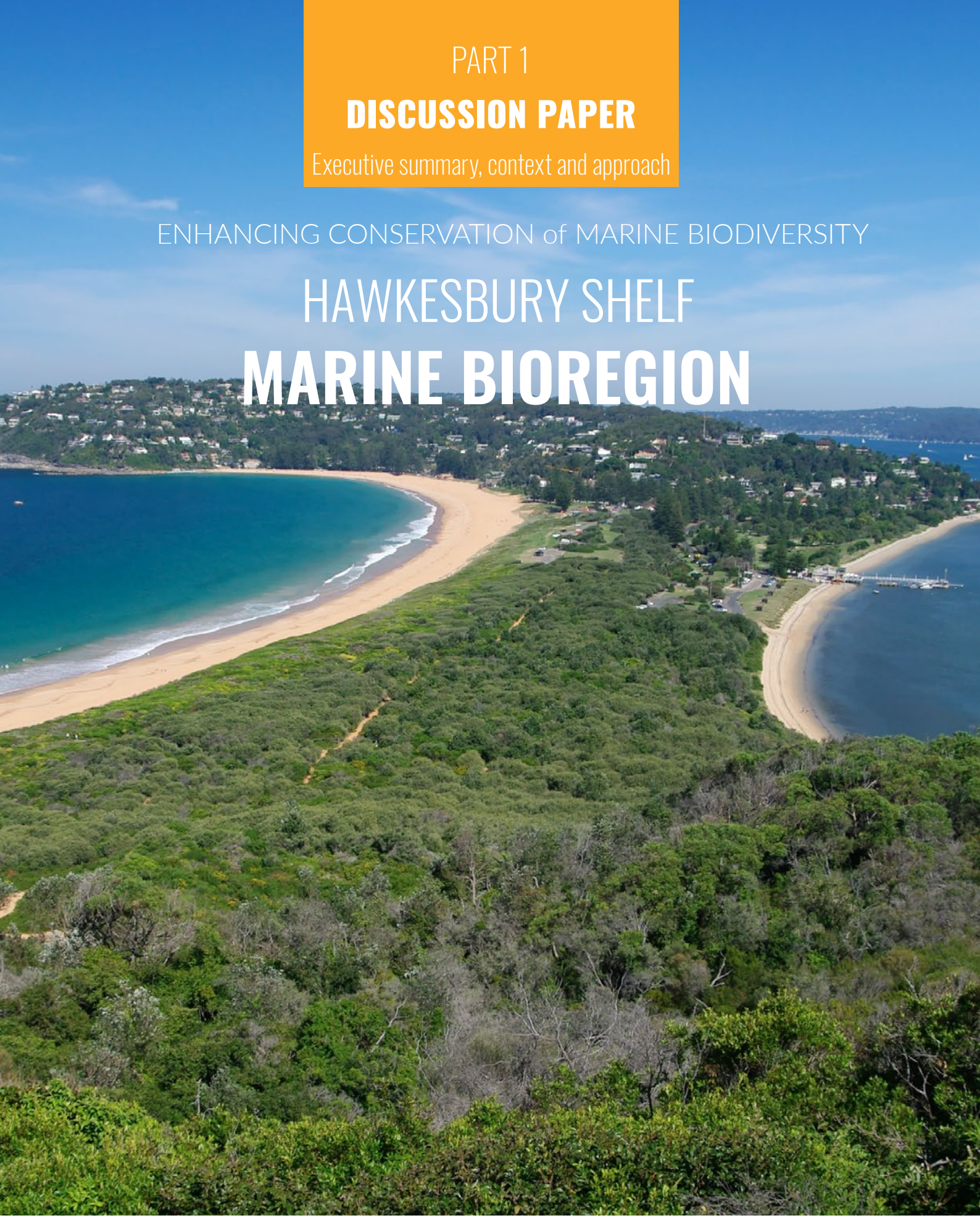
PART 1

DISCUSSION PAPER

Executive summary, context and approach

ENHANCING CONSERVATION of MARINE BIODIVERSITY

HAWKESBURY SHELF MARINE BIOREGION



NSW GOVERNMENT

Enhancing conservation of marine biodiversity – Hawkesbury Shelf marine bioregion – PART 1

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More information

NSW Marine Estate Management Authority
www.marine.nsw.gov.au

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Contents

1 Executive summary

The **Hawkesbury Shelf marine bioregion** (the bioregion) includes the estuaries, coastline and marine waters from Newcastle to Wollongong. The bioregion is renowned for its beauty above and below the water. Its beaches, bays and harbour are the 'blue backyard' for millions of NSW residents and an iconic and valuable part of the NSW marine environment.

This discussion paper describes how we propose to manage the priority threats that impact the **Hawkesbury Shelf marine bioregion**. The proposal includes establishing a marine park which will aim to enhance the conservation of marine biodiversity and maximise environmental, social, cultural and economic benefits to the NSW community. The proposed marine park will consist of a suite of management changes at 25 discrete or non-contiguous sites to provide localised reductions in risk from some threats to enhance community benefits.

The marine park proposal is in addition to and will complement the initiatives under the *Marine Estate Management Strategy 2018–2028* (the Strategy). The Strategy addresses priority threats to the NSW marine estate identified in the statewide Threat and Risk Assessment (TARA).

The discussion paper is presented into two parts:

- **Part 1 (this document)** – outlines the context and approach for enhancing marine biodiversity in the bioregion
- **Part 2** – is the site proposal which describes the proposed management at 25 discrete sites within a marine park in the bioregion.The proposal meets the requirements of the *Marine Estate Management Act 2014* which guides how the marine estate is to be managed in NSW. The draft site objectives, described in this paper align with the objects of the Act.

Zones will be used to manage the network of 25 sites within the proposed marine park. The zones proposed to be used for management are listed below. The zones may change depending on community feedback and the outcome of the final marine park, to ensure the appropriate zone type is used to attain the site objectives.

- **Sanctuary zones** are proposed to enhance biodiversity at a site and also deliver a range of other environmental, social, economic and cultural benefits depending on the objectives for the particular site. A range of activities can occur within this zone type including scuba diving, snorkelling, swimming and boating. Fishing and other extractive activities are restricted unless otherwise authorised for example research and monitoring or Aboriginal cultural use.
- **Conservation zones** are proposed to enhance some aspects of biodiversity at a site while also delivering economic benefits that are consistent with ecologically sustainable development, specifically Aboriginal cultural use, and lobster and abalone fishing by commercial and recreational fishers.
- **Special purpose zones** are proposed to address a particular threat or enhance a particular use at a site. For example, to provide for recreational fishing or scuba diving only at a site (to reduce potential for social conflict) or protect intertidal species to address moderate risks from recreational hand gathering.

The Marine Estate Management Authority (the Authority) is seeking your views about the sites and the management changes proposed at each.

Your input to this discussion paper will inform the final marine park proposal that will be considered by the NSW Government later in 2018. Existing management rules will remain in place, and none of the proposals in this discussion paper will be implemented until the NSW Government announces the outcome.

2 Purpose of this discussion paper

This discussion paper provides **an update on the Hawkesbury Shelf marine bioregion assessment**, outlines the management responses to priority threats, and **seeks your feedback** on the proposal.

More than 6.3 million people live near coastal waters in this bioregion. It extends from Stockton (Newcastle) in the north to Shellharbour (near Wollongong) in the south and includes the coastline, estuaries, coastal lakes and lagoons, beaches and ocean waters out to the continental shelf, although this proposal focuses on NSW state waters to three nautical miles from the coastline.

The proposal has been developed by the Marine Estate Management Authority (the Authority) in consultation with community, government and expert stakeholders. The aim is to enhance the conservation of marine biodiversity in the Hawkesbury Shelf marine bioregion while achieving balanced community outcomes, including opportunities for a wide range of recreational and commercial uses. This balance inevitably involves judgement and trade-offs.

Spatial management changes at 25 sites (Figure 1) are proposed in Part 2 to reduce some risks and enhance community benefits.[1] These proposals complement the nine initiatives of the *NSW Marine Estate Management Strategy 2018 – 2028* (the Strategy), which along with existing management arrangements, deliver the vision of *'a healthy coast and sea, managed for the greatest wellbeing of the community, now and into the future'*[2]. Many of the priority and cumulative threats (to the benefits) outlined in this discussion paper will be addressed through the Strategy and also complement existing management arrangements.

Your feedback will be used to identify benefits and costs to the community and to assist in finalising the proposals, including evaluating the trade-off decisions involved.

Table 1. Structure of the discussion paper

HAWKESBURY SHELF MARINE BIOREGION DISCUSSION PAPER		
PART 1	Enhancing conservation of marine biodiversity – Hawkesbury Shelf marine bioregion	Outlines the context and approach for enhancing marine biodiversity while achieving balanced community outcomes
PART 2	Marine park site proposals	Provides a summary of the network, including environmental, cultural, social and economic benefits, the threats to these benefits and management options to enhance benefits and manage the priority threats

[1] Marine Estate Management Authority (2017). Marine protected areas within the NSW marine estate – their role and purpose

[2] Managing the NSW Marine Estate: Purpose, Underpinning Principles and Priority Setting (MEMA 2013)

2.1 HAVE YOUR SAY

You are invited to provide feedback through an online submission form available at www.marine.nsw.gov.au.

Alternatively, you can post your submission to:

Submission – Enhancing conservation of marine biodiversity in the Hawkesbury Shelf marine bioregion – Discussion paper
NSW Marine Estate Management Authority
Locked Bag 1
Nelson Bay NSW 2315

More information to inform your submission is available on the NSW marine estate website **www.marine.nsw.gov.au.**

If you have any queries, you can email **contact.us@marine.nsw.gov.au**.

The Authority may publish your submission unless you advise otherwise. Publication of submissions will usually include your name and the name of your organisation, if relevant. The Authority will remove contact details such as your email address, postal address and telephone number. At the Authority's discretion, some submissions (or part of submissions) may not be published due to their length, content, appropriateness or confidentiality. All submissions received could be disclosed, if requested, in accordance with the *Government Information (Public Access) Act 2009*.

Questions in the online submission form

General questions

The proposed marine park in combination with the Marine Estate Management Strategy effectively address the identified priority threats and enhance benefits, in particular marine biodiversity conservation in the bioregion (*choose from Strongly Agree*, *Agree*, *Neutral*, *Disagree*, *Strongly Disagree*) Why?

Provide general comments on the proposed network of sites (*free-form text box and option to upload a file*).

For each of the 25 proposed sites

How do you use or what benefits do you gain from this site? (*List of check boxes*)

Are there any positive outcomes you anticipate from the proposed management changes at this site?

Are there any negative outcomes you anticipate from the proposed management changes at this site?

Evaluation questions

Was the submission form (this survey) easy to understand? (*yes/no*, *comment*)

Did the submission form (this survey) allow you to say what you wanted to say about the proposed network as set out in this discussion paper? (*yes/no*, *comment*)

Other

Would you like to be kept informed about marine estate reforms, news and community engagement opportunities? (*yes/no*)

2.2 WHAT'S NEXT?

Your input to this discussion paper will inform the final spatial management proposal to enhance conservation of marine biodiversity in the bioregion. The NSW Government will consider the final proposal later in 2018. Existing management rules will remain in place, and none of the proposals in this discussion paper will be implemented, until the NSW Government announces the outcome.

The *Marine Estate Management Strategy 2018–2028* (the Strategy) incorporates consultation on the broader suite of measures to address threats to the environmental assets of the bioregion.

3 Background

The NSW Government tasked the Authority with providing advice on options to **enhance marine biodiversity in the Hawkesbury Shelf marine bioregion while achieving balanced community outcomes, including opportunities for a wide range of recreational and commercial uses.**

More information about the process, along with supporting information, is available at the NSW marine estate website at **https://www.marine.nsw.gov.au/key-initiatives/hawkesbury-shelf-marine-assessment** and summarised in Appendix 1.

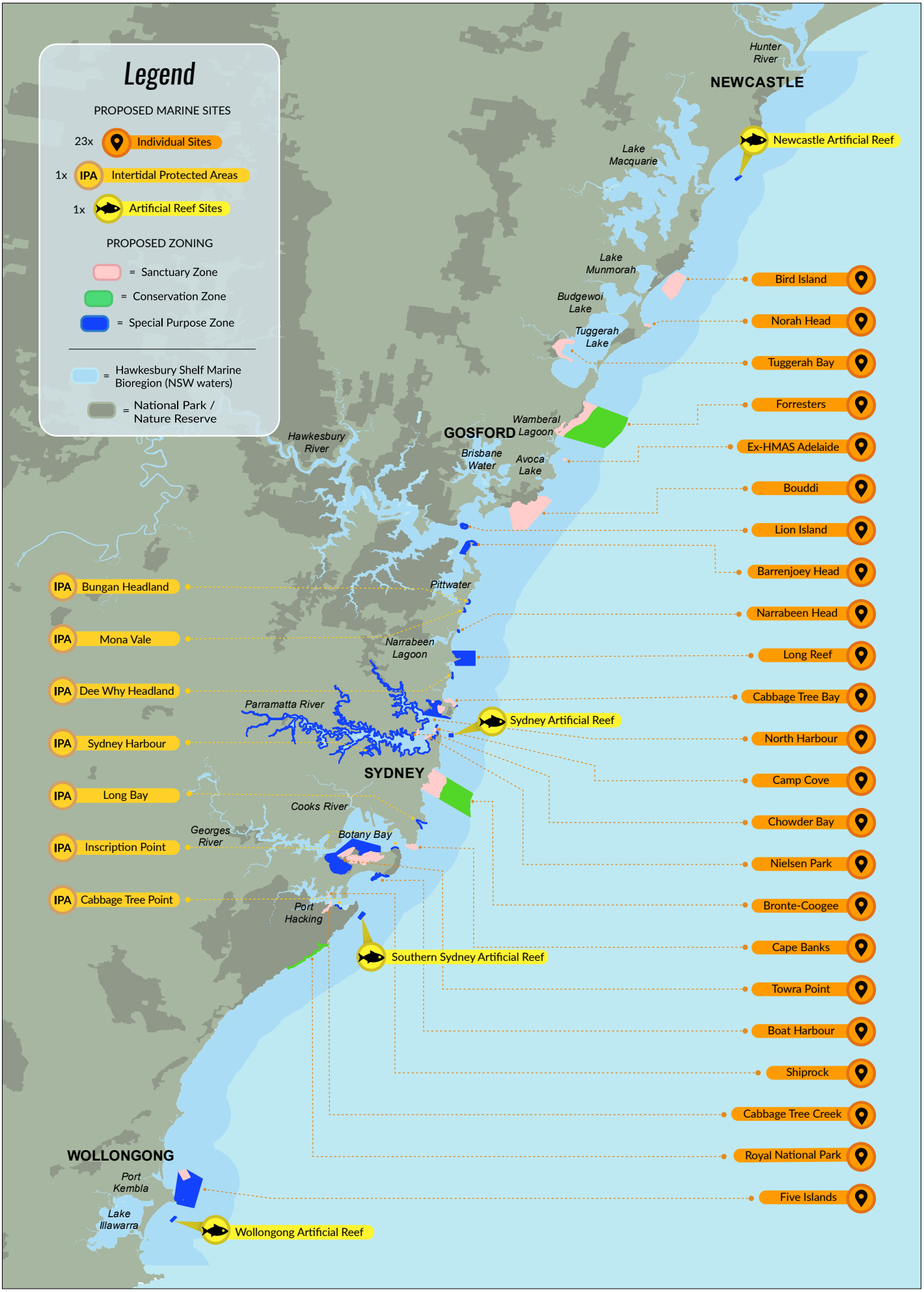


Figure 1. Overview of proposed marine park in the Hawkesbury Shelf marine bioregion

4 Responding to priority threats

Priority threats were identified as part of the NSW Marine Estate Threat and Risk Assessment (TARA). The TARA ranked priority threats to the environmental assets and the social, cultural and economic benefits derived from the NSW marine estate (Table 2). Threats were recognised as a priority if they were assigned a risk level of moderate or high. Focusing management effort towards these threats also ensures key environmental, social, cultural and economic benefits are realised and contributes to community wellbeing.

The **primary response** to address priority threats is the *Marine Estate Management Strategy 2018–2028* (the Strategy), which sets an over-arching strategy for the NSW Government to coordinate the management of the marine estate with a focus on achieving the objects of the *Marine Estate Management Act 2014*. The Strategy responds to the TARA by setting out management initiatives to reduce the priority statewide and cumulative threats and risks to community benefits.

Further details on the Strategy can be found on the marine estate website: **www.marine.nsw.gov.au**.

The Strategy includes the following nine initiatives:
Improving water quality and reducing litter – by reducing land-based runoff through on-ground habitat restoration, improved land-use planning, and litter reduction initiatives.

- **Delivering healthy coastal habitats with sustainable use and development** – by reducing the cumulative impacts of existing and future coastal and agricultural development on habitats through better coordinated planning, policy and legislative mechanisms and delivery of improvements to fish passage at priority coastal barriers.
- **Planning for climate change** – by strengthening our understanding of how the marine estate will respond to a changing climate, which will better prepare NSW for the impacts of climate change on the marine estate by informing decision-making and supporting adaptation planning.
- **Protecting the Aboriginal cultural values of the marine estate** – by increasing Aboriginal participation in management decisions within the marine estate and involvement in management of Sea Country to support the continuation of Aboriginal culture in NSW.
- **Reducing impacts on threatened and protected species** – by improving the coordination, reporting, data sharing, research, compliance and community awareness of the priority threats to threatened and protected species and taking actions in partnership with others to reduce them.

- **Ensuring sustainable fishing and aquaculture** – by developing and implementing harvest strategies for high and moderate risk commercial fisheries identified as priority threats to fish communities and threatened and protected species, and undertaking an environmental impact statement on recreational fishing. Impacts of aquaculture on seagrass and marine habitats will also be managed through Sustainable Aquaculture Strategies.
- **Enabling safe and sustainable boating** – by reducing the impacts of moorings and boating infrastructure on seagrass and other marine habitats and piloting water quality improvements from boating by addressing recreational vessel cleaning, anti-fouling and lack of sewage pump out facilities.
- **Enhancing social, cultural and economic benefits** – by addressing threats to social, cultural and economic benefits alongside environmental benefits. It includes improving understanding of current and future use of the marine estate, public access and reducing user conflicts as well as developing the Marine Integrated Monitoring Program.
- **Delivering effective governance** – by securing a commitment from all layers of government to coordinate their management of the marine estate, streamlining marine planning and operations, and strengthening community participation in decision making.

Some threats that were identified as priorities for the Hawkesbury Shelf marine bioregion were not recognised as statewide threats. These include threats that operate at a local or regional scale only, such as threats associated with large commercial vessels and related port infrastructure, which are largely confined to the bioregion.

Table 2 lists priority threats that the TARA identified as impacting the central region (Hawkesbury Shelf marine bioregion); some of these threats may be managed in part using spatial management in the form of a marine park. Those not identified as being managed by spatial management will be managed through the Strategy. A small number of priority threats to the bioregion that were not identified as statewide priorities are also identified. The Authority will consider the need for further management responses to these regional threats and the community will be consulted if any changes are proposed.

Table 2. Ranked priority threats to environmental, social, cultural and economic benefits in the Hawkesbury Shelf marine bioregion

* indicates threats to be addressed using spatial management in the bioregion
\+ indicates priority threats in the bioregion that are not recognised as statewide threats

	Ranked priority threats to environmental assets of the bioregion
1	Urban stormwater discharge
2	Foreshore development
3	Estuary entrance modifications (in estuaries)
+ 4	Shipping – large commercial vessels and associated port activities and industries (trade ships, cruise ships, etc.)
5	Agricultural diffuse source runoff (in estuaries)
6	Clearing riparian and adjacent habitat including wetland drainage
* 7	Climate change 20 years
* 8	Recreational boating – boating and boating infrastructure (in estuaries)
9	Sewerage effluent and septic runoff
10	Navigation and entrance management and modification, harbour maintenance, etc.
11	Modified freshwater flows (in estuaries)
+ 12	Industrial discharges (in estuaries)
13	Recreation and tourism – four-wheel driving
14	Stock grazing of riparian and marine vegetation (in estuaries)
+ 15	Small commercial vessels (ferries, charter boats, whale watching vessels, fishing vessels, etc.) (in estuaries)
16	Beach nourishment and grooming
+ 17	Service infrastructure – pipes, cables trenching and boring (in estuaries)
* 18	Recreational fishing – shore-based line and trap fishing
* 19	Recreational fishing – boat-based line and trap fishing
20	Recreation and tourism – passive recreational use
+ 21	Thermal discharges (in estuaries)
* 22	Commercial fishing – ocean trawl
+ 23	Recreation and tourism – shark control measures
* 24	Commercial fishing – estuary general (in estuaries)
25	Oyster aquaculture (in estuaries)
* 26	Recreational fishing – hand gathering
+ 27	Mining and extractive industries (in estuaries)
* 28	Commercial fishing – ocean trap and line (in coastal and marine waters)
+ 29	Shipping – small commercial vessels (ferries, charter boats, commercial fishing, whale watching, etc.) (in coastal and marine waters)
* 30	Commercial fishing – ocean haul (in coastal and marine waters)
*+ 31	Commercial fishing – sea urchin and turban shells (in coastal and marine waters)
32	Charter activities – charter whale and dolphin watching (in coastal and marine waters)

	Ranked priority threats to social, cultural and economic benefits derived from the bioregion	
1	Water pollution on environmental values – urban stormwater discharge	
2	Water pollution on environmental values – agricultural diffuse source runoff	
3	Water pollution on environmental values – litter, solid waste, marine debris and microplastics	
4	Sediment contamination (toxicants in sediment; dioxins in Sydney Harbour, Cooks River)	
5	Inadequate social and economic information	
6	Anti-social behaviour and unsafe practices	
7	Limited or lack of access infrastructure to the marine estate	*
8	Lack of compliance with regulations (by users) or lack of compliance effort (by agencies) [3]	*
9	Reductions in abundances of species and trophic levels	*
10	Climate change stressors 20 years	*
11	Inadequate, inefficient regulation, over regulation (agencies)	*
12	Overcrowding/congestion	
13	Seafood contamination	
14	Loss of public access (either by private development or Government area closures)	
15	Pests and diseases	
16	Conflict over resource access and use	*
17	Habitat (physical) disturbance	*
18	Modified hydrology/hydraulics and flow regime	
19	Wildlife disturbance (shorebirds, turtles, whales) and impacts to ecological health by dog walkers, four-wheel driving, marine vessels, etc.	*
20	Lack of community awareness of the marine estate, associated threats and benefits, regulations and opportunities for participation	*
21	Loss or decline of marine industries	
22	Water pollution on environmental values – septic runoff, point source pollution and sewage overflows (such as outfalls, Sewage Treatment Plants, etc.)	
23	Lack of or ineffective community engagement or participation in governance	*
24	Other water pollution and contamination affecting human health	
25	Excessive or illegal extraction	

[3] 'effort' is linked to availability of resources

4.1 WHAT IS SPATIAL MANAGEMENT?

Spatial management refers to site-based management that can be used to promote, regulate or control activities to manage threats to social, cultural, economic or environmental values. Site-based management is typically implemented through regulation.

Spatial management can be used to reduce resource-use conflict by providing dedicated areas for different uses, or by restricting the activities of one user group if they detrimentally impact other users. Examples of spatial management include regulating the use of vessels to reduce bank erosion, noise or anchoring impacts, access restrictions for vehicles and dogs on beaches, marine parks and aquatic reserves, recreational fishing havens and fishing closures, among others.

Spatial management can complement other management measures to reduce threats to the social, cultural, economic and environmental benefits of the marine estate to maximise community wellbeing.

CURRENT SPATIAL MANAGEMENT IN THE BIOREGION

Spatial management in the Hawkesbury Shelf marine bioregion currently includes aquatic reserves, national parks and nature reserves, intertidal protected areas, fishing closures and other forms of recreational fishing controls, recreational fishing havens, boating controls, compliance and enforcement, scientific reference sites, land-use planning policies and critical habitat sites for listed threatened species (Greynurse Shark critical habitat at Magic Point near Maroubra and Little Penguin critical habitat at North (Sydney) Harbour).

Eleven existing marine protected areas in the bioregion address some threats. Spatial management is generally not an effective or efficient mechanism to address the majority of the major threats to the biodiversity of the bioregion identified through the TARA (see Table 2). For example, marine spatial management is a very indirect means of addressing threats from urban stormwater discharge, foreshore development, estuary entrance modification, shipping, diffuse source water pollution, sewerage effluent and septic runoff, climate change stressors such as sea level rise, and industrial discharges. Spatial management can be effective if it aims to streamline and simplify site-based regulatory controls.

WHAT ARE THE BENEFITS COMMUNITIES DERIVE FROM THE BIOREGION?

There are four categories of benefits that communities derive from the bioregion: social, cultural, economic and environmental benefits (Table 3).

Social benefits are benefits that the community derives from the bioregion associated with human interaction and relationship with the environment.

Cultural benefits are associated with Aboriginal cultural heritage and use such as traditions, cultural practices and language.

Economic benefits are benefits derived by the community from the bioregion that are of an economic or financial nature.

Environmental benefits are the physical and biological elements of the marine estate (for example, habitat and associated biodiversity).

Table 3. Social, cultural, economic and environmental benefits the community derives from the Hawkesbury Shelf marine bioregion

		BENEFITS
Social		**Participation (safety, health and wellbeing)** – the bioregion offers opportunities for activities such as diving, swimming, recreational boating and fishing; these activities are important to our physical and mental health and sense of place and belonging to each other within our community. The health and wellbeing benefits that the natural environment provides are indirect and can be a significant contributor to quality of life for individuals and communities.
		**Participation (socialising and sense of community)** – the bioregion provides outstanding experiences for local communities and visitors that relate to the benefits of socialising and sense of community with family and friends; for example, scuba diving, snorkelling, fishing, taking in the spectacular coastal views, or nature watching. Being in nature allows people to connect to each other and enhance relationships between people that involve nature.
		**Enjoyment – biodiversity and beauty (social intrinsic benefit)** – the bioregion contributes to community wellbeing in many ways, including through the diversity of plants and animals living in marine ecosystems and the natural beauty of the marine estate. A healthy bioregion enhances community connection with an appreciation of the marine environment. Caring for nature is important for the wellbeing of others, in particular where values and beliefs about marine resources are shared. Environmental knowledge and awareness is an important component of enjoying the biodiversity and beauty of the marine estate. This includes the benefits of scientific reference sites, education and learning.
		**Scientific reference sites** – provides baseline monitoring areas that contribute to expanding scientific understanding through research and monitoring. This understanding can increase people's enjoyment and appreciation of the bioregion. These sites also have intrinsic and bequest values.
		**Education and learning** – promoting place-based learning, such as in Long Reef Aquatic Reserve, improves environmental awareness and knowledge about the bioregion. This understanding typically has positive impacts on other social values, provides opportunities for interaction with the bioregion, and fosters a sense of environmental stewardship.
		**Enjoyment – consumptive use (e.g. catching a fish)** – the enjoyment benefit of consumptive or extractive use is most obviously experienced by those sectors that value or rely on extractive use such as catching fish for recreational or commercial uses. There are mental and physical wellbeing benefits associated with fishing, employment and income, and there are potential health benefits associated with seafood consumption and active lifestyles.
Cultural		**Aboriginal cultural heritage and use** – is reflected in tradition, cultural practices, language, stories and significant places, including Aboriginal cultural uses. This knowledge is passed on through generations to ensure continuity of culture. The bioregion includes the Sea Country of several Aboriginal nations who derive both tangible and spiritual benefits from their relationship with Sea Country, with cultural fishing for community health and wellbeing a significant benefit.

BENEFITS		
Economic		**Indirect values (intrinsic and bequest)** – nature is part of people's belief and value system and many people value nature in the bioregion for its own sake, not only because it benefits human life – nature has an intrinsic value. Bequest value is the value of knowing that resources in the bioregion will be available for future generations to enjoy and appreciate, and as such is a fundamental part of intergenerational equity.
		**Viability of businesses (employment and value of production)** – the bioregion provides a livelihood for many from businesses such as fishing, aquaculture and marine tourism. Marine industries deliver a range of social and economic benefits to community wellbeing, including active employment, fresh seafood and opportunities for nature-based tourism. Marine businesses can contribute significantly to local economies.
		**Direct values (individual enjoyment)** – can be gained from activities such as bird and whale watching and swimming. There is economic benefit related to enjoyment where the value of the benefit is greater than the economic cost of the activity to the user.
Environmental		**Estuarine and ocean waters** – this refers to the habitat of the water column that exists vertically between the seafloor and the water surface and horizontally between the mean high water mark on the coastline and 3 nautical miles seaward.
		**Saltmarsh** – refers to species of herbaceous plants and low shrubs that can tolerate high soil salinity and at least occasional flooding by seawater. Saltmarsh provides habitat and food for fishes, birds, mammals, insects, and invertebrates and contributes to the base of estuarine food chains through decomposition of vegetation.
		**Seagrass** – provides habitat for a diverse range of flora and fauna, including invertebrates (such as crabs, bivalves), algae and fishes. These areas are an important habitat for juvenile stages of commercially and recreationally important species (such as snapper, yellowfin bream). They contribute to coastal productivity, act as carbon stores, regulate nutrients, and affect water clarity by stabilising sediments.
		**Beaches and mudflats** – are important habitats for a diverse range of faunal communities, forming a key part of the marine food chain. Invertebrates and other important prey species dominate subtidal areas, which are spawning, nursery, nesting, rookery and feeding areas for many marine organisms.
		**Mangroves** – are found mostly in soft sediment areas in sheltered parts of estuaries. This habitat is high in biodiversity and provides important ecosystem functions, including stabilising sediments, supplying organic matter to the soil, maintaining water quality, and acting as a buffer between the sea and land.
		**Shallow soft sediments** – these habitats are extensive throughout NSW marine waters, and are likely to be the dominant habitat in most sections of the coast and estuaries. Shallow soft sediments perform essential ecosystem functions such as the breakdown of organic matter, release of nutrients to the water column, and removal of nitrogen.
		**Deep soft sediments** – these habitats are extensive throughout NSW marine waters and are found in deeper coastal waters than shallow soft sediments (> 25 metres in depth). These areas provide habitat for a similar assemblage of species to those found in shallow soft sediments (such as invertebrates, fishes, crabs, sharks, marine plants), and provide similar ecosystem functions (such as nutrient recycling).

BENEFITS		
Environmental		**Rocky shores** – are common along the NSW coastline and are adjacent to most rocky headlands. Rocky shores are important habitat for seaweed and many invertebrates (such as oysters, crabs, sea urchins, starfish). A range of fish species are also commonly found in rock pools. Many of the migratory shorebirds that use the beaches and tidal mud flats use rocky shorelines for roosting, and other shorebirds and seabirds use rocky shores as feeding, nesting and foraging sites.
		Shallow reefs – are found adjacent to most headlands along much of the coast in depths up to 25 metres. Shallow reefs contain a diverse assemblage of marine plants, fishes, sharks, rays and invertebrate species.
		Deep reefs – include rocky reefs deeper than 25 metres. They are inhabited by dominant habitat-forming biota (such as sponges) and support a wide diversity of invertebrates and fish.
		Planktonic assemblages – are made up of microscopic plants (phytoplankton), animals (zooplankton and larval stages of other organisms), and microbes (bacteria and protists), collectively known as plankton that live in the water column. Plankton is the basis of most marine food chains, fundamentally supporting primary and secondary production. It is important food for many invertebrates, fishes and some species of whale.
		Fish assemblages – marine fishes of NSW are diverse, often habitat specific, and have large variations in the extent of movement either seasonally or all year round. They occupy a range of habitats, principally rocky reefs or soft sediments, across a depth range from shallow rock pools to depths of up to around 100 metres within state coastal waters. Fish contribute to the functioning of most marine ecosystems influenced by their abundance and level in the food web. Many species of fish are harvested or caught as bycatch in the coastal and estuarine waters of the bioregion as part of commercial and recreational fisheries.
		Species and communities protected under the *Fisheries Management Act 1994* – includes threatened species such as the Greynurse Shark, White Shark, and Black Rockcod, and protected fish such as sygnathiformes (seahorses, seadragons, pipefish, pipehorses).
		Species protected under the *Biodiversity Conservation Act 2016* – includes marine mammals (whales, dolphins, and seals), marine reptiles (turtles, sea snakes), shorebirds (such as oystercatchers, plovers, sandpipers, herons), seabirds (such as petrels, albatrosses, shearwaters), and threatened species (such as Little Penguin).
		Biodiversity – is the variety of living animal and plant life from all sources, and includes diversity within and between species and diversity of ecosystems.

WHAT THREATS CAN SPATIAL MANAGEMENT ADDRESS TO ENHANCE BENEFITS?

Threats that spatial management can address to enhance environmental, social, cultural and economic benefits the community derives from the bioregion are summarised in Tables 4 and 5.

Table 4. Moderate and high threats to ENVIRONMENTAL benefits proposed to be addressed by spatial management (summarised from the statewide TARA – bioregion findings)

LEGEND *(identified as):* Moderate Risk | High Risk | **e** estuaries | **cm** coast & marine

ENVIRONMENTAL	Clean waters	Estuarine and marine habitats, assemblages and associated biota												Threatened and protected species	
ACTIVITY/THREAT	Estuarine and ocean waters	Saltmarsh	Mangrove	Seagrass	Beaches and mudflats	Beaches	Shallow soft sediments	Deep soft sediments	Rocky shores	Shallow reefs	Deep reefs	Planktonic assemblages	Fish assemblages (harvest and bycatch)	Species & communities protected under FMA	Species protected under BCA
	ASSET														
Climate change (over the next 20 years)	e	e								cm		e cm		e	e cm
Boating & boating infrastructure	e			e	e		e		e	e				e	e
Fishing (recreational)*													e cm	cm	e cm
Fishing (commercial)*							cm						e cm	cm	e cm

FMA – Fisheries Management Act 1994; BCA – Biodiversity Conservation Act 2016.

* Some fishing methods pose a minimal or low risk to the marine estate. Key examples include the lobster and abalone fisheries, spear fishing and Aboriginal cultural fishing.

Climate change

Impacts from **climate change** are cumulative, compounding the effect of other activities currently affecting the marine estate. Climate change is a global stressor, meaning that the threats cannot be controlled at a local scale. Regardless, spatial management can improve the ecological resilience of habitats and species to the impacts of climate change.

Boating and boating infrastructure

Impacts on water quality from **boating and boating infrastructure** are driven by pollution resulting from spills of chemicals, fuel, or oil, anti-fouling paints, sewerage and greywater discharges and vessel operation and associated infrastructure. These threats will be addressed via the Strategy and current management controls via regulation.

The impacts of **boating and boating infrastructure** on *habitats*, *assemblages and associated biota* are most prevalent in seagrass, beaches and mudflats, shallow soft sediments, rocky shores and shallow reefs in estuaries. Habitats dominated by soft sediments and seagrass are susceptible to sediment contamination, associated with antifouling paints and runoff from marinas, and physical disturbance from boat moorings, anchoring and the construction of ports and related infrastructure. The invertebrate species inhabiting the contaminated sediments are vulnerable to bioaccumulation, significantly impacting the marine food web. Habitats dominated by rocky substrates (rocky shores and shallow reefs) and the species inhabiting them are impacted by physical disturbance from anchoring.

The impacts of **boating and boating infrastructure** on *wildlife (including those species and communities protected under the Biodiversity Conservation Act 2016 and the Fisheries Management Act 1994*) are driven by physical disturbance (from vessel strikes), wildlife disturbance (from vessel noise), and marine debris (through ingestion or entanglement). These stressors can result in shifts in habitat use and feeding behaviour, reductions in health, abundance, distribution and increased injury or death.

Spatial management techniques that can help to reduce the impacts of **boating and boating infrastructure** include rules to address specific stressors, such as closures to boating or anchoring, speed limits in sensitive environments to reduce vessel wildlife strike or wash, or the construction of new boating infrastructure to provide refuge areas for marine organisms and reduce risks associated with vessel strike.

Fishing activities

The impacts of **fishing activities** on *habitats*, *assemblages*, *and associated biota* are most prevalent in deep soft sediment habitats and on the abundance and structure of some fish assemblages. Impacts result from harvest of invertebrate species on intertidal and shallow reefs and mudflats from trapping, line fishing and hand gathering (such as saltwater nippers, cunjevoi, reef fish), and incidental bycatch of non-target species (particularly of fish). Overall, fishing can result in measurable changes in the fish assemblage reflected in both the abundance and size structure of fish assemblages. These key stressors associated with **fishing activities** can reduce biodiversity and contribute to site scale/area changes to fish assemblages, marine organism abundances and trophic levels. Spatial management can complement other fishing management to reduce these impacts at a site or local scale.

The impacts of **fishing activities** on *wildlife (including those species and communities protected under the Fisheries Management Act 1994* and the *Biodiversity Conservation Act 2016*) are driven by disturbances to marine mammal and marine reptile breeding or resting areas, disturbance of shorebird nesting, foraging, and roosting habitat and injury through entanglement in or ingestion of fishing gear or incidental catch. These species can also be impacted indirectly through changes in the food web due to the reduced abundance of prey species that are fished. The TARA for the bioregion found that some fishing methods – such as lobster and abalone fishing, spear fishing, and Aboriginal cultural fishing – present a minimal or low risk to the marine estate.

Spatial management can support other measures to address key priority stressors related to **fishing activities**, such as *wildlife disturbance*, at a site or local scale. Spatial closures of key breeding and foraging areas provide a refuge area for marine organisms and reduce the risks associated with *wildlife disturbance* and *incidental bycatch*; closures to certain fishing gear reduce impacts on threatened and protected species. Key stressors that can be effectively mitigated through spatial management include reductions in abundance of harvested species, particularly reef and rocky shore invertebrates, sedentary finfish, and wildlife disturbance.

Table 5. Moderate and high threats to SOCIAL, CULTURAL and ECONOMIC benefits proposed to be addressed by spatial management (summarised from the statewide TARA – Central Region findings)

LEGEND *(identified as):* Moderate Risk High Risk

SOCIAL, CULTURAL and ECONOMIC		Social benefits				Cultural benefits	Economic benefits		
		Participation		Enjoyment		Cultural heritage and use	Indirect values	Viability of businesses	Direct values
		Safety, health and wellbeing	Socialising and sense of community	Biodiversity and beauty	Consumptive use	Tangible and intangible cultural heritage	Intrinsic and bequest values	Employment and value of production	Individual employment value
THREAT	**STRESSOR**	**BENEFITS**							
Resource-use conflict	Conflict over resource access and use								
Environmental	Wildlife disturbance to shorebirds, turtles, whales (e.g. by dog walkers, four-wheel drives, and vessels)								
	Habitat disturbance (e.g. from foreshore development, fishing access)								
	Reductions in abundance of species and trophic levels								
	Climate change over the next 20 years								
Governance	Inadequate, inefficient regulation or over regulation (agencies)								
	Lack of, or ineffective community engagement or participation in, governance								
	Lack of community awareness of the marine estate and associated threats and benefits								
	Lack of compliance with regulations (users) or lack of compliance effort (agencies)								
Lack of access availability	Limited or lack of access infrastructure to the marine estate								

Spatial management can assist in managing threats to a range of social, cultural and economic benefits the community derives from the bioregion.

The threats to *participation* benefits include safety, health and wellbeing, and socialising and sense of community. These threats are driven by **resource-use conflict, governance** and **lack of access availability**. The many competing uses of the marine estate can sometimes come into direct conflict with each other, for example boating and swimming. Wellbeing benefits associated with use of the coast can also be threatened by competing use of coastal land (such as development of the coastal zone). Spatial management often involves making trade-offs, and while participation in certain activities such as passive use may increase with spatial management, this may come at the cost of other user groups e.g. access for boating or fishing may decrease.

Governance of the marine estate, including lack of compliance with regulations (such as littering, fisheries regulation) can impact on stress levels and relaxation; this is likely when negative interactions become more common as population increases.

Limited or lack of access infrastructure was identified as a potential threat to participation. For example, there is a lack of water-based infrastructure (such as moorings) and land-based infrastructure (such as boat ramps) in some areas. Loss of public access also impacts participation benefits. Again, it should be noted that the trade-offs associated with access restrictions could be seen as both beneficial and detrimental to community wellbeing depending on value systems, beliefs and practices of the people involved.

The impacts on the *enjoyment* of biodiversity, beauty, and consumptive use the community derives from the bioregion are driven by **environmental** threats, including wildlife and habitat disturbance, reductions in abundances of species, climate change, as well as **governance** and **lack of access availability**. These **environmental** threats will disproportionately affect those that value direct interaction and enjoyment of biodiversity and wildlife, including snorkelers, divers those involved in nature based passive use and fishers.

Governance threats, including lack of knowledge and awareness of the marine environment, could detract from the full extent to which people can appreciate and enjoy the benefits it provides. Under regulation can also have significant impacts on community enjoyment of beauty or biodiversity values, particularly if the community believes these values are not being adequately protected. Over regulation or complex regulation has also been identified by community as a major impediment to enjoyment.

There is a consistently high risk to *Aboriginal cultural heritage and use*: the majority of threat categories present a high or moderate risk to this benefit. Impacts relate to a historical and ongoing **loss of access** to the coast and resources associated with urbanisation, private development, protected area closures, and fishing regulations. This loss may lead to damage to cultural sites or artefacts and limit the opportunities for access to food sources and the ability to conduct cultural practices and obligations. **Governance** of the marine estate, including stressors relating to lack of community engagement or participation in governance,

lack of community awareness and over regulation, were identified as high risks to *Aboriginal culture and heritage*. Aboriginal people identified that the wider community had an inadequate understanding of Aboriginal worldviews of culture and nature, and that restrictions on resource collection (of fish or shellfish, for example) for social events impact their cultural practices in the bioregion.

The impacts on the *intrinsic and bequest values* the community derive from the bioregion are driven by the **environmental** threat of reductions in abundance of species and trophic levels and loss of public access. The Marine Estate Community Survey found that the loss of fish from overfishing is a threat to social benefits. It also found that the diversity and abundance of marine life in the marine estate has a high intrinsic value. Nature is part of people's belief and value system, and many people value nature for its own sake, not only because it benefits human life. People also value knowing that resources will be available for future generations to enjoy, with the perceived threat to *intrinsic and bequest values* is expected to be experienced by the breadth of the community.

The impacts on the *viability of businesses* are driven by the **environmental** threat of reductions in abundance of species and trophic levels and climate change as well as the threat of poor **governance** arrangements, including the lack of compliance with regulations (users), or lack of compliance effort (agencies), and a lack of access infrastructure. Illegal activities have the potential to create long-term negative impacts on businesses and employment, for example commercial fishers may be significantly impacted where their livelihoods are under threat from overfishing and habitat destruction related to illegal activities. A lack of access infrastructure in the bioregion is likely to result in opportunity costs on current employment or production.

The impacts on the *individual enjoyment value* the community derive from the bioregion are driven by the threats of **climate change and lack of access to the marine estate**. Climate change is also likely to have significant impacts on enjoyment benefits the community derive from the coast. In particular, more extreme weather events, flooding, and impacts on marine habitats will negatively impact a range of user groups (such as tourists, residents, fishers). A lack of access infrastructure has the potential to impact on enjoyment values if people are deterred from participating in activities in the marine estate or where their enjoyment is negatively impacted by congested access and waiting times. This is more likely in this bioregion where population is larger and there is more pressure on access infrastructure.

WHAT YOU TOLD US ABOUT SPATIAL MANAGEMENT

In 2016, the Authority released the Hawkesbury Shelf marine bioregion assessment discussion paper. The paper identified eight management initiatives, including 'spatial management for biodiversity conservation and use-sharing'. Many of the initiatives have been captured in the Strategy. Feedback on all of the initiatives, including spatial management, are summarised in the Hawkesbury Shelf Phase 2 Community Engagement Report, a description of which is provided in Appendix 5.

5 OPTIONS TO ENHANCE MARINE BIODIVERSITY USING SPATIAL MANAGEMENT – **THE PROPOSAL**

5.1 DRAFT OBJECTIVES

The Authority's vision is '*a healthy coast and sea, managed for the greatest wellbeing of the community, now and into the future*'.

While the nine initiatives under the Strategy are the primary means of enhancing the conservation of biodiversity, the management changes proposed in this discussion paper are intended to enhance the conservation of biodiversity in the Hawkesbury Shelf marine bioregion.

The draft objectives of the network proposed align with the objects of the *Marine Estate Management Act 2014* and purposes of marine protected areas as detailed below (Table 6). They are consistent with the Authority's Marine Protected Areas Policy Statement, marine protected area objectives nationally, and have considered previous community feedback in 2016 on the values of marine protected areas.

Depending on community feedback and the outcomes of the final marine park, the objectives of individual sites may change.

Table 6. Draft objectives of the proposed marine park and objects of the *Marine Estate Management Act 2014* (MEM Act)

OBJECTS OF THE MEM ACT	PURPOSES OF MARINE PARKS AND AQUATIC RESERVES (MEM ACT)	DRAFT OBJECTIVES FOR THE MARINE PARK
(a) To provide for the management of the marine estate of New South Wales consistent with the principles of ecologically sustainable development in a manner that: (i) promotes a biologically diverse, healthy and productive marine estate, and (ii) facilitates – the maintenance of ecosystem integrity, and	The primary purpose of a marine park is to **conserve the biological diversity and maintain ecosystem integrity and ecosystem function, of bioregions** in the marine estate. The primary purpose of an aquatic reserve is to **conserve biological diversity, or particular components of biological diversity** (such as specific ecosystems, communities or species), in a specified area of the marine estate.	**Draft Environmental Objectives** • enhance the conservation of marine biodiversity • reduce risks to identified threatened and protected species of the bioregion • reduce risks to identified habitats of the bioregion
– economic opportunities for the people of New South Wales, including opportunities for regional communities, and	The secondary purposes of marine parks and aquatic reserves where consistent with the primary purpose are: • to **provide for the management and use of resources in a manner that is consistent with the principles of ecologically sustainable development**	**Draft Economic Objectives** • promote marine ecotourism in the bioregion • continue to provide for marine economic opportunities that are consistent with ecologically sustainable development, e.g. low-risk commercial fishing activities • establish and maintain public infrastructure to support access and use of the bioregion, e.g. moorings, boat ramps
– the cultural, social and recreational use of the marine estate, and	• to **support Aboriginal cultural uses** • to provide **opportunities for public appreciation and enjoyment**	**Draft Cultural Objective** • maintain and support Aboriginal cultural use of the marine estate **Draft Social Objectives** • enhance the intrinsic benefits derived by the community from the marine estate • enhance bequest values for current and future generations • reduce conflicts between alternative users of the marine estate • provide enhanced recreational experiences for particular user groups
– the use of the marine estate for scientific research and education,	• to **enable scientific research** and **education**	**Draft Scientific and Education Objectives** • enhance opportunities for scientific research, education and learning including Aboriginal culture • provide baseline monitoring areas (scientific reference sites)
(b) to promote the co-ordination of the exercise, by public authorities, of functions in relation to the marine estate		**Draft Governance Objectives** • ensure appropriate mechanisms exist for community involvement in the management of the marine estate • promote stewardship of the marine estate • reduce regulatory complexity in the bioregion to improve self-compliance

5.2 SITE SELECTION

The Authority used an iterative spatial planning process to identify 25 potential sites (Appendix 2). This process included:

- assessing the current management of 11 existing marine protected areas in the bioregion and more than 50 sites identified by the NSW community during community engagement in 2015 and 2016 (Appendix 3)
- assessing the current management of the priority threats and stressors in Table 2 and identifying opportunities for site scale reductions in risk to enhance community benefits
- using Marxan spatial planning software and relevant data layers to identify:
  - the location of environmental assets in relation to priority threats and stressors
  - potential site-based constraints to site selection within the bioregion such as the location of ocean outfalls, dredging activity, and the desalination plant intake
  - current aquaculture, commercial and recreational fishing effort in the bioregion to attempt to avoid priority areas that are used by these activities and industries and thus reduce social and economic impacts
  - sites adjacent to existing nature reserves and national parks to ensure there is potential for adjoining harmonious public land management and opportunities for climate change adaptation of coastal habitats.

A set of criteria (Appendix 4) was developed and used to further inform the selection of sites and the specific management arrangements proposed for each site. The sites under consideration were repeatedly critiqued by agency experts and informed by analysing submissions from community feedback in 2015 and 2016. The end result of this iterative process saw the determination of site boundaries and finalisation of proposed management arrangements at each site.

5.3 DRAFT ZONE TYPES

In developing the proposal, three zone types are proposed to simplify management and compliance rules (Table 7).

The conservation zone is a new zone type proposed in this marine park that allows for greater flexibility in zoning. As described below this zone has some benefits to biodiversity while allowing selected activities to continue.

Table 7. Description of proposed zone types

ZONE TYPE	DESCRIPTION
Sanctuary zone	Enhance biodiversity at a site and also deliver a range of other environmental, social, economic and cultural benefits depending on the objectives for the particular site. A range of activities can occur within this zone types including scuba diving, snorkelling, swimming and boating. Fishing and other extractive activities are restricted unless it is otherwise authorised, for example research and monitoring or Aboriginal cultural use.
Conservation zone	Enhance some aspects of biodiversity at a site while also delivering economic benefits that are consistent with ecologically sustainable development, specifically Aboriginal cultural use and lobster and abalone fishing by commercial and recreational fishers.
Special purpose zone	Address a particular threat or enhance a particular use at a site. For example, to provide for recreational fishing or scuba diving only at a site (to reduce potential for social conflict), or protect intertidal species to address moderate risks from recreational hand gathering.

5.4 THE PROPOSED MARINE PARK – WHY IS IT DIFFERENT?

The proposed marine park looks different to the other marine parks in NSW which utilise multiple zone types within a single, large marine park boundary, and include large areas of general use and habitat protection zones. The proposed marine park involves a network of 25 non-contiguous sites across the bioregion that address identified priority threats and risks, and enhance a range of community benefits. Draft management objectives for the network of sites are outlined in Table 6 and can be achieved by using the specific zone types such as those described in Table 7.

This approach takes into consideration the large population and existing use of the land and water in the bioregion which includes Sydney Harbour; a highly valued and used asset by locals and tourists alike. The harbour provides a major port facility, supports Sydney ferries, provides tourism opportunities including Taronga Zoo and Sydney Opera House, supports harbour dependent businesses, provides outdoor leisure and sporting activities and has strong culture and heritage values. The proposed marine park network of sites and zone types provides for greater flexibility in the design of the park to accommodate and enhance these uses.

The proposal, although unique in the NSW marine estate, is not unique in protected area management in NSW. In the national park estate, Sydney Harbour National Park consists of a number of non-contiguous sites to protect islands and foreshore areas around Sydney Harbour. The proposed marine park network allows linkages with areas of national park in many cases. Similar to Sydney Harbour National Park, the proposed marine park would be comprised of multiple sites managed under a single management plan.

5.5 DISCUSSION

IMPLEMENTING SPATIAL MANAGEMENT

Spatial management can be implemented using a variety of regulatory instruments. Marine protected areas in NSW (marine parks or aquatic reserves) are established under the *Marine Estate Management Act 2014*; however, activity-specific legislation can also achieve desired outcomes. For example, boating controls can be established through the *Marine Safety Act 1998*, or fishing controls through the *Fisheries Management Act 1994*.

Aquatic reserve and marine park provisions in the *Marine Estate Management Act 2014* are largely aligned, including regulatory and procedural requirements related to management rules, and management plans. The purpose of marine parks and aquatic reserves differs: marine parks have a greater focus on maintenance of ecosystem integrity and ecosystem function of bioregions; aquatic reserves are focused on conservation of biological diversity in specified areas.

Spatial management, such as declaring a marine park, can increase regulatory and compliance burdens and costs on the community more than activity-specific legislation would. For example, additional planning, consent and concurrence provisions apply to developments within or affecting marine protected areas, and additional compliance patrols are required. Examples of other types of activities that could be regulated in marine protected areas include:

- navigation and use of vessels (such as anchoring and mooring controls, speed restrictions)
- organised research activities (such as university and government researchers)
- commercial activities (such as whale and dolphin watch boats, water taxis, para-sailing, jet boats, surf schools, fitness trainers, boat and surfboard hire, filming for television and movies)
- organised sporting, educational and recreational activities (such as surf-carnivals, school education field days, clean-up days, sailing and fishing club events, fireworks, scuba diving club events)
- use of motorised vehicles and equipment (such as four-wheel drives, drones, sea planes)
- domestic animals (such as horse training, dogs).

Many people are likely to be directly affected by activity regulation, which also brings an administrative cost to government. This is a result of the large population and high-intensity use of many sites in the bioregion. In many cases, these regulations will add to, rather than replace, existing state and local government regulations. Significant ongoing management and compliance resources are then required to administer the more complex rules and regulations associated with marine protected areas.

In other NSW marine parks individual zones are contained within the outer boundaries of the park, including large general use zones. All zones are subject to marine park regulations. This proposal looks to establish a network of 25 discrete sites as a marine park, without a broad general use zone. Such an approach reduces the need for additional regulation. It is also similar to the Sydney Harbour National Park on land which consists of a number of discrete sites to protect islands and foreshore areas around Sydney Harbour.

The 25 sites proposed will deliver on the draft objectives for the marine park and be managed as one park under a single management plan.

Marine parks can provide economic opportunities for businesses in the tourism sector due to 'brand identity' for destination marketing purposes nationally and internationally. Conversely, marine protected areas can have economic impacts on businesses that rely upon extractive activities, such as commercial fishing, and also limit future economic development opportunities from mining.

The regulatory powers available in marine parks are generally more comprehensive and integrated than activity-specific legislation. Despite this, declaring a marine park can be ineffective at dealing with many of the greatest threats to biodiversity from off-site activities. This contributes to the frustration of some stakeholders who value marine biodiversity but find that these areas do not 'protect' biodiversity from the greatest threats.

The bequest and intrinsic values associated with marine parks are likely to be greater than for other implementation options. For example, using sanctuary zones in a marine park to restrict extractive activities is likely to be recognised and valued more by the general community than using a closure under fisheries management legislation.

Recognising and respecting existing access rights and arrangements is an important principle for the management of the marine estate. Access restrictions, whether in the form of marine park or activity-specific legislation, can impact social, economic and cultural benefits derived by the community from the marine estate. Conflict over resource access and use, over regulation and lack of access availability were all identified as high risks to the cultural heritage values of Aboriginal people. Any proposals to restrict access by Aboriginal people require close analysis to ensure the spiritual, social and customary significance of Sea Country is recognised and cultural use rights are respected.

When implementing spatial management, there are advantages and disadvantages of marine protected area versus activity-specific legislation. The use of marine park provisions of the *Marine Estate Management Act 2014* brings a more holistic and integrated approach to manage threats and conserve benefits in the marine estate.

RESEARCH AND MONITORING

Expanding scientific understanding through research and monitoring is an important social value. Several of the proposed sites outlined in Part 2 of this discussion paper have been used for research in the past, including Bouddi National Park marine extension, Cabbage Tree Bay, Bronte-Coogee and Cape Banks aquatic reserves. The waters of the bioregion are adjacent to an aggregation of world-class tertiary education institutions in NSW. Changes to management at several additional sites are proposed to enhance amenity and provide sites and opportunities for scientific research and monitoring as their primary purpose.

The final number and location of scientific reference sites will be determined as part of the development and implementation of the statewide Marine Integrated Monitoring Program (MIM Program).

The MIM Program will provide data and information to inform adaptive management for this initiative and others outlined in the Strategy. In addition, the MIM Program will include monitoring and evaluation of the social, cultural and economic impacts of the network of sites in the bioregion.

COMMUNITY ENGAGEMENT AND EDUCATION

Long Reef, Narrabeen and Cabbage Tree Bay Aquatic Reserves and Manly Cove are used for school and community education programs run by council environment centres and private companies. Several community groups (for example, Friends of Cabbage Tree Bay, Reefcare Long Reef, and Manly Penguin Wardens) foster stewardship of these sites.

While there is focused education on fisheries management in the bioregion, there are also opportunities for community education, citizen science, and other targeted approaches to foster greater community engagement and involvement in addressing priority threats to the environmental assets and the social, cultural, economic benefits (Tables 4 and 5).

Developing and implementing a community engagement and education program could address key information failures that have been identified in this bioregion. Such a program could also educate the community on ways to reduce priority threats; it could also link in with, and be supported by, existing education programs within Authority member agencies. Consideration of existing community and school education programs in the bioregion would be necessary to avoid duplication of effort.

There is also an opportunity to work with researchers and existing citizen science groups in the bioregion (for example, the Reef Life Survey) on the design and implementation of citizen science programs to engage the community in understanding how they can monitor changes in marine biodiversity, social usage and priority risk levels over time.

Implementation would also require close engagement with Aboriginal communities to ensure their views are carefully considered, and to ensure management provisions respect Aboriginal rights and do not increase risks to cultural values.

Community engagement and education initiatives would aim to address identified information failures, including the need for:

- effective communication of zone objectives, locations, regulations and boundaries at a local and regional scale
- clear signage on management rules and delineation of boundaries for the network of sites and communication of these boundaries using existing mechanisms
- user-friendly advisory material in multilingual formats. Such information can be delivered via existing mobile phone based apps, on the marine website, via multilingual news forums and in tourism and key outlets supporting uses of the marine estate (such as bait and tackle shops, dive shops, local government offices)
- supporting and expanding existing ethnic community fishing workshops and field days to include education and advice on the proposed marine park network of sites and associated rules and to promote community involvement in marine estate within the bioregion.

COMPLIANCE AND ENFORCEMENT

Spatial management is a form of regulatory intervention. It must be underpinned by an effective compliance regime that combines education with enforcement: this approach assists and supports voluntary community compliance and also provides an active deterrent to non-compliance.

Concerns have previously been raised by local government and a number of other stakeholders that existing levels of compliance enforcement in the bioregion are inadequate, and that the complexity of management rules complicates education materials and voluntary compliance due to confusion and misunderstanding. Additional compliance resources would be required to deal with the large number of people likely to use the sites and to enforce existing and new regulatory requirements at each site. The community expects a rapid response to investigate and address breaches of site-based rules and regulations.

MANAGEMENT

The *Marine Estate Management Act 2014* requires a statutory management plan to be prepared for marine parks that must:

- identify the environmental, social, and economic values to be conserved
- identify the threats to those values
- establish management objectives in relation to the values and threats
- specify management actions to achieve the management objectives.

Examples of values, threats and objectives are set out for each site in Part 2 of this discussion paper.

Management resources are required to support development and implementation of management plans, and to support the high levels of interaction with relevant state and local government authorities that are associated with marine park management. Additional resources are also required to undertake development impact assessment, to administer extensive activity regulation and permitting provisions, and to interact with the community on issues relating to site-based management.

5.6 MANAGING IMPACTS OF THE PROPOSAL

POTENTIAL IMPACTS ON RECREATIONAL FISHING

The proposal will affect access and use for some recreational fisheries, namely shore and boat-based line and trap fishing and hand gathering. Significant areas of the bioregion are already subject to access and use restrictions; for example, restrictions in the major ports provide navigational priority to trade and cruise ships and transport ferries. Existing marine protected areas already restrict access.

Recreational fishing peak stakeholder groups have expressed concern at any further loss of access. Fishers have noted the need for offsets or compensation to be considered by government for any loss of recreational fishing access. This could be in the form of:

- new 'recreational fishing special purpose zones' (such as parts of Long Reef, Sydney Harbour), where all other commercial fisheries and other incompatible uses may be restricted
- additional artificial reefs (there are already two offshore artificial reefs in the bioregion) (see Part 2 of this discussion paper)
- reviewing closures currently restricting recreational fishing in the bioregion to allow for access in these areas to offset any loss of access in the 25 sites proposed
- the Long Reef site will also be used to explore and trial new and alternative approaches to the management of threats from recreational fishing. If it is successful, these approaches could be expanded in the bioregion or more broadly across the state (see Part 2 of this discussion paper).

POTENTIAL IMPACTS ON BOATING

Impacts to boating are not anticipated to be significant across the bioregion. Impacts are more likely where they directly relate to boat-based line and trap fishing. One potential impact of the proposed network is that boat-based activities may be displaced or concentrated in or outside the sites.

IMPACTS ON COMMERCIAL FISHING

There are nine managed fisheries in the NSW marine estate, including seven share management fisheries (Abalone, Lobster, Estuary General, Estuary Prawn Trawl, Ocean Hauling, Ocean Trawl, Ocean Trap & Line) and two restricted fisheries (Sea Urchin and Turban Shell, and Southern Fish Trawl). Fishery activities and the controls on them are generally at a statewide scale rather than at a bioregional or local scale. Further detail on these fisheries is available in the statewide TARA Environmental Background Report.

Given commercial fishing is already prohibited in Lake Macquarie, Sydney Harbour and Botany Bay and low-risk commercial fishing activities like lobster and abalone are proposed to continue under this proposal, the potential impacts on commercial fishing in the bioregion are anticipated to be low.

The Authority will consult with the commercial fishing industry to inform the final sites and boundaries to limit impacts on the commercial fishers in the bioregion. The Authority will also seek the views of commercial fishers on proposed offsets and trade-offs that may be required to implement a final proposal. This could include:

- reviewing existing fishing closures and restrictions on access for affected fisheries in the bioregion
- improving security of access to priority existing fishing grounds through their declaration as 'commercial fishing special purpose zones' under the *Marine Estate Management Act 2014*
- recognition of commercial fishing access in land-use planning processes in the bioregion to reduce loss of access from changes through land-use change and foreshore development.

Compensation may also be required for any imposed loss of access associated with the final proposal and will be negotiated with industry during the finalisation and implementation of the proposal.


CLAUDIO'S QUALITY SEAFOODS
Ruby
$ 15.99 kg

APPENDIX 1 – Five-step decision-making process

The assessment piloted the Authority's five-step decision-making process for marine estate management.

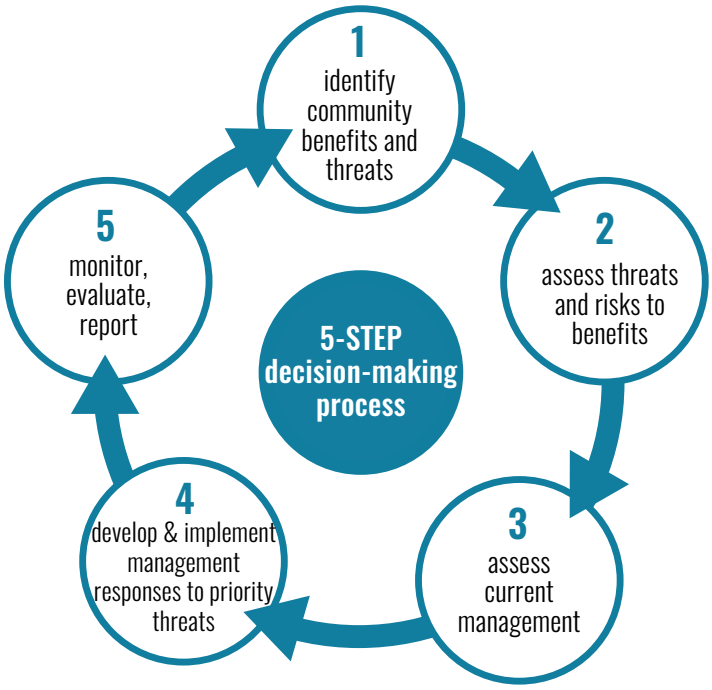


Figure 2. The Authority's five-step decision-making process applied to the Hawkesbury Shelf marine bioregion assessment

- **STEP 1** involved early and effective engagement with the NSW community, including Aboriginal and regional communities, which started in 2014 via the NSW Marine Estate Community Survey. This was followed by more engagement in mid-2015 to identify the benefits derived by the community from the bioregion, perceived threats to those benefits and to identify sites for consideration in the assessment.

- **STEP 2** applied an evidence-based threat and risk assessment (TARA) to identify the priority threats and risks to the environmental assets and social, cultural and economic benefits derived from the bioregion. Further details on the process and outcomes of the TARA can be found in the statewide TARA report (see the 'Central Region' findings).

- **STEPS 3** and **4** involved an evaluation of the threats causing high and moderate risks to determine those that were 'acceptable' under current management settings, those that were outside the responsibility of the Authority agencies[4], and those that required further management attention.

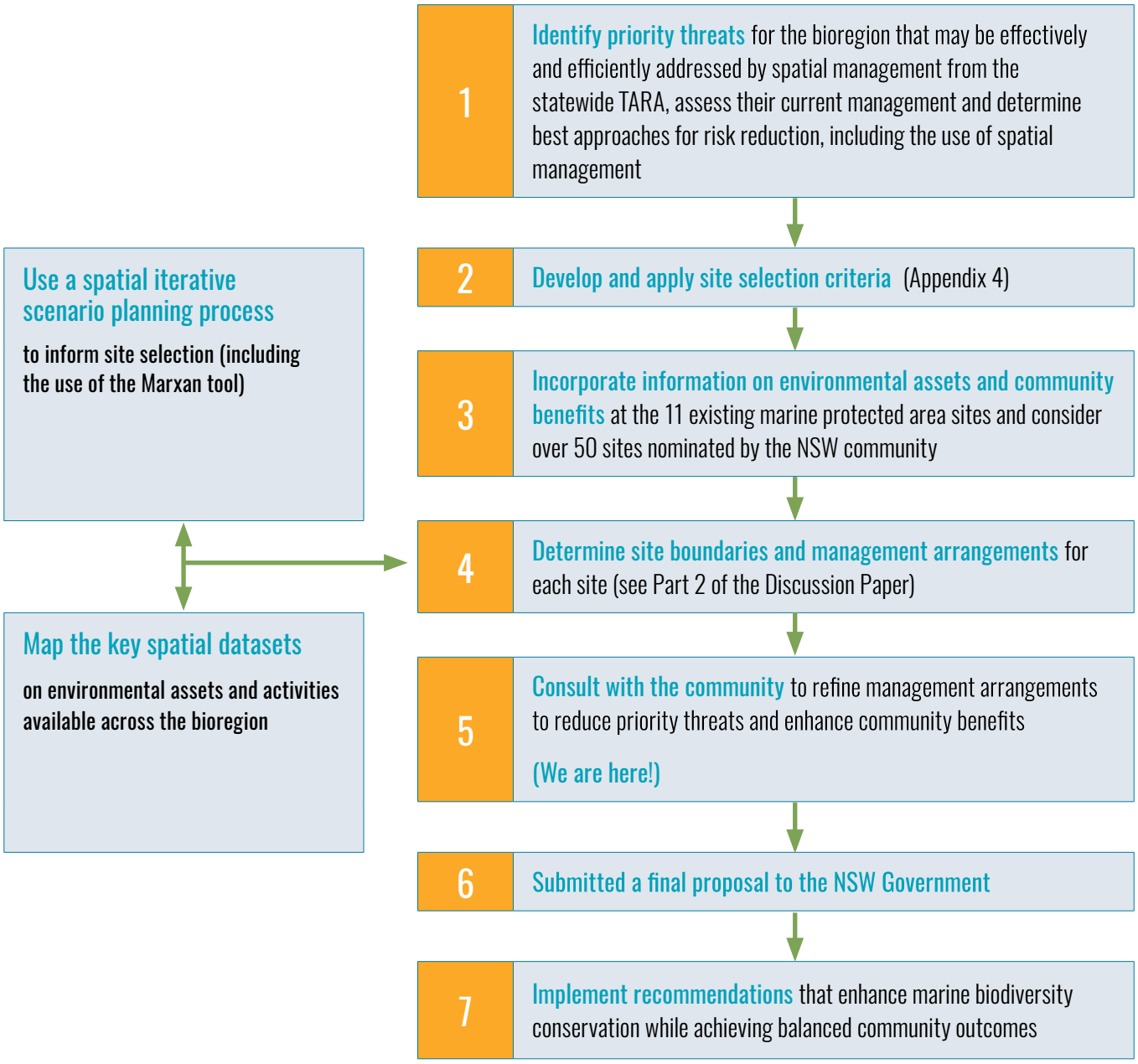
  As part of Steps 3 and 4, the Authority released a discussion paper on eight suggested management initiatives to address the priority threats to the environmental assets (water quality, habitats and marine biodiversity) and social, cultural and economic values and uses of the bioregion. Some of the initiatives, such as addressing water quality, litter and marine debris, restoring coastal habitats, research priorities, wildlife interactions, improving boating infrastructure and land-use planning outcomes, are not bioregion specific. The NSW Government tasked the Authority to incorporate the broader initiatives into the Strategy. Some initiatives including reducing resource use conflict in Pittwater and regional boating strategies for Lake Macquarie and Pittwater are already being progressed by the Department of Primary Industries and Transport for NSW respectively.

  The management proposals outlined in this discussion paper complement the Strategy. Together, they enhance the conservation of marine biodiversity in the bioregion.

- **STEP 5** following implementation, ongoing monitoring, evaluation and review will be undertaken as part of the MIM Program. These will include monitoring environmental assets, social, cultural and economic benefits and priority threats and associated stressors. Evaluation of the effectiveness of final management will ensure transparency and accountability and also allow management to adapt over time.

[4] Authority member agencies include the Department of Primary Industries, Department of Planning and Environment, NSW Office of Environment and Heritage and Transport for NSW

APPENDIX 2 – Iterative spatial planning approach



APPENDIX 3 – Sites identified by community consultation

Table 8. Sites recommended by the community during consultation on the Hawkesbury assessment (listed in alphabetical order)

Sites identified for consideration by the NSW community
Bondi & North Bondi
Barrenjoey Headland, Palm Beach & Whale Beach
Botany Bay
Botany Bay – Bare Island
Brisbane Water & Hawkesbury River, Broken Bay
Bronte to Coogee Beaches & headlands, Gordons Bay & Clovelly
Camp Cove
Central Coast beaches & headlands
Clifton Gardens/Chowder Bay
Oak Park, Cronulla
The Basin & The Apartments, Collaroy including Long Reef to Barrenjoey
Curl Curl & Curl Curl Lagoon
Dee Why Lagoon
Fairlight
Five Islands
Freshwater
Georges River
Hawkesbury River
Hunter River (Hexham Swamp)
Kurnell including Inscription Point, Towra Point, Taren Point & Boat Harbour
Lake Illawarra, Port Kembla
Lake Macquarie
Lion Island
Little Bay
Long Bay
Long Reef offshore
Shelly Beach, Manly
Martin Island
Maroubra/Malabar including Magic Point at South Maroubra
Moon Island

Narrabeen Lagoon
Norah Head
Northern beaches coastal beaches & headlands
Northern Illawarra
North Head, Sydney including Bluefish Point & Old Man's Hat
Osborne Shoals (submerged shoal complex in Bate Bay & near Boat Harbour Aquatic Reserve)
Parramatta River
Pittwater
Port Hacking - Cabbage Tree Point /The Basin, Oak Park, Shiprock to Lilli Pilli
Quarantine Bay
Queenscliff
Riley's Island & Pelican Island
Royal National Park
Spectacle Island, Muogamarra Nature Reserves
Swansea Heads
Sydney Harbour (Lane Cove River, Bradleys Head to Middle Harbour, Middle Harbour Creek)
Sutherland Shire (The Basin at Bonnie Vale)
Toowoon Point & Tudibaring Head
The Gap / Colours Reef, Watson's Bay
Tuggerah Lakes
The Entrance – Terrigal (offshore areas)
Voyager Point
Wamberal Lagoon
Wattamolla inlet at Royal National Park
Windang Island
Yumbool Point & Green Point
Marine extensions to national parks adjacent to Kooragang Nature reserve, Awabakal Nature Reserve, Munmorah State Recreation (now Conservation) Area, Bouddi National Park, Kuringai Chase National Park, Brisbane Waters National Park, Sydney Harbour National Park, Botany Bay/Kamay National Park and Royal National Park.

APPENDIX 4 – Site selection criteria

Table 9. Hierarchy of criteria used in developing the proposal

CATEGORY	QUESTIONS ADDRESSED
THREAT AND RISK ASSESSMENT (TARA)	
Addressing the key risks to the benefits derived from the environmental assets in the bioregion	• Is there a reduction in level of the priority risks to environmental assets? • Is there a reduction in level of the priority risks to social, cultural and economic benefits? • Is there a reduction in level of cumulative risks? • Are there opportunities to improve community wellbeing?
HABITAT & BIODIVERSITY REPRESENTATION	
Representing the marine habitats and biodiversity under threat within identified sites	• Do the sites include the habitat types and marine biodiversity (environmental assets) under threat as identified from the bioregion TARA findings? • Are there habitats and/or occurrences of species listed under the: – Register of the National Estate or World Heritage List – *Fisheries Management Act* (Threatened Species or Protected Species Provisions) – *Biodiversity Conservation Act 2016* (Threatened Species or Protected Species Provisions) – International Migratory Bird Agreements (e.g. JAMBA, CAMBA)?
EFFECTIVENESS	
How effective is the design of the sites and network?	• Are appropriate spatial buffers in place to increase effectiveness and to allow for climate change adaptation? • Does the selected location address particular threats? • Is there effective connectivity between habitats? • Is there adequate protection for threatened and protected species?
ECONOMIC BENEFITS	
Addressing potential impacts (negative or positive) on economic benefits via site selection	• Do the areas have current or potential use by commercial or charter fishers? • Are these areas of interest for mineral, petroleum, gas or sand extraction? • Do the areas have current or potential economic importance for shipping/trade?

CATEGORY	QUESTIONS ADDRESSED
SOCIAL BENEFITS	
Addressing potential impacts (negative or positive) on social benefits	• Do the areas have current or potential use by various forms of recreational fishing? • Are there established patterns of recreational and/or commercial use (e.g. popular diving sites or recreational fishing sites)? • Is there an adequate number and size of sites to allow for their use as scientific reference sites to evaluate change in condition, monitor risk reduction over time, and address knowledge gaps?
MANAGEMENT PRACTICALITY	
Considering potential synergies or conflicts	• Does the site compromise boating safety? • Is there likely to be community support for the sites selected (e.g. were sites or features nominated via consultation)? • Is there potential for alignment with adjoining national park, nature or Crown land reserves (either marine or terrestrial)?

APPENDIX 5 – What you previously told us about spatial management

The 2016 discussion paper identified **spatial management for biodiversity conservation and use-sharing** as having potential to enhance biodiversity outcomes, and reduce resource-use conflict and sought the community's views. The results were summarised in the Hawkesbury Shelf Phase 2 Community Engagement Report. Three main themes emerged from the review of submissions:

1. There is widespread concern about the level of biodiversity protection, whether in relation to specific activities or about general conservation aims.
2. People have a high personal value for the range of services and uses the bioregion provides.
3. Individuals and organisations want to safeguard those services and uses.

Of the eight initiatives contained in the discussion paper, the spatial management initiative generated the greatest interest from stakeholders and the community. Given the wide range of personal values and uses, the submissions ranged from full support to complete opposition to the use of spatial management.

Submissions often cited resource-use conflict from personal observations and anecdotal evidence of the harmful effects of other user groups. Examples of resource-use conflict included anglers and spear fishers citing examples of large fish being pushed out of areas due to disturbances from scuba divers. Conversely, scuba divers and snorkellers expressed concern over fishing activities, such as the taking of large fish and damage to sea beds and reefs caused by anchoring. Scientists, scuba diving groups and conservation interests often asserted the need for spatial management in the form of marine protected areas to protect various species and habitats or to appreciate the intrinsic beauty and value of biodiversity of the marine estate.

Many submissions cited potential benefits and costs of increasing marine protected areas. Potential benefits included enhancing the value of local businesses (including for scuba diving, snorkelling and fishing), as a national and internationally marketable tourism asset, opportunities to build ecotourism industries (for example, scuba diving industry, wildlife watching boat tours), new job opportunities and investment in infrastructure, improved marine biodiversity and ecosystem resilience, and increases in fish abundance.

Potential costs included congestion and concentration of uses on water and land due to displacement, increased impacts on remaining accessible sites (such as increased density of anchoring, fishing, rubbish), impacts on Aboriginal people's cultural rights, reduced supply of locally-caught seafood, and need for compensation for commercial and recreational fishers for any imposed loss of access.

The submissions highlight that careful evaluation is required to strike a balance between competing uses and outcomes, and that while judgement will be required, this will be informed by the best available information.

PART 1

DISCUSSION PAPER

Executive summary, context and approach

ENHANCING CONSERVATION of MARINE BIODIVERSITY

HAWKESBURY SHELF **MARINE BIOREGION**

NSW GOVERNMENT