



Marine Estate
Management Authority

Guidelines for

Assessing management options for the NSW marine estate

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Guidelines for assessing management options for the NSW marine estate

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This document and a glossary of key terms are also available at www.marine.nsw.gov.au

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Glossary

The terms used in this paper are defined in the Marine Estate Management Authority (2015) Glossary of terms¹.

Additional terms used that relate specifically to management are:

- Current management settings - established policy and programs, which may include initiatives or reforms already underway or approved for implementation
- Management mechanisms – tools such as market based instruments, education, rules, regulations or other methods that can be used to manage threats/activities/assets/benefits
- Management options - potential/proposed management for the marine estate (may include a number of management mechanisms)
- Management responses - management options selected for implementation.

¹ http://www.marine.nsw.gov.au/__data/assets/pdf_file/0004/561631/glossary-of-terms-for-marine-estate-TARA.PDF

1. INTRODUCTION

BACKGROUND

Vision—the vision for the NSW marine estate is a healthy coast and sea, managed for the greatest well-being of the community, now and into the future (MEMA, 2013).

Objects and principles—the objects of the *Marine Estate Management Act 2014* (MEM Act), and the vision and guiding principles for management of the marine estate in *Managing the NSW Marine Estate: Purpose, Underpinning Principles and Priority Setting* (MEMA 2013) provide guidance to NSW Government agencies in managing the marine estate. These are key considerations for the Marine Estate Management Authority (MEMA) and the Marine Estate Expert Knowledge Panel (MEEKP) in providing advice to Government.

Approach—the MEMA approach seeks to maintain and enhance the Estate’s natural assets whilst allowing access and use in a way that maximises economic, social and environmental benefits for the people of NSW over the long-term.

Process—a 5-step decision-making process has been developed by MEMA to guide future management of the marine estate (see Figure 1).

GUIDELINES: PURPOSE

This technical paper provides guidance on the application of Steps 3 and 4 of the framework to assist MEMA agencies in developing their management responses to the priority threats and opportunities identified for the marine estate, and to assist agencies in assessing trade-offs between benefits.

The aim is to ensure management effort will be directed to actions that most effectively and cost-effectively deliver on the vision for the marine estate², providing for a healthy coast and sea and delivering maximum community benefit³, now and into the future.

This paper presents a process to review, develop, assess and recommend management responses. The process outlined can be applied in a range of contexts and scales as appropriate, in responding to threats and opportunities within the NSW marine estate. The guidelines are not intended to be a manual with step-by-step instructions, but present a flexible, overarching framework.

This paper articulates a thorough and detailed methodology for assessing management options. The method, and depth of assessment, can and should be tailored to the circumstances within which options are to be considered.

A flowchart illustrates progress through the stages and activities presented in these guidelines (Appendix A).

Example templates demonstrate how information may be collected and reviewed (Appendix B). These templates represent a process to be undertaken (not a form to be completed). Each template is designed to produce a recommendation that can be included in a final summary table. The sequence of stages, and of the activities within the stages, is not prescriptive. It is expected that the stages will be reviewed and repeated as required. Templates can be viewed as worksheets within a workbook, with earlier stages refined as further stages are undertaken.

The Guidelines also provide the foundation for developing a credible business case(s) to support the presentation of options. Completion of the activities detailed in the Guidelines will support presentation of the case for change and demonstration that the proposal offers value for money relative to alternatives.

² This includes clean and safe waters, biologically diverse and resilient ecosystems, accessibility to the community, maximum economic, social and environmental benefits, and key community benefits maintained and enhanced for current and future generations.

³ Community benefit, as defined in the MEMA (2015) Glossary of terms, is anything that contribute to the well-being of the community. There are three separate categories of community benefits: economic, social and environmental benefits.

Figure 1: 5-Step decision-making process. Assessing and implementing management options - Steps 3 and 4 of putting the principles for managing the NSW Marine Estate into practice.⁴

Step 1	HOW THE COMMUNITY SEES THE BENEFIT	Identify key economic, social and environmental benefits, and perceived threats and opportunities derived from the Estate	Develop ongoing engagement strategy: <ul style="list-style-type: none"> community consultation expert input stakeholder surveys 	Principle 1
Step 2	ASSESS THREATS AND RISKS TO BENEFITS	Expert assessment of threats and opportunities to the key economic, social and environmental benefits	Prioritise threats based on their likelihood and consequence and consider relevant scale: <ul style="list-style-type: none"> local regional statewide 	Principle 2
Step 3	ASSESS MANAGEMENT OPTIONS TO MAXIMISE BENEFITS	Identify and assess current and potential management settings in delivering benefits to the community	Apply values to economic, social and environmental benefits of alternative uses. Assess which options deliver maximum benefit to the community	Principles 1, 3, 4, 5, 6 & 7
Step 4	IMPLEMENT PREFERRED MANAGEMENT OPTIONS	Implement options that maximise overall benefits to the NSW community as a whole	Identify the most efficient and cost-effective management options. Design measurable performance indicators Develop strategic monitoring program to measure outcomes relative to the vision.	Principles 1 & 8
Step 5	BE ACCOUNTABLE	Monitor, measure and report on performance Review progress	Report transparently to the community. Promote strategic research to inform management and enhance future outcomes. Examine performance, including benefit, threat and risk status periodically. Review management arrangements for those not achieving adequate performance.	Principles 1, 9 & 10

⁴ Marine Estate Management Authority (2015) Threat and Risk Assessment Framework for the NSW Marine Estate, p.3
Initial reference - Marine Estate Management Authority (2013), Managing the NSW Marine Estate: Purpose, Underpinning Principles and Priority Setting, NSW Marine Estate Management Authority, November 2013, p.9.
See Marine estate principles, Appendix C.

2. DEVELOPING MANAGEMENT RESPONSES

The key economic, social and environmental benefits that the marine estate provides to the NSW community, and threats to those benefits, have been identified as part of Step 1 of the MEMA 5-step decision-making process for managing the marine estate (Figure 1).

The ways in which various threats and activities may affect the benefits that accrue from the marine estate have been identified as part of Step 2 for putting the principles for managing the marine estate into practice (Figure 1). As part of Step 2, a Threat and Risk Assessment (TARA) process should have been undertaken to assess the risk of a threat to a benefit being realised. This process should consider the magnitude of the potential consequences, and the likelihood that those consequences will occur, under current management. The risk of the threat being realised has been rated as a function of consequence and the likelihood of the consequence occurring.

TARA processes also identify:

- the range of threats to a particular benefit
- the risk trend for threats under current management settings, and
- the spatial scale at which the priority threat operates - local, regional, and/or statewide.

The community also provides information on threats and opportunities through community consultation.

Management responses will be informed by the social, economic and environmental benefits identified in Step 1. They will be developed in response to the priority threats and risks identified via the TARA processes of Step 2 and to other identified management opportunities⁵ for the marine estate. In responding to the range of threats prioritised from the TARA, threats will be grouped and targeted management options developed. While each option will be individually assessed, the ways in which options may work together as a management response will also be assessed.

The process to identify, assess and recommend management responses to priority issues consists of 4 key stages that can be undertaken and repeated as required (see Figure 2). The sequence of stages, and of activities within each stage, is not prescriptive. An iterative assessment is appropriate; stages may be reviewed and refined as further stages are undertaken. The depth of assessment will be related to the stage of the assessment. The detail and accuracy of analysis increases as management options are further refined.

Completing the four steps of assessing management options will require adequate investment of time and resources. Significant actions include:

- analysing and grouping threats for management responses
- identifying and reviewing current management settings relevant to priority threats and drafted guiding objectives, to identifying risks for further action and management requiring additional attention
- identifying other management mechanisms that may effectively and cost-effectively achieve a tangible reduction in priority risks
- assessing management options, considering effectiveness in addressing risk, net community benefits, and cost-effectiveness, including assessment of the base-case.

The assessment of management options will require expertise in the:

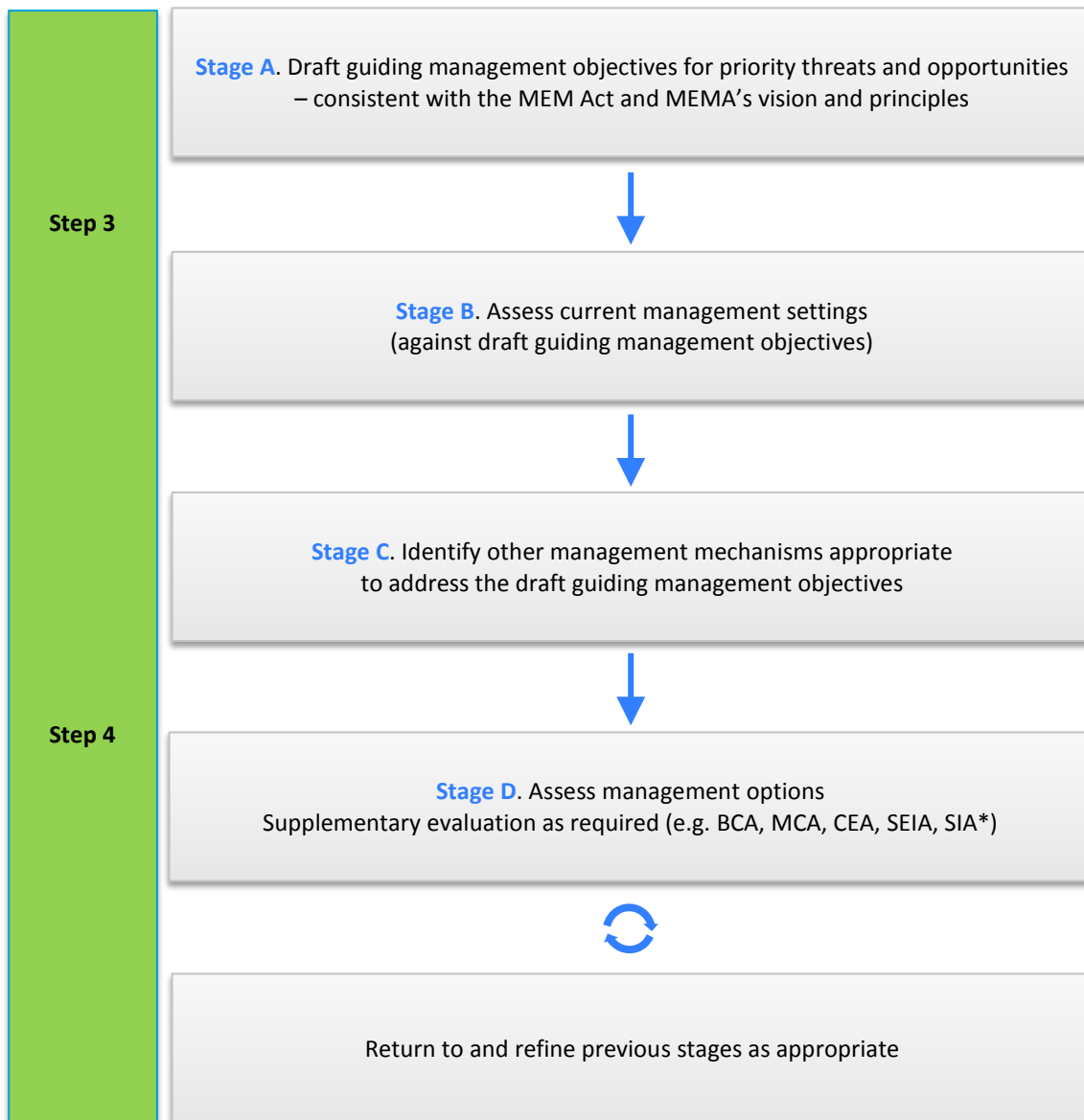
- assessment of risk
- assessment of social, economic and environmental costs and benefits
- economic appraisal of management options.

⁵ Such opportunities identified for the marine estate may include opportunities identified by the community as important, economic opportunities, opportunities for regional development, or opportunities to improve efficiencies and reduce red tape.

Community consultation will inform the key steps of assessing management options. The MEMA Community and Stakeholder Engagement Strategy (2014) details the rationale and approach MEMA will take towards engagement, public participation and communication activities with the wide range of stakeholders across the NSW marine estate.

The process of developing and assessing management options will be facilitated by collaborative work across agencies. This collaborative inter-agency approach will be essential where management options concern a number of MEMA agencies' areas of responsibility.

Figure 2. Key stages of Steps 3 and 4.



*See Box 2 for example evaluation methods.

STAGE A. DRAFT GUIDING MANAGEMENT OBJECTIVES FOR PRIORITY THREATS AND MANAGEMENT OPPORTUNITIES

In developing management responses to priority threats and/or opportunities, the first stage is to consider the scope and priority of issues to be addressed and to draft guiding objectives that specify management priorities. This provides the opportunity to consider and highlight the issues to be addressed.

Threats and risks can be grouped for management attention where relevant. Such a thematic approach will enable a collective inter-agency consideration and prioritisation of, and a coordinated response to, the issues to be addressed.

The initial drafting of guiding objectives in response to priority threats and opportunities may concurrently consider - and management objectives may focus on - threats, assets, activities, and/or benefits. For example, where one threat poses risks to multiple benefits, it may be appropriate for management to focus on the threat. Where a particular benefit or asset is at risk from multiple threats, management may focus on the asset or benefit. Where a particular activity or activities drive the risk of a threat, management may focus on this activity or activities. Therefore, there may be more than one management objective related to a threat, or a management objective may focus on more than one threat or activity.

The drafting of guiding objectives will consider the relevant scale at which the threat or opportunity could be addressed – local, regional and/or statewide. The drafting of guiding objectives will also consider whether available information is adequate to assess risk, and where there may be knowledge gaps.

The rationale for intervention must be identified. The basis for government intervention may be defined by the strategic objectives and/or priorities of government. The existence of market failures in the management of the marine estate in NSW establishes sound reasons for government intervention (MEMA 2013). Pinpointing the underlying cause of a problem can both clarify the basis for government intervention, and guide the development of appropriate responses⁶. For example, the underlying cause of a threat such as externalised costs (externalities), under-investment in value-creation opportunities or information failure, may be due to ‘market failure’ (see Box 1).

MEMA agencies’ jurisdiction to manage threats will need to be considered. Some priority threats to the benefits of the marine estate may be beyond the scope of MEMA to address, such as climate change. However the impacts of such threats on the economic, social and environmental benefits derived from the Estate may justify government action to mitigate impacts.

It is anticipated that there will be sites and situations where resource conflicts will need to be managed and where trade-off decisions between alternative economic, social and environmental benefits from the marine estate will need to be made. These potential trade-offs may need to be noted in the initial drafting of management objectives, and will guide the choice and prioritisation of management options. Where decisions involve choices between competing uses/benefits, the benefits and costs of alternatives uses will be transparently evaluated in the assessment of management options (Stage D).

The guiding objectives will inform the assessment of current management settings and the development and assessment of management options. They should be specified broadly enough to allow consideration of a range of options. They may include draft quantitative targets. It is important that the desired objective of the management response is clearly stated and understood, and that it is not confused with the means of obtaining it.

It will be appropriate to review these objectives once further actions have looked at the practicality of achieving them, and before finalising the process. The processes of identifying gaps and duplications in current management settings (Stage B), considering the potential of other management mechanisms (Stage C), and of evaluating the costs and benefits of management options (Stage D), may provide information on feasibility, cost and/or other impacts that will lead to revisions of management objectives. Note that in finalising management options, more specific management objectives will be developed. Such objectives should be specific, measurable, agreed, realistic and time-based (known as ‘SMART’ objectives).

⁶ “The first step in developing effective policies and programs to manage key threats will be to clearly identify the cause of the problem...the cause will often be a market-failure in the form of over-exploitation of the Estate’s resources or conflict between competing uses because of the Estate’s open access characteristics” (MEMA 2013:12).

Box 1. Glossary—basis for government intervention.

Glossary—basis for government intervention

Identifying the underlying cause of a problem can both clarify the basis for government intervention, and guide appropriate responses. The underlying cause of a threat such as over-exploitation, conflict between competing uses, or under-investment in value-creation opportunities, may be due to a 'market failure' (see NSW Better Regulation Office 2009, NSW Treasury 2017).

'Market failure' is where a market left to itself does not allocate resources optimally. Where market failure exists, there is a potential role for government to improve net benefits for the community. Governments may intervene to influence the behaviour of businesses or individuals, or to achieve benefits that would otherwise not be delivered. Government intervention is not justified in every instance of market failure; the benefits of intervention must also outweigh the cost.

The existence of market failures in the management of the marine estate in NSW establishes sound reasons for government intervention (MEMA 2013). Examples relevant to management of the marine estate include:

Externalities

Externalities are costs or benefits arising when the economic activity of one group generates a positive or negative impact for another without there being a market price associated with the impact. The existence of externalities can result in too much or too little of goods and services being produced and consumed than is economically efficient. Externalities can arise from over-exploitation and resource use conflict (MEMA 2016).

In the case of the marine estate, externalities arise where individuals or businesses using the Estate may not bear the full cost of their activities, leading to parts of the Estate being damaged (MEMA 2013).

Government intervention to 'internalise' an externality (e.g. through regulation or by charging fees for certain activities) may be justified if this will bring about a more efficient or socially desirable outcome.

Goods associated with positive externalities are sometimes termed 'merit goods'. Governments may encourage increased supply of merit goods through subsidisation of or public provision of such goods, thereby remedying the under-investment in maintaining and enhancing the Estate (MEMA 2013).

Public goods

Public goods exist where the provision of a good (product, service, or resource) to one person is also available to all people at no extra cost. Public goods are said to be 'non-excludable' and 'non-rival'. Because the good is non-excludable, everyone can use it once provided. This means that the costs of provision cannot be recovered by extracting payment from users. Governments may choose to intervene to provide public goods (and rectify under investment in value-creation opportunities) to maintain and enhance benefits for users of the marine estate.

Inequitable outcomes

In some circumstances, markets may distribute resources in a way that does not meet policy outcomes. For instance, an efficiently operating market may result in the inequitable provision of infrastructure. In order to achieve the greatest well-being of the community (MEMA 2013) and enhance equity, government intervention may be justified.

Information failure/imperfect information

Information failure occurs when the impact, and total costs associated with, an activity or use is either unknown or not accurately known. Imperfect information or information asymmetry can prevent fully informed decision-makings, and lead to inefficient or socially undesirable outcomes. There may be justification for government intervention in order to address critical knowledge gaps and improve communication.

Opportunity to simplify, repeal, reform or consolidate existing regulation

Where regulation already exists in the marine estate, government intervention may be justified in order to reduce the costs imposed by regulatory requirements. The costs of regulation include administrative compliance costs, substantive compliance costs, financial costs and indirect costs. In cases where reducing regulatory burden would result in an increase in net benefits derived from the Estate, government intervention would be justified.

STAGE B. ASSESS CURRENT MANAGEMENT SETTINGS (AGAINST DRAFT GUIDING MANAGEMENT OBJECTIVES)

The next stage is to assess current management settings against the guiding management objectives identified in Stage A. This assessment will review what management settings are in place, whether they support achieving the guiding management objectives, and if not, where they fall short. This assessment will also provide opportunity to review risk against any initiatives or reforms already underway or approved for implementation. Such assessment will identify opportunities that warrant new management controls to improve or enhance management outcomes, enhance the cost-effectiveness of resource allocation and/or achieve tangible risk reduction of priority threats.

The first task is to identify the current management settings that are relevant to the threats and objectives. Following a TARA, much of this information will already have been noted. In addition, this task will include identifying any existing initiatives or reforms already underway or approved for implementation that are relevant to the guiding management objectives.

Assessment of current settings should:

- consider the relevance of current management settings to the management objectives identified at Stage A
- broadly evaluate the effectiveness of the current management setting already funded from within existing programs or budgets (which may include, where information is available):
 - effectiveness in addressing the threat or opportunity, considering trends
 - reasons for management effectiveness or ineffectiveness, e.g. resourcing, implementation.
- broadly evaluate the cost-effectiveness of the current management settings, considering the effectiveness of the program in relation to cost, and
- identify any management gaps and duplications.

A more detailed review and evaluation of the risk may also be undertaken as required. Given that the TARA addresses a broad suite of risks, this stage will provide an opportunity to collect further information, undertake a more detailed assessment of the risks (where appropriate) and consider any initiatives or reforms already underway or approved for implementation.

In considering what further action may be required, agencies will also consider what level of risk may be acceptable under current management. Assessing risk tolerance and thresholds will focus on the aspects/stressors of activities that may cause risk. The criteria for assessing risk tolerance include:

- reference to the MEM Act Objects
- considering any legal, regulatory or other requirements
- reconsidering risk trend (increasing, stable, decreasing), describing spatial and/or temporal information as relevant
- identifying any cumulative risk, i.e. how the risk interacts with other risks
- reflecting on confidence in risk attribution
- weighing up trade-offs, as relevant, considering the level of benefits derived from the activity/stressor causing the threat against the level of benefits under threat due to the risk (i.e., do the benefits from the risk justify tolerance of the risk).

The level of detail required for assessing risk tolerance thresholds will be guided by the risks under consideration. Where trade-offs are required, consideration of the net benefits to the NSW community (identification of the social, economic and environmental costs and benefits associated with the risk), will assist in prioritising risks to be addressed. The initial evaluation of trade-offs can be transparently undertaken using a broad-scale assessment process. The adequacy of evidence will need to be considered. Where further information is required to support decision-making, there are a range of methods that can be used to transparently evaluate the trade-off of benefits (see Box 2).

The assessment of current management settings can provide information as to what level of improvements may be required. Alternatively, assessment of the risk against current and/or planned management settings may lead to the conclusion that further action in this case is not required. In some cases, a program of research, monitoring and/or data collection may be recommended. Where it is determined that the current level of risk can be accommodated in current marine estate management settings (i.e. the risk can be tolerated), the recommendation will be for review, monitoring and reporting of the risk, either as part of the MEMA monitoring program (Step 5 of the MEMA 5-step decision-making process) or by the relevant individual agency.

The process of assessment will provide a list of management settings/mechanisms that could be continued with no further action required, or could be modified or expanded upon to improve how threats are addressed. The process will also build awareness of management gaps where additional or more comprehensive management responses will be considered, any potential areas where the efficiency of resource allocation could be improved, and where management duplication could be reduced or coordination improved.

The assessment of current existing management settings/mechanisms should also enable their comparison with modified or alternative management mechanisms that may be proposed in Stage C.

STAGE C. IDENTIFY OTHER MANAGEMENT MECHANISMS APPROPRIATE TO ADDRESS THE DRAFT GUIDING MANAGEMENT OBJECTIVES

Following the assessment of current management settings, the next stage is to identify whether there are other management mechanisms, or modifications or extensions to existing mechanisms, that could achieve tangible risk reduction in priority threats and cost-effectively achieve the objectives established in Stage A. Community consultation may also identify management mechanisms that warrant further analysis, particularly if these are likely to be effective and efficient in reducing risk levels and/or are more acceptable to the community and key stakeholders.

FORMS OF INTERVENTION

Intervention can take several forms. Consistent with modern public policy principles, light-handed intervention is generally preferred. Management mechanisms may include market-based instruments, industry or community based information programs/campaigns, regulatory approaches or alternative non-regulatory approaches.⁷ Preference should be given to efficient and cost-effective management programs that align private incentives and behaviours with broader community outcomes. Identifying appropriate mechanisms might include innovative options that have not been used in NSW in the past.

In some situations, market-based instruments that minimise the cost to the community of achieving management objectives may provide an alternative to prescriptive regulation. Examples include:

- creating markets in tradeable property rights
- introducing government charges
- providing or reforming government subsidies
- creating financial liability to encourage stakeholders to take precautions.

Information and awareness campaigns provide information to assist informed decision-making. This may include industry or community based campaigns.

Non-regulatory, voluntary approaches include self-regulation, quasi-regulation where standards are not legally binding, or co-regulation where an industry develops regulatory arrangements in consultation with government.

Regulatory approaches can range from performance-based options which specify desired outcomes to prescriptive rules that focus on inputs, processes and procedures. Prescriptive regulatory instruments are more likely to be justified where a high level of certainty is required and where the risks associated with non-compliance are high. Performance based alternatives, which allow businesses to determine how they will meet performance standards, can be more flexible and encourage innovation.

Where the underlying cause of the problem is under-investment in value creating opportunities, there may be sound reasons for the government to provide services or funding.

Options that utilise existing resources and that refocus current activities or programs should be considered, particularly as new funding is not assured.

SHORT-LISTING MECHANISMS

In short-listing proposed mechanisms, attention should be given to:

- effectiveness in addressing the management objective/s and achieving tangible reductions in priority threats (where the proposed management mechanism addresses multiple threats/objectives, the degree to which the mechanism addresses each should be identified)
- net community benefits
 - community benefits being maintained (economic, social and/or environmental)
 - potential impacts to other benefits (economic, social and/or environmental)
- other unintended effects, e.g. 'crowding out', displacement effects

⁷ See NSW Government, Better Regulation Office (2009) Guide to Better Regulation, November

- administrative costs and revenues
- cost-effectiveness of management mechanism, comparing costs with benefits
- compatibility with current legislative, policy and planning controls
- compatibility with existing access arrangements, with the flexibility to be modified over time if required.
- community acceptability
- timeframes for implementation.

The shortlisting process will identify a portfolio of management mechanisms (existing and/or alternatives) that can be drawn upon in the development of management options. It ensures that only options that are likely to be effective, cost-effective and feasible, progress to the more detailed and resource intensive assessment of Stage D.

STAGE D. ASSESS MANAGEMENT OPTIONS

Management options for priority threats and opportunities can be drafted, guided by the management objectives identified in Stage A and the opportunities to improve or enhance management outcomes identified in Stage B, and drawing upon the recommendations from Stage C (portfolio of effective mechanisms). A management option may include a combination of management mechanisms. For example, addressing a particular threat may include both an education campaign and a market-based mechanism.

In developing management options, it will be necessary to:

- consider program/project implementation, including planning, program of work, governance roles and responsibilities, procurement methods, change management, sustainability issues, technical standards and legislative requirements, benefits realisation, risk management and involvement of stakeholders
- establish clear program/project objectives (specific, measurable, achievable, realistic and timely)
- identify the resources necessary to deliver the program/project.

The assessment of management options will enable identification and description of their advantages and disadvantages, provide information that can inform their improvement, and enable recommendation of the most effective and cost-effective options. Such assessment will:

- identify the expected effective change in the level of risk posed by the threat
- consider the expected positive and negative changes to the community across economic, social and environmental benefits (net community benefits)
- consider effectiveness in addressing risk and net benefits against cost
- support prioritisation and recommendation of options.

One option which should be included as the base against which other options are to be compared is the 'business-as-usual' option. The benefits and costs of options should be compared against expected future outcomes (benefits and costs) under current management settings (NSW Treasury 2017).

Professional judgement will be required regarding the depth and range of assessment appropriate to the significance and scale of the management option.

Prioritisation and recommendation of management options and packages of options will involve evaluating the extent to which those options maximise net benefits to the community at least cost (MEMA 2013). While management options that address particular priority threats will be individually assessed, the process of prioritising and recommending options will consider how options work together as a management response to the TARA.

The assessment of management options can be supported by community consultation and the involvement of stakeholders and other experts (engagement). Community and stakeholder engagement can assist in identifying costs and benefits associated with management options and improve understanding of the trade-offs and impacts associated with different management options. Where appropriate, as part of evaluation processes, targeted stakeholder and/or community engagement can be undertaken to obtain qualitative or quantitative information on values. The assessment of management options can also include informal targeted consultation with stakeholders and other experts to garner feedback on their practicality, to identify their potential impacts, and to assess if there will be unintended consequences from their implementation. Public exhibition of management options, and feedback from the general community, can generate additional information on social and economic impacts that can be incorporated into the final shaping of management responses and impact management strategies.

ASSESSING CHANGE IN RISK

The TARA has provided a base-line assessment of risk. The key focus of management responses will be to reduce priority risks. Where a management option addresses a number of threats, each threat should be noted and the reduction in risk considered. Where a management option links with other options to address cumulative risk, identify key linkages.

Assessing the change in risk will involve consideration of the logic of the proposed option; clear articulation of how a project/program/policy will work, and the linking of program activities with intended outcomes. This assessment can be informed by past evaluation of established programs, or consideration of comparable programs, where such information is available. The consideration of program logic will also provide an opportunity to define targets and to think about how the management initiative would be measured, tracked and reported on.

The steps in assessing change in risk from a proposed option will include:

- identify risk(s) addressed
- describe how option(s) will address risk(s) and expected impact on risk(s)
- identify what data would be needed to effectively monitor and evaluate the initiative
- identify linkages with other options
- identify expected change in risk rating
 - as an independent option
 - with linkages to relevant options.

ASSESSING NET BENEFITS

The evaluation of the benefits and costs of management options is undertaken to ensure that the proposed interventions are in fact worthwhile, with the key decision rule being that if the stream of benefits over time exceeds the stream of costs, then the new or changed management will provide net benefits to the NSW community (MEEKP 2014). In particular, evaluation of the benefits and costs of management options can inform decision-making where trade-offs⁸ between benefits need to be made. The evaluation of benefits and costs can also be used to rank competing options in terms of the net benefits they provide to the NSW community.

The initial evaluation of benefits and costs of management options can be transparently undertaken using a broad-scale assessment process. The assessment will include considering impacts on short-term benefits, long-term benefits, and the potential permanent loss of a benefit. This approach may be supported by monetary values where available. Other indicators will consider impacts on community wellbeing in terms of jobs (created or lost), numbers of people affected (positively or negatively) and environment indicators such as risk to vulnerable species or habitats. Many benefits will not be easily measured or standardised. Where quantitative data are not available, or are limited, the magnitude of benefits and costs can be estimated drawing on qualitative information and through the application of professional judgement. In many cases, a broad comparative assessment may provide adequate guidance to the appropriate selection of management options.

Consider the level of confidence regarding the identified impact of management options on net community benefits. Where further information is required to support decision-making, there are a range of methods that can be used to transparently evaluate the benefits and costs of alternative management options, and that can assist in decision-making regarding the trade-off of benefits (see Box 2). Existing guidelines and technical papers are available to help guide such analyses (see List of references).

Assessing net benefits will also provide an opportunity to consider how benefits related to the management option will be measured, tracked and reported on.

ASSESSING EFFECTIVENESS AGAINST COST

The assessment of options will include consideration of financial costs against effectiveness in addressing risk and net benefits. Consideration of cost-effectiveness can inform decision-making and promote efficient resource allocation. It can also be used to compare which options offer superior value for money.

Options need to be costed. Identifying the financial/administrative costs to government will require identifying establishment costs and ongoing administrative costs. Potential financial benefits may include avoided costs, savings, and/or revenue. Credible methodologies for estimating costs must be used and referenced (as with business-cases, NSW Treasury 2008, p.18).

⁸ the relinquishment of one benefit or value for another that is regarded as more desirable (MEMA Glossary of terms).

Early stage estimates of costs and benefits may be highly subjective, and should be given as ranges, to identify the key risks and uncertainties. The basis for and accuracy of the cost estimates should be stated. Identify uncertainties in quantified costs and benefits and consider how these may be resolved to assist in prioritising options and in future development of a business-case. Sensitivity analysis is recommended.

Such economic appraisal will consider the quantifiable financial costs of a program against the identified net benefits to show:

- whether the benefits of a proposed project are likely to exceed its costs
- which among a range of options to achieve an objective has the highest net benefit
- which option is the most cost effective, where benefits are equivalent.

(NSW Treasury 2008).

Value for money is achieved when the maximum benefit is obtained from the program provided within the resources available. Achieving value for money does not always mean that the 'highest quality' program is selected. A lower cost option still appropriate to quality requirements may be appropriate where a department/agency has limited funds available. Value for money is achieved when the 'right sized' solution is selected to deliver appropriate outcomes commensurate with need (NSW Government 2016).

PRIORITISATION AND RECOMMENDATION

Professional judgement can be applied to prioritise and rank management options with regard to effectiveness in addressing threat, net benefits to the community and cost-effectiveness.

A potential method agencies can use to support ranking management options is to weight different factors according to their importance. Factors to consider are effectiveness in addressing threat, net benefits to the community and cost-effectiveness. These factors could be assigned a score (for example, 1 to 5). Each factor could then be weighted by how important they are to the ranking. Note that the weighting for each factor would be constant for all management options considered. This method provides comparative scores that can inform judgement of priorities.

The strategic objectives and/or priorities of government will also be considered in prioritising options.

Options have been developed in response to priority threats as a part of an intended suite of inter-related initiatives that will provide a management response to the TARA. The inter-linkages between options will need to be considered when options are prioritised and ranked.

Packages of options can be assessed using the same criteria, and drawing upon the information gathered, to assess individual options. Such assessment will:

- consider the threats addressed by the package of options, and identify the expected cumulative effective net change in relevant risks
- consider the expected cumulative positive and negative changes to the community across economic, social and environmental benefits (net community benefits)
- consider net effectiveness in addressing risk and net benefits against cost.

For the purposes of developing a business-case to support presentation of options as a package, different combinations of options can be assessed. Depending on the options prioritised, this is likely to involve comparison of packages including an increasing number of highest ranked options, with net change in risk and benefits compared against financial costs. Such presentation of options will be built upon the evidence gathered in the individual assessment of each option, and consideration of linkages and cumulative change.

Box 2. Evaluation—benefits and costs.

Evaluation—benefits and costs

The standard of evidence preferred for evaluation and comparison of options, as with business case development, is referenced quantitative (preferred standard) and qualitative data, and established methodologies that assess costs and benefits, and link resources to services to results via an evidence-based results logic (NSW Treasury 2008).

Where further information is required to support decision-making, there are a range of methods that can be used to transparently evaluate the benefits and costs of alternative management options.

Monetary values may be used to provide a transparent assessment of management options to support decision making, where appropriate to the benefit being preserved. Social Benefit-Cost Analysis (**BCA**) aims to express the benefits and costs of options in monetary terms (MEEKP 2014). MEEKP Technical Paper 1 details valuation methodologies that can be used to estimate the value of non-market benefits. Techniques such as choice modelling, travel cost analysis, or contingent valuation techniques can be used depending on the value being assessed and the depth of information sought (MEEKP 2014). Decision trees, such as the Productivity Commission's Figure 3.1 'Dealing with non-market outcomes in policy analysis', can guide the choice of valuation techniques (Baker & Ruting 2014, p.50). The projects and the benefits have to be of reasonable significance to justify the resources required for a comprehensive BCA (NSW Treasury 2017).

Non-market benefits cannot always be adequately or easily valued and professional judgement will be required in these instances (MEEKP 2014, p.4). The introduction of an alternative ranking system may be possible, and enable comparison of options or elements of those options. For example, Multi-Criteria Analysis (**MCA**) techniques can assist decision makers to resolve conflicts and rank objectives (see NSW Treasury 2017, NSW DoCS 2009). A MCA seeks to compare quantitative and qualitative impacts across different proposals by assigning weights and scores to various criteria that are linked to the objectives of the proposal. MCA may involve some non-testable judgments on values.

Where the benefits of an option are not readily valued, but the option satisfies an agreed objective, or where alternative options provide similar outcomes, Cost-Effectiveness Analysis (**CEA**) of the management options can be used to rank them. The best policy option will be one that meets objectives most effectively and at least cost (MEMA 2013, Principle 6, p.6).

In some cases, further regional or sectoral social and economic impact assessment may be appropriate to inform the evaluation of options and the development of impact mitigation/management strategies. Methods that focus on regional and sectoral impacts can usefully complement BCA by highlighting, for example, local impacts that may warrant special consideration (MEEKP 2014, p. 5).

A Socio-economic Impact Assessment (**SEIA**) measures the broad range of economic and quantitative social (e.g. employment/incomes/age profiles) effects which may arise from new or changed management settings, and identifies the scale and distribution of the costs and benefits of changes being considered. Social Impact Assessment (**SIA**) analyses, monitors and manages the social consequences (intended and unintended) of management changes. This information can inform the refinement of management options.

SEIA or SIA, in predicting the future effects of management options, can also assist in managing change. The use of SEIA or SIA can also be based on the recognition that particular management options may have adverse social and economic impacts on some sections of the community, and that impact management strategies may assist structural adjustment. SIA can positively affect the quality and the community acceptance of management responses.

(Note: This list does not preclude the use of alternative assessment methodologies. The use of assessment methods will be influenced by the data, time and resources available, and the complexity of the issues under consideration).

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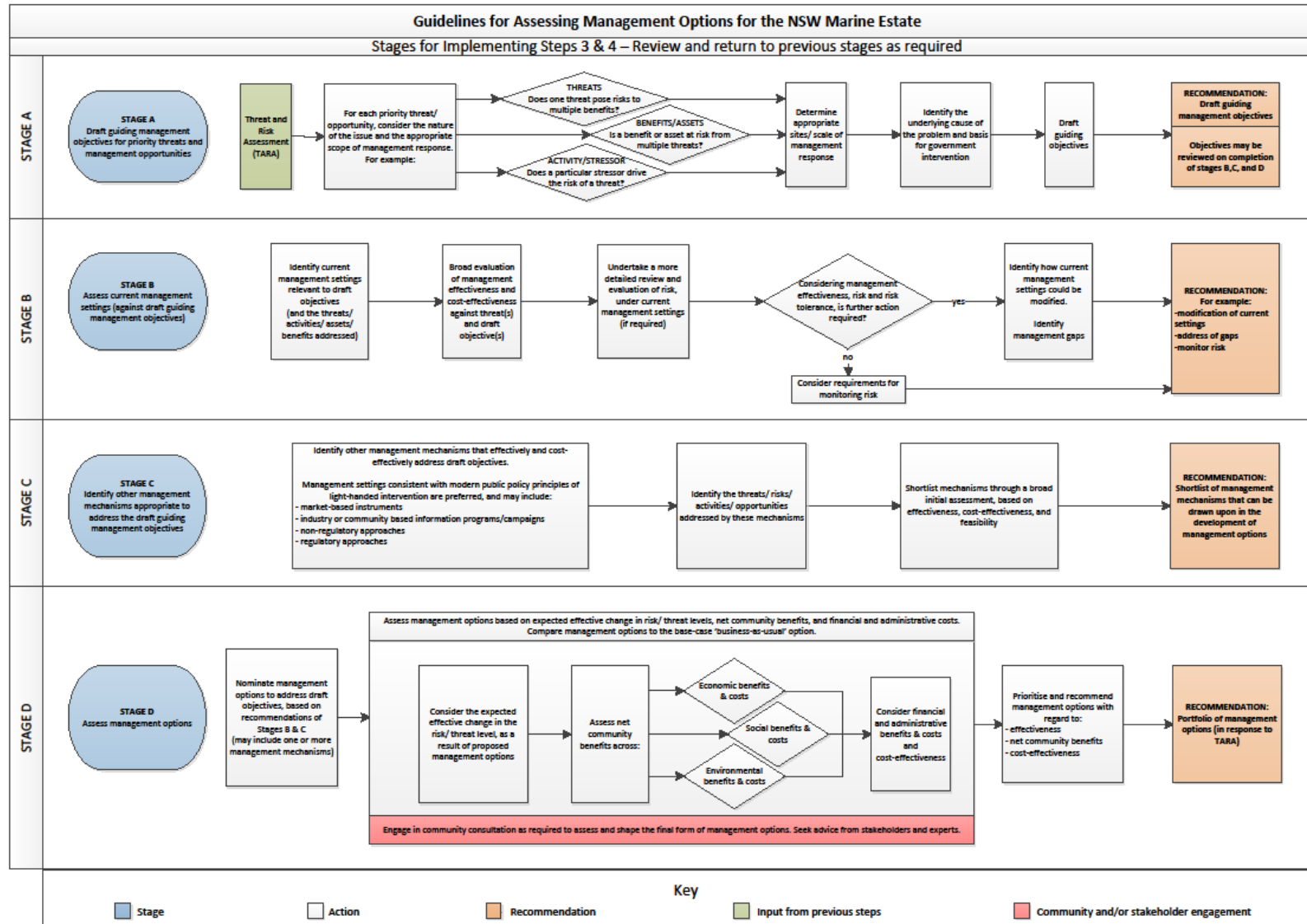
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APPENDIX A: STAGES A - D FLOWCHART

Figure 3. Stages for implementing Steps 3 & 4. Review and return to previous stages as required.



APPENDIX B: STAGES A - D TEMPLATES

DEMONSTRATION EXAMPLE

TEMPLATES A TO D (OF THE GUIDELINES FOR ASSESSING MANAGEMENT OPTIONS FOR THE NSW MARINE ESTATE)

KEY	
	Information available from the TARA
	Information to be collected from agencies
	Assessment by agencies
	Recommendation
<i>text</i>	<i>Guidance and examples</i>

The following templates provide example of completion of Stages A to D of the Guidelines for assessing management options for the NSW marine estate (Guidelines).

The four stages of assessment identified in the Guidelines recommend that practitioners ask:

- Stage A - what issues need to be addressed (in response to the TARA)?
- Stage B - what is being done already (and should it be modified) and where are the gaps?
- Stage C - what are additional/other mechanisms/tools that can be used?
- Stage D - do these options effectively and cost-effectively address risk and maximise net community benefits?

These templates provide an example of how each stage can be progressed. Each template is designed to produce a recommendation that will inform the next stage and that can be included in a final summary table. The sequence of stages, and of the activities within the stages, is not prescriptive. It is expected that stages will be reviewed and repeated as required. Templates should be viewed as worksheets within a workbook, with the earlier stages refined as further stages are undertaken.

In assessing and further developing management options that effectively and cost-effectively address threats and risks and that maximise net community benefits, an iterative assessment is appropriate. The depth of assessment is related to the stage of the assessment. The detail and accuracy of analysis increases as management options are further refined.

The Guidelines are not intended to be a manual with step-by-step instructions, but present a flexible, overarching framework for the process. They and the templates articulate a thorough and detailed methodology for assessing management options. The method, and depth of assessment, can and should be tailored to the circumstances within which options are to be considered.

STAGE A

DRAFT GUIDING MANAGEMENT OBJECTIVES FOR PRIORITY THREATS AND MANAGEMENT OPPORTUNITIES

Objectives should be consistent with the MEM Act, MEMA vision and principles

Priority threats/issues/activity or use	To assets/benefits	Priority issues to address issues - activities/stressors/interactions	Site/scale	Adequacy of evidence/knowledge gaps	Basis for government intervention	Draft/qualify guiding objective(s) (considering scope of management)
<i>Information from Threat and Risk Assessment</i>	<i>Information from Threat and Risk Assessment</i>	<i>Consider and prioritise the issues (activities/stressors/interactions from TARA) that require increased management focus including risk level and trend</i>	<i>Determine appropriate sites/scale of management e.g.</i> <ul style="list-style-type: none"> statewide regional local (site) 		<i>e.g.</i> <ul style="list-style-type: none"> over-exploitation resource use conflict under-investment in value-creation opportunities information failure risk to be observed & reacted to opportunity to simplify, repeal, reform or consolidate existing regulation NSW Government objective/priority 	<i>Threat, asset, activity, benefit management e.g.</i> <ul style="list-style-type: none"> to protect the benefits (of) by managing (resource-use conflict) of (asset, activities and/or stressor, benefits if/as appropriate) at (place/scale, if applicable)
Theme A						
Theme B						
Theme C etc.						

STAGE B

ASSESS CURRENT MANAGEMENT SETTINGS (AGAINST DRAFT GUIDING MANAGEMENT OBJECTIVES)

DRAFT GUIDING MANAGEMENT OBJECTIVE (FROM STAGE A):

Current management settings	Mechanisms (instruments/tools)	Priority issues (from/or refer to Table A)	Broad evaluation of management effectiveness and cost-effectiveness against threat(s) and draft objective(s)	Further risk evaluation (as required)	Recommendation
IDENTIFY			ASSESS		RECOMMEND
<i>e.g. overarching program/legislation/strategy (incl. initiatives and reforms underway or approved)</i>	<i>e.g. education, licensing, financial incentive.</i>	<i>threat/activity/asset and/or benefit to address</i>	<p><i>Identify:</i></p> <ul style="list-style-type: none"> <i>threat, activity, asset and/or benefit addressed by identified management setting</i> <p><i>Consider current management:</i></p> <ul style="list-style-type: none"> <i>appropriateness to draft guiding objective</i> <i>effectiveness in responding to the threat, considering trends</i> <i>reasons for management in/effectiveness, e.g. resourcing, implementation, external/influencing factors</i> <p><i>Identify:</i></p> <ul style="list-style-type: none"> <i>gaps, e.g. activities/stressors not addressed, priority sites excluded</i> <i>duplications, e.g. replicated effort, other programs (e.g. Commonwealth, local)</i> 	<p><i>More detailed review and evaluation of risk, against management setting (only as if required) potentially considering:</i></p> <ul style="list-style-type: none"> <i>predicted impacts of initiatives and reforms underway or approved</i> <i>information beyond TARA</i> <i>cumulative impacts</i> <i>evidence/uncertainty?</i> <i>legacy issues?</i> <p><i>Consideration of risk tolerance – consider acceptability of the identified level of risk.</i></p>	<p><i>e.g.</i></p> <ul style="list-style-type: none"> <i>continue current setting/mechanisms, or</i> <i>modify current setting/mechanisms, or</i> <i>address gaps, or</i> <i>research/monitoring, or</i> <i>combination of above</i> <p><i>OR</i></p> <ul style="list-style-type: none"> <i>no further action required</i>
Revised guiding objective					

STAGE C

IDENTIFY OTHER MANAGEMENT MECHANISMS APPROPRIATE TO ADDRESS THE DRAFT GUIDING OBJECTIVE

DRAFT GUIDING MANAGEMENT OBJECTIVE (FROM STAGE A):

Basis for government intervention	Mechanisms (policy tools/instruments)	Threats, risks, activities, opportunities addressed	Assessment of effectiveness, cost-effectiveness, and feasibility of identified mechanisms	Recommendation
<i>From Stage A</i>	<i>e.g.</i> <ul style="list-style-type: none"> • market-based instruments <ul style="list-style-type: none"> • tradeable property rights • government charges • subsidies reform • financial liabilities • information and awareness • voluntary (e.g. self-/quasi-/co-) regulation • regulation • public provision 		Assessment may consider where information is available: <ol style="list-style-type: none"> 1. effectiveness in addressing the management objective/s 2. community benefits being maintained (economic, social and environmental) 3. potential impacts to other benefits (economic, social and environmental) 4. unintended effects, e.g. ‘crowding out’, displacement effects 5. administrative costs and revenues 6. cost-effectiveness 7. compatibility with current legislative, policy and planning controls 8. compatibility with existing access arrangements, with the flexibility to be modified over time if required. 9. community acceptability 10. timeframes for implementation 	Shortlist of management mechanisms that can be drawn upon in the development of management options

STAGE D

ASSESS MANAGEMENT OPTIONS (POTENTIAL MANAGEMENT SETTINGS/MECHANISMS SHORT-LISTED IN STAGES B AND C)

Identify depth & range of assessment, appropriate to significance and scale of response (e.g. 5 years, 10 years, 20 years, absolute changes; NSW only or also site specific).

Note: this table can be populated with qualitative narrative, monetary values, financial administrative information only (where option outcomes are the same), or scaled values (see Guidelines - Box 2. Evaluation: benefits and costs).

DRAFT GUIDING MANAGEMENT OBJECTIVE (FROM STAGE A):

Base Case:			
Effective change in risk/threat levels		<i>Outline the anticipated change in risk from 'business-as-usual'</i>	
Economic (to community)	Benefits	<i>Consider 5/10/20 yrs, absolute changes</i>	<i>Comment on net benefits</i>
	Costs		
Social	Benefits		
	Costs		
Environmental	Benefits		
	Costs		
Financial (to Government)	Benefits	<i>Consider 5/10/20 yrs</i>	<i>Comment on cost-effectiveness</i>
	Costs		
Summary of relevant community feedback			
Summary		<i>Include advantages, disadvantages, trade-offs, risks</i>	
Recommendation:			
Comment on linkages with other options:			

Option X:			
Effective change in risk/threat levels		<i>Outline the anticipated change in risk, consider 5/10/20 yrs</i>	
Economic (to community)	Benefits	<i>Consider 5/10/20 yrs, absolute changes</i>	<i>Comment on net benefits</i>
	Costs		
Social	Benefits		
	Costs		
Environmental	Benefits		
	Costs		
Financial (to Government)	Benefits	<i>Consider 5/10/20 yrs</i>	<i>Comment on cost-effectiveness</i>
	Costs		
Summary of relevant community feedback			
Summary		<i>Include advantages, disadvantages, trade-offs, risks</i>	
Recommendation:			
Comment on linkages with other options:			

Option Y (if relevant):			
Effective change in risk/threat levels		<i>Outline the anticipated change in risk, consider 5/10/20 yrs</i>	
Economic (to community)	Benefits	<i>Consider 5/10/20 yrs, absolute changes</i>	<i>Comment on net benefits</i>
	Costs		
Social	Benefits		
	Costs		
Environmental	Benefits		
	Costs		
Financial (to Government)	Benefits	<i>Consider 5/10/20 yrs</i>	<i>Comment on cost-effectiveness</i>
	Costs		

Option Y (if relevant):	
Summary of relevant community feedback	
Summary	<i>Include advantages, disadvantages, trade-offs, risks</i>
Recommendation:	
Comment on linkages with other options:	

Narrative:

Stage A – management objective:

Stage B – assessment of current management settings:

Stage C - other management mechanisms identified:

Stage D – management options assessment:

APPENDIX C: MARINE ESTATE PRINCIPLES

Table 1. Underpinning principles for managing the NSW marine estate.

#	Principles
1	<p data-bbox="256 421 1145 454">Effective community engagement to identify and prioritise benefits and threats</p> <p data-bbox="256 501 1401 562">A feature of common property resources is that the incentives faced by individuals can lead to outcomes that are not in the interests of the broader community.</p> <p data-bbox="256 584 1434 741">Two things follow. First, a thorough understanding of the key community benefits derived from the NSW Marine Estate at the local, regional and state level is required, as well as threats to those benefits. Information on these benefits and threats will be achieved through ongoing and effective community engagement and expert input. A critical component of this first step will be to fully understand the benefits that the Estate provides to indigenous communities and to identify the best engagement strategies.</p> <p data-bbox="256 763 1342 853">Clear and accessible analysis and interpretation of these benefits and threats will build widespread community understanding of their relative importance and thereby encourage effective, ongoing, community input.</p> <p data-bbox="256 875 1426 936">Second, a challenge for management is to align the incentives faced by individuals with desired community outcomes. This is further explained in Principle 8.</p>
2	<p data-bbox="256 985 1106 1019">Identification of priority actions will be based on threat and risk assessment</p> <p data-bbox="256 1066 1417 1189">Management resources are limited. Management effort will therefore focus on those areas that make the best improvement to economic, social and environmental benefits for the community. It follows that ongoing assessment of the threats and associated risks to key community benefits provided by the NSW Marine Estate is required.</p>
3	<p data-bbox="256 1236 1366 1270">Values will be assigned to enable trade-off decisions between alternative uses of the Marine Estate</p> <p data-bbox="256 1317 1417 1473">A range of approaches will be used to make informed trade-offs between alternative uses of the Estate. When a trade-off is made, implicitly different values have been assigned to those alternative uses. It is important therefore that there be openness and transparency about these values. Furthermore, it will be imperative to have a common ‘value’ basis for comparison across the economic, social and environmental benefits associated with alternative uses.</p> <p data-bbox="256 1496 1426 1619">Many of the social and environmental benefits provided by marine ecosystems are crucial, but do not have an obvious value to enable ‘like for like’ comparison. Two dangers arise: (i) decisions may favour outcomes which have an obvious value; or (ii) community benefits that do not have an obvious value may be arbitrarily assumed to have a very high value and unnecessarily constrain alternative uses.</p> <p data-bbox="256 1641 1442 1798">To make informed and transparent trade-off decisions, values should therefore be made explicit from the outset, as well as the assumptions behind those valuations. Valuation techniques for biodiversity are subject to ongoing development and now enable us to assign values to benefits that are not obvious. This also applies to social benefits.⁹ However, where values cannot be quantified, qualitative assessments will be provided.</p>
4	<p data-bbox="256 1854 1326 1888">Best available information will be used in trade-off decisions, but judgment will still be required</p> <p data-bbox="256 1935 1401 1995">Changes to the NSW Marine Estate’s biodiversity and the community benefits it delivers may not be immediately obvious, particularly in the short-term. There are also considerable current knowledge gaps</p>

⁹ A technical paper on valuation techniques and their appropriate use will be developed by the Marine Estate Expert Knowledge Panel.

#	Principles
	and uncertainties about ecosystems, threats and the effectiveness of alternative management options. It follows that the valuation process outlined above can only ever provide part of the answer, and while best available evidence will be used in trade-off decisions, judgment will still be required.
5	<p>The well-being of future generations will be considered</p> <p>Assessment of community benefits and costs will explicitly consider the well-being of future generations. An important overarching sustainability principle is that future generations have a stake in inheriting an asset that is at least as valuable as it is for today's users.</p>
6	<p>Existing access arrangements will be respected</p> <p>While the NSW Marine Estate is largely a common property resource, various access rights and arrangements to the Estate already exist including but not limited to seascapes, diving, indigenous access and cultural heritage including sacred sites and shipwrecks, shipping routes, ports and infrastructure, recreational boating access and infrastructure, commercial fishing licences and other entitlements including aquaculture leases and recreational fishing access including recreational fishing havens. Future management of the Estate will recognise and respect existing rights and arrangements, but retain the option to modify them over time to maximise community benefits.¹⁰</p>
7	<p>The precautionary principle will be applied</p> <p>In response to uncertainty and information gaps, the precautionary principle will be applied and measures will be taken to avoid threats of unacceptable environmental damage. However, lack of full scientific certainty will not be sufficient reason for postponing action.</p> <p>This does not equate to a 'no risk' approach, but will involve careful evaluation to avoid serious and irreversible damage to the environmental values of the Estate and an assessment of the risk associated with alternative management options.</p> <p>Underlying a precautionary approach is the changing nature of the marine environment, either naturally or from man-made causes, which the people of NSW can do little about. A healthy and resilient marine ecosystem will, however, be better able to adapt to change and in so doing provide more benefit options for future generations.</p>
8	<p>Efficient and cost-effective management to achieve community outcomes</p> <p>Addressing challenges such as over-exploitation of the Estate will be a priority. Preference will be given to addressing these challenges through efficient and cost-effective management programs that align private incentives and behaviours with results desired by the community at relevant scales.</p> <p>Where government intervention is deemed appropriate, the best policy will be the one that meets policy goals most efficiently and at least cost. This will favour policies that directly address the causes of threats and which offer choice and flexibility in how outcomes can be achieved. Consistent with best practice, policies that are simple and involve less regulation will be favoured.</p>
9	<p>Management decisions will be transparent and adjust in response to new information</p> <p>To ensure transparency in management settings and the balance of community benefits they aim to achieve, clear and transparent analyses of management options will be made available to inform community input. Furthermore, because decisions will often be made under conditions of uncertainty and</p>

¹⁰ Any changes would be consistent with government policy and legislative and legal frameworks associated with defined and legally recognised property rights.

#	Principles
	imperfect information, management settings will be responsive to new information as it becomes available. Authority and Expert Knowledge Panel advice will be made public.
10	<p>Management performance will be measured, monitored and reported and information pursued to fill critical knowledge gaps</p> <p>Appropriate accountability for management performance will be critical. This will require monitoring, measurement of change and public reporting of the economic, social and environmental benefits derived from of the Estate. Monitoring the condition and use of the Estate will be necessary. This will be complemented by recommending strategically targeted research to fill critical knowledge gaps.</p>

Table 2. Principles for managing the NSW marine estate – facts, implications and challenges.

Facts	Implications/challenges	Principles applied
The Estate is largely an open access resource	Identify key community benefits (what the community wants) from the Estate and threats to those benefits	1. Effective community engagement, to identify and inform key benefits and threats
Management resources are limited	Management effort needs to be directed to where it produces most benefit to the community, for now and into the future	2. Identification of management priorities will be based on threat and risk assessment
Multiple benefits are derived from the Estate	Trade-offs between non-complementary uses will be necessary to maximise overall benefits to the community, now and into the future Some access rights have already been assigned	3. To evaluate trade-offs, values will be placed on alternative uses of the Marine Estate 4. Best available evidence will be used in trade-off decisions, but judgment will still be required 5. The well-being of future generations will be considered 6. Existing access rights will be respected
Knowledge gaps and uncertainty exist about ecosystems, threats and the effectiveness of management	Marine ecosystems can be damaged irreversibly	7. The precautionary principle will be applied
Management should be efficient, transparent and accountable	To maximise community benefits, management programs will align private incentives and behaviours with preferred community outcomes and be as light-handed and least cost as possible Monitoring, measurement and clear reporting of change in community benefits is required Management will need to adjust to new information as it emerges.	8. Efficient and cost-effective management to achieve community outcomes 9. Management decisions will be transparent and adjust in response to new information 10. Management performance will be measured, monitored and reported and information pursued to fill critical knowledge gaps.