental assets.

Submissions included the cumulative impact of climate change in conjunction with other activities or stressors on environmental assets (e.g. urchin barrens, tropicalisation, decreased oxygen levels, reduction of saltmarsh), as well as the potential for climate change to accelerate or worsen other stressors (e.g. the risk from introduced species may be increased with changes to species distributions, the impact on current stormwater infrastructure from a rise in sea level). Feedback suggested that temperature and ocean acidification should be linked in a cumulative assessment.

Secondary impacts from climate change stressors were also highlighted in the submissions. These impacts could be closely linked to cumulative impacts (e.g. the impact of kelp die-off on fish assemblages and shallow rocky reefs). Several submissions also noted the legacy impacts of greenhouse gases that have already been released.

Feedback on specific interactions between climate change stressors and assets included:

- general support for the current risk levels on kelp forests and shallow reef habitats
- questions about the different risk levels for altered ocean currents across regions
- altered storm or cyclone activity focused on the physical impact to the beach, rather than the communities inhabiting the beaches (e.g. the impact of storms on beach erosion at Collaroy Beach)
- further clarification on the use of quantitative and qualitative data supporting scoring decisions (this information is currently in the TARA Background Environmental Report)
- the risk rating of altered storm or cyclone events on saltmarsh communities
- the vulnerability of mangroves to increased air and sea temperatures and altered storm or cyclone events
- impacts from ocean acidification were generally overstated for the 20 year projection
- the impacts of altered ocean currents on connectivity and larval dispersal.

General comments on the climate change risk rating included the overlap and potential 'double-counting' of stressors from storm inundation and altered storm or cyclone events, and the need to emphasise that the risk ratings are tentative and based on a precautionary approach. Changes to risk levels for climate change (20- and 50-year projections) are noted below as a result of the submissions review and technical team analysis process.

CLIMATE CHANGE – 20 YEARS

Coastal and marine

The Authority's review of evidence of **altered ocean currents and nutrient inputs** affecting **planktonic assemblages** on the south coast, due to reduced impacts of changes in east Australian current influence in this region, resulted in a low risk level.

moderate → low

Several submissions identified greater 20-year impacts to **beaches, coastal and marine waters and rocky shores** as a result of **climate and sea temperature rise** than in the draft report. This resulted in minor rather than insignificant consequence in the northern region, and minor rather than insignificant consequence in the central and southern regions. Risk levels increased because of recent analysis of long-term trends in sea temperature data showing consistent increases that are expected to be higher on the north coast.

Beaches, ocean waters (central, southern regions) & rocky shores (central, southern)	minimal	→	low
Ocean waters & rocky shores	minimal	→	moderate

Coastal and marine

(northern region for both) 

Submissions recommended an increase in the risk rating from **climate and sea temperature rise** for **species protected under BCA** across all regions, as any day above 42°C impacts the viability of shorebird eggs. Consequently, as the number of days above 42°C increases, the viability of shorebird populations will decrease. Risk level increased to moderate.

low  moderate

Several submissions identified greater 20-year impacts to **coastal and marine waters** as a result of **ocean acidification** increases than those identified in the draft TARA report, resulting in minor rather than insignificant consequence and a low risk level.

minimal  low

Submissions recommended an increase in the risk rating of **altered storm and cyclone activity** for **species protected under BCA** across all regions, as increased storm activity is already having a significant impact on shorebird breeding sites in particular. A major storm event in mid-2016 resulted in significant depletion of sand from all shorebird nesting beaches.

moderate  high

Reviews of **sea level rise** projections on **beaches** over 20 years and the likely consequences were revised to minor, resulting in a low risk level.

moderate  low

Estuarine

Several submissions identified greater 20-year impacts to **estuarine waters, mangroves, saltmarsh and seagrass** as a result of **climate and sea temperature rise**, resulting in moderate rather than insignificant consequence for estuarine waters, and minor rather than insignificant consequence for mangroves, saltmarsh and seagrass. This was supported by a new internal analysis of estuarine water-temperature trend data showing consistent increases, and recent work documenting large mangrove dieback in northern Australia. Review of the impacts of climate and sea temperature rise on **species protected under BCA** found that the consequence level should be increased to moderate. Risk levels associated with climate change and sea temperature rise therefore increased for mangroves, saltmarsh, estuarine waters, seagrass and BCA species.

Mangroves, saltmash, estuarine waters (southern region) minimal  low

Seagrass, BCA species low  moderate

Estuarine waters (northern, southern regions) minimal  moderate

Several submissions identified greater 20-year impacts to **subtidal reefs, estuarine waters, mangroves, saltmarsh and shallow soft sediments** as a result of **ocean acidification** increases than those identified in the draft TARA report, resulting in minor rather than insignificant consequence and a low risk level.

minimal  low

The original risk level for **altered storm and cyclone activity** and **estuarine waters** was considered an underestimate of consequence in the northern region of these interrelated components that will impact on estuarine water quality parameters, including salinity, turbidity and nitrates.

low  moderate

Several submissions indicated a need to increase the risk level for **altered storm and cyclone activity** and **beaches and mudflats** to reflect increases in physical disturbance (e.g. due to storms, flooding). Similarly, submissions indicated that altered storm and cyclone activity would

Estuarine

increase freshwater events, increasing the risk to **saltmarsh**, **species and communities protected under FMA and BCA**, and **subtidal reefs**. Risk levels increased for beaches, mudflats, saltmarsh, sub-tidal reefs, FMA species and BCA species.

Beaches & mudflats, saltmarsh, subtidal reefs	minimal	→	low	
FMA species, BCA species	moderate	→	high	

Reviews of **sea level rise** projections over 20 years and the impact on **mangroves, saltmarsh,** and **species and communities protected under FMA** resulted in the likely consequences being revised to minor for mangroves and moderate for saltmarsh, resulting in low and moderate risk levels respectively.

Mangroves	moderate	→	low	
Saltmarsh, FMA species	high	→	moderate	

CLIMATE CHANGE – 50 YEARS

Coastal and marine

Submissions provided suggested likely lower consequence of **altered ocean currents and nutrient inputs** affecting **planktonic assemblages** in the southern region as this region will be less influenced by changing oceanography, resulting in a reduced risk level.

moderate	→	low	

Several submissions identified greater 20-year impacts as a result of a **climate and sea temperature rise** increases than were identified in the draft report, resulting in major rather than moderate consequence for **coastal and marine waters,** resulting in a high risk level**,** and moderate rather than insignificant consequence for **rocky shores, resulting in a moderate risk level**. This is supported by recent analysis of coastal water temperature trend data showing consistent increases.

Ocean waters	moderate	→	high	
Rocky shores	minimal	→	moderate	

Review of several submissions identified reduced 50-year impacts on **coastal and marine waters** and **beaches** as a result of **ocean acidification** than were identified in the draft, resulting in moderate consequence being likely rather than major. Similarly, a review of **shallow soft sediments** and **deep soft sediments** resulted in major consequences being possible rather than likely, resulting in a moderate risk level.

high	→	moderate	

Review of submissions identified reduced 50-year impacts on **species protected under BCA** as a result of **ocean acidification** than were identified in the draft TARA report, resulting in minor consequence rather than moderate, and a moderate overall risk level. Similarly, the **species and communities protected under FMA** consequence was reduced to minor, resulting in a low risk level.

BCA species	high	→	moderate	
FMA species	moderate	→	low	

Submissions indicated a need for decreased risk level of **altered storm and cyclone activity** to reflect reduced impacts of storms in **deep soft sediments** areas, and the resilience of such habitats to change, resulting in a low risk level.

moderate	→	low	

Submissions indicated the need for increased risk level to **beaches** and **rocky shores** to account for a projected **sea level rise** over 50 years, with the likely consequence revised to moderate and

Coastal and marine

an overall risk level of moderate. **Deep soft sediments** are expected to have insignificant consequences rather than minor from sea level rise and were, therefore, reduced to minimal.

Beaches, rocky shores — high → moderate

Deep soft sediments — low → minimal

Estuarine

Submissions included evidence relating to likely increase in the consequence of changes in **altered ocean currents and nutrient input**s and the effect of physio-chemical components of **estuarine waters**, resulting in an increase in risk level to low.

minimal → low

Submissions and review of evidence note the likely lower consequence of changes in **altered ocean currents and nutrient input**s affecting **planktonic assemblages,** as most effects will be driven more by catchment rather than oceanic inputs, resulting in a low risk level.

moderate → low

Several submissions identified greater 50-year impacts on **saltmarsh** as a result of **climate and sea temperature rise**, resulting in minor rather than insignificant consequence in the central and southern regions, resulting in a moderate risk level. **Estuarine waters** and **species protected under FMA** consequence was increased to high in the northern region, and moderate in the central and southern regions, resulting in increased risk levels.

Saltmash & FMA species — high → moderate

Estuarine waters (northern region) — moderate → high

Estuarine waters (central and southern regions) — low → moderate

Several submissions and additional recent evidence note a likely lower consequence of **ocean acidification** affecting **estuarine waters, mangroves, saltmarsh, seagrass, subtidal (shallow) soft sediments, and species and communities protected under FMA,** as these are more likely to be influenced by catchment rather than oceanic inputs, resulting in a moderate risk level.

high → moderate

Submissions considered the original risk level underestimated consequence of **altered storm and cyclone activity** on **estuarine waters** in the northern region. There are interrelated components that will impact on estuarine water quality parameters (e.g. salinity, turbidity and nitrates due to increases in catchment inputs). A review of evidence found that **planktonic assemblages** are likely to have a higher consequence of water column characteristics, resulting in a low risk level.

Estuarine waters — moderate → high

Planktonic assemblages — minimal → low

Multiple submissions indicated a need for increased risk level of **sea level rise** to **beaches and mudflats** to reflect projected rises over 50 years, with the likely consequence revised to moderate and risk level to moderate.

low → moderate

FEEDBACK ON THE SOCIAL AND ECONOMIC TARA

More than 200 individual comments about threat and risk levels to social and economic benefits were analysed and assessed. A summary of comments received for the threats is included in this section.

The social and economic TARA matrix displays the risk levels that have changed from the draft to the final statewide TARA, using bold and strikethrough over the text to mark changes (Appendix 5). Submissions were also used to improve the evidence base of a number risk levels that did not change.

The stressors identified in the social and economic TARA that received the most comments in submissions were the effects of water pollution on environmental values; inadequate, inefficient regulation or over-regulation (agencies); and conflict over resource access and use.

RESOURCE USE CONFLICT

Feedback on resource-use conflict were largely related to the benefits of **participation** and **viability of businesses**. Numerous concerns about conflict over resource use and access were raised in submissions, and examples were provided. The concerns reinforced that the term 'resource' is broader than just a singular physical resource (e.g. 'fish'), but encompasses a range of assets and benefits derived from the marine estate and, as a result, a suite of potentially related conflicts.

Submissions demonstrated that **resource use conflicts (resource access and use)** are occurring on a regular and ongoing basis and resulted in an increase to moderate risk level for **participation** benefits and an increase from minimal to low risk level for **enjoyment** benefits.

Participation	low	→		moderate
Enjoyment	minimal	→		low

Submissions raised a specific issue around the take of abalone on the south coast. This influences the likelihood of **illegal or excessive extraction** occurring and resulted in a moderate risk level to **business viability** and low risk level to **participation** benefits.

Business viability	low	→		moderate
Participation	minimal	→		low

ENVIRONMENTAL

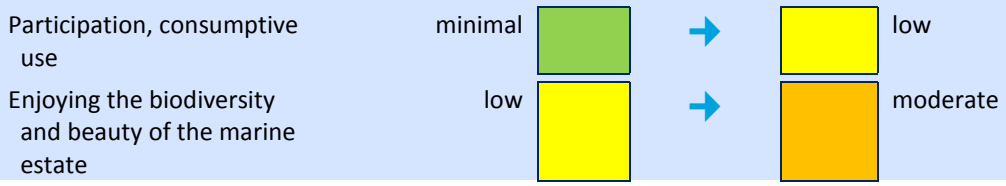
Feedback on environmental threats to social and economic benefits covered all stressor and benefit categories in the social and economic TARA.

Water pollution

Submissions raised water pollution issues and provided examples or information about how this impacts on social and economic benefits. The source or water pollution stressor was not always described, indicating that this might not be considered important or be well understood by the community.

Submissions identified a need to clearly articulate the risk from septic run-off in this stressor category across all regions. To better present septic impacts, this stressor has been renamed to include septic run-off in the stressor title.

The inclusion of septic run-off in this stressor category increases the consequence of impacts from insignificant to moderate across a number of benefit categories, resulting in a low risk level for **participation** and **consumptive use** and a moderate risk level for **enjoying the biodiversity and beauty of the marine estate**. This change also results in consistency in risk levels across the regions.



Submissions highlighted the significance of oyster industries in the northern and southern regions, and septic impacts on the **viability of their business**, resulting in a moderate risk level in the northern and southern regions.

Submissions provided examples of the impacts **urban stormwater discharge** has in regional areas, particularly on **viability of regional fishing and tourism businesses**, resulting in a moderate risk level.

The draft statewide TARA assumed that the central region would be less likely to be impacted by agricultural run-off because it has a greater urban population. Review of this stressor has demonstrated that this did not sufficiently account for some large agricultural catchments in the central region, namely the Hawkesbury River and Hunter River catchments.

A review of **water pollution – agricultural diffuse source run-off** has resulted in a moderate risk level in the central region across all benefits categories. Risk levels across the regions are now the same (Appendix 5).

A number of submissions presented information about litter and marine debris. Through the review of this stressor, new evidence regarding community attitudes to litter, particularly in regional areas, was identified and considered.

Submissions and new evidence demonstrated that while the likelihood of **litter** might be higher in the central region due to population pressures, **marine litter** is just as likely to have an impact in other regions where there is a higher community expectation of a clean environment. The risk levels in northern and southern regions has increased to a moderate risk level. Risk levels across the regions are now the same (Appendix 5).

Wildlife disturbance

There was limited new information provided about this stressor through submissions. The review process considered that this category should be redefined to include resulting ecological health impacts on disturbed wildlife.

Habitat (physical) disturbance

Submissions provided limited new information provided about this stressor, including issues about illegal camping, four wheel driving, anchoring and foreshore development, and some of this has been added to the evidence table. These types of uses and activities were assessed and accounted for in the existing risk levels, and so there were no changes to risk levels.

Reductions in abundances of species and trophic levels

The benefit most affected by this stressor has been determined to be **consumptive use**. Several submissions provided information to support this risk level. One submission presented potential impacts on food security and this has been added to the evidence table in the existing benefit categories.

A review of this stressor considered why the central rating for **viability of businesses** was rated lower in the central region. Despite the ban on commercial fishing in Sydney Harbour, there is commercial fishing throughout the central region and therefore resulted in a moderate risk level.

low → moderate

Pests and diseases

Several submissions noted the significant impacts that pests and disease have on the viability of a range of businesses and provided examples of impacts to the oyster industry, tourism and seafood producers and distributors.

Submissions provided evidence that the consequence of **pests and disease** on the **viability of businesses** is major, and the likelihood possible, resulting in a moderate risk level across all regions.

low → moderate

Modified hydrology

There was limited new information provided about this stressor through submissions. The feedback that was provided was assessed to have been accounted for in the current risk levels, and so there were no changes to risk levels.

Sediment contamination

There was limited new information provided about this stressor through submissions. Feedback about the risk to the health of fishers and their families from dioxins was assessed to have already been accounted for in the current risk levels for safety health and wellbeing benefits, and so there were no changes to risk levels.

Climate change

Climate change has the greatest number of high risk levels of any stressor in the social and economic TARA, and submissions proposed to further increase the risk levels of at least two more benefit categories.

Given the uncertainty of actual climate change impacts being realised in the next 20 years and to improve consistency between the environmental TARA and the social and economic TARA, this stressor category has been split to assess impacts over the next 20 years and impacts over the next 50 years. A range of risk levels have changed or been added to incorporate the addition of the new 50-year threat (see Appendix 5).

GOVERNANCE OF THE MARINE ESTATE

Feedback on the impacts of **regulation** on **safety, health and wellbeing** and **consumptive use** benefits varied. Limited new evidence was provided, and information was assessed as supporting current risk levels, or it has been added to evidence and justification tables where applicable.

Several submissions provided documented examples of regulation impacting on viability of business, including for tourism operators, the commercial fishing industry including, Sydney Fish Markets, and port operators in NSW.

The consequence of **inadequate, inefficient or over-regulation** on **viability of business** was increased to moderate, resulting in a moderate risk level for all regions.

A need for improved consultation was raised in submissions, but there was limited new evidence about this stressor.

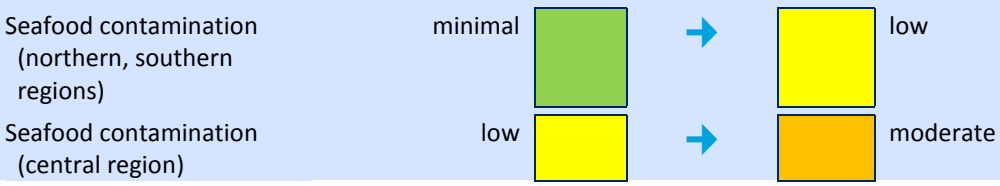
Submissions relating to lack of community awareness and lack of compliance provided limited new information or evidence about these stressor categories. The feedback provided was assessed to have already been accounted for in the current risk levels, and so there were no changes to risk levels.

PUBLIC SAFETY

Feedback on public safety stressors largely related to the benefits of **safety, health and wellbeing**, **viability of business** and **direct economic values**. Shark attacks were the most commonly raised wildlife interaction that affected benefits, but no evidence was provided to increase risk levels for this stressor.

The impacts of **seafood contamination** on **viability of business** was well documented in submissions, including the broader impacts an outbreak can have on seafood suppliers, local consumers and tourism across all regions. Specific examples in the central region were noted, including dioxins in Sydney Harbour and the recent Williamtown PFAS (Perfluorooctane sulfonic acid)/PFOS (perfluorooctane sulfonate) contamination. The location of the Sydney Fish Markets, in particular its tourism benefits in this region, also supported a high risk level to business from outbreaks for the central region.

The consequence of **seafood contamination** on **viability of businesses** was increased to moderate across all regions as a result of submissions. The likelihood of **seafood contamination** also increased from possible in the northern and southern regions and likely in central region, resulting in risk level changes to moderate risk level in the central region and low in the northern and southern regions.



Algal blooms were raised by a couple of submissions as warranting a higher risk level. It was assessed that the current risk level sufficiently accounted for this stressor, noting there are management settings in place to manage this risk.

CRITICAL KNOWLEDGE GAPS

Submissions did not specifically address the threat of a lack of social and economic information on benefits. No risk level changes have been made.

LACK OF ACCESS AVAILABILITY

The points raised in submissions about limited or lack of access infrastructure supported the current moderate risk level for safety, health and wellbeing and viability of business across the regions.

The mental-health impacts on the commercial fishing industry from a series of reforms (e.g. losses to public access over the years) was raised by submissions and is supported by evidence provided to a Parliamentary Inquiry into commercial fishing.

The likelihood of impacts to **safety, health and wellbeing** from **loss of public access** has been increased to likely to include the impacts to commercial fishers from ongoing reforms affecting their industry, resulting in a moderate risk level.

The loss of access due to fishing closures, specifically marine parks, and the impacts they have had on viability of business, were documented by submissions. Assessment of this evidence resulted in a change to likelihood levels for relevant regions.

The likelihood of impacts to **viability of businesses** from **loss of public access** has been increased to likely in northern and southern regions, resulting in a moderate risk level.

ABORIGINAL CULTURAL HERITAGE AND USE BENEFITS

In addition to feedback from the nine Aboriginal workshops there was one submission from an Aboriginal representative body: the NSW Aboriginal Land Council.

A cultural technical group comprising marine estate agency Aboriginal representatives considered comments relevant to the two cultural heritage and use benefit categories – *Tangible Aboriginal Cultural Heritage* and *Intangible Aboriginal Culture and Heritage* in the draft TARA – and recommended changes to risk levels and evidence.

An important change to the final statewide TARA report is the renaming of the social and economic TARA to social, cultural and economic TARA. This is intended to better present and recognise consideration of Aboriginal cultural heritage in the threat and risk assessment process.

The social and economic TARA has been renamed the social, cultural and economic TARA.

Another key change is the combination of the two benefit categories *Tangible Aboriginal Cultural Heritage* and *Intangible Aboriginal Culture and Heritage* into a single benefit category *Tangible and Intangible Aboriginal cultural heritage (traditions, spiritual values, knowledge, places, items and source of food)*. Feedback from workshops strongly suggested that the demarcation of these benefits was widely seen as arbitrary to Aboriginal people. This change resulted in the increase of risk levels across the TARA.

There is a single Aboriginal culture and heritage benefit category titled *Tangible and Intangible Aboriginal cultural heritage (traditions, spiritual values, knowledge, places, items and source of food)*.

Detailed risk level comments from the Aboriginal workshops are outlined in the workshop report (Origin Communications Australia 2017[4]) and have not been repeated here. As such this section focuses on the key changes by threat category.

Risk levels across most threats and stressors impacting on cultural heritage and use in the social and economic TARA have increased to high.

RESOURCE USE CONFLICT

Changes to conflict over resource use and anti-social behaviour stressor categories result from reported conflicts with other users, including other cultural groups and commercial and recreational fishers, inappropriate behaviour at sites of cultural significance, and cases of vandalism at known cultural sites.

[4] Origin Communications Australia (2017) *Report on workshops, issues and TARA priorities: Marine Estate Authority – Threat and Risk Assessment Aboriginal Community and Stakeholder Consultations and Workshops*, March–April 2017.

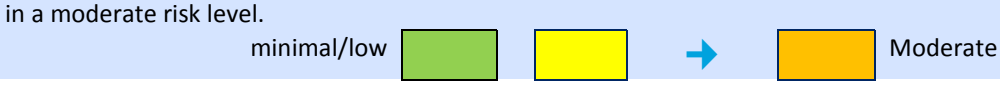
Feedback at workshops highlighted that Aboriginal commercial fishers are affected by an inability to provide and afford fishing licences as a result of competition within the industry, forcing them out of an industry that is an integral component of cultural practice. It was highlighted that there were 172 Aboriginal commercial fishers, and now there are approximately 20. This contributes to a loss of the cultural practice of passing the tradition to younger generations.

The consequence of both **conflict over resource access and use**, and **anti-social behaviour and unsafe practice** has been elevated to major and assigned a likelihood of likely, resulting in a high risk level for both stressors.

Impacts from overcrowding and congestion, loss or decline in marine industries, and excessive or illegal extraction were also documented. Examples highlighted in workshop discussion included issues with collecting cultural foods (e.g. abalone and pipis).

The consequence of impacts to **overcrowding and congestion** and **loss and decline of marine industries** has been elevated to moderate, resulting in a moderate risk level for both stressors.

The likelihood of impacts to **excessive or illegal extraction** has been increased to likely, resulting in a moderate risk level.



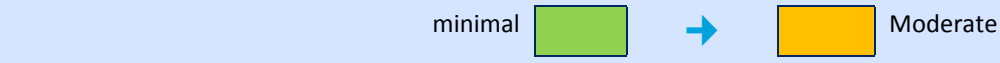
ENVIRONMENTAL

Feedback on environmental threats covered all stressors in the cultural heritage and use benefit category.

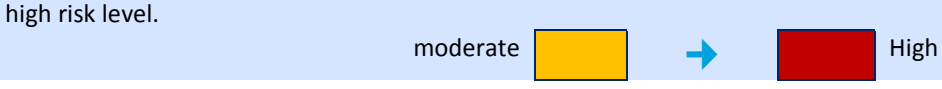
The assessment of water pollution stressors changed due to the impact that water pollution has on Aboriginal communities' ability to conduct cultural practices (e.g. weaving, abalone collection and gathering pipis). This curtails the ability of Aboriginal people to enjoy their cultural fishing rights and the ability to pass on cultural information and practice cultural activities with their younger generations.

Feedback was also provided that the spiritual seascape and food resources are impacted by water pollution as well as totemic species (e.g. turtles), which are in decline.

Workshop feedback led to the consequence of water pollution on environmental values for **point-source pollution and sewage overflows** increasing from minor to major, resulting in a moderate risk level.



The consequence of impacts to water pollution for **urban storm water discharge, agricultural diffuse source run-off and litter** have all been increased from moderate to major, resulting in a high risk level.



Impacts to wildlife disturbance, habitat disturbance and reductions in abundances of species and trophic levels were also documented at workshops. Evidence was provided that shark netting contributes to cultural sickness, which is an issue for communities with totemic ties to whales and communities on the north coast with ties to dolphins. Four wheel drive activity on beaches is also causing major erosion and disruption of nesting areas for shore birds and migratory species in adjacent wetlands.

The consequence of impacts to **wildlife disturbance, habitat disturbance and reductions** in **abundance of species and trophic levels** was elevated from moderate to major, resulting in a high risk level.

Feedback was provided in workshops on the impact of pests and diseases on culturally significant species.

The consequence of impact to **pests and diseases** has been elevated to major, resulting in a moderate risk level.

Submissions during the workshops were also made regarding the impacts of modified hydrology, hydraulics and flow regime. An example raised by Aboriginal people consulted on the draft TARA report was the impact on the weir at Ulladulla Creek, which empties into the bay: this disrupts fish breeding and affects important cultural resources.

The likelihood of impacts to modified **hydrology, hydraulics and flow regime** has been increased from possible to likely, resulting in a moderate risk level.

Impacts to sediment contamination and climate change stressors were also considered at workshops. It was documented that flooding and high rainfall due to climate change affects totemic species (e.g. Bellingen River Snapping Turtle). It was also noted that cultural sites will degrade and become less accessible as a result of sea level rise and increased storm activity across the state.

The consequence of impacts to **sediment contamination** and **climate change** has been increased from moderate to major, resulting in a high risk level.

GOVERNANCE

Changes to inadequate, inefficient regulation, over-regulation (agencies) and lack of community awareness of the marine estate stressor categories have been made in response to concerns by Aboriginal people that they do not have enough say in the management, planning and decisions that impact their culture and cultural practice.

The consequence of **inadequate, inefficient regulation, over-regulation (agencies)**, and **lack of community awareness** of the marine estate has been elevated from moderate to major with the likelihood not changing, resulting in a high risk level for both stressors.

Impacts from lack of or ineffective community engagement or participation in governance, and lack of compliance with regulations (by users) or lack of compliance effort (by agencies) were also documented. Examples highlighted in workshop discussions included that a lack of compliance with regulations that govern cultural sites and artefacts is a key threat. Another example was the regulation for the bag limit of pipis was felt to be inadequate, which limits the ability of communities to afford pipis for important cultural ceremonies.

The likelihood of the stressors lack of or **ineffective community engagement or participation** in governance and **lack of compliance with regulations (by users) or lack of compliance effort (by agencies)** has increased for both from possible to likely. The consequence of both has increased from moderate to major, resulting in a high risk level.

PUBLIC SAFETY

Feedback on public safety threats was provided for all stressors. In workshops, changes were suggested for seafood contamination and water pollution and contamination affecting human health and safety. Evidence was provided highlighting that river health is critical as mining and agricultural run-off impacts water quality, which affects the quality and therefore consumption of traditional foods (pipis and oysters). This was particularly evident in Newcastle, where pesticide run-off from farms is impacting water quality.

The likelihood of **seafood contamination** and **other water pollution and contamination** affecting human health and safety has increased from possible to likely. The consequence for both stressors has also increased from moderate to major, resulting in a high risk level.

CRITICAL KNOWLEDGE GAPS

Impacts from inadequate social and economic information were also documented in workshops. This includes economic development needs, lack of education and training, values and significance of the marine estate to Aboriginal people, and the loss of spiritual land that is now underwater.

The consequence of **inadequate social and economic information** has been elevated from moderate to major with the likelihood remaining likely, resulting in a high risk level.

LACK OF ACCESS AVAILABILITY

Changes to limited or lack of access infrastructure to the marine estate results from evidence provided that a lack of access to affordable boats and cars impacts the ability of Aboriginal communities to access important cultural sites, totemic species and traditional food sources.

The consequence of **limited or lack of access infrastructure** to the marine estate has been elevated from minor to moderate with the likelihood increasing to likely, resulting in a moderate risk level,

Feedback from the workshops surrounding loss of public access (either by private development or Government area closures) elucidated that there are currently underwater areas that were previously hunting grounds, tracks and culturally significant sites. Access to cultural sites is also limited by inundation, which has occurred in the Solitary Islands. In addition, drainage of wetlands has resulted in weed infestation and consequent reduction in sedge grass availability. This has occurred at women's traditional places in the Ballina-Byron region.

The consequence of **loss of public access (either by private development or Government area closures)** has increased from moderate to major, resulting in a high risk level.

OTHER FEEDBACK

FEEDBACK ON THE STATEWIDE TARA AND TARA PROCESS FROM SUBMISSIONS

The TARA concept

The threat and risk assessment concept was largely supported. Submissions that commented on the TARA acknowledged 'the benefits of the TARA … to decision making' and were 'pleased to see a new approach to the management of the marine environment' but also qualified the TARA needs to be 'appropriately applied' in order to be effective.

In principle, I think the scientific TARA is a good idea …

One submission questioned why a high or moderate risk level won't necessarily lead to a change in current management or regulations and whether this was because of a lack of resources or unwillingness to manage an unpopular issue.

RISK TOLERANCE

Assessment of risk tolerance was not previously included as part of the Hawkesbury Shelf marine bioregion assessment process. It was, however, included as a critical step in assessing management options for the NSW marine estate. Current management for high and moderate threats (as reported in the final statewide TARA) is being reviewed to consider whether the level of risk is acceptable and to identify criteria for assessing risk tolerance as a part of the management decision-making process.

Execution of the statewide TARA

Baselines

A couple of submissions questioned the 'appropriate bar or baseline' that various environmental and social values should be assessed on, and suggested the baseline should be measured in the absence of anthropogenic impacts rather than their current state.

Issues were also raised with how historical damage or legacy threats are addressed in the TARA and whether the ultimate goal is to repair and rehabilitate values or only maintain or prevent future damage.

Missing threats

The following threats were identified through submissions as missing from the draft statewide TARA:

- **government policy and decision-making failures** (e.g. delay in the gazettal of a marine park in the central region, lack of action to address climate change impacts locally, overfishing and the historic overallocation of fishing licences, oceanic sewage and stormwater outflows)
- introduced or translocated species and pathogens (marine pests and disease)
- **lack of investment in scientific research and monitoring** (e.g. stock assessment on target species, recreational fishing take and impacts on ecosystem functions, inadequate establishment and monitoring of 'no-take' control areas for research, climate change impacts)
- **legacy threats** (e.g. urchin barrens, past introductions of marine pests such as *Caulerpa taxifolia*)
- **critical knowledge gaps in the environmental TARAs** – should be assessed similarly to the way assets were assessed in the social and economic TARA

- **threats to marine historic heritage and use in social and economic TARA** – threats to marine historic heritage (e.g. the impacts of anchoring, recreational activities and sand mining on shipwrecks) were not assessed in the TARA.

Missing benefits

MARINE HISTORIC HERITAGE

The conservation and enjoyment of marine historic heritage provides social and economic benefits to the NSW community. The omission of this benefit was raised during the consultation phase of the statewide TARA. Marine historic heritage includes shipwrecks, jetties, lighthouses and submerged planes, among other items. While there are some existing protections in place, it is important to identify and assess the threats to marine historic heritage so that ongoing management needs can be determined.

Submissions to the previous 2016 Hawkesbury Shelf marine bioregion assessment consultation reported missing benefits not incorporated in the TARA. These included the benefits of:

- marine historic heritage – the conservation and enjoyment of marine historic heritage provides social and economic benefits to the NSW community
- commercial fishing and the Sydney Fish Market – provision of fish for consumption and bait, health benefits of local seafood to the community, supply of fresh local seafood to domestic and international tourists, Sydney Fish Markets as a tourist attraction and contributor to the NSW economy
- recreational fishing and boating – high social and economic benefit return to the NSW community
- significant NSW State infrastructure such as ports, which provide significant social and economic benefit.

SOCIAL AND ECONOMIC ASSESSEMENT – FROM THE HAWKESBURY DRAFT TARA TO THE STATEWIDE TARA

The original social and economic TARA for the Hawkesbury Shelf marine bioregion took a sector-based approach to assessing threats and risks, for example how the activities of shipping could impact on recreational boating. In contrast, the draft statewide TARA now looks at threats and risks through the lens of 'impacts on community wellbeing'. This means we have considered the benefits and costs to the community as a whole rather than for a particular user group, sector or industry. This has allowed for both the threats and benefits of an activity or user group to be assessed.

Cumulative threats

A couple of submissions reported they believe that the collective threat from multiple forms of pollution has been understated in the draft statewide TARA.

Others commented on assessing all forms of fishing together. Views both for and against fishing being included as a cumulative threat were presented.

Stakeholder workshops raised that change to fish habitats within a catchment affects fish assemblages and commercial and recreational fishing catch. The workshops also noted that the current condition and extent of different habitats is important when assessing cumulative threats.

One submission requested a new cumulative threat of 'unsustainable fishing legacy impacts on near shore algal beds' to address concerns about urchin barrens, particularly in the central and southern regions.

Ranked priority threat lists

Commentary on the priority threats lists presented in the draft statewide TARA report was also provided in submissions and the following comments made:

- climate change should be elevated to a higher statewide priority

- recreational fishing ranks too high on the lists – 'highly visible but benign users (recreational anglers) identified as major threats while other less visible threats are not addressed'
- fishing (commercial and recreational) features too often and too high on the lists
- pollution features too little and too low on the lists, with some pollution threats not listed at all
- fishing should not be listed as a higher priority threat to coastal and marine waters than pollution, inappropriate coastal development and introduced pests and pathogens – 'confirms extreme bias against "fishing" in general'.

Social and economic TARA

Concern was also raised at the notion of 'trade-offs' and caution urged regarding this approach.

One submitter noted that although only two stressors (climate change and reductions in abundance of species and trophic levels) were identified as having high risks to social and economic benefits, they are very significant ones.

Another submission noted that estimates of the 'monetary value of ecosystem services', which underpin most social and economic benefits, is missing from the TARA and suggested it be included in the final statewide TARA.

A few submissions questioned the term 'community wellbeing' and its application in the social and economic TARA. Recreational fishers in particular seemed concerned that this approach would not represent their 'intrinsic links to the ocean' or their right to go fishing and referenced the recent ocean beaches and headlands changes in Byron Bay.

Evidence

Submissions questioned the evidence presented in the draft statewide TARA, in particular in regard to the threats of recreational and commercial fishing, boating and perceived downplaying of the benefits of marine parks and sanctuary zones.

A few submissions also made comment about the overwhelming amount of information provided as well as a concern that the evidence is not accessible to the general public and made suggestions about improving the index of the TARA Background Environmental Report.

Level of confidence

Submitters recognised that there is limited available evidence for many threats and risks.

… the scientific underpinning of successful marine environmental management is centred on acknowledging uncertainty …

A couple of submissions highlighted that it is important for the level of uncertainty of a threat or risk to carry over to decision-making about appropriate management strategies and requested formal acknowledgement of the precautionary principle in this process.

The same submissions supported further data and information collection but were concerned that this is 'expensive in terms of time and cost' and proposed other precautionary management tools (e.g. marine parks) be applied independently of the statewide TARA.

Engagement on the TARA

Several submissions expressed concern about the complexity of the TARA reports and engagement process. Submitters felt that a high level of technical expertise was required to provide a submission, and that this risked excluding some stakeholders and community members.

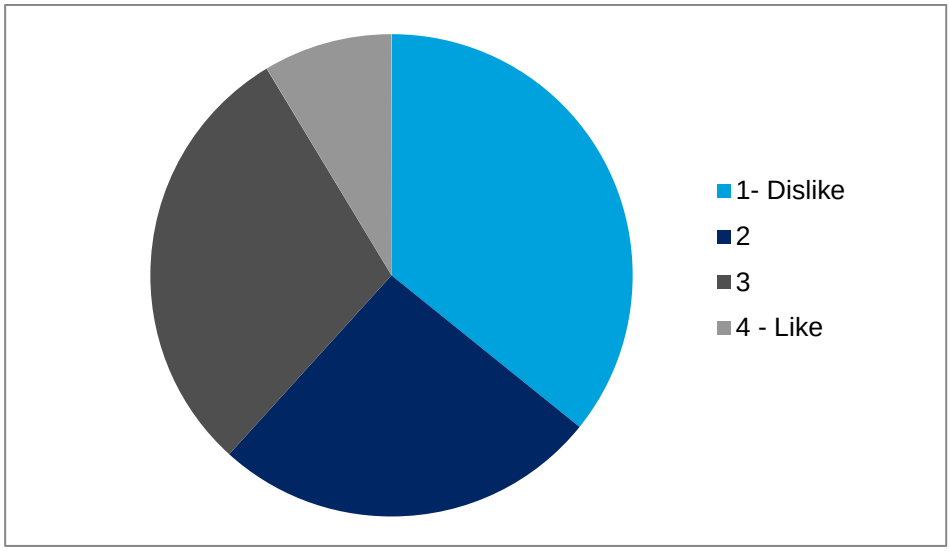
One submission also questioned the effectiveness of engagement 'with local authorities that are responsible for managing areas of the marine estate'.

TARA tool rating

Submitters using the TARA interactive tool were given the option to rate how they liked the using the tool using a rating system 1 to 4, with 1 being 'dislike' and 4 'like'. Just over a third of users who provided a rating selected 'dislike', but it is not clear whether this was due to the tool itself or the complexity of the draft TARA more generally.

The results of the TARA tool rating are depicted in Figure 3.

Figure 3 – TARA tool rating



FEEDBACK ON THE TARA REPORT AND TARA PROCESS FROM ABORIGINAL WORKSHOPS

The following feedback is from the Aboriginal workshop report (see Origin Communications Australia 2017). The following points in regard to the statewide TARA process were raised or supported by Aboriginal participants at Aboriginal workshops:

- Aboriginal cultural aspects must be included across all elements of the statewide TARA.
- Local and culturally authoritative viewpoints and knowledge are essential in the process to effective engagement and management of sea country.
- The demarcations of tangible and intangible Aboriginal culture and heritage in the draft statewide TARA were widely seen as being arbitrary.
- Delineation 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 responsibility for Country and Sea Country. A more holistic and culturally appropriate threat and risk assessment framework must be reflected in the final statewide 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.

- The notion of 'derived benefit', which underpins the draft statewide TARA framework, must be clearly defined for Aboriginal people as core aspects such as spiritual connection and cultural responsibility for land and sea. These are not readily reflected in a risk–benefit matrix that includes 'benefits' such as the ability to apply for a licence. The issue of licences is a critical one for many Aboriginal people as it represents a government decision-making process over what many regard as an inherent cultural right. This makes viewing the ability for an Aboriginal person to apply for a licence somewhat at odds with the concept of inherent and inalienable rights.
- A separate Aboriginal section of the statewide TARA – above and beyond specific inclusions in risk levels already drafted – is an essential component for Aboriginal people to see that their rights and perspectives are tangibly reflected and appropriately respected.

KNOWLEDGE GAPS AND KEY STUDIES REQUIRED

The TARA tool submission form included a question about knowledge gaps and key studies required to fill these. Most submissions included information about threats or activities they viewed as having knowledge gaps and made suggestions about the type of research that is required to rectify this. Most comments were made regarding environmental knowledge gaps and key studies required.

Table 2 summarises the environmental knowledge gaps and key studies by threat or activity, Table 3 summarises other environmental knowledge gaps or studies, and Table 4 summarises social and economic knowledge gaps and studies.

Knowledge gaps and key studies were not the focus of stakeholder workshop sessions, but relevant comments from the workshops have been included in the tables below. Aboriginal workshop comments were more detailed and have been included in Table 5.

Table 2 – Environmental TARA (coastal and marine and estuaries) knowledge gaps and key studies identified

Threat or activity	Risk level information if available	Knowledge gap and key studies identified
Resource use		
Shipping		• shipping impacts (a priority knowledge gap) • impact of anchor scour from large ships on deep rocky reef • do not know how extensive deep rocky reef habitat is in the Wollongong region where ships anchor
	Coastal TARA – shipping – large commercial vessels on beaches in the northern region	• no published quantitative or experimental research on how large commercial shipping anchoring impacts on a range of seafloor environments and its associated biota
		• impacts of plastic on wildlife in NSW
Commercial fishing		• commercial bycatch • stock assessment of target species in NSW, fisheries-independent data on stocks, clear targets to resolve the uncertainty around the status of NSW managed fish stocks
	Coastal TARA – commercial fishing – ocean trap and line on shallow reefs in the southern region	• indirect ecological effects of fishing • demonstrate trophic links
Charter	Coastal TARA – charter fishing	• stock assessment of target species in

Threat or activity	Risk level information if available	Knowledge gap and key studies identified
fishing	– line fishing on rocky shores in the central region	NSW, fisheries-independent data on stocks, clear targets to resolve the uncertainty around the status of NSW-managed fish stocks
Recreational fishing		• complete an environmental impact assessment • stock assessment of target species in NSW, fisheries-independent data on stocks, clear targets to resolve the uncertainty around the status of NSW-managed fish stocks
	Coastal TARA – recreational fishing – boat-based line and trap fishing on shallow reefs in the southern region	• adequate reporting of tonnage of catch, recreational fishing take • number and size of catches to get a more accurate estimate of total catches and impact on reef ecosystems
	Coastal TARA – recreational fishing – boat-based line and trap fishing on shallow reefs in the southern region	• demonstrate trophic links • indirect effects of fishing • impacts on ecosystem function • data to support monitoring and distinguishing the effects of environmental changes from fishing impacts in areas that don't have sanctuary zones (e.g. central region)
	Coastal TARA – recreational fishing – hand gathering on rocky shores in the northern region Coastal TARA – recreational fishing – hand gathering on rocky shores in the northern region	• harvesting pressure at accessible sites monitored • more studies investigating collection of other species on rocky shores and other accessible coastal habitats
	Coastal TARA – recreational fishing – boat-based line and trap fishing on species and communities protected under FMA in the southern region	• little current research on all aspects of Grey Nurse Shark in the southern region
	Coastal TARA – recreational fishing – boat-based line and trap fishing on species protected under BCA in the southern region	• research investigating ghost fishing by abandoned traps and nets
	Estuaries TARA– recreational fishing – boat-based line and trap fishing on species and communities protected under FMA in the southern region	• Department of Primary Industries-Fisheries should conduct a survey of black rock cod in Wagonga Inlet to confirm their presence and vulnerability
Aboriginal	Coastal TARA – Aboriginal	• Fish stock diversity in Warrell Creek,

Threat or activity	Risk level information if available	Knowledge gap and key studies identified
cultural fishing	cultural fishing on fish assemblages in the northern region	Nambucca Heads • Review of commercial fishing licences and methods (netting) and impacts on sustainable fishing and traditional ecological knowledge
Recreation and tourism	Recreational boating and infrastructure	• develop a survey and forward data collection strategy that tracks boating behaviour across all classes of activity. When considered in conjunction with boating safety plans, this provides a more accurate information of user intensity, movements, interactions and risk • improve monitoring, detail of marine mammal strikes and extent of impact. What is an acceptable impact threshold on species populations in different locations? • better understand actual impacts of boats on vertebrates by improved data gathering and record keeping • lack of information about boat-based contamination and shading by marinas and wharves • proposed marinas not adequately researched • review of outdated regional environmental plan (Sydney Harbour catchment) 2005 and a new State Environment Planning Policy to recognise the importance of boating infrastructure and facilitates appropriate development
	Stakeholder workshops – estuaries TARA – resource use – recreation and tourism – boating and boating infrastructure in the northern region	• investigate sewage pump out and boat-based sewage issues
	Illegal camping Stakeholder workshops – estuaries TARA – resource use – recreation and tourism in the northern region	• need to consider illegal camping and associated impacts.
Modified freshwater flows	Stakeholder workshops - estuaries TARA – resource use - modified freshwater flows – in the northern region	• need to investigate modified freshwater flows and effect of agriculture on species and communities in the northern region

Threat or activity	Risk level information if available	Knowledge gap and key studies identified
Land-based impacts		
		• more data collected on stormwater discharge points in estuaries and a survey of the nature of discharge following significant rainfall events • chemical and endocrine stressors are a critical knowledge gap and must be further investigated • lack of information about marine rubbish pollution, cold water pollution and catchment run-off • lack of information around land reclamation for State Significant Developments
	Estuaries TARA – land-use intensification – agricultural diffuse source run-off on estuarine waters	• research is needed

	Estuaries TARA – hydrological modifications – estuary entrance modifications on mangroves in the northern region
	
	Stakeholder workshops – estuaries TARA – land-use intensification – agricultural diffuse source run-off on estuarine waters in the northern region
		• lack of scientific studies or monitoring of:
		  • agricultural diffuse source run-off from intensive blueberry farming
		  • clearing riparian and adjacent habitat including wetland drainage
		  • fertiliser, chemicals and pesticide run-off into local creeks and rivers
		• further studies on groundwater, siltation and chemical run-off from blueberry farms

	Stakeholder workshops – estuaries TARA – land-use intensification – agricultural diffuse source run-off & point discharge – industrial discharges on subtidal reefs & species protected under BCA in the northern region	• look further into the impact of toxins on top predators and testing fish for levels of DDE organic chlorines and organic phosphates.
Climate change		
		• lack of understanding of the impacts of climate change on the marine environment in NSW
	Coastal TARA – climate change – climate and sea temperature rise on beaches in the northern region	• quantify displacement of native species and potential ecological impact of shifts in populations

Threat or activity	Risk level information if available	Knowledge gap and key studies identified
	Coastal TARA – climate change – flooding, storm surge, tsunami, inundation from extreme events on beaches in the northern region	• review of Aboriginal Heritage Information Management System (AHIMS) to identify Aboriginal sites in coastal area at risk from extreme events
	Estuaries TARA – climate change – sea level rise on seagrass in the northern region	• impact of sea level rise on seagrass
	Estuaries TARA – climate change – flooding, storm surge, tsunami, inundation from extreme events on seagrass in the northern region	• look at historical seagrass levels, impacts of increased turbidity and burying of seagrass
	Estuaries TARA – climate change – climate and sea temperature rise on species and communities protected under FMA in the southern region	• more research on climate change impacts
	Estuaries TARA – climate change – ocean acidification on saltmarsh in the southern region	• a lot of studies on ocean acidification on marine animals that rely on forming calcareous skeletons but need more data on local species
	Estuaries TARA – climate change – flooding, storm surge, tsunami, inundation from extreme events on saltmarsh in the southern region	• monitoring of freshwater inputs in key salt marshes in the southern estuaries (e.g. Moruya, Clyde and Jervis Bay)

Table 3 – Other environmental knowledge gaps or key studies identified

Topic area	Knowledge gap and key studies identified
Marine protected areas	• associated monitoring program to assess environmental impacts of opening of sanctuary zones in NSW to fishing from shore • research to determine the social and economic merit of opening of sanctuary zones in NSW to fishing from shore • before-and-after control-impact design research in marine parks is a critical knowledge gap, especially for Batemans Marine Park

Table 4 – Social and economic TARA knowledge gaps or key studies identified

Threat or activity	Risk level information if available	Knowledge gap and key studies identified
Environmental – reductions in abundance of species and trophic levels	Social and economic TARA – environment – reductions in abundance of species and trophic levels on enjoyment – enjoying the biodiversity and in the northern region	• weak evidence base • more research needed

Threat or activity	Risk level information if available	Knowledge gap and key studies identified
Environmental - pests and disease	Social and economic TARA – environment – pests and disease on viability of business – employment and value of production in the northern region	• more research into the potential impact of pests and disease, particularly on tourism
	Social and economic TARA – environment – pests and disease intrinsic and bequest values in the northern region	• limited evidence on the impact on intrinsic values
	Stakeholder workshops – social and economic TARA – environmental – pests and disease on all social and economic benefits	• emerging new policy on marine incursions, related to large commercial vessels and ports
Environmental – water pollution	Stakeholder workshops – social and economic TARA – environment – water pollution on participation – safety, health and wellbeing & enjoyment – enjoying the biodiversity and beauty of the marine estate in central region	• need to map and better understand leachate issues from landfill and impacts on groundwater and waterways
Environmental – climate change	Coastal TARA – climate change – flooding, storm surge, tsunami, inundation from extreme events on beaches in the northern region	• review of Aboriginal Heritage Information Management System (AHIMS) to identify Aboriginal sites located in coastal areas at risk of damage or destruction from extreme storm events
Environmental – seismic testing for oil and gas	Stakeholder workshops – social and economic TARA – environmental in central region	• not covered by the TARA • potentially affects social and economic benefits
Governance of the marine estate	Social and economic TARA – governance – lack of or ineffective community engagement or participation in governance on direct values – individual enjoyment value in the northern region	• weak evidence base
Public safety – seafood contamination	Stakeholder workshops – social and economic TARA –public safety – seafood contamination on safety, health and wellbeing	• not adequately addressed • unclear governance • who is monitoring? • need to update guidelines for health
Loss of access availability – commercial fishing		• consideration of the social and economic impacts that reductions (to the commercial fishing industry) have had on supply of product to the Sydney Fish Market and impacts on consumers, export and import markets and tourists

Table 5 – Knowledge gaps or key studies identified from Aboriginal workshops

Aboriginal knowledge gap and key studies identified
• Community-held cultural knowledge, including stories and knowledge of areas now underwater but previously used for hunting and ceremony and responsibilities for offshore islands (e.g. Five Sisters and Solitary Islands)
• lack of community understanding of the difference between 'tangible' and 'intangible' heritage as defined in legislation and management arrangements (e.g. coastal midden sites are both physical ('tangible') remnants of cultural practice and cultural markers for spirituality ('intangible'))
• decisions about recognising authentic cultural witnesses and traditional owners of country
• lack of knowledge concerning traditional practice and cultural importance of many marine species (e.g. whale festivals and ceremonies, sacred totems such as white shark, various grey and gummy sharks)
• culturally significant sites and areas that are yet to be recognised or registered, and concerns regarding security and public knowledge of sacred sites
• areas and significant cultural sites without formal recognition aren't promoted, protected or managed
• investigation and recognition of relationships between coastal and inland communities and nations, including use of marine resources, trading, ceremonies and sites
• knowledge of gathering ceremonies (e.g. shellfish, oysters and pipis) and impacts of access to marine resources and locations on social, economic and cultural benefits, including spiritual and physical wellbeing
• process for cultural knowledge and ownership, including cultural and intellectual property rights
• access to reserve areas or sanctuary zones for cultural practices or catches where fish numbers are increasing
• additional funded research and analysis for fish traps and related traditional sites (e.g. Arrawarra fish traps)
• research into Aboriginal approaches and knowledge supported through the statewide TARA process (e.g. oral histories)

MANAGEMENT SUGGESTIONS

Management suggestions were not specifically sought through consultation on the draft statewide TARA, but this type of information was included in some submissions. Management suggestions are summarised below by the environmental threat (Table 6) or social and economic threat (Table 7) they propose to address. Relevant stakeholder workshop comments have also been included. Aboriginal workshop comments have been included in a separate table (Table 8).

Several submissions commented specifically on marine protected areas as a management tool. Submissions in favour of this type of management tool highlighted that there is no marine park in the central region. They put forward that the Office of Environment and Heritage should play a key role in their management and that marine parks:

- provide resilience against a broad range of threats
- deliver both environmental and social benefits
- are perceived to be low cost
- provide a baseline from which to manage threats
- provide a mechanism to help marine ecosystems recover from past and ongoing threats (e.g. urchin barrens).

There were also submissions that did not support this type of management tool and reported that these present a 'lock out' for recreational fishers which is 'easy' compared to addressing the 'real threats'. Education of anglers was presented as a preferred option to 'lock outs'.

Table 6 – Management suggestions to address environmental threats

Threat or activity	Management suggestions
Shipping – large commercial vessels	• have areas and assets of significance identified by industry, acknowledged and incorporated within relevant management initiatives, including future port growth and development • explore potential mitigation strategies for anchor scouring on deep rocky reef • manage anchor scour impacts from large vessels in NSW
Commercial fishing	• continue existing fisheries legislation (already managed efficiently and effectively via this tool) • ban or restrict commercial fishing in some areas (e.g. netting in Pittwater, Lake Illawarra) • increase regulation or compliance of commercial fishers • establish clear targets for rebuilding stocks where they are overfished or subject to overfishing • better engagement of commercial fishers
Recreational fishing	• educate anglers rather than have lock outs • change fishing restrictions at Mackerel Boulder in Cape Byron Marine Park • increase regulation or compliance of recreational fishers • establish clear targets for rebuilding stocks where they are overfished or subject to overfishing • reinstate sanctuary controls at ocean beaches and headlands to reduce resource extraction and allow sufficient recovery time for ecosystem recovery • establish Sydney Marine Park to protect key breeding and feeding grounds in Sydney and allow recovery of damaged habitats • impose the same controls (e.g. closed areas, quotas) on recreational fishers as on commercial fishers
Research and education	• establish science-based comprehensive, adequate and representative sanctuary zones in marine parks in all regions as scientific reference zones to provide baseline information from which to manage threats and risks from • use ‘no-take’ marine park control areas as research and management yardsticks to measure and assess the impact of fishing
Recreation and tourism – recreational boating and boating infrastructure	• provide fixed public mooring apparatus (courtesy moorings) in prime anchoring positions shown to be substantially affecting assemblages • ensure proposed marinas are adequately researched, consistent with land zoning and marine ecosystems • continue education of boaters • educate users to encourage more effective custodians of the environment and reduce interaction with marine flora and fauna
Recreation and tourism – four wheel driving	• put rangers at checkpoints, have sign in and sign out, and require rubbish to be taken home by users • have better management of 4WD effects on beach amenity by local councils in central region
Land-based impacts	• prohibit future development in some locations (e.g. Lake Illawarra) • prioritise marine assets over environmentally damaging development • regulate blueberry farming in Nambucca, Bellingen,

Threat or activity	Management suggestions
	Clarence Valley and Coffs Harbour Local Government Areas, including through local or state government planning requirements • open the second lake entrance at Lake Illawarra to improve water quality • restore native vegetation of rivers and creeks to stop erosion (e.g. Lake Illawarra) • install stormwater quality improvement devices at drain outlets to minimise rubbish and plastic debris on beaches • establish clear targets for reducing industrial, agricultural, sewage and urban discharge pollution to below levels that harm or prevent recovery of environmental assets
Climate change	• consider future climate change risks as part of the planning process now to identify vulnerabilities and build resilience • upgrade marine parks especially sanctuary zones to account for future climate induced impacts, provide resilience and reduce cumulative impacts from climate change stressors

Table 7 – Management suggestions to address social and economic threats

Threat or activity	Management suggestions
Resource use conflict – overcrowding /congestion	• develop management approaches that identify opportunities for shared usage by all user groups
Environmental - climate change	• adopt an adaption and resilience management approach as a response to the threat to social and economic benefits
Governance – inadequate, inefficient regulation, over-regulation	• requires changes to existing land management and planning practices to overcome
Governance – lack of or ineffective community engagement or participation in governance	• include locally respected fishing and spearfishing leaders as members on marine park advisor committees • acknowledge how social engagement can lead to solutions to legacy and future threats • use positive language about how community engagement can lead to better management of marine resources • engage the broader community to implement marine strategies
Governance – lack of community awareness of the marine estate, threats and benefits, regulations and opportunities for participation	• more education about where food (fish) comes from
Governance – lack of compliance with regulations or lack of compliance effort	• increase compliance officers • have more education • improve collaboration between commercial and recreational fishing sectors and Government
Lack of access availability	• requires changes to existing land management and planning practices

Threat or activity	Management suggestions
– limited or lack of access infrastructure	
Lack of access availability – loss of public access	• adopt management approaches that identify opportunities for shared usage by all user groups

Practical management approaches and initiatives by region (northern, central, southern) are detailed in the Aboriginal workshop report (Origin Communications Australia 2017). The following table lists some examples at a statewide level.

Table 8 – Management suggestions from Aboriginal workshops

Management suggestions
• apply the principle that Aboriginal people should be included and engaged in the management of sea country and land areas
• bring Aboriginal perspective to Country and the environment into mainstream management to support sustainability and protection
• include Aboriginal representation and experts on marine park advisory committees and the Authority more broadly to offer high-level strategic insights and capability as well as on-ground capacity (e.g. site works, research or analysis)
• involve Aboriginal people directly in the decision-making process, beyond just providing advice
• use a 'dial before you dig' model to ensure information about Aboriginal cultural knowledge, values and impacts or involvement is actively sought and breaches penalised

APPENDIX 1 – METHODS USED FOR ENGAGEMENT OF THE DRAFT STATEWIDE TARA

PUBLIC ANNOUNCEMENT AND AWARENESS CAMPAIGN

WEBSITES

The following reports relevant to the draft statewide TARA were released to the marine estate website on 18 January 2017:

- NSW Marine Estate Threat and Risk Assessment Draft Report (BMT WBM 2016)
- TARA Environmental Background Report (MEMA 2016a)
- Social and Economic TARA reference list (MEMA 2016b)
- Sea countries of New South Wales: a benefits and threats analysis of Aboriginal people's connections with the marine estate (Feary 2015)
- Peer review of 'Sea countries of New South Wales: a benefits and threats analysis of Aboriginal people's connections with the marine estate' (Schnierer 2015)
- Social and economic background information report on the NSW marine estate (Vanderkooi Consulting 2015).

The following supporting materials were also released on 18 January 2017 or made available during the engagement period:

- Video - Introduction to the marine estate and draft Statewide TARA (YouTube, 3:20 min.)
- Video - Draft Statewide TARA (YouTube, 5:52 min.)
- Fact sheet 1 – Draft Statewide Threat and Risk Assessment
- FAQs – Draft Statewide Threat and Risk Assessment
- Glossary of terms – Statewide Threat and Risk Assessment
- Presentation – Draft Statewide Threat and Risk Assessment – Stakeholder workshops Feb 2017
- TARA interactive tool
- Video – draft statewide TARA interactive tool demonstration (YouTube, 3:24 min)
- Fact sheet 2 – Threats and stressors – Draft statewide threat and risk assessment
- Fact sheet 3 – Navigation guide – TARA interactive tool
- Threat and Risk Assessment Framework.

Information about the draft statewide TARA and engagement period was also included on the following websites: Department of Primary Industries, Office of Environment and Heritage and Transport for NSW.

The draft statewide TARA engagement was also listed on the NSW Government consultation website – Have Your Say.

Emails

Email notifications to more than 1,300 marine estate stakeholders and 60 boating stakeholders were sent at the start of the engagement period and one month before the close of submissions.

Two hundred and thirty thousand (230,000) recreational fishing licence holders were notified of the release of the draft statewide TARA through the February Newscast newsletter. Five thousand multicultural contacts were notified through Multicultural NSW's Email Link service in February and again in March to notify an extension.

Media and social media

A media release was issued on 18 January 2017 to announce the release of the draft statewide TARA and commencement of community and stakeholder engagement period. A subsequent media release was issued on 31 March to remind the community and stakeholders to provide feedback before the submission period closed.

More than a dozen media articles on the draft statewide TARA were published during the engagement period and include radio, online news articles and in stakeholder newsletters. A list of known media is contained in Appendix 2.

The draft statewide TARA engagement period was advertised on the Department of Primary Industries – Fisheries and Roads and Maritime 'Maritimes' Facebook pages and tweeted to Department of Primary Industries' Twitter.

TARA INTERACTIVE TOOL

An interactive web-based tool to allow users to navigate, interrogate and provide feedback on the draft statewide TARA was developed. This was needed because of the distribution of stakeholders across NSW, the complexity of the draft statewide TARA report and background material, and consideration of feedback on engagement methods used in the previous Hawkesbury Shelf marine bioregion engagement process.

The tool enabled comment on the three sections of the statewide TARA, namely: the environmental TARA – estuaries; the environmental TARA – coast and ocean; and the social and economic TARA.

The TARA interactive tool was the primary method for the public to submit their feedback on the draft statewide TARA. Stakeholders and the community were able to provide specific comments and evidence for individual risk levels or submit general feedback.

Users were encouraged to consider the evidence used to determine the risk levels and provide any evidence they may have that can better inform the finalisation of the draft statewide TARA report, including as attached files or documents.

The risk level and general feedback form also included the following specific questions about knowledge gaps and key studies required, as well as provision of local examples:

1. If you think the evidence is insufficient what key studies are required?
2. Please provide local examples about where this threat and/or stressor is occurring or where this threat and/or stressor is being managed well.

Users were also given the opportunity to rate the online interactive tool.

TARGETED STAKEHOLDER ENGAGEMENT

To engage with the wide range of NSW marine estate stakeholders across the state with an interest in the draft statewide TARA, a series of targeted regional workshops was held with the following groups:

1. stakeholders (including academics and researchers) most likely to hold new evidence or who could effectively review and comment on evidence related to the draft statewide TARA report
2. peak marine estate stakeholder groups and bodies that could effectively disseminate information to their members or the broader community

3. government representatives (including local government representatives) that have a responsibility for managing the marine estate or are likely to play a key role in developing future management initiatives and implementing the Strategy
4. Aboriginal communities.

Stakeholder workshops

Six stakeholder workshops were held in February 2017 at Ballina, Coffs Harbour, Newcastle, Sydney, Kiama and Narooma. Invited stakeholders included a range of organisations and individuals across State agencies, local government, recreational fishing, commercial fishing, conservation, diving, boating and universities.

An independent facilitator conducted the workshops and produced a stakeholder workshop report detailing workshop attendees, workshop framework and feedback collected, see the *Draft statewide threat and risk assessment – stakeholder workshop report* (BMT WBM 2017).

Aboriginal workshops

Ten Aboriginal stakeholder workshops were held in March 2017 at Byron Bay, Coffs Harbour, Port Macquarie, Newcastle, two in Sydney, Wollongong, Nowra, Ulladulla and Bega.

Participation in workshops was quite broad and included members and management of Local Aboriginal Land Councils, Aboriginal community members, traditional owners, former members of peak advisory bodies, local fishers, local government, Aboriginal people involved with tourism, training and community development, National Parks and Wildlife Service personnel and health workers.

An independent Aboriginal consultancy was involved in identifying key bodies and knowledge-holders; the consultancy also conducted the workshops. A detailed Aboriginal stakeholder workshop report is available (see Origin Communications Australia 2017).

HAWKESBURY SUBMISSIONS

Submissions to the Hawkesbury Shelf marine bioregion assessment in 2016, which included draft TARA findings for the Central Region (Stockton to Wollongong), were also reconsidered alongside the draft statewide TARA submissions to inform the central region final TARA findings.

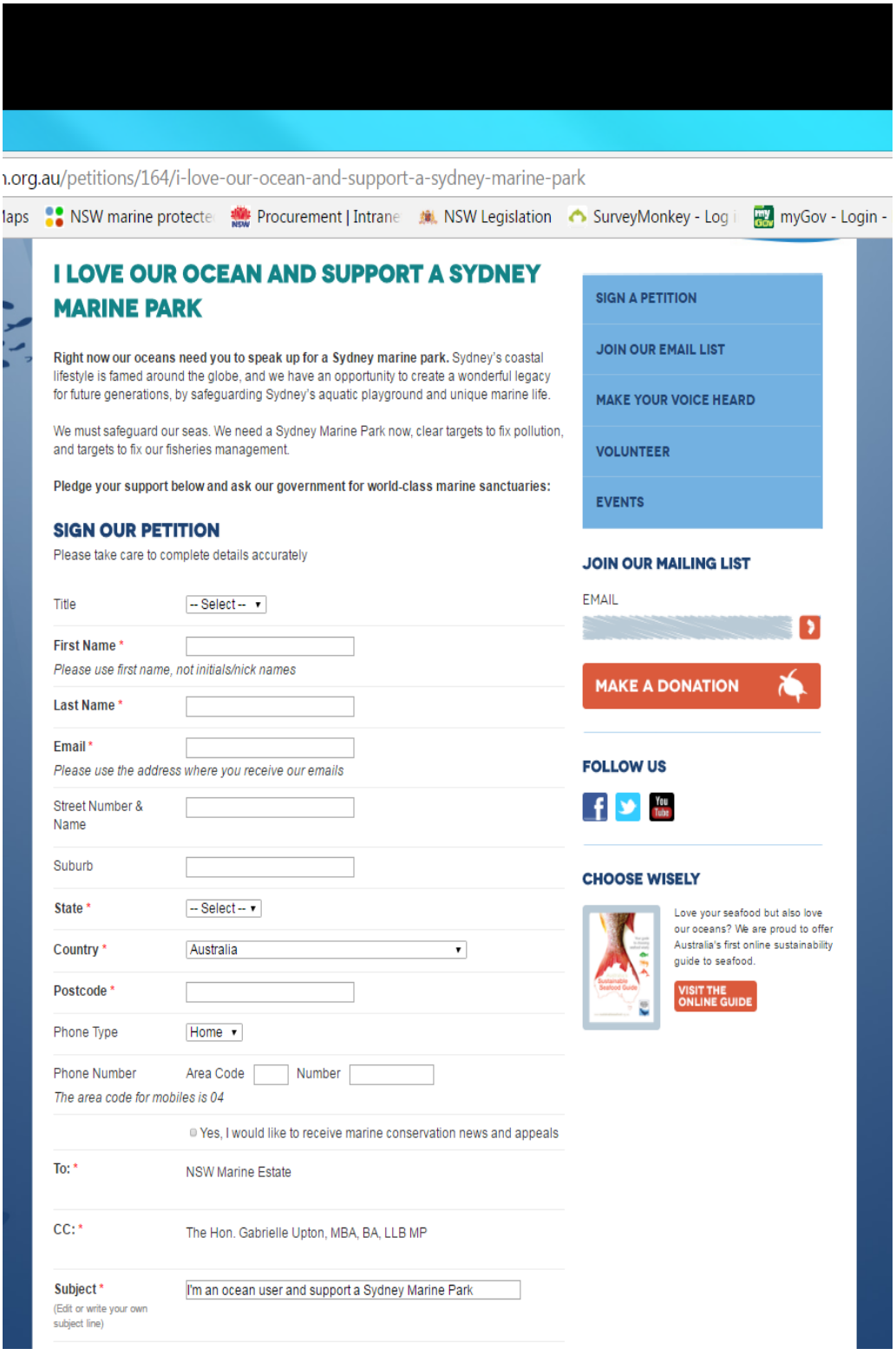
APPENDIX 2 – DRAFT STATEWIDE TARA MEDIA

Table 9 - Known media on the draft statewide TARA between January and April 2017

Date	Media publication or organisation	Method	Headline
19/01/2017	2SM	Radio	
21/01/2017	ABC online	News article	Climate change and agricultural run-off top two threats identified in NSW marine threat report
18/01/2017	Bellingen Shire Courier - Sun	News article	Have your say – draft NSW marine estate Threat and Risk Assessment Report released
23/01/2017	Marine Business	News article	Boating labelled 'high' environmental threat
24/01/2017	Fishing World Magazine	News article	Draft NSW marine estate Threat and Risk Assessment Report released
31/01/2017	Boat Advice	News article	Report identifies boating as high risk to environment
2/2/2017	NSW Rec Fisher – RFA NSW	Newsletter	Draft NSW marine estate Threat and Risk Assessment Report released
Summer edition 2016-2017	Coastal currents – Sydney Coastal Councils Group	Newsletter	Draft Statewide Threat and Risk Assessment for the NSW marine estate
10/3/2017	Professional Fishermen's Association	Newsletter	Marine Estate Management Authority – issues identified with the TARA
27/3/2017 3/4/2017	Fishing World Magazine	News article	Submissions closing on threat and risk assessments for NSW Marine Parks Community engagement for draft TARA extended
24/3/2017 31/3/2017	Professional Fishermen's Association	Newsletter	Marine Estate Management Authority
10/4/2017	Marine Business	News article	Boating Industry Association seeks to downgrade 'high' boating risks

APPENDIX 3 – CAMPAIGN SUBMISSIONS

https://www.marineconservation.org.au/petitions/164/i-love-our-ocean-and-support-a-sydney-marine-park



.org.au/petitions/164/i-love-our-ocean-and-support-a-sydney-marine-park

laps | NSW marine protecte | Procurement | Intrane | NSW Legislation | SurveyMonkey - Log | myGov - Login -

I LOVE OUR OCEAN AND SUPPORT A SYDNEY MARINE PARK

Right now our oceans need you to speak up for a Sydney marine park. Sydney's coastal lifestyle is famed around the globe, and we have an opportunity to create a wonderful legacy for future generations, by safeguarding Sydney's aquatic playground and unique marine life.

We must safeguard our seas. We need a Sydney Marine Park now, clear targets to fix pollution, and targets to fix our fisheries management.

Pledge your support below and ask our government for world-class marine sanctuaries:

SIGN OUR PETITION

Please take care to complete details accurately

Title -- Select --

First Name *
Please use first name, not initials/nick names

Last Name *

Email *
Please use the address where you receive our emails

Street Number & Name

Suburb

State * -- Select --

Country * Australia

Postcode *

Phone Type Home

Phone Number Area Code Number
The area code for mobiles is 04

Yes, I would like to receive marine conservation news and appeals

To: * NSW Marine Estate

CC: * The Hon. Gabrielle Upton, MBA, BA, LLB MP

Subject * I'm an ocean user and support a Sydney Marine Park
(Edit or write your own subject line)

SIGN A PETITION
JOIN OUR EMAIL LIST
MAKE YOUR VOICE HEARD
VOLUNTEER
EVENTS

JOIN OUR MAILING LIST
EMAIL

MAKE A DONATION

FOLLOW US

CHOOSE WISELY

Love your seafood but also love our oceans? We are proud to offer Australia's first online sustainability guide to seafood.

VISIT THE ONLINE GUIDE

PETITION TEXT

'Dear Ministers,

I'm an ocean user who supports the Australian Marine Conservation Society's call for a Sydney Marine Park protected with science based marine sanctuaries and better pollution and fisheries management.

I endorse the Australian Marine Conservation Society's submission to the NSW government's draft threat and risk assessment, because:

- the draft threat and risk assessment shows that for the great majority of risks identified there is limited available evidence to support solid, science based decision-making
- the greatest threats to our oceans - plus the fisheries, communities and businesses that depend on a healthy marine environment - are government policy failures. These fail to protect our coasts and oceans, plus invest in adequate science for research, monitoring and management
- because of government's limited understanding of specific risks and threats, we need to take management action now, implementing management tools that deliver great benefits with little costs.

We need:

1. science based marine parks protected with sanctuaries in waters that don't already have them, particularly the Sydney region
2. clear targets for pollution reduction to levels that will allow important habitats like seagrass beds and kelp reef to regenerate, restoring vital fish breeding and feeding grounds
3. a clear timetable for ending overfishing and resolving the uncertainty over the state of fish stocks in New South Wales, to ensure there are more fish in the water for everyone to benefit from.

As an ocean lover, I know that NSW's existing marine parks, in places like Jervis Bay, Port Stephens, Batemans Bay and Coffs Coast are hugely popular destinations for fishing, diving, snorkelling and much more and are good for local businesses too. These waters are protected well enough so that we know us ocean users can be confident knowing that they will stay world class for future generations.

I also know that marine sanctuaries in NSW deliver great benefits to the local communities and regional economies, and are strongly supported, They achieve this with little social or economic cost, compared to the costs we know occur when we don't manage our marine environment carefully enough.

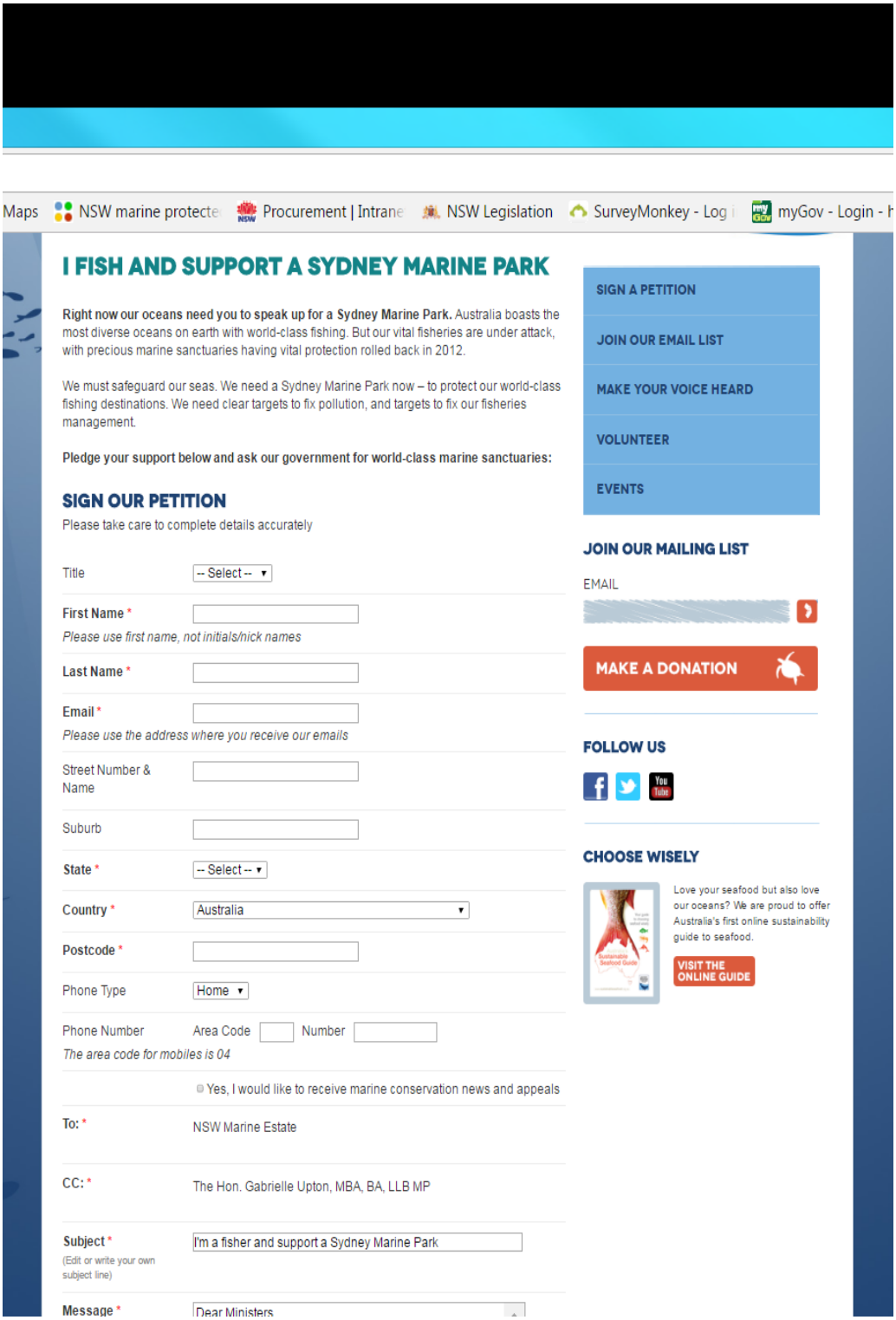
These protected places are regularly featured in the world's our fishing magazines and TV shows for good reason, and so have thriving local recreational fisheries. We know that marine parks deliver great benefits to the local community - with little social or economic cost, because they enhance what already exist in our waters.

I very much want the same for the Sydney region. A Sydney Marine Park would protect key breeding and feeding grounds, which, together with action to reduce pollution, would allow the recovery of damaged habitats. More science based fisheries management would resolve the uncertainty around the condition of most of our fish stocks. A Sydney Marine Park would also ensure a bright future for conservation, fishing and recreation in our iconic waters.

Please consider this email a formal submission endorsing the Australian Marine Conservation Society's submission commenting on the NSW Marine Estate Management Authority's draft Threat and Risk Assessment.

Yours faithfully,'

https://www.marineconservation.org.au/petitions/162/i-fish-and-support-a-sydney-marine-park



Maps | NSW marine protecte | Procurement | Intrane | NSW Legislation | SurveyMonkey - Log | myGov - Login - h

I FISH AND SUPPORT A SYDNEY MARINE PARK

Right now our oceans need you to speak up for a Sydney Marine Park. Australia boasts the most diverse oceans on earth with world-class fishing. But our vital fisheries are under attack, with precious marine sanctuaries having vital protection rolled back in 2012.

We must safeguard our seas. We need a Sydney Marine Park now – to protect our world-class fishing destinations. We need clear targets to fix pollution, and targets to fix our fisheries management.

Pledge your support below and ask our government for world-class marine sanctuaries:

SIGN OUR PETITION

Please take care to complete details accurately

Title -- Select --

First Name *

Please use first name, not initials/nick names

Last Name *

Email *

Please use the address where you receive our emails

Street Number & Name

Suburb

State * -- Select --

Country * Australia

Postcode *

Phone Type Home

Phone Number Area Code Number

The area code for mobiles is 04

Yes, I would like to receive marine conservation news and appeals

To: * NSW Marine Estate

CC: * The Hon. Gabrielle Upton, MBA, BA, LLB MP

Subject * I'm a fisher and support a Sydney Marine Park

(Edit or write your own subject line)

Message * Dear Ministers

SIGN A PETITION
JOIN OUR EMAIL LIST
MAKE YOUR VOICE HEARD
VOLUNTEER
EVENTS

JOIN OUR MAILING LIST

EMAIL

MAKE A DONATION

FOLLOW US

CHOOSE WISELY

Love your seafood but also love our oceans? We are proud to offer Australia's first online sustainability guide to seafood.

VISIT THE ONLINE GUIDE

PETITION TEXT

'Dear Ministers,

I'm a recreational fisher who supports the Australian Marine Conservation Society's call for a Sydney Marine Park protected with science based marine sanctuaries and better pollution and fisheries management.

I endorse the Australian Marine Conservation Society's submission to the NSW government's draft threat and risk assessment, because:

- the draft threat and risk assessment shows that for the great majority of risks identified there is limited available evidence to support solid, science based decision-making.
- the greatest threats to our oceans - plus the fisheries, communities and businesses that depend on a healthy marine environment - are government policy failures. These fail to protect our coasts and oceans, plus invest in adequate science for research, monitoring and management.
- because of government's limited understanding of specific risks and threats, we need to take management action now, implementing management tools that deliver great benefits with little costs.

We need:

1. science based marine parks protected with sanctuaries in waters that don't already have them, particularly the Sydney region
2. clear targets for pollution reduction to levels that will allow important habitats like seagrass beds and kelp reef to regenerate, restoring vital fish breeding and feeding grounds
3. a clear timetable for ending overfishing and resolving the uncertainty over New South Wales fish stocks to ensure there are more fish in the water for everyone.

As a recreational fisher, I know that NSW's existing marine parks in places like Jervis Bay, Port Stephens, Batemans Bay and Coffs Coast are hugely popular destinations for a fishing trip. With world class fishing opportunities available, these waters are protected well enough so that fishers like me can be confident that they will stay world class for future generations.

These protected places are regularly featured in our fishing magazines and TV shows for good reason – they have thriving local recreational fisheries. We know that marine parks deliver great benefits, with little social or economic cost compared to the real costs we know happen when we don't manage our waters carefully enough.

I very much want the same for the Sydney region. A Sydney Marine Park would protect key breeding and feeding grounds, which, together with action to reduce pollution, would allow the recovery of damaged habitats. More science based fisheries management would resolve the uncertainty around the condition of most of our fish stocks. With these measures, a Sydney Marine Park will ensure a bright future for conservation and great fishing in our iconic waters.

Please consider this email a formal submission endorsing the Australian Marine Conservation Society's submission commenting on the NSW Marine Estate Management Authority's draft Threat and Risk Assessment.

Yours faithfully,'

APPENDIX 4 – ENVIRONMENTAL RISK MATRICES

Coastal and marine waters		Clean waters			Marine Habitats and Assemblages																								Threatened and Protected Species					
		Ocean waters			Beaches			Shallow soft sediments			Deep soft sediments			Rocky Shores			Shallow Reefs			Deep Reefs			Planktonic Assemblages			Fish assemblages (harvest and bycatch)			Species and communities protected under FMA			Species protected under BCA		
Resource use		North	Central	South	North	Central	South	North	Central	South	North	Central	South	North	Central	South	North	Central	South	North	Central	South	North	Central	South	North	Central	South	North	Central	South	North	Central	South
Shipping	Large commercial vessels and associated port activities and industries (trade ships, cruise ships, etc.)	Minimal	Low	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	High	Minimal	Minimal	Low	Minimal	Minimal	Low	Minimal	Minimal	Moderate	Minimal	Minimal	Minimal	NA	NA	NA	Minimal	Minimal	Minimal	low	High	low
	Small commercial vessels (ferries, charter boats etc.)	Low	Low	Low	Minimal	Low	Minimal	Minimal	Minimal	Minimal	Minimal	minimal	Minimal	Low	Low	Low	Low	Low	Low	minimal	Minimal	minimal	Minimal	Low	Minimal	NA	NA	NA	Minimal	Minimal	Minimal	Moderate	Moderate	moderate
Commercial fishing	Ocean Trap and Line	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Low	Low	Low	NA	N/A	NA	Low	Low	Low	Low	Low	Low	Minimal	Minimal	Minimal	Moderate	Low	Moderate	high	Moderate	Moderate	moderate	Moderate	low
	Ocean Trawl	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Low	Minimal	Minimal	Moderate	Moderate	Moderate	NA	N/A	NA	Minimal	Low	Low	Minimal	Low	Low	Minimal	Minimal	Minimal	High	Low	Low	moderate	Moderate	Low	moderate	Moderate	low
	Ocean Haul	Minimal	Minimal	Minimal	moderate	Minimal	moderate	Minimal	Minimal	Minimal	NA	N/A	NA	NA	N/A	NA	NA	N/A	NA	NA	N/A	NA	Minimal	Minimal	Minimal	Moderate	Moderate	Moderate	Low	Low	Low	low	low	low
	Sea urchin and turban shells	Minimal	Minimal	Minimal	NA	N/A	NA	NA	N/A	NA	NA	N/A	NA	NA	N/A	NA	Minimal	Minimal	Minimal	NA	N/A	NA	NA	N/A	NA	Low	Moderate	Moderate	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal
	Lobster	Minimal	Minimal	Minimal	NA	N/A	NA	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	NA	N/A	NA	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	N/A	Minimal	Low	Low	Low	Minimal	Minimal	Minimal	Low	Low	Low
	Abalone	Minimal	Minimal	Minimal	NA	N/A	NA	NA	N/A	NA	NA	N/A	NA	NA	N/A	NA	Minimal	Minimal	Minimal	NA	N/A	Minimal	NA	N/A	NA	Low	Low	Moderate	Minimal	Minimal	Low	Minimal	Minimal	Minimal

Charter fishing	Line fishing	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Low	Low	Low	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Low	Low	Low	Low	Low	Low	low	low	low
Recreational fishing	Shore-based line and trap fishing	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	NA	N/A	NA	Low	Low	Low	Low	Low	Low	NA	N/A	NA	Minimal	Minimal	Minimal	Moderate	Moderate	Moderate	Moderate	Moderate	Low	low	low	low
	Boat-based line and trap fishing	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	NA	N/A	NA	low	low	low	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	low	low	low
	Spearfishing	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	NA	N/A	NA	Minimal	Minimal	Minimal	NA	N/A	NA	Minimal	Minimal	Minimal	Low	Low	Low	Low	Low	Low	Minimal	Minimal	Minimal
	Hand Gathering	Minimal	Minimal	Minimal	Low	Low	Low	Minimal	Minimal	Minimal	NA	N/A	NA	low	low	low	Low	Low	Low	NA	N/A	NA	NA	N/A	NA	Moderate	Moderate	Moderate	NA	N/A	NA	Low	low	Low
Aboriginal Cultural fishing (including permitted as well as native title rights)	Line fishing, spearfishing, hand gathering, traditional fishing methods, related cultural traditions	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Low	Minimal	Minimal	Low	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal
Charter activities	Whale and dolphin watching	Minimal	Low	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	NA	Minimal	NA	NA	Minimal	NA	NA	Minimal	NA	NA	Minimal	NA	Minimal	Minimal	Minimal	NA	NA	NA	Minimal	Minimal	Minimal	Moderate	Moderate	Moderate
Aquaculture	Fish farming	NA	NA	Minimal	NA	NA	Minimal	NA	NA	Minimal	Low	NA	N/A	NA	NA	Minimal	NA	NA	Minimal	NA	NA	Minimal	NA	NA	Minimal	NA	NA	NA	NA	NA	Minimal	NA	NA	Minimal
Bait and aquarium trade	Imported baits, imported fish and other aquatic sp.	Minimal	Minimal	Minimal	NA	N/A	NA	NA	N/A	NA	NA	N/A	NA	NA	N/A	NA	NA	N/A	NA	NA	N/A	NA	Low	Low	Low	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal
Research and education	Collecting, sampling and tagging	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal

Recreation and tourism	Boating and boating infrastructure	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Low	Low	Low	Low	Low	Low	Minimal	Minimal	Minimal	NA	NA	NA	Minimal	Minimal	Minimal	low	low	low
	Snorkelling and diving	Minimal	Minimal	Minimal	NA	N/A	NA	NA	N/A	NA	NA	N/A	NA	Minimal	Minimal	Minimal	low	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	NA	NA	NA	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal
	Passive recreational use	Minimal	Minimal	Minimal	low	Moderate	Low	NA	N/A	NA	NA	N/A	NA	low	Moderate	low	Minimal	Minimal	Minimal	NA	N/A	NA	NA	N/A	NA	NA	N/A	NA	Minimal	Minimal	Minimal	Moderate	moderate	moderate
	Four wheel driving	Minimal	Minimal	NA	High	High	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	high	Moderate	NA
	Shark control measures	NA	N/A	NA	NA	Minimal	NA	NA	Minimal	NA	NA	Minimal	NA	NA	N/A	NA	NA	Minimal	NA	NA	N/A	NA	NA	N/A	NA	NA	Low	NA	N/A	High	NA	N/A	High	NA
Dredging (includes placement)	Navigation & entrance management and modification, harbour maintenance etc.	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Low	Moderate	Low	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	NA	NA	NA	Minimal	Minimal	Minimal	Low	Low	Low
Modified freshwater flows	Extraction, artificial barriers to estuarine flow	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	NA	NA	NA	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal
Mining and extractive industries	Oil, gas, minerals, sand, aggregate, mining coal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Service infrastructure	Pipelines, cables, trenching and boring	N/A	Low	N/A	N/A	Low	N/A	N/A	Low	N/A	N/A	Minimal	N/A	N/A	Low	N/A	N/A	Low	N/A	N/A	Minimal	N/A	N/A	Low	N/A	N/A	N/A	N/A	N/A	Minimal	N/A	N/A	Minimal	N/A

Land-based impacts																																						
Landuse intensification	Urban stormwater discharge	Low	Low	Low	Moderate	Moderate	Moderate	Low	Low	Low	Minimal	Minimal	Minimal	Minimal	Low	Minimal	Low	Moderate	Low	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	NA	NA	NA	Minimal	Low	Minimal	Low	High	Low
	Foreshore development	Minimal	Minimal	Minimal	Moderate	High	Moderate	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Moderate	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	NA	NA	NA	Minimal	Minimal	Minimal	Moderate	High	moderate
	Beach nourishment and grooming	NA	N/A	NA	Moderate	Moderate	Moderate	Minimal	Low	Minimal	NA	N/A	NA	NA	N/A	NA	NA	N/A	NA	NA	N/A	NA	Minimal	Minimal	Minimal	Minimal	NA	NA	NA	Minimal	Minimal	Minimal	low	Moderate	low
	Clearing riparian and adjacent habitat including wetland drainage	Minimal	Minimal	Minimal	Low	Moderate	Low	Minimal	Low	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	minimal	Minimal	Minimal	NA	NA	NA	Minimal	Minimal	Minimal	low	High	low
	Agricultural diffuse source runoff	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Low	Low	Low	Low	Low	Low	Minimal	Minimal	Minimal	Low	Low	Low	Low	Low	Low	Low	Low	low	Low	NA	NA	NA	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal
	Deliberate introduction of pests and weeds (e.g. foxes, bitou bush)	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	NA	N/A	NA	NA	N/A	NA	Minimal	Minimal	Minimal	NA	N/A	NA	NA	N/A	NA	NA	N/A	NA	NA	NA	NA	NA	NA	NA	N/A	NA	high	high	high
Point discharges	Industrial discharges	minimal	Low	Minimal	Minimal	Minimal	Minimal	Minimal	Low	Minimal	Minimal	Low	Minimal	Minimal	Minimal	Minimal	Minimal	Low	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	NA	NA	NA	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal
	Thermal discharges	NA	Minimal	NA	NA	Minimal	NA	NA	Minimal	NA	NA	Minimal	NA	NA	Minimal	NA	NA	Minimal	NA	NA	Minimal	NA	NA	Minimal	NA	NA	NA	NA	NA	NA	NA	Minimal	NA	Minimal	Minimal	NA
	Sewage effluent and septic runoff	Low	Low	Low	Minimal	Low	Minimal	Low	Low	Low	Minimal	Low	Minimal	Low	Moderate	Low	Minimal	Low	Minimal	Minimal	Minimal	Moderate	Minimal	Low	Low	Low	NA	NA	NA	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal
Hydrologic modifications	Estuary entrance modifications + Breakwaters	Minimal	Minimal	Minimal	High	High	High	Low	Low	Low	Minimal	Minimal	Minimal	Low	Minimal	Low	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	NA	NA	NA	Minimal	Minimal	Minimal	Moderate	Moderate	moderate

Climate change 20 years																																		
Climate change	Altered ocean currents & nutrient inputs	Moderate	Low	Low	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Low	Low	Low	Minimal	Minimal	Minimal	Moderate	Moderate	Low	NA	NA	NA	Low	Low	Low	Low	Low	Low
	Climate and sea temperature rise	Moderate	Low	Low	Low	Low	Low	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Moderate	Low	Low	Moderate	Moderate	Moderate	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	NA	NA	NA	Minimal	Minimal	Minimal	Moderate	Moderate	moderate
	Ocean acidification	Low	Low	Low	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Moderate	Moderate	Moderate	NA	NA	NA	Low	Low	Low	Low	Low	Low
	Altered storm/cyclone activity	moderate	Low	Low	Low	Low	Low	Low	Low	Low	Minimal	Minimal	Minimal	Low	Low	Low	Moderate	Moderate	Moderate	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	NA	NA	NA	Minimal	Minimal	Minimal	High	High	High
	Sea level rise	Minimal	Minimal	Minimal	Low	Moderate	Low	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Low	Low	Low	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	NA	NA	NA	Minimal	Minimal	Minimal	High	High	High
Climate change 50 years																																		
Climate change	Altered ocean currents & nutrient inputs	Moderate	Moderate	Low	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Moderate	Moderate	Moderate	Minimal	Minimal	Minimal	Moderate	Moderate	Low	NA	NA	NA	Moderate	moderate	Moderate	High	High	High
	Climate and sea temperature rise	high	Moderate	Moderate	Moderate	Moderate	Moderate	Low	Low	Low	Low	Low	Low	Moderate	Moderate	Moderate	high	high	high	Minimal	Minimal	Minimal	Low	Low	Low	NA	NA	NA	Minimal	Minimal	Minimal	High	High	High
	Ocean acidification	Moderate	Moderate	Moderate	moderate	Moderate	moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	High	High	High	NA	NA	NA	Low	Low	Low	Moderate	Moderate	moderate
	Altered storm/cyclone activity	Moderate	Moderate	Moderate	high	high	high	Moderate	Moderate	Moderate	low	low	low	low	low	low	Moderate	Moderate	Moderate	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	NA	NA	NA	Minimal	Minimal	Minimal	High	High	High
	Sea level rise	Minimal	Minimal	Minimal	moderate	high	moderate	Low	Low	Low	Minimal	Minimal	Minimal	Moderate	Moderate	Moderate	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	NA	NA	NA	Minimal	Minimal	Minimal	High	High	High

Estuaries		Clean waters			Estuarine Habitats and Assemblages																											Threatened and Protected					
		Estuarine waters			Saltmarsh			Mangrove			Seagrass			Beach and Mudflats			Shallow Soft Sediments			Rocky Shores			Subtidal Reefs			Planktonic Assemblages			Fish assemblages (harvest and bycatch)			Species and communities protected under FMA			Species protected under BCA		
	Region	North	Central	South	North	Central	South	North	Central	South	North	Central	South	North	Central	South	North	Central	South	North	Central	South	North	Central	South	North	Central	South	North	Central	South	North	Central	South	North	Central	South
Resource use																																					
Shipping	Large commercial vessels and associated port activities and industries (trade ships, cruise ships,	Low	Moderate	Low	Minimal	Moderate	Minimal	Minimal	Moderate	Minimal	Minimal	Moderate	Low	Minimal	Moderate	Low	Minimal	Low	Minimal	Minimal	Moderate	Low	Minimal	Low	Low	Minimal	Low	Minimal	n/a	n/a	n/a	Low	moderate	Low	low	moderate	moderate
	Small commercial vessels (ferries, charter boats etc.)	Low	Low	Low	Low	Low	Low	low	High	Low	Low	Low	Low	Low	Moderate	Low	Low	Moderate	Low	Minimal	Low	Low	Minimal	Low	Low	Minimal	Low	Minimal	n/a	n/a	n/a	Minimal	Low	Minimal	low	Moderate	low
Commercial fishing	Estuary General	Minimal	Minimal	Minimal	low	Minimal	Minimal	low	Minimal	Minimal	Low	Low	Low	Minimal	Low	Minimal	low	Low	low	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Moderate	Moderate	Moderate	Moderate	Low	Moderate	moderate	Moderate	low
	Estuary Prawn Trawl	Low	Minimal	N/A	Minimal	Minimal	N/A	Minimal	Minimal	N/A	Low	Low	N/A	Minimal	Minimal	N/A	Low	Low	N/A	n/a	n/a	n/a	n/a	n/a	n/a	Minimal	Minimal	N/A	moderate	Moderate	N/A	Low	Low	N/A	low	low	N/A
Charter fishing	Line fishing	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Low	Low	Minimal	Minimal	Minimal	Minimal	Low	Moderate	Low	low	Low	Low	low	low	low
Recreational fishing	Shore-based line and trap fishing	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Low	Low	Low	low	Low	low	low	Low	low	low	Low	low	low	Low	low	low	low	low	Minimal	Minimal	Minimal	Moderate	Moderate	Moderate	low	Low	low	moderate	moderate	low
	Boat-based line and trap fishing	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	low	Low	low	low	Low	low	Minimal	Minimal	Minimal	low	Low	low	Minimal	Minimal	Minimal	low	low	low	Minimal	Minimal	Minimal	Moderate	Moderate	Moderate	low	Low	low	moderate	moderate	low
	Spearfishing	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Minimal	minimal	Minimal	Minimal	Minimal	Minimal	low	Low	low	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal
	Hand gathering	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	low	Low	low	low	low	low	Minimal	Minimal	Minimal	Minimal	Low	Low	Minimal	Minimal	Minimal	na	na	na	Moderate	moderate	low	Minimal	Minimal	Minimal	low	low	low
	Fish stocking (prawns; other species)	N/A	Minimal	Minimal	N/A	Minimal	Minimal	N/A	Minimal	Minimal	N/A	Minimal	Minimal	N/A	Minimal	Minimal	N/A	Minimal	Low	N/A	Minimal	Minimal	N/A	Minimal	Minimal	N/A	Minimal	Minimal	N/A	Minimal	Minimal	N/A	Minimal	Minimal	N/A	Minimal	Minimal

Aboriginal Cultural Fishin	Line fishing, spearfishing, hand gathering, traditional fishing methods, related cultural traditions	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal
Charter activities	Whale and dolphin watching	Minimal	Minimal	Minimal	n/a	n/a	n/a	n/a	n/a	n/a	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	n/a	n/a	n/a	Minimal	N/A	Minimal	Moderate	low	moderate
Aquaculture	Oyster aquaculture	Low	Minimal	Low	Low	Low	Low	Low	Low	Low	Moderate	Moderate	Moderate	Low	Low	Low	Minimal	Minimal	Minimal	Low	Low	Low	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Moderate	Moderate	Moderate	low	low	low
Aquaculture	Mussel farms	n/a	n/a	Minimal	n/a	n/a	Minimal	n/a	n/a	Minimal	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Minimal	n/a	n/a	Minimal	n/a	n/a	n/a	n/a	n/a	Minimal	n/a	n/a	Minimal	n/a	n/a	Minimal	n/a	n/a	Low
Aquaculture	Prawn farms	Low	n/a	n/a	Minimal	n/a	n/a	Minimal	n/a	n/a	Minimal	n/a	n/a	Minimal	n/a	n/a	Minimal	n/a	n/a	Minimal	n/a	n/a	Minimal	n/a	n/a	Minimal	n/a	n/a	Minimal	n/a	n/a	Minimal	n/a	n/a	Minimal	n/a	n/a
Bait and aquarium trade	Imported baits, imported fish and other aquatic species	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	low	low	low	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	low	low	Low	Minimal	Minimal	Minimal
Research and education	Collecting, sampling and tagging	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal
Recreation and tourism	Boating and boating infrastructure	Moderate	Moderate	Moderate	Minimal	Minimal	Minimal	Low	Low	Minimal	High	High	High	Moderate	High	Moderate	Moderate	High	Moderate	Low	Moderate	Low	low	Moderate	Low	low	low	low	n/a	n/a	n/a	High	High	High	moderate	Moderate	moderate
	Snorkelling and diving, and other rec use	Minimal	Minimal	Minimal	n/a	n/a	n/a	n/a	n/a	n/a	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Low	Minimal	Low	Minimal	Minimal	Minimal	n/a	n/a	n/a	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal
	Passive recreational use	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Moderate	Moderate	Moderate	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	n/a	n/a	n/a	Minimal	Minimal	Minimal	moderate	moderate	moderate
	Four wheel driving	Low	Low	Low	Moderate	Moderate	Moderate	Minimal	Minimal	Minimal	n/a	n/a	n/a	Moderate	Moderate	Moderate	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Moderate	Moderate	Moderate	moderate	moderate	moderate

Dredging (including Place	Navigation & entrance management and modification, harbour maintenance, etc.	Moderate	Moderate	Moderate	Low	Low	Low	Minimal	Minimal	Minimal	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	High	High	High	Minimal	Minimal	Minimal	Low	Moderate	Low	Moderate	Moderate	Moderate	n/a	n/a	n/a	Moderate	Moderate	Moderate	low	low	low
Modified freshwater flov	Extraction, artificial barriers to riverine and estuarine flow (e.g. dams, weirs, waterway crossings,	high	High	high	High	High	High	High	moderate	Low	Moderate	Moderate	Moderate	Low	low	Low	Moderate	Moderate	Moderate	Low	Low	Low	Low	Low	Low	Moderate	Moderate	Moderate	n/a	n/a	n/a	High	High	High	moderate	moderate	moderate
Mining and extractive industries	Oil, gas, minerals, sand, aggregate, coal mining	Minimal	Low	Minimal	Minimal	Low	Minimal	Minimal	Low	Minimal	Minimal	Moderate	Minimal	Minimal	Low	Minimal	Minimal	Low	Minimal	Minimal	Low	Minimal	Minimal	Low	Minimal	Minimal	Low	Minimal	n/a	n/a	n/a	minimal	Moderate	minimal	low	low	low
Service infrastructure	Pipelines, cables, trenching and boring	Minimal	Low	Minimal	Minimal	Moderate	Minimal	Minimal	Moderate	Minimal	Minimal	moderate	Minimal	Minimal	low	Minimal	Minimal	Low	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	minimal	Minimal	n/a	n/a	n/a	minimal	Moderate	minimal	low	low	low
Land-based impacts																																					
Landuse Intensification	Urban stormwater discharge	high	High	high	Moderate	moderate	Moderate	moderate	Moderate	Moderate	Moderate	High	Moderate	Moderate	High	Moderate	Moderate	High	Moderate	Low	High	Low	Low	High	Low	Moderate	High	Moderate	n/a	n/a	n/a	Moderate	High	Moderate	moderate	High	moderate
	Foreshore development	Low	Low	Low	Moderate	high	Moderate	moderate	Moderate	Moderate	Low	Low	Low	Moderate	High	Moderate	low	High	low	Minimal	Moderate	Minimal	Minimal	Minimal	minimal	Minimal	Minimal	Minimal	n/a	n/a	n/a	Moderate	Moderate	Moderate	moderate	High	moderate
	Beach nourishment and grooming	minimal	Low	Minimal	Minimal	N/A	Minimal	Minimal	N/A	Minimal	low	Moderate	low	moderate	Moderate	Moderate	low	Low	low	Minimal	N/A	Minimal	Minimal	N/A	Minimal	Minimal	Minimal	Minimal	n/a	n/a	n/a	Minimal	Minimal	Minimal	low	Moderate	low
	Clearing riparian and adjacent habitat including wetland drainage	high	High	high	high	High	Moderate	moderate	Moderate	low	Moderate	Low	Moderate	Moderate	Low	low	Moderate	Moderate	Moderate	Minimal	Low	Minimal	Moderate	low	Moderate	Moderate	Moderate	Moderate	n/a	n/a	n/a	high	High	Moderate	Moderate	High	Moderate
	Agricultural diffuse source runoff	high	High	high	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	high	Moderate	high	moderate	Moderate	Moderate	high	moderate	high	Minimal	Moderate	Moderate	low	Moderate	Moderate	high	Moderate	high	n/a	n/a	n/a	high	moderate	high	moderate	moderate	moderate
	Stock grazing of riparian and marine vegetation	Low	Low	Low	High	High	High	High	High	High	High	High	High	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	low	low	low	n/a	n/a	n/a	high	high	high	Minimal	Minimal	Minimal
	Deliberate introduction of animals and plants (e.g. foxes, dogs, cats, bitou bush)	Minimal	Minimal	Minimal	Low	Low	Low	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Low	Low	Low	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Low	Low	Low	high	high	high

Point Discharges	Industrial discharges	Low	High	Low	Minimal	Low	Minimal	Minimal	Moderate	Minimal	Minimal	Low	Minimal	Minimal	Moderate	Minimal	Minimal	Moderate	Minimal	Minimal	Low	Minimal	Minimal	Minimal	Minimal	Minimal	Moderate	Minimal	n/a	n/a	n/a	Minimal	Low	Minimal	Minimal	moderate	Minimal
	Thermal discharges	Minimal	High	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	High	Minimal	Minimal	Low	Minimal	Minimal	Low	Minimal	Minimal	Low	Minimal	Minimal	Low	Minimal	Minimal	High	Minimal	n/a	n/a	n/a	Minimal	Minimal	Minimal	Minimal	Low	Minimal
	Sewage effluent and septic runoff	Moderate	High	Moderate	low	Low	low	Low	Low	Low	Moderate	Moderate	Moderate	Moderate	Low	Moderate	Moderate	Moderate	Moderate	Minimal	Low	Low	low	low	low	moderate	Moderate	Moderate	n/a	n/a	n/a	Moderate	Moderate	Moderate	low	Moderate	low
Hydrologic Modifications	Estuary entrance modifications	Moderate	Moderate	Moderate	High	High	High	moderate	Moderate	Moderate	High	High	High	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Low	Low	Low	Low	Low	Low	Moderate	Moderate	Moderate	n/a	n/a	n/a	High	High	High	Moderate	Moderate	Moderate
Climate change (20 years)																																					
Climate change	Altered ocean currents & nutrient inputs	Low	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Low	Minimal	Minimal	n/a	n/a	n/a	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal
	Climate and sea temperature rise	Moderate	Moderate	low	low	low	low	low	low	low	low	Minimal	Minimal	Low	Low	Low	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Low	Low	Low	Minimal	Minimal	Minimal	n/a	n/a	n/a	Minimal	Minimal	Minimal	moderate	moderate	moderate
	Ocean acidification	low	low	low	low	low	low	low	low	low	Low	Low	Low	Low	Low	Low	low	low	low	Low	Low	Low	low	low	low	Moderate	Moderate	Moderate	n/a	n/a	n/a	Minimal	Minimal	Minimal	Low	Low	Low
	Altered storm/cyclone activity	Moderate	Low	Low	low	low	low	Minimal	Minimal	Minimal	Low	Low	Low	low	low	low	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	low	low	low	Minimal	Minimal	Minimal	n/a	n/a	n/a	low	low	low	High	High	High
	Sea level rise	Minimal	Minimal	Minimal	Moderate	Moderate	Moderate	low	low	low	Low	Low	Low	Low	Low	Low	Minimal	Minimal	Minimal	Low	Low	Low	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	n/a	n/a	n/a	Moderate	moderate	Moderate	High	High	High

Climate change (50 years)																																					
Climate change	Altered ocean currents & nutrient inputs	Moderate	low	low	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Low	Low	Low	low	low	low	n/a	n/a	n/a	Minimal	Minimal	Minimal	Moderate	Moderate	Moderate
	Climate and sea temperature rise	High	Moderate	Moderate	High	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Low	Low	Low	Low	Low	Low	Moderate	Moderate	Moderate	Low	Low	Low	n/a	n/a	n/a	High	Moderate	Moderate	High	High	High
	Ocean acidification	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	High	High	High	Moderate	Moderate	Moderate	High	High	High	High	High	High	High	High	High	n/a	n/a	n/a	Moderate	Moderate	Moderate	High	High	High
	Altered storm/cyclone activity	High	Moderate	Moderate	Moderate	Moderate	Moderate	low	low	low	Moderate	Moderate	Moderate	Low	Low	Low	Minimal	Minimal	Minimal	Low	Low	Low	Moderate	Moderate	Moderate	low	low	low	n/a	n/a	n/a	Moderate	Moderate	Moderate	high	high	high
	Sea level rise	Minimal	Minimal	Minimal	High	High	High	moderate	moderate	moderate	Low	Low	Low	Moderate	Moderate	Moderate	Low	Low	Low	Moderate	Moderate	Moderate	Low	Low	Low	Minimal	Minimal	Minimal	n/a	n/a	n/a	High	High	High	High	High	High

APPENDIX 5 – SOCIAL, CULTURAL AND ECONOMIC RISK MATRICES

		Social benefits															Economic benefits								
	Tier 1 benefits	Participation						Enjoyment						Cultural heritage &			Indirect values			Viability of businesses			Direct values		
	Tier 2 benefits	Safety, health & wellbeing (including			Socialising & sense of community			Enjoying the biodiversity & beauty			Consumptive use (extracting)			Tangible and Intangible Aboriginal cultural			Intrinsic & bequest values (economic			Employment & value of production			Individual enjoyment value (consumer		
Social and Economic Threats Tier 1 threats	Stressors	North	Central	South	North	Central	South	North	Central	South	North	Central	South	North	Central	South	North	Central	South	North	Central	South	North	Central	South
Resource use conflict	Conflict over resource access and use	1	Med	Med	2	Med	Med	3	Low	Low	4	Low	Low	5	High	High	6	Low	Low	7	Low	Low	8	Low	Low
	Anti-social behavior and unsafe practices	9	Mod	Mod	10	Mod	Mod	11	Mod	Mod	12	Low	Min	13	High	High	14	Mod	Low	15	Mod	Low	16	Mod	Low
	Overcrowding / congestion	17	Mod	Mod	18	Mod	Mod	19	Low	Low	20	Low	Low	21	Med	Med	22	Mod	Low	23	Min	Min	24	Mod	Low
	Loss or decline of marine industries	25	Low	Mod	26	Min	Low	27	Min	Min	28	Low	Mod	29	Med	Med	30	Min	Min	31	Mod	Mod	32	Min	Min
	Excessive or illegal extraction	33	Low	Low	34	Min	Low	35	Min	Min	36	Low	Low	37	Med	Med	38	Min	Min	39	Low	Med	40	Low	Low
Environmental	Water pollution on environmental values - septic runoff, point source pollution and sewage overflows (such as outfalls, STPs, etc)	41	Low	Low	42	Low	Low	43	Mod	Mod	44	Low	Low	45	Mod	Mod	46	Low	Min	47	Low	Med	48	Low	Min
	Water pollution on environmental values - urban stormwater discharge	49	Mod	Mod	50	Mod	Mod	51	Mod	Mod	52	Mod	Mod	53	High	High	54	Mod	Mod	55	Mod	Mod	56	Mod	Mod
	Water pollution on environmental values - agricultural diffuse source runoff	57	Med	Mod	58	Med	Mod	59	Mod	Mod	60	Med	Mod	61	High	High	62	Med	Mod	63	Med	Mod	64	Med	Mod
	Water pollution on environmental values - litter, solid waste, marine debris and microplastics	65	Mod	Med	66	Mod	Med	67	Mod	Mod	68	Mod	Med	69	High	High	70	Mod	Med	71	Mod	Med	72	Mod	Med
	Wildlife disturbance (shorebirds, turtles, whales) and impacts to ecological health by dog walkers, 4WD, marine vessels etc.	73	Low	Low	74	Low	Low	75	Mod	Mod	76	Min	Min	77	High	High	78	Low	Low	79	Min	Min	80	Low	Low
	Habitat (physical) disturbance (e.g.from foreshore development, commercial and recreational fishing methods, four wheel driving, and extractive industries (mining).	81	Low	Low	82	Low	Low	83	Mod	Mod	84	Mod	Mod	85	High	High	86	Low	Low	87	Min	Min	88	Low	Low
	Reductions in abundances of species and trophic levels	89	Low	Low	90	Low	Low	91	Mod	Mod	92	High	High	93	High	High	94	Mod	Mod	95	Med	Mod	96	Low	Low
	Pests and diseases	97	Mod	Mod	98	Low	Low	99	Low	Low	100	Mod	Mod	101	Med	Med	102	Low	Low	103	Med	Med	104	Low	Low
	Modified hydrology/hydraulics and flow regime	105	Low	Low	106	Mod	Mod	107	Low	Low	108	Mod	Mod	109	Med	Med	110	Low	Low	111	Low	Low	112	Low	Low
	Sediment contamination (toxicants in sediment; dioxins in Sydney Harbour, Cooks River)	113	Mod	Low	114	Mod	Low	115	Mod	Low	116	Mod	Low	117	High	High	118	Mod	Low	119	Mod	Low	120	Mod	Low
	Climate change stressors 20 years (sea level rise, altered storm/cyclone activity, flooding, climate and sea temperature rise, altered ocean currents and nutrient inputs)	121a	Low	Low	122a	Low	Low	123a	Mod	Mod	124a	Mod	Mod	125a	High	High	126a	Low	Low	127a	Mod	Mod	128a	Mod	Mod
	Climate change stressors 50 years (sea level rise, altered storm/cyclone activity, flooding, climate and sea temperature rise, altered ocean currents and nutrient inputs)	121b	High	High	122b	High	High	123b	High	High	124b	High	High	125b	High	High	126b			127b			128b		
Governance of the marine estate	Inadequate, inefficient regulation, over-regulation (agencies)	129	Mod	Mod	130	Low	Low	131	Mod	Low	132	Mod	Mod	133	High	High	134	Min	Min	135	Med	Med	136	Low	Low
	Lack of or ineffective community engagement or participation in governance	137	Low	Low	138	Low	Low	139	Low	Low	140	Low	Low	141	High	High	142	Min	Min	143	Min	Min	144	Min	Min
	Lack of community awareness of the marine estate, associated threats and benefits, regulations and opportunities for participation	145	Min	Min	146	Min	Min	147	Mod	Mod	148	Low	Low	149	High	High	150	Low	Low	151	Low	Low	152	Low	Low
	Lack of compliance with regulations (by users) or lack of compliance effort (by agencies)	153	Mod	Mod	154	Mod	Mod	155	Mod	Mod	156	Mod	Mod	157	High	High	158	Low	Low	159	Mod	Mod	160	Low	Low
Public safety	Wildlife interactions (e.g. shark bite, jellyfish, boat striking a whale)	161	Low	Low	162	Low	Low	163	Min	Min	164	Min	Min	165	Min	Min	166	Min	Min	167	Min	Min	168	Min	Min
	Seafood contamination	169	Mod	Low	170	Min	Low	171	Min	Min	172	Mod	Mod	173	High	High	174	Low	Min	175	Med	Low	176	Min	Min
	Other water pollution/contamination affecting human health and safety (such as toxic algal blooms, e. coli concetrations, etc.)	177	Low	Low	178	Low	Low	179	Low	Low	180	Min	Min	181	High	High	182	Low	Low	183	Low	Low	184	Low	Low
Critical knowledge gaps	Inadequate social and economic information	185	Mod	Mod	186	Mod	Mod	187	Mod	Mod	188	Mod	Mod	189	High	High	190	Mod	Mod	191	Mod	Mod	192	Mod	Mod
Lack of access availability	Limited or lack of access infrastructure to the marine estate	193	Mod	Mod	194	Mod	Mod	195	Mod	Mod	196	Mod	Mod	197	Med	Med	198	Min	Min	199	Mod	Mod	200	Mod	Low
	Loss of public access (either by private development or Government area closures)	201	Med	Med	202	Low	Low	203	Low	Low	204	Mod	Mod	205	High	High	206	Mod	Mod	207	Low	Med	208	Low	Low

APPENDIX 6 – LIST OF ACRONYMNS & ABRIEVIATIONS

The Audit - Independent Scientific Audit of Marine Parks in NSW

The Authority - Marine Estate Management Authority

BCA - *Biodiversity Conservation Act*

FMA - *Fisheries Management Act*

The Strategy - Marine Estate Management Strategy

TARA - Threat and Risk Assessment

PFOS - perfluorooctane sulfonate

PFAS - Perfluorooctane sulfonic acid