

Marine Estate Management Strategy

Annual report 2022–2023

December 2023



Sugarloaf Point Lighthouse, completed in 1875, stands 15 metres above Sugarloaf Point, just south east of Seal Rocks, Worimi Country. The strong bedding in the centre of frame is the Booti Booti Sandstone which overlies the thinly bedded Yagon Siltstone – Photo courtesy of NSW DPI © State of New South Wales

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- NSW Department of Planning & Environment – Environment & Heritage Group
- NSW Department of Planning & Environment – Planning & Assessment
- Transport for NSW

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Preamble

The Marine Estate Management Authority (Authority) acknowledges the Traditional Owners and Custodians of the land on which we live and work, and pays respect to Elders past, present and emerging.

First Nations people hold deep cultural and spiritual connections to the sea. They have cared for Sea Country for thousands of years, passing on their knowledge and tradition to each new generation. The Authority works collaboratively with First Nations people to maintain their social, cultural, economic and spiritual connections to the marine estate, now and into the future.



© Bindarray Maagun (River Feast) by Gumbaynggirr artist Lavinnia Inglis

Foreword from the Chair of the Marine Estate Management Authority



The NSW marine estate is a valuable natural asset to the people of NSW and visitors alike. The iconic beaches, pristine estuaries and biodiverse marine flora and fauna contribute to people's wellbeing and ensure the continuation of cultural practices for First Nations people.

Threats to the natural assets, and the flow-on effects on communities, are managed by the NSW Marine Estate Management Authority under its Marine Estate Management Strategy 2018–2028 (the Strategy).

The Strategy is the centrepiece in the Authority's ambitious program of works to reduce priority threats and optimise the governance arrangements for the NSW marine estate, ensuring collaboration in the delivery of 100 projects across the state-wide.

It is my privilege to share notable achievements and milestones in this report, from 2022–23, that have contributed to positive outcomes that benefit community.

The NSW Government committed more than \$30 million in 2022–23 for a range of initiatives that improve water quality, enhance marine habitats, plan for climate change, manage impacts to threatened species, as well as embedding cultural knowledge and practices into management and ensuring sustainable use by all who utilise its resources. In its fifth year of implementation, the Strategy is already delivering on its outcomes.

More than a third of our investments in 2022–23 focused on the enhancement of water quality and the reduction of litter. We maintained our comprehensive statewide water quality monitoring program to help measure our success. Partnerships with our First Nations communities also enabled the seeding of 2 million native flat Angasi oysters, a pivotal contribution to oyster reef restoration, and the enhancement of water quality at the Wagonga Inlet.

MEMA's commitment to ensuring the resilience of the marine estate included the integration of climate change data into key planning documents and the establishment of 2 blue carbon demonstration sites in Northern NSW that seek to increase the extent of marine vegetation that will sequester and store carbon. The development of the Domestic Waterfront Structure Strategy furthers the preservation of aquatic habitats in our estuaries, including threatened seagrass communities.

In supporting the wellbeing of our First Nations communities, we funded 13 projects to embed First Nations knowledge into the management of Sea Country, including the launch of 4 new business development programs along the South Coast, and provided training to over 100 people that provided many opportunities for employment in Sea Country management.

We are committed to integrated management and adapting to change. In 2022–23, we embarked on a review of threats, new and emerging, to ensure our focus remains on the priority threats facing the marine estate. We consistently seek advice from our independent Marine Estate Expert Knowledge Panel, to ensure the best ecological, social, cultural and economic information is considered in decision-making.

With funding now secured for the remaining 5 years of the Strategy, we will continue to collaborate and build resilient systems and deliver our vision for the marine estate, which is a healthy coast and sea, managed for the greatest wellbeing of the community, now and into the future.

Russell Reichelt AO AFTSE Chair, Marine Estate Management Authority

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Introduction

This report describes the annual progress of the 10-year Marine Estate Management Strategy 2018–2028 (the Strategy): it describes the progress of the Strategy projects and initiatives, risk management and finances for the 2022–23 financial year. It is informed by the compilation of the public triannual reports that were published in the past 12 months in line with the current Implementation Plan for 2022–2024.

The Strategy

The Strategy provides the overarching framework for coordinated management of the marine estate to deliver the Authority’s vision for ‘a healthy coast and sea, managed for the greatest wellbeing of the community, now and into the future’. It is underpinned by the NSW Marine Estate Threat and Risk Assessment (TARA).

The marine estate comprises 1,750 kilometres of coastline, 826 beaches and 185 estuaries. It includes estuaries, the shoreline, submerged lands, offshore islands, and the waters of the NSW coast from the Queensland to the Victorian border and out to 3 nautical miles offshore. It also includes 85% of the NSW population who live along the NSW coastline and the many domestic and international visitors who come to our coasts.

The Strategy outlines a series of management actions across 9 initiatives to address the priority threats to environmental assets and social and economic benefits derived from the marine estate. These are highlighted in the 2018–2028 Strategy Snapshot. A final component – program management, monitoring, reporting, and evaluation – supports the implementation of the Strategy.

The evaluation of the Strategy’s performance is guided by the Marine Integrated Monitoring Program (MIMP), specifically its Integrated Monitoring and Evaluation Framework. Evaluation is scheduled at strategic points throughout the 10-year life of the Strategy to enable adaptive management. Progress against short-term outcomes was evaluated after the first 2 years (in 2020–21). Subsequent evaluations will happen every 5 years: in 2023–24 (the mid-term review) and again in 2027–28 (the final evaluation).

The Strategy is a genuine commitment from the NSW Government to manage one of our greatest natural assets – the NSW marine estate. More than \$287 million of funding has been allocated for the 10 years of implementation from 2018 to 2028.

Report structure

The report is presented against the 3 overarching areas of change for the Strategy outcomes to deliver on our vision for the NSW marine estate:

- Natural and built environment
- People, communities and businesses
- Governance and management.

The 9 initiatives and 53 actions are reported under those areas of change. The outcomes and initiatives are interrelated: actions in one area of change often support actions in others.

How we work

In 2022–23, the Marine Estate Management Authority (the Authority) continued to work across multiple agencies and partners during the fifth year of the 10-year Strategy.

We continued to implement about 100 projects to improve waterway health, engage and consult with communities, provide First Nations training and employment opportunities, and protect important coastal and marine species.

Key achievements for each of the initiatives this year are presented in this report. Triannual snapshot reports highlight key work delivered for each initiative throughout the year and are available on the [Marine Estate Management Strategy website](#).

The Strategy's governance and program management framework provides a governance structure that gives the Authority oversight of the Strategy projects while working in close collaboration with [advisory bodies](#), initiative working groups, government agencies and community partners. This approach ensures coordination, consistency and transparency across all Strategy projects and enables the Strategy's progress to be monitored and reported.

Adaptive management

This year saw the beginning of recovery from flooding in February and March 2022. The floods had a devastating effect on many communities and delayed several projects last year, especially on the North Coast. Through our investment, some delayed projects caught up to their original schedule. Other projects are still recovering, and this has affected our capacity to perform on-ground work, engage with communities in person, and conduct field research, education and training.

The NSW state government election in March 2023 also saw a change in government. This change influenced delivery timeframes for some projects and brought some uncertainty around Strategy implementation.

Despite these issues, we were able to deliver key elements of the Strategy on time through adaptive management approaches with regular reviews. We manage risk carefully to help reduce the impact of unplanned events on implementation of the Strategy.

Strategy evaluation

The independent [Baseline Evaluation of the Marine Estate Management Strategy](#) covered Stage 1 (2018–2020) of the Strategy. Published in September 2021, it highlighted that the program had:

- built strong foundations for future success
- achieved change against all short-term outcomes
- set a trajectory for achieving intermediate and long-term outcomes.

[Thirteen recommendations](#) from the evaluation support the delivery of the Strategy.

The independent, mid-term evaluation of the Strategy formally started with the engagement of Aither in September 2022. So far, Aither has completed a:

- desktop review of information available against the key evaluation questions
- staff survey focusing on the context and basis assessment for the process outcome
- series of stakeholder interviews, including with members of the Marine Estate Expert Knowledge Panel.

We have also adopted an evaluation, engagement and communications plan.

The economic evaluation component has also started, with a desktop review of existing benefit information and the 2018 and 2022 cost–benefit analysis used in previous Strategy business cases.

Enhancing and expanding connections

We have continued to work with our partners and stakeholders – the NSW community, Aboriginal people, local government, industry and the research community.

NSW community

The Strategy has used a variety of channels to provide clear, consistent and accurate information about the benefits and progress of the Strategy with the broader NSW community.

Highlights include:

- publishing 3 snapshot reports for 2022–23 on the [NSW Marine Estate website](#), communicating key deliverables every 4 months, and showcasing the benefits of the Strategy
- publishing the [Strategy Implementation Plan 2022–2024](#), which explains the planning for projects implemented across the Strategy
- publishing the [Marine Estate Education Strategy](#) and appointing an engagement officer to assist in its implementation
- piloting the [Marine Estate Agents program](#) in primary schools to educate students on the features of the NSW marine estate, sustainability and Aboriginal and Torres Strait Islander cultures and histories
- developing careers videos for high schools
- distributing 7 [marine estate newsletters](#) with a total of 58 articles to more than 1,200 people
- completing public consultation on 15 policy options for improved management of recreational vessels that are reaching or that have reached the end of their useful life.

We publish our work on the [marine estate website](#). We also reached the community through media releases and social media, with 127 Instagram posts and 44 Instagram stories reaching 1,900 followers.

You can [connect with us](#) to receive our newsletters and see our Instagram posts. Refer to Appendix A for examples of our communication and engagement activities in 2022–23.

First Nations people

Coastal First Nations people have been managing Land and Sea Country for tens of thousands of years, and they are sharing their cultural knowledge and practices in ways that embed First Nations people in the management of Sea Country in NSW, such as:

- employing Aboriginal people in Strategy implementation
- providing training and skills development in marine industries and natural resource management
- providing support for Aboriginal economic development to work on Sea Country in marine and tourism industries
- facilitating a range of actions to improve the management of Sea Country in consultation with Aboriginal communities.

Our engagement and connections with our Aboriginal communities in 2022–23 included:

- engaging Elders to deliver practical training, held on-Country, for school students to learn some of the cultural history and stories of their coastline, for example during the Mystery Bay school cultural camp
- employing the Joonga Dive Team to seed 2 million baby native flat Angasi oysters (*Ostrea angasi*) onto the Wagonga Inlet Living Shoreline subtidal reef to restore this rare species of oyster reef
- reviving culture through the South Gumbaynggir Culture Camp, Darruyagam Maagun Culture and Wellness Camp and the Yeagl Registered Native Title Bodies Corporate Celebration Day
- completing 5 cultural tourism plans for Aboriginal businesses on the South Coast
- involving Sea Country Rangers in estuary and riverbank management at various locations
- completing technical and summary reports for the First statewide Sea Country surveys from interviews with 562 Aboriginal people across 11 locations coastal locations in NSW.

To find out more about cultural heritage and learn about the connection Aboriginal communities have with Sea Country, watch the updated series of NSW Sea Country videos or read about our work with Aboriginal communities in the section for Initiative 4 in this report.

Coastal councils

Coastal councils are critical Strategy partners. Through a threat and risk assessment approach, they help identify coastal and marine areas that are under threat at a local scale. They are key to addressing these threats, including through programs such as coastal management programs. They provide a necessary link to the community and facilitate actions that enhance the community benefits we all derive from the marine estate.

Our engagement and connections with our local councils in 2022–23 included:

- delivering 21 local government targeted workshops to more than 400 participants
- supporting ongoing liaison between project leads and local government staff
- employing a Strategy council liaison officer to build and strengthen partnerships with local councils through the communications and engagement strategy
- developing an online video to inform and assist councils with best practice in erosion and sediment controls to reduce soil entering our waterways during construction works
- co-developing 7 new strategies for domestic waterfront structures for estuaries that will reduce administrative costs to councils and provide a consistent decision-making framework
- identifying breakwater structures in council areas and assigning preliminary responsibility to enable management actions.

DPE-Planning created an accessible conditions library that houses standard development consent conditions, including how to manage erosion and sediment at construction sites. Council officers can implement these conditions in development applications, which are available on DPE-Planning's website and in the Planning Portal.

Our engagement with councils has allowed us to observe the benefits of the Strategy. In particular, council-led coastal management programs align with initiatives 1 and 2 and their focus on water quality, marine litter, the health of estuarine and marine habitats and coastal management.

To support our staff in this work, we developed a Stakeholders Engagement toolkit. This internal resource will ensure a consistent and effective approach across the Strategy when engaging with key stakeholders and the wider community. It includes the Council Engagement and Communication Strategy that guides what, how and why Strategy staff communicate and engage with councils about the marine estate and on the delivery of marine estate management programs.

Industry

Economic benefits are a vital focus of the Strategy. Projects contribute to improved viability and sustainability of coastal and marine industries, providing new economic opportunities and supporting industry innovation. Industries involved in Strategy projects include tourism, fishing, aquaculture, agriculture and emerging horticulture industries.

Our engagement and connections with our industry partners in 2022–23 included the following:

- The Clean Coastal Catchments Macadamia Research Update in Ballina attracted 50 farmers and other key industry representatives. The update gave the latest advice on managing fertiliser nutrients and erosion in NSW macadamia orchards.
- Farm management plans, including effluent and nutrient management, were completed by 24 farmers to improve efficiencies, reduce costs and reduce pollution into local waterways.
- Project leaders have actively engaged with farmers, industry partners and councils about the Risk-based Framework. The framework promotes best practices. Our partners now have a better understanding of the framework and are more willing to use it for decision-making and management.
- The Easter Rock Lobster and Spanner Crab harvest strategies were adopted. The Line and Trap Harvest Strategy Working Group was formed to develop strategies for snapper and yellowtail kingfish.
- Educational videos on sea turtle health assessments for wildlife rehabilitation providers and veterinarians were created.
- Eight new contracts were executed to assist hothouse growers upgrade irrigation systems so they could reduce water use and risk of nutrient waste into local rivers, creeks and estuaries.

Research community

We partnered with CSIRO and universities to better understand the natural assets and systems in the marine estate. To share the results of this work, we published 25 peer-reviewed scientific papers this year. The papers are listed under each initiative and include:

- 6 papers related to improving water quality and reducing litter
- 4 papers related to delivering healthy coastal habitats with sustainable use and development
- 12 papers related to planning for climate change
- 3 papers related to reducing impact to threatened species.

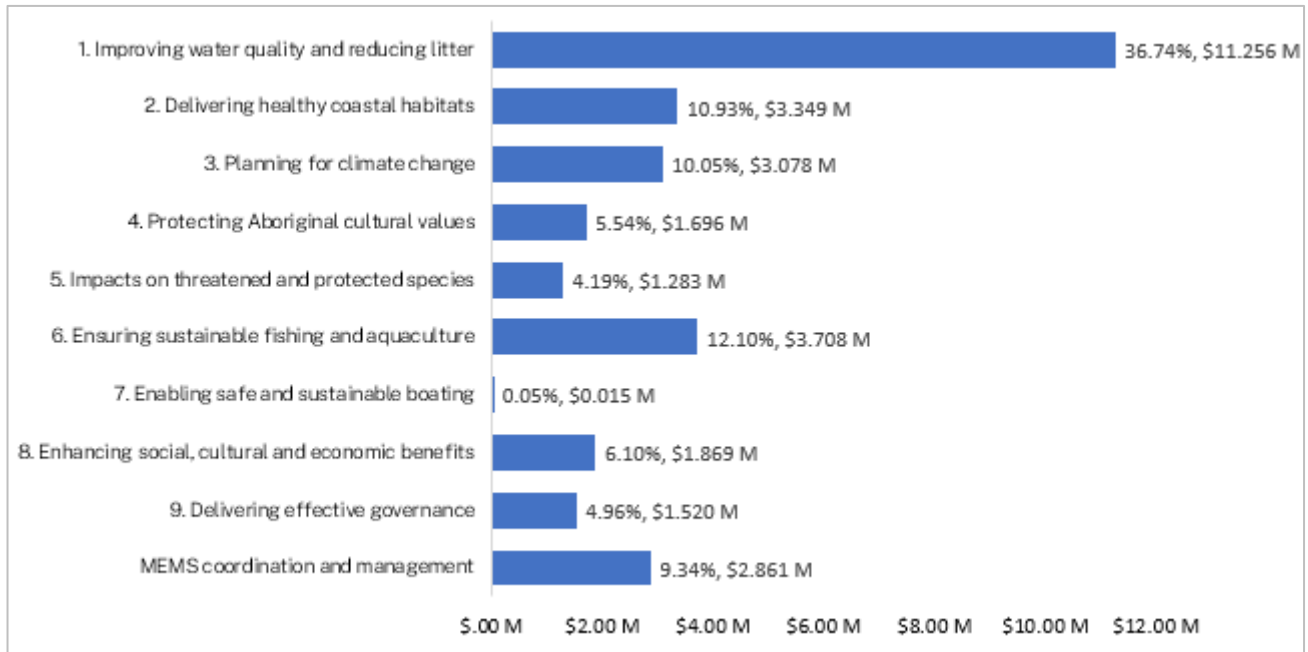
Finance

The NSW Government has invested substantial funding to manage one of our greatest natural assets – the NSW marine estate. More than \$287 million of funding has been allocated to the Strategy for the 10 years of implementation from 2018 to 2028:

- \$45.7 million for Stage 1 – the 2 years from August 2018 to June 2020
- \$28.3 million for Stage 2 – year 3 of the Strategy from July 2020 to June 2021
- \$30.7 million for Stage 2 – year 4 of the Strategy, from July 2021 to June 2022
- more than \$182 million for Stage 3 – the final 6 years from July 2022 to June 2028, which is equivalent to about \$30 million each year. About \$30.7 million was allocated to the Strategy in 2022–23 across the 9 initiatives.

Figure 1 shows the budget allocation per initiative for 2022–23 and the percentage of the Strategy’s budget it represents.

Figure 1. Budget allocations for the Strategy initiatives for 2022–23



Staffing

The Strategy directly employs people in 8 state government agencies and indirectly through local government and industry. It also engages consultants and researchers through contract arrangements to assist with research projects, on-ground works and community engagement.

The Strategy funds 135 staff in 123 full-time equivalent (FTE) positions. More than 70% of these roles are in regional NSW and 8 of the roles are Aboriginal Identified positions.

Year 5 Strategy-funded positions are as follows:

- DPI-Fisheries: 78 roles (73.6 FTE)
- DPE-Environment and Heritage Group: 26 roles (25.4 FTE)
- Local Land Services: 13 roles (8.1 FTE)
- DPE-Planning and Assessment: 3 roles (3 FTE)
- DPI-Agriculture: 3 roles (2.8 FTE)
- DPE-Water: 3 roles (2.2 FTE)
- DPE-Crown Lands: 2 roles (2 FTE).

This collaboration by agencies and partners enables the holistic and coordinated management of the marine estate and facilitates broad benefits to the community annually. Other ongoing staff from across the government agencies also provide substantial support on an in-kind basis.

Natural and built environment

The marine estate is one of the most significant natural resources in NSW. It includes around one million hectares of estuary and ocean, as well as thousands of kilometres of ocean coastline, beaches, estuaries and coastal lake foreshores.

The estate's natural beauty and the clean waters support a variety of unique and abundant Australian marine life. This is highly valued by the community.

These values are under pressure. For example, much of the water runoff from cities, industries and agriculture in our catchments flows downstream through our waterways and can lead to reduced water quality in rivers, estuaries, wetlands and the marine environment. Structures such as jetties, breakwaters and bridges can impact the condition of the marine estate. Other threats, including rising sea temperatures, ocean acidification and invasive species present longer-term concerns.

The Strategy outcomes:

- Enhanced condition of the marine estate, including its habitats, wildlife and natural beauty, in identified regions and maintained elsewhere
- Improved incorporation of the likely impacts of climate change in planning for and managing the marine estate
- Increased appropriateness of the built environment with reduced risk to the marine estate

How we get there – the strategy initiatives:

- Initiative 1 – Improving water quality and reducing litter
- Initiative 2 – Delivering healthy coastal habitats with sustainable use and development
- Initiative 3 – Planning for climate change
- Initiative 5 – Reducing impacts on threatened and protected species



Photo 1. A humpback whale breach in the harbour

Initiative 1 – Improving water quality and reducing litter



Photo 2. River bank erosion control and stabilisation. Photo: DPI

Initiative objective

To improve water quality and reduce marine litter for the benefit of marine habitats, wildlife and the community

Initiative long-term outcomes

Improved water quality and waterway health in the marine estate in alignment with community values

Reduction in input of litter to the marine estate in alignment with community values

Maintained or improved biodiversity and marine habitats

Budget planned year 2022–23

\$11,256,083

Management challenges and opportunities

Healthy marine and estuarine environments with clean water are highly valued by the NSW community. The statewide TARA identified diffuse source water pollution as the number one threat to marine habitats and wildlife and the many social, cultural and economic benefits provided by the marine estate. Litter is a significant component of water pollution.

The first 5 years of the Strategy have focused on improving water quality through habitat improvements, addressing litter and reducing land-based runoff.

The \$11.2 million allocated to this initiative is about 37% of the total funding for the Strategy. This investment reflects the impact of water quality and pollution on other initiatives.

Highlights – Improving water quality and reducing litter

9 workshops about the **Risk-based Framework** delivered to local governments, waterway managers and others



Remnant **oyster reefs** mapped for **7 priority estuaries**

Aboriginal SCUBA diver team employed to **seed 2 million Native flat oysters** onto the new Wagonga Inlet subtidal reef



Irrigation upgraded at **8 farms** to re-use water and reduce runoff



3 workshops to reduce synthetic fertilisers and nutrients into waterways attached by **70 livestock farmers**

13 livestock farmers interviewed increase understanding of industry decisions and improve best practice tools and methods

Oyster reef research results **shared** at **7 scientific events** including international conferences

Major studies finalised: Marine Debris Threat and Risk Assessment, 2021–22 Health of Estuaries report, Lake Illawarra baseline assessment for pilot risk-based framework, Lake Illawarra baseline assessment linked to a coastal management plan priority action, Water quality condition and trends broadscale monitoring for Taree to Wollongong,



Riparian habitat enhanced and protected by planting **34,000 native plants**, and installing **21 alternative water points** and **20km fencing**

Over **6km of unsealed roads rehabilitated** at **13 separate sites** with improved drainage and sealing to reduce sediments and nutrients entering coastal waterways



Post-extreme flood event **water sampling and mapping** completed for Clarence, Hawkesbury and Hunter rivers



4 training workshops delivered to **140 local government staff** to reduce erosion and sediment loss from work sites and keep fish and their habitats healthy

A **fertiliser and water management seminar** delivered to over **100 people** including berry and greenhouse growers, advisors, industry and government representatives



Macadamia research update presented to **50 people** including growers, advisors, industry and government representatives.

12 articles, 2 conference papers, 2 newsletters published on evidence-based best practice for industry partners including Macadamia, Livestock, berries, and greenhouse vegetables

Putting the Strategy into action

During this fifth year of the Strategy, we have made substantial progress towards improving water quality and reducing pollution, while maximising the benefits of NSW coastal estuaries, rivers, and coastal waters.

Our achievements include:

- the public release of new [Technical Water Sensitive Urban Design Guidelines](#) for achieving new stormwater targets in Wianamatta-South Creek
- statewide monitoring of the marine estate's estuary water quality for 2022–2023, which continues to provide data to assess broadscale condition and trends.

Although catastrophic wet weather events in the first few months of 2022–23 delayed some on-ground activity, we were able to bring forward community engagement activities and also focus on contract development for new projects.

For example, we engaged stakeholders, including local government and other decision-making agencies, to address diffuse source water pollution impacts and management using the Risk-based Framework. Project leaders have actively engaged with community members, farmers, industry partners and councils to promote best practices. This included 4 farm rehabilitation activities under the River Crystal Initiative.

DPI-Fisheries released [a new video](#) that guides councils on best practice in erosion and sediment controls to reduce soil entering our waterways during construction works. The video is the seventh video in the Fish Friendly Council video series. DPE-Planning also completed updates to the Erosion and Sediment Guidelines, which have been approved for public exhibition early in the 2023–24 financial year.

On-ground works have reduced the amount of sediment and nutrients entering into waterways. Works included upgrades to dirt roads and tracks, and rehabilitation of riparian vegetation and eroding riverbanks. For example, 700 metres of the Branch River banks have been stabilised. This work will help minimise sediment loss at this site and ultimately reduce risks to water quality. The Branch River flows into the Karuah River, so this work will positively impact both rivers and the Port Stephens-Great Lakes Marine Park.

To better understand long-term trends in biological, geomorphic, and riparian condition of the inflowing streams in the Lake Illawarra catchment, we have been collecting data about ecological condition, streamflow, and ecosystem processes. This information will highlight indicators including macroinvertebrates, benthic diatom assemblages, streamflow discharges, and stream metabolism (respiration and productivity). This links to a priority action in the Lake Illawarra Coastal Management Plan. The data provides an initial baseline assessment for ongoing monitoring in a risk-based framework pilot case study area.

We also started several other projects this year:

- the Hornsby Town Centre Water Sensitive Urban Design Retrofit case study
- Richmond Collaborative Partnership, which started with a drone and photography-based map of the Environmental Impacts of the 2022 Flood Disaster on the Richmond River Catchment
- Integrated Orchard Management for macadamia research progress on sediment and nutrient export
- the Ecohealth monitoring program in Emigrant Creek with Southern Cross University measuring positive effect of rehabilitation effort implemented since 2014.

The projects in this initiative will contribute new guidelines on construction and sediment controls to provide stakeholders with valuable management and planning tools.

What people say

Feedback from this engagement included:

“Sealing Mayfield Road represents a significant and necessary measure to improve the health of the Crookhaven River Floodplain. This road sealing will reduce sedimentation impact on oysters and ultimately improve the whole river environment. The positive impact extends beyond oyster farming, benefiting recreational and commercial fishing, river enthusiasts, and the entire community.”

Angela Riepsamen, Treasurer of the Shoalhaven Crookhaven Shellfish Quality Assurance Program

More information

Triannual snapshot reports – see actions under Initiative 1

Implementation plan

Publications and research conferences:

- Technical Water Sensitive Urban Design Guidelines
- Marine Debris Threat and Risk Assessment
- 2021–22 Health of Estuaries report

Conference papers:

- method for broadscale monitoring of microplastics in NSW estuaries presented (keynote speaker and poster) at AMSA 2022.
- ACTA Conference Proceedings Parks, Jarvis, Unsworth and Sun, 2023, Better management of soilless potting media for Southern highbush blueberry, an Australian case study, Acta Horti 1357:79–84.
- IAL Conference & Exhibition and ICID 24th Congress Sun, Bright, Simpson & Parks, 2022, Application of systems thinking to facilitate practice change in managing nutrient runoff in the Australian macadamia industry.

Peer-reviewed papers:

- research contributions to DPI Macadamia grower's guide: nutrition and soil health – Part 1: the foundations and Macadamia grower's guide: nutrition and soil health – Part 2: the next level.
- Benthotage C, Cole V, Schulz K and Benkendorff K (2022) Water quality and the health of leaf oysters (Isognomon ephippium), Presentation to the Conference: Molluscs 2022, at Gold Coast, Qld Australia, November 2022.
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- McAfee D, McLeod IM, Allevay HK, Bishop MJ, Branigan S et al. (2022) Turning a lost reef ecosystem into a national restoration program. Conservation Biology 36:e13958. doi: 10.1111/cobi.13958.

Initiative 2 – Delivering healthy coastal habitats with sustainable use and development



Photo 3. Lake Curalo – an Intermittently Closed and Open Lake or Lagoon (ICOLL) at Eden on the Far South Coast.
Photo: Garry Hunter

Initiative objective

To protect coastal and marine habitats and associated species and enhance the health of the marine estate by improving the design, quality and ongoing management of foreshore development, use and waterway infrastructure

Initiative long-term outcomes

Improved design and management of foreshore and coastal land use and development, balancing social and economic benefits of development with enhanced coastal and marine habitats

Maintained or improved biodiversity and marine habitats

Budget year 2022–23

\$3,348,972

Management challenges and opportunities

Coastal development and infrastructure provide important social and economic benefits for NSW, provided they are well planned and managed.

Poorly planned foreshore development, land-use changes and marine infrastructure not only detract from the economic and social benefits, but they also can impact marine estate habitats and species. For example, poorly maintained wharves, boat ramps and breakwalls reduce community access and potentially impact marine and estuarine plants and animals.

Sustainable use and development require better coordination of investment planning, decision-making and management. Our aim is to improve how we collectively manage activities that impact coastal habitats and species in the marine estate, so they align with community values.

The \$3.3 million allocated to this initiative is about 10% of the total funding for the Strategy.

Highlights – Delivering healthy coastal habitats with sustainable use and development

Audited 53 ICOLLs (Intermittently Closed and Open Lakes and Lagoons), spanning 8 local government areas

Opened up **25km of habitat** for **migratory fish** in the Brunswick River by replacing a causeway with a bridge



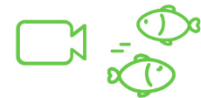
Preliminary responsibility assigned to **95 of the 108 structures** previously identified as responsibility of NSW Government or Unknown



Subtidal **biodiversity** remotely **assessed at 16 sites** in Sydney's Aquatic Reserves

Marine Vegetation Strategies for Richmond and Tweed progressed with **in-depth analysis** of foreshore and floodplain identifying **14km² of priority areas**

Rocky reef fish sampled at **290 sites** using baited remote underwater video



2022 Australian Marine Science Association **conference presentation** on the need for research on impacts of jetties to NSW estuaries seagrass



Decision **Support Tool** used in the development of three Camden Haven Bank Management Strategy for Local Council

Domestic **waterfront structures strategies** released **covering 1,046km** of estuary foreshore

50 jetties surveyed for seagrass biomass for ecological sustainability improvement in jetty design



90 sites surveyed in Sussex Inlet to assess the impact of jetties on larval fishes.

Cumulative **threat maps** support multiple stressor impact to threatened species **Posidonia australis** in Pittwater

Putting the Strategy into action

Initiative 2 seeks to improve coastal and marine habitats and the management of foreshore and waterways. This year, strong collaboration and engagement, along with robust project management practices have enabled us to develop new strategies and policies, fish passage improvements, and data and information-sharing to fill knowledge gaps.

The year started well. We were successful in coordinating, facilitating and participating in engagements through consultations and presentations with key stakeholders. It has set the stage to foster successful delivery of policy development, planning strategies, scientific reports, and fish passage works in the upcoming months and collectively ensure healthy coastal habitats in the marine estate.

Taking this type of multiagency and local government co-operative approach has allowed us to collaborate, inform, build relationships, and set expectations in coastal habitat management.

We have had some good results from expanding native fish habitats. On the Brunswick River, replacing a causeway with a new bridge opened up 25 kilometres of fish habitat to migratory fish. This will enable local native fish species to migrate between the ocean and the waters near the village of Main Arm during low flows. Works are also underway at 2 priority fish passage locations to improve access to a wider range of important feeding and spawning habitats for migratory fish. Both projects include a new bridge, a new weir gate structure and fishway.

The previous installation of a fishway at the Kyogle Weir is good news for the Richmond River, its fish, and anglers on the river. Summer sampling found more than 12 different species of native fish are using the fishway to access more than 1,500 kilometres of waterways upstream from the weir. This approach results in better opportunities for both native fish and marine estate users.

We are improving our management of structures such as jetties and breakwaters to benefit communities and the marine environment. We have been working with councils and other stakeholders to assign primary responsibility of breakwater management. Surveys of the impacts of jetties on seagrass biomass and on larval fish populations are feeding into more sustainable jetty designs.

Our research and assessment efforts have improved our knowledge of the coastal environment through subtidal biodiversity surveys in the Sydney region, audits of 53 ICOLLs, and video surveys of rocky reef fish.

We participated in 2 major conferences and consulted with the community and stakeholders during the exhibition of the Coastal Design Guidelines from July to September 2022.

What people say

Feedback from our stakeholders included:

“With funding from DPI marine estate, this work has opened up 7km of upstream habitat and 27.4km of fish passage from the estuary mouth. The community highly values the Brunswick River and it is really important to be able to maintain the cultural, ecological, biodiversity, and recreational values that ‘the Bruns’ provide for the community.”

Chloe Dowsett – Coast, Biodiversity & Sustainability Coordinator Byron Shire Council, Reconnecting Fish Habitats

More information

[Triannual snapshot reports – see actions under Initiative 2](#)

[Implementation plan](#)

Peer-reviewed publications and conferences:

- Asbridge E and Dwyer PG (2022) [Marine Vegetation Management Strategies: A framework for estuary wide prioritisation of protection and rehabilitation](#). *Restoration Ecology* 31(7). doi: 10.1111/rec.13819.
- Broad A, Rees M, Knott N, Swadling D, Hammond M, Ingleton T, Morris B and Davis AR (2023) [Anchor scour from shipping and the defaunation of rocky reefs: A quantitative assessment](#). *Science of the Total Environment* 863:160717. doi: 10.1016/j.scitotenv.2022.160717. (jointly with Initiative 7)
- Dwyer PG, Mamo LT, Coleman MA, Dengate C, Kelaher BP (2022) [Multi-use and eco-features for breakwater upgrade works](#). Proceedings of 37th International Conference on Coastal Engineering (ICCE), 4-9 December 2022 Sydney, NSW Australia.
- Edgar GJ, Stuart-Smith RD, Heather FJ, Barrett NS, Turak, E, Sweatman H, Emslie MJ, Brock DJ, Hicks J, French B, Baker SC and Knott NA (2023) [Continent-wide declines in shallow reef life over a decade of ocean warming](#). *Nature* 615(7954):858–865. doi: 10.1038/s41586-023-05833-y.
- one presentation to the [2022 Australian Marine Science Association](#) conference on the need for research on impacts of jetties to NSW estuaries seagrass.
- Co-host of the [2022 Australian Mangrove and Saltmarsh Network](#) conference in Ballina with Strategy-related field trips, 5 Strategy project presentations, and a keynote address from Authority Chair Russell Reichelt.

Initiative 3 – Planning for climate change



Photo 4. SCUBA divers are well placed to record and report sightings of species that are moving south along the NSW coast in response to warming ocean temperatures. Photo credit: Jarrad Baker

Initiative objective

To understand, adapt and increase resilience to help mitigate the impacts of climate change on the NSW marine estate

Initiative long-term outcomes

Adaptation planning, strategies and decision-making across the marine estate incorporates the likely future impacts of climate change

Budget year 2022–23

\$3,077,515

Management challenges and opportunities

Understanding the effects of climate change on the marine estate is critical and requires dedicated planning. Although the climate is changing, the likelihood and consequence of these effects are not well known.

There are many knowledge gaps that need to be filled so we can mitigate the impacts of climate change on the NSW marine estate. This year, we continued to fill key knowledge gaps about response and resilience to climate change and collaborating with partners on climate change adaptation. This work will ensure that the likely future effects of climate change are better understood, anticipated and planned for in policy and management.

The \$3 million allocated to this initiative is about 10% of the total funding for the Strategy.

Highlights – Planning for climate change

Published **12 scientific papers** on the impact of climate change, including **3** relating to long-spined **urchins**, tropical branching **corals**, and Australian **marine ecosystems**



1,000 citizen science **climate change report cards** handed out during the NSW Taste of Seafood festivals



Macrophyte and disturbance **mapping** completed in **16 estuaries**, totalling **1,940 ha** of macrophytes and **525 artificial structures**

Future **ocean warming assessed** and the model results presented to marine park managers

137 towed video transects have quantified marine habitat cover along the entire NSW coast
Published **6 scientific papers** to showcase the results

1st Statewide Steering Committee meeting with key marine state and climate change agencies held in May 2023 for facilitating climate change adaptation in NSW marine parks



Putting the Strategy into action

Initiative 3 is working to improve our knowledge of climate change impacts, incorporating this knowledge into adaptation planning, and increasing resilience to help mitigate these impacts on the NSW marine estate. This year, monitoring, research and citizen science continued to detect the effects of climate change on the marine estate.

The knowledge gaps are progressively being filled. Video transects along the NSW coast have provided the data we need about marine habitat, including marine vegetation, sediments and topography. It will be a key tool for understanding and monitoring the impact of climate change in the years to come. The images were in the process of being made available online shortly after the end of the reporting period.

We started 3 new projects in this period:

- NSW Blue Carbon Strategy 2022–2027 started with 2 blue carbon demonstration projects on national park and primary production lands. Several public talks were given to communicate research findings, and the Duck Creek site was showcased at the Australian Saltmarsh and Mangrove conference.
- The Facilitating Climate Adaptation in NSW Marine Parks project has so far produced a literature review and identification of climate change risk.
- The second-pass assessment of mangrove and saltmarsh vulnerability to sea level rise gave detailed hydrological modelling of water and sediment delivery to wetlands and is being incorporated into vulnerability assessments.

Other activities include:

- The research collaboration with Redmap Australia continues to map changes in fish marine species distribution.
- An assessment of future ocean warming, derived from the latest generation of global climate models, was presented to NSW marine park managers to help anticipate climate change and its impacts on the marine estate.

The data gathered through projects in this initiative provide a baseline of current condition that can be used for ongoing modelling and monitoring of the impacts of climate change. It also helps coastal and marine managers and communities plan for climate change. The benefits for planning and implementation are already being seen in the blue carbon projects.

What people say

Feedback from stakeholder engagement included:

“I’m most excited by the Duck Creek Blue Carbon project as a way of exploring what sort of local carbon offset projects are possible in our region. That’s going to be relevant for us as we work towards our community goal of being net zero emissions in the future.”

Debbie Firestone – Program Leader Climate Change and Sustainability Officer from Tweed Shire Council
[Investigating a blue carbon demonstration site on primary production land](#)

More information

[Triannual snapshot reports – see actions under Initiative 3](#)

[Implementation plan](#)

Publications:

- [New estuarine habitat maps](#) for Batemans Bay, Cullendulla Creek, Clyde River, Cudgera Creek, Merimbula Lake, Mooball Creek, Pambula Lake, Tweed River and Twofold Bay
- [NSW citizen science report card](#) documenting marine species that are on the move along the NSW coastline
- [Maps of future projections of mangrove and saltmarsh under sea level rise scenarios](#)

Peer-reviewed publications:

- Davis T and Nimbs M (2022) [Susceptibility of tidal pool fish assemblages to climate change](#). *Ecologies* 2022(3):510–520. doi: 10.3390/ecologies3040037.
- Davis TR, Champion C, Dalton S, Coleman MA (2023) [Are corals coming to a reef near you? Projected extension of suitable thermal conditions for hard coral communities along the east Australian coast](#). *Austral Ecology*: 48(5):1–8. doi: 10.1111/aec.13327.
- Davis TR, Knott NA, Champion C, Przeslawski R (2023) [Impacts of climate change on densities of the urchin *Centrostephanus rodgersii* vary among marine regions in eastern Australia](#). *Diversity* 15(3):419. doi: 10.3390/d15030419.
- Davis T, Larkin MF, Forbes A, Veenhof RJ, Scott A, Coleman MA (2022) [Extreme flooding and reduced salinity causes mass mortality of nearshore kelp forests](#). *Estuarine, Coastal and Shelf Science* 275:107960. doi: 10.1016/j.ecss.2022.107960.
- Harris RJ, Bryant C, Coleman MA, Leigh A, Briceno VF, Arnold PA, Nicotra AB (2023). [A novel and high throughput approach to assess photosynthetic thermal tolerance of kelp species using chlorophyll \$\alpha\$ fluorometry](#). *Journal of Phycology*. 59(1):179–192. doi: <https://doi.org/10.1111/jpy.13296>.
- Hughes MG, Glasby TM, Hanslow D, West G and Wen L. (2022) [Random forest classification method for predicting intertidal wetland migration under sea level rise](#). *Frontiers in Marine Science* 10:749950. doi: 10.3389/fenvs.2022.749950.

- Molinos JG, Hunt HL, Green ME, Champion C, Hartog JR, Pecl GT (2022) Climate, currents and species traits contribute to early stages of marine species redistribution. *Communications Biology* 5(1):1329. doi: 10.1038/s42003-022-04273-0.
- Nimbs MJ, Wernberg T, Davis TR, Champion C, Coleman MA (2023) Climate change threatens unique evolutionary diversity in Australian kelp refugia. *Scientific Reports* 13:1248. doi: 10.1038/s41598-023-28301-z.
- Pecl GT, Kelly R, Lucas C, van Putten I, Badhe R, Champion C, et al. (2023) Climate- driven ‘species-on-the-move’ provide tangible anchors to engage the public on climate change. *People and Nature* 5(2018):1–19. doi:10.1002/pan3.10495.
- van Oppen MJH and Coleman MA (2022) Advancing marine conservation through genomics. *PLoS Biology* 20(10): e3001801. doi: 10.1371/journal.pbio.3001801.
- Veenhof RJ, Coleman MA, Champion C, Dworjanyn S (2023) Urchin grazing of kelp gametophytes in warming oceans. *Journal of Phycology* 59(1). doi: 10.1111/jpy.13364.
- Veenhof RJ, Champion C, Dworjanyn SA, Shalders TC, Coleman MA (2023) Reproductive phenology of the kelp *Ecklonia radiata* at its Australian warm range edge and the influence of environmental factors. *Marine and Freshwater Research* 74(11). doi: 10.1071/MF22259.
- Veenhof RJ, Champion C, Dworjanyn SA, Wernberg T, Minne AJP, Layton C, Bolton JJ, Reed DC, Coleman MA (2022) Kelp gametophytes in changing oceans. In Hawkins et al. (eds) *Oceanography and Marine Biology: An Annual Review*, volume 60, Taylor Francis Group, UK.
- Vergés A, Cruz D, Langley M, Wood G, Bolton D, Campbell AH, Coleman MA, Steinberg PD and Marzinelli EM (2022) Restoration in practice: projects from around the world. Operation crayweed. In Eger AM, Layton C, McHugh TA, Gleason M, and Eddy N (eds) *Kelp Restoration Guidebook: Lessons Learned from Kelp Projects Around the World.* The Nature Conservancy, Sacramento, CA, USA.
- Eger AM and Wernberg T (2022) Introduction. In Eger AM, Layton C, McHugh TA, Gleason M, and Eddy N (eds) *Kelp Restoration Guidebook: Lessons Learned from Kelp Projects Around the World.* The Nature Conservancy, Sacramento, CA, USA.
- Wen L, Glasby TM and Hughes MG (2023) The race for space: modelling the landward migration of coastal wetlands under sea level rise at a regional scale. *Science of the Total Environment* 859(Pt 2): 160483. doi: 10.1016/j.scitotenv.2022.160483.

Initiative 5 – Reducing impacts on threatened and protected species

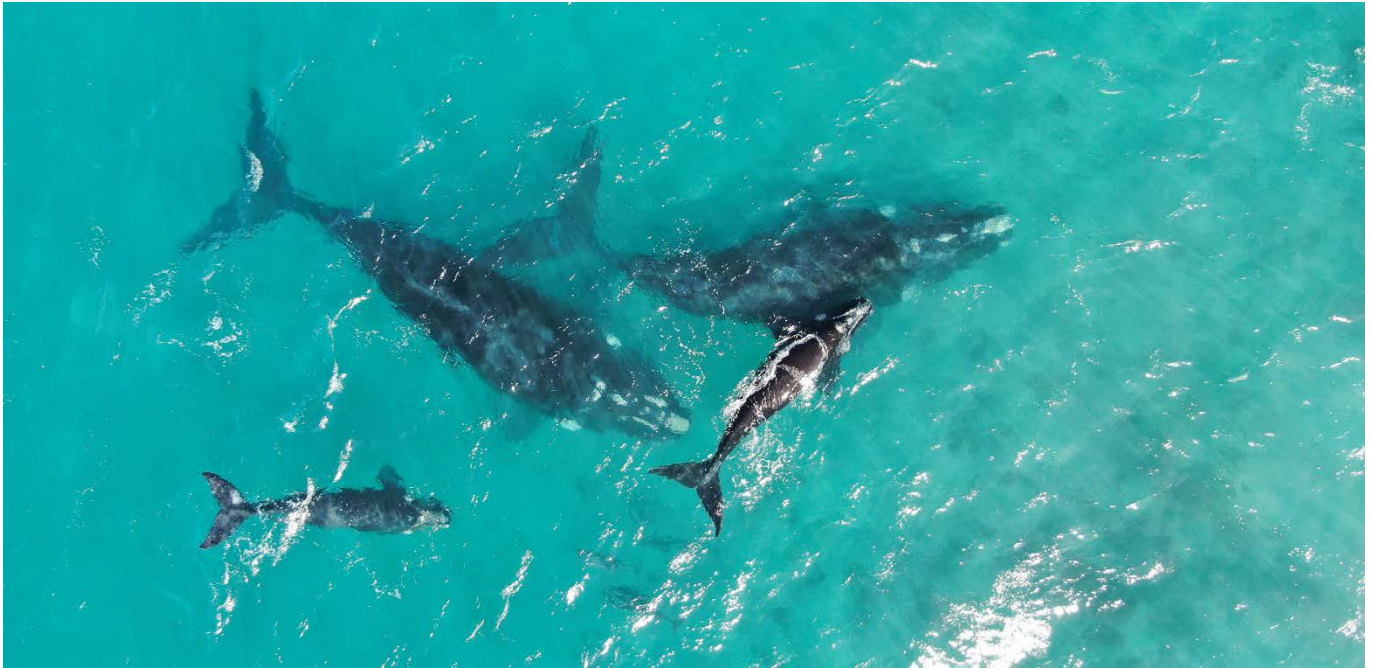


Photo 5. Right Whale ID drone operator captured mother and calves at Flat Rock NSW. Photo: Mark Fackerell

Initiative objective

To understand and mitigate threats to threatened and protected species in NSW

Initiative long-term outcomes

Improved or maintained conservation status and health of targeted threatened and protected species in the wild

Budget year 2022–23

\$1,282,502

Management challenges and opportunities

NSW is home to many threatened and protected species. The cumulative impacts of climate change, fishing, litter, recreational activities such as boating, as well as land-based and industrial activities, pose a cumulative threat to threatened and protected species in the marine estate.

This management initiative seeks to reduce the cumulative risks to wildlife and to enable the continued social, cultural and economic benefits from the biodiversity of the marine estate by:

- improving partnerships between government agencies and non-government organisations
- improving existing wildlife conservation programs
- expanding community and industry education on the impacts of human activities.

The \$1.3 million allocated to this initiative is about 4% of the total funding for the Strategy.

Highlights – Reducing impacts on threatened and protected species

Held a **multilateral workshop** to investigate novel techniques to manage live stranded large whales



Launched **11 educational videos** for sea turtle health assessment



Post-mortems for **20 turtles, 5 cetaceans, 3 pinnipeds**



Recorded **70 Southern Right Whale sightings**: including 3 cow-calf pairs and a 5 unaccompanied adults



91 people attended 5 training sessions across NSW on large whale disentanglement

Initiated the **Leatherback turtles species distribution model**

12 humpback whales were freed from **34 entanglements**
6 successful rescue missions; 6 unassisted DPI SMART Drumline releases

Putting the Strategy into action

Initiative 5 aims to understand and mitigate threats to threatened and protected species in NSW. This will help to improve or maintain the conservation status and health of targeted threatened and protected species in the wild.

The focus this year has been expanding capacities and starting new projects to understand and mitigate threats to threatened and protected species in NSW. Our projects included:

- a species distribution model and a population viability assessment for the critically endangered leatherback turtle, with predictive measures to quantify the potential risk between these animals and shark nets
- improved scientific outcomes from marine wildlife stranding events, through increased sample collection and analysis examining the impacts of heavy metals and other anthropogenic impacts on health metrics
- projects to improve understanding of habitat use and distribution for species that may be at risk from climate change and urban and industrial development
- a review of the Artificial Light At Night (ALAN) audit report and sky glow report to assess the impacts of anthropogenic light on marine wildlife.

We have worked in partnership with the community, partners, industry and government to share information and resources. It has helped us respond to marine wildlife events, continue our monitoring programs, and ensure people using the marine estate minimise interactions with threatened and protected marine species.

We are updating memorandums of understanding (MoU) with NSW Marine Rescue and DPI-Fisheries.

We are partnering with non-government agencies to improve sample collection from deceased marine wildlife. The National Parks and Wildlife Service established a Port Stephens Large Whale Disentanglement node to protect migrating whales. This has helped us improve or maintain conservation status and health of targeted threatened and protected species in the wild.

We continue to build staff capability, for example, we:

- delivered new Large Whale Disentanglement training to NSW National Parks and Wildlife Service (NPWS) staff
- attended oil spill preparedness workshops
- provided training to DPI-Fisheries shark meshing contractors so they could identify animals that were released live following disentanglement from the shark nets. This will improve our understanding of post-release survivorship of these species and allow more accurate assessments of the impacts of bycatch on vulnerable species.

Our focus on education continues. Seal sample collection guidelines and videos demonstrating appropriate behaviour around seals and best practice handling and assessment of sea turtles were developed. A series of educational videos for rehabilitation providers and veterinarians on [sea turtle health assessments](#) were published. The videos demonstrate best practice techniques for handling and assessing sea turtles and will improve animal welfare and rehabilitation outcomes.

DPI-Fisheries have continued work to decrease interactions between non-target species and fishers gear, and have published 2 scientific papers, and developed new seabird management plans for ocean trawl fisheries.

What people say

Feedback from stakeholder engagement included:

“We now have capability to get teams to disentangle whales up and down the NSW coast, thanks largely to the training through the MEMS-funded Partnerships to Protect Marine Wildlife project. This includes staff from a range of different agencies.”

Andrew Marshall, Marine Wildlife Project Officer NSW NPWS
[Partnerships to protect marine wildlife](#)

More information

[Triannual snapshot reports – see actions under Initiative 5](#)

[Implementation plan](#)

Conferences:

- [2023 Australian Marine Science Association](#) conference presentation, ‘Right Whale ID: The faces of Success’.

Peer-reviewed publications:

- Hall, J, Bengtson Nash S, Gautam A, Bender H, Pitcher BJ, McCallum H and Doyle C (2023) [Persistent organic pollutants and trace elements detected in New Zealand fur seals \(long-nosed fur seal; *Arctocephalus forsteri*\) from New South Wales, Australia, between 1998 and 2019. *Science of the Total Environment* 902: 166087. doi: 10.1016/j.scitotenv.2023.166087.](#)
- Kelaher BP, Monteforte KI, Morris SG, Schlacher TA, March DT, Tucker JP, and Butcher PA (2023) [Drone-based assessment of marine megafauna off wave-exposed sandy beaches. *Remote Sensing* 15\(16\):4018. doi: 10.3390/rs15164018.](#)
- Schilling H, Dedden A, Crocetti S, Liggins G, Lorigan S, Marshall A, Rogers T, Schaeffer A, Suthers I, Johnson D (2023) [Regional oceanography affects humpback whale entanglements in set fishing gear. *Conservation Science & Practice* <https://doi.org/10.1111/csp2.13034>.](#)

People, communities and business

The marine estate is a central part of Australia's heritage and culture. Almost 6 million people live within 50 kilometres of the NSW coastline, including the people of 11 coastal Aboriginal nations who are intimately connected to their Land and Sea Country.

Experiences in, and associations with, the marine estate through the generations have established a contemporary coastal and marine culture that crosses many sectors. It offers the opportunity for activities such as diving, swimming and fishing while providing a livelihood for many, particularly as a hub for international and domestic trade and tourism through its ports, nature-based tourism, and seafood related industries.

The Strategy outcomes:

- Sea Country supports improved wellbeing for Aboriginal communities
- Greater community appreciation and enhanced sustainable experiences of the marine estate in identified regions, and maintained elsewhere
- Enhanced coastal and marine opportunities

How we get there – the Strategy initiatives:

- Initiative 4 – Protecting the Aboriginal cultural values of the marine estate
- Initiative 6 – Ensuring sustainable fishing and aquaculture
- Initiative 7 – Enabling safe and sustainable boating
- Initiative 8 – Enhancing social, cultural and economic benefits



Photo 6. Recreational fishing is enjoyed by more than one million people in NSW

Initiative 4 – Protecting the Aboriginal cultural values of the marine estate



Photo 7. Yuin research divers. Day one of training. Photo: Ian Kerr

Initiative objective

To work with Aboriginal communities in the management of Sea Country to reduce threats and risks to Aboriginal cultural heritage.

Initiative long-term outcomes

Improved Aboriginal satisfaction with Sea Country management

Aboriginal people derive greater economic benefit from the marine estate

The broader NSW community has a greater appreciation of the significance of Sea Country for Aboriginal people

Budget year 2022–23

\$1,696,123

Management challenges and opportunities

Sea Country is central to the overall health and wellbeing of Aboriginal people, their cultural practices and their traditions. Aboriginal people and their cultural values are not yet appropriately represented in the management of the marine estate, and there are still significant knowledge gaps relating to Aboriginal cultural values.

There are also many high-risk threats that cumulatively affect Aboriginal cultural heritage associated with Sea Country. Involving Aboriginal people will help identify cultural values and improve how we manage Sea Country and address threats.

The \$1.7 million allocated to this initiative is about 5% of the total funding for the Strategy.

Highlights – Protecting the Aboriginal cultural values of the marine estate

5 cultural tourism plans completed for Southern Region Aboriginal businesses



5 videos promoted Aboriginal engagement and activities in the NSW marine estate



Sea Country Rangers involved in **estuary and river bank management** by Coffs Harbour and Kempsey LALCs. Coastal weeds and marine debris completed by



Eden, Bega, Merrimans, Wagonga, Cobowra and Bodalla LALCs

Reviving culture through the South Gumbaynggir Culture Camp, Darruyaygam Maagun Culture & Wellness Camp, the Arakwal family cultural camp, and the Yaegl Registered Native Title Bodies Corporate Celebration Day

Pathways to further employment with research scientists through capacity building on Country: On water: **102** Aboriginal people obtained their **general boat licence**, **30** people completed Certificate II Maritime Operations **Coxswain Grade 1** training, **12** people completed **Coxswain grade 3** training



Underwater: **6 Aboriginal** people on the South Coast completed the inaugural **scuba dive** (research diver) certification course



6 members of the Yaegl registration Native Title Bodies Corporate **familiarised** with the successful Joonga Land and Water Aboriginal Corporation **SMART drumline contract and tourism business**

Aboriginal marine skill vessel and education trailer storage shed completed at Taylors Beach, Port Stephens

Putting the Strategy into action

Initiative 4 aims to increase community understanding of Aboriginal Sea Country values, enhance economic opportunities and employment for Aboriginal people, as well as increase active involvement in managing the marine estate.

In this reporting period, we were able shift our focus to new or expanding projects as we completed projects from previous years that had been impacted by COVID.

Projects aiming to develop marine skills in Aboriginal communities were started in the Central region and consolidated in the Southern and Northern regions. Examples included a general boating skills licensing courses, coxswains courses, and first aid training.

A particular success was the work of the Sea Country Rangers in plastic recycling, which delivered economic and environmental benefits:

- Building on the success of the Plastic Collective project at Bowraville last year, purpose-built machinery and facilities are now in place at Bowraville to establish the supply chain for plastic recycling products.
- The Miimi Sea Country Rangers collect and process recycled oyster drums and other suitable plastics from the Nambucca River and surroundings to make other valuable recycled plastic items such as bollards and park benches. The work is part of the ongoing Nambucca River clean-up by Miimi Aboriginal Corporation.

We are supporting aspirations for cultural tourism business growth through funding for 5 new cultural tourism business plans on the South Coast. This work focuses on the education tourism sector. These are in addition to 7 businesses that we previously supported.

We promoted appreciation of the significance of Sea Country for Aboriginal people through several activities. A highlight was the 3-day Arakwal Family Cultural Camp near Byron Bay. This camp promoted the protection of Aboriginal cultural values in the Byron Bay region and also educated youth about the importance of culture, healthy living, and social and emotional wellbeing. Importantly, the exchange of cultural knowledge established a positive ongoing relationship between DPI-fisheries and the Aboriginal community.

Other activities that aimed to revive culture included:

- the South Gumbaynggir Culture Camp
- Darruyaygam Maagun Culture & Wellness Camp
- Yaegl Registered Native Title Bodies Corporate Celebration Day
- completion of Buckenbowra cultural fish trap re-establishment near Batemans Bay.

Increased involvement of Aboriginal people in marine estate research and management has contributed to identifying the cultural values associated with Sea Country and improved management of the marine estate.

What people say

A key highlight of the year was the development of several [engagement videos](#). These videos showcase several projects and include testimonials from people engaged in the projects:

“The [Initiative 4] programs that have been offered to community in the last 3 years by DPI has been a great initiative for South Coast Aboriginal people and a very successful story in completing the courses compared to our local training institutions ... This [Cultural Tourism project] has led people to real jobs because they now have qualifications.”

Wally Stewart – Founder of Joonga Aboriginal Land & Water Corporation,
graduate and mentor of 3 of the maritime/tourism courses delivered through the program
[Cultural economic development \(nsw.gov.au\)](#)

More information

[Triannual snapshot reports – see actions under Initiative 4](#)

[Implementation plan](#)

Initiative 6 – Ensuring sustainable fishing and aquaculture



Photo 8. Commercial fisher. Photo: iStock

Initiative objective

To ensure fishing and aquaculture is managed in a way that is consistent with ecologically sustainable use while providing for the health, heritage and social benefits of fishing and seafood consumption

Initiative long-term outcomes

Improved ecological sustainability, economic viability and community wellbeing of fishing and aquaculture in the marine estate

Budget year 2022–23

\$3,707,970

Management challenges and opportunities

Sustainable fishing and aquaculture bring many benefits for the NSW community. It also generates billions of dollars and creates thousands of jobs across coastal NSW.

These activities need to be managed to reduce threats to the environmental assets of the marine estate.

This initiative will support significant social and economic benefits for the people of NSW and, specifically, cultural benefits to Aboriginal people.

The \$3.7 million allocated to this initiative is about 12% of the total funding for the Strategy.

Highlights – Ensuring sustainable fishing and aquaculture

Finalised the **Spanner Crab Harvest Strategy** which was endorsed by CommFish NSW

Finalised the report: **Economic value of NSW aquaculture**



52,520 dusky flathead fingerlings stocked in St Georges Basin, Lake Conjola and Burrill Lake



New **agreement for oyster aquaculture research signed** by Southern Cross University and DPI Aquaculture



Over 200 old witches hat nets and rectangular crab traps exchanged for more environmentally responsible round crab traps and lift nets **during 5 exchange day events** held across NSW



Sea Dumping **permit to deploy Terrigal and Forster artificial reefs granted** by the Commonwealth

22 fishing hook and line bins distributed in Byron Bay, Richmond Valley, Coffs Harbour, Lake Macquarie, Northern Beaches and Shellharbour council areas to encourage responsible fishing



Putting the Strategy into action

Initiative 6 aims to deliver viable recreational, Aboriginal and commercial fisheries now and into the future. Despite project delays due to the impacts of COVID-19 restrictions, we were able to deliver key activities and milestones during this period. These included:

- enhancing fishing opportunities by fish stocking and installing artificial structures
- ensuring best-management practice through policy development, reviews and education programs
- exploring new business opportunities.

Our investment in fisheries continues with:

- the decision to install new offshore artificial reefs at Coffs Harbour and Ballina next year
- fish stocking into Lake Macquarie, St Georges Basin, Lake Conjola and Burrill Lake (dusky flathead fingerlings)
- exchanging older-style crab nets for environmentally responsible round crab traps and lift nets
- installing fishing hook and line bins in coastal council areas to encourage responsible fishing.

Initiative 6 continues to work towards more sustainable fisheries through the continued development of harvest strategies, which guide fisheries harvest through management of total allowable catches. The harvest strategies for spanner crab, trawl whiting and lobster fisheries have been finalised in this reporting period. The Trap and Line Harvest Strategy Working Group has been appointed and are currently developing the harvest strategies for the snapper and kingfish fisheries. The Mulloway Harvest Strategy Working Group is also nearing completion of the mulloway harvest strategy.

Collectively, these and other projects in this initiative have improved fisheries sustainability, economic viability and community wellbeing through improving fishing and aquaculture opportunities and will ultimately leading to improving stakeholder enjoyment from the marine estate.

What people say

Feedback from this engagement included:

“This harvest strategy and the science behind it is good news for recreational fishers. The advantage with the harvest strategy is it sets targets, so if the biomass falls, they reduce commercial quota and they reduce recreational take. If it increases, there's potential for increases for both commercial and recreational, which is possibly where we're at now. It's very promising for the recreational fishers.”

Ian Puckeridge, a recreational lobster fisher of about 47 years

More information

[Triannual snapshot reports – see actions under Initiative 6](#)

[Implementation plan](#)

Publications:

- [Spanner Crab Harvest Strategy](#)
- [Trawl Whiting Harvest Strategy](#)
- [Lobster Harvest Strategy](#).

Initiative 7 – Enabling safe and sustainable boating



Photo 9. Boats on moorings. Photo: iStock

Initiative objective

To balance protection of coastal and marine habitat and species with ongoing access and safe and sustainable boating

Initiative long-term outcomes

Boating provides increased social and economic benefits for NSW communities while supporting sustainable social, economic, cultural and environmental benefits of the marine estate

Budget year 2022–23

Initiative 7 is funded by Transport for NSW with the addition of \$15,000 of Strategy funding

Management challenges and opportunities

Recreational and commercial boating brings significant economic and social benefits to the NSW community, but those benefits rely on adequate infrastructure such as boat launching ramps, moorings and marinas.

Boating activity will increase as vessel ownership continues to grow. We need to accommodate this increase while maintaining the social, economic and environmental benefits of the marine estate.

This initiative is largely funded by Transport for NSW. The Strategy contributes an additional \$15,000 to this initiative (less than 1% of the total funding for the Strategy).

Highlights – Enabling safe and sustainable boating

35 projects completed under the Boating Now program



4288 moored vessels audited

12 environmentally friendly moorings deployed in Port Stephens, Sydney Harbour and Jervis Bay



Public consultation on 15 policy options for improved management of recreational vessels near or at end of their useful life



Regulatory reviews & consultation
Marine Pollution Regulation 2014
Marine Safety Regulation 2016

Launch of the Maritime Safety Plan 2022–2026 working towards zero fatalities and serious injuries on navigable waterways in NSW by 2056

Continued implementation of the Maritime Infrastructure Plan 2019–2024 through programs such as Boating Now Programs and Maritime Infrastructure Stimulus Program.



Putting the Strategy into action

Projects delivered as part of Initiative 7 continue to improve the safety and sustainability of boating, improving infrastructure, including boat ramps and navigational aids, and delivering compliance enforcement and education campaigns.

We are implementing the [Maritime Infrastructure Plan 2019–2024](#) through programs such as Boating Now programs and the Maritime Infrastructure Stimulus Program.

Our statewide mooring audit program helps to increase compliance, improve water safety and access, reduce mooring wait lists and salvage costs, and safeguard the marine environment.

The Environmentally Friendly Mooring research project continues. So far, we have:

- completed Stage 2 – recruitment of mooring licensees to replace existing moorings with environmentally friendly moorings for in-water trials in 3 maritime regions for a 2-year trial period
- started Stage 3 – deployment of environmentally friendly moorings for in-water trials in Port Stephens, Sydney Harbour and Jervis Bay. Ongoing work includes data collection of mooring performance, sea-floor monitoring, biodiversity surveys and carbon sampling.

We are investigating options to improve management of end-of-life recreational vessels. Our consultation on policy options in 2022–23 generated 174 public submissions, which we are now considering.

The potential impacts of large ships anchoring on seabed habitats offshore was also assessed and an educational workshop on anchoring was hosted with relevant stakeholder groups.

A focus on safety led to the launch of the [Maritime Safety Plan 2022–2026](#), which aims for zero fatalities and serious injuries on navigable waterways in NSW by 2056.

What people say

Feedback from this engagement included:

“[About the new pontoon for Corocan Park in Grafton funded under the Boating Now project] ... This waterfront public asset will encourage greater use of the mighty Clarence River for outdoor recreation activities including swimming, fishing, boating, yachts, sail boats, kayaks, canoes and dragon boats. This structure will be well utilised by these groups and has the potential to increase their participation numbers. The new structure will also increase efficiency, allowing more people access to the river, quickly and safely. I would like to thank the NSW Government for its funding and assistance with this project.”

Mayor Tiley, Clarence Valley Council, 3 March 2023

More information

Triannual snapshot reports – see actions under Initiative 7

Implementation plan

Publications:

- Maritime Infrastructure Plan 2019–2024
- Maritime Safety Plan 2022–2026
- End of Life Vessels Policy Options Paper
- Broad A, Rees M, Knott N, Swadling D, Hammond M, Ingleton T, Morris B and Davis AR (2023) Anchor scour from shipping and the defaunation of rocky reefs: A quantitative assessment. *Science of the Total Environment* 863:160717. doi: 10.1016/j.scitotenv.2022.160717 (jointly with Initiative 2)

Initiative 8 – Enhancing social, cultural and economic benefits



Photo 10. People enjoying the marine estate. Photo: iStock

Initiative objective

To improve the social, cultural and economic benefits that the NSW community derives from the marine estate by responding to priority threats

Initiative long-term outcomes

Improved social, cultural and economic benefits of the marine estate that contribute to the wellbeing of the NSW stakeholders and community

Increased stakeholder and community adoption of safe and sustainable use of the marine estate

Budget year 2022–23

\$1,869,410

Management challenges and opportunities

The community derives many social, cultural and economic benefits from the NSW marine estate. There is a need to improve our understanding of these benefits, and the issues that could impact them, to support holistic management decisions.

There is also a need to improve community awareness of the diversity of benefits supported by our marine estate and how their actions may influence them.

The \$1.9 million allocated to this initiative is about 6% of the total funding for the Strategy.

Highlights – Enhancing social, cultural and economic benefits



Putting the Strategy into action

Initiative 8 has a major education, research and monitoring component through working with institutions and government agencies to increase understanding of how we all use and value the marine estate to maximise community benefits.

A key focus this period was towards ensuring that social, cultural and economic values are better incorporated into planning and management of the marine estate.

A highlight this year was the release of the NSW Marine Estate Education Strategy, which guides a more efficient and co-ordinated approach across government agencies and with stakeholders to build community awareness and foster stewardship of the marine estate.

As part of this strategy, 228 students took part in a pilot primary school program of the [Marine Estate Agents program](#). Teachers' feedback informed the final program design. This new primary school educational program is based around the features of the NSW marine estate and includes innovative classroom resources and lesson plans in geography and science, emphasising sustainability and Aboriginal and Torres Strait Islander cultures and histories.

We also released careers videos for high schools to showcase the diversity of jobs related to the NSW marine estate (for example, commercial fisherman, education ranger, research scientist).

Significant milestones were achieved in enhancing our understanding of the human (social, cultural, economic) dimensions of the marine estate:

- The [Community Wellbeing Framework Report](#) provides the overarching approach for long-term monitoring of social, cultural, and economic benefits as part of the NSW MIMP.
- The 'Connections to Sea Country survey – Aboriginal people of coastal NSW' is a technical report and summary report that provide insights from interviews with 562 Aboriginal people across 11 coastal locations in NSW.

- Economic monitoring data has been updated to include the past 2-years. We have initiated data analysis and engagement with stakeholders to produce a report that investigates the drivers for economic changes in specific industries and regions, as well as broader trends within the marine estate over the past 5 years and into the future.

We also made some progress towards incorporating human dimensions into marine estate planning and management:

- provision of new social, cultural and economic monitoring data to inform Strategy program evaluation as required under the Integrated Monitoring and Evaluation Framework for the MIMP
- production of an internal draft report scoping the use of a natural capital accounting approach in the Strategy and initiating an assessment of new environmental markets for coastal and marine assets and services (including blue carbon)
- initiation of a cost-benefit analysis for oyster reef restoration under Initiative 1
- commencement of the Blue Economy project in Stage 3, focusing on the development of a 'blue growth strategy' for the NSW marine estate
- re-initiated the Human Values and Activity Mapping project for delivery in Stage 3.

What people say

The NSW marine estate is an important contributor to the wellbeing of our community:

“It is a massive stress reliever to get down to the coast and the fresh air and swimming in the ocean. It’s a social activity being amongst other surfers. It connects the community. It has many other health benefits.”

“Taking walks along the coastline, going swimming, observing wildlife and the beauty of nature, it all contributes to my overall mental and physical wellbeing.”

Resident of NSW Coastal Community– taken from the Community Wellbeing survey (wave 1).
Community wellbeing framework (nsw.gov.au)

More information

Triannual snapshot reports – see actions under Initiative 8

Implementation plan

Publications:

- Marine Estate Education Strategy
- Community Wellbeing Framework
- Marine Estate Agents program

Governance and management

Management of the marine estate is shared across all levels of government: local, state and Commonwealth. Government departments and agencies have diverse interests and responsibilities. They also have some overlap in jurisdictional boundaries.

As a result, all levels of government need to work together closely so that legislation, policy and programs are efficient and effective and support management of the marine estate in its entirety. In particular, improving the governance of marine protected areas is a focus of this initiative.

Good governance and management are essential for the Strategy to achieve its vision for ‘a healthy coast and sea, managed for the greatest wellbeing of the community, now and into the future’.

Strategy outcomes:

- Improved coordination, transparency, inclusiveness and evidence-based decision-making in managing the marine estate
- Improved efficiency and effectiveness in managing the marine estate

How we get there – the Strategy initiatives:

- Initiative 9 – Delivering effective governance
- Program management, monitoring, reporting, evaluation and engagement



Photo 11. Splendid nudibranch pair North Head aquatic reserve, Sydney. Credit: John Turnbull

Initiative 9 – Delivering effective governance



Photo 12. Fisheries patrol Photo credit: Cara Van Der Wal

Initiative objective

To improve governance arrangements across the marine estate to support coordinated, transparent, inclusive and effective decision-making

Initiative long-term outcomes

Improved coordination, transparency, consistency and inclusiveness of managing the marine estate

Improved efficiency and effectiveness in managing the marine estate

Budget year 2022–23

\$1,519,535

Management challenges and opportunities

There is a need for governance that supports improved integrated management of the marine estate over the life of the Strategy.

Complex governance arrangements and overlapping jurisdictions can lead to unclear roles and responsibilities, inconsistencies, duplication and inappropriate regulation. Governance arrangements that are simpler and easier to understand will provide for effective and efficient management of the marine estate and deliver social, cultural, economic and environmental benefits.

The Strategy enhances interagency coordination and streamlining of agency effort, especially at the State government level. It also tests contemporary approaches to regulation and compliance, and seeks to actively involve stakeholders and communities in managing the marine estate.

The \$1.5 million allocated to this initiative is about 5% of the total funding for the Strategy.

Highlights – Delivering effective governance

Celebrated
40 years of North
Harbour Aquatic
Reserve and
Bushrangers Bay
Aquatic Reserve

Seizure of more than
8000 cockles that had
been illegally collected
and listed for sale on
Facebook



Greater Sydney region compliance
1,981 hours patrolling found
82% compliance from the
1193 interactions
with fishers



71% compliance in the 10th
annual operation **Turbo Reef**

20 compliance officers
inspected **417 fishers**

933 invertebrates returned
to marine protected waters, of
which 80% were cockles



Collected social, cultural,
economic and environmental
values for the **Lord Howe
Island Marine Park** to
inform management planning

More celebrations
including **20 years**
of Narrabeen Head
Aquatic Reserve



Putting the Strategy into action

Initiative 9 includes marine protected area planning projects that are critical to the delivery of NSW Government commitments and community expectations for the delivery of holistic governance for NSW marine parks and aquatic reserves. The Initiative includes protected area planning and management for the 6 marine parks and 12 aquatic reserves in NSW, as well as improved compliance service delivery for marine protected areas in the Greater Sydney region.

During this reporting period, background research informed management planning processes for Lord Howe Island Marine Park, and program planning and management for aquatic reserves. The Greater Sydney region also conducted extensive compliance activities, conducting 728 hours of patrols in aquatic reserves. They found an overall compliance rate for all inspected fishers of 82%.

Earlier in the year, a targeted operation in Southern Sydney led to the seizure of more than 8,000 cockles illegally collected and listed for sale on Facebook. This is a significant deterrent for others considering the illegal sale of fish and should lead to increased compliance.

The year was marked by several aquatic reserve anniversaries, and 3 milestone anniversaries were celebrated with public events:

- 20 years of Narrabeen Head Aquatic Reserve
- 40 years of North Harbour Aquatic Reserve and Bushrangers Bay Aquatic Reserve.

These significant events were an opportunity to showcase the environmental values of aquatic reserves and how they can also deliver social, cultural and economic benefits to the community.

This initiative is closely linked with program management, monitoring, reporting, evaluation and engagement.

What people say

“We appreciate the role that NSW Fisheries officers plays in protecting sensitive marine environments, including high-profile aquatic resources such as Long Reef and Cabbage Tree. A collaborative approach to conservation, sharing information and resources has benefoted both NPWS and Fisheries. It’s also helping achieve great outcomes!”

National Parks and Wildlife Service ranger

More information

[Triannual snapshot reports – see actions under Initiative 9](#)

[Implementation plan](#)

Program management, monitoring, reporting, evaluation and engagement



Photo 13. Coastal Sydney aerial drone image. Photo credit: Shutterstock

Objective	
To improve governance, monitoring, evaluation and reporting across the marine estate to support coordinated, transparent, inclusive and effective decision-making (related to Initiative 9).	
Long-term outcomes	
Improved coordination, transparency, consistency and inclusiveness of managing the marine estate (contributes to Initiative 9 outcomes)	
Improved efficiency and effectiveness in managing the marine estate (contributes to Initiative 9 outcomes)	
Improved coordination and implementation of the MIMP for the marine estate	
Budget year 2022-23	\$2,860,593

Management challenges and opportunities

To ensure coordinated management of the Strategy, a governance structure and program management framework have been implemented to support the Strategy’s delivery across agencies and across NSW. For more information about the Strategy’s governance, please refer to the [Agency’s annual report](#).

The framework provides the community and stakeholders assurance that the Strategy is being implemented in a coordinated, integrated and transparent way.

The \$2.9 million allocated to this initiative is about 9.3% of the total funding for the Strategy.

Highlights – Program management, monitoring, reporting, evaluation and engagement



100 projects implemented
8 MoUs
between DPI and partner agencies

3 public triannual snapshot reports and **1 annual report** to communicate progress of Strategy projects



5-Year Review of the Statewide **TARA** in final stage of completion
Workshop with more than **40 agency representatives** and the Marine Estate Expert Knowledge Panel

Fisheries Spatial Data Portal updated with Remnant Oyster Reefs, Blue Carbon Priority Areas, and Domestic Waterfront Structure Strategies datasets



Developed the **Marine Estate Communication and Engagement Framework** for release in 2023–24

Published the **Implementation Plan for 2022–2024**



Online, interactive **maps** for NSW **Aquatic Reserves** received around **3000 site visits** in the first month

Putting the Strategy into action

This component of the Strategy is related to Initiative 9 to support the Strategy's delivery across agencies and across NSW.

At a strategic level, we are delivering:

- continuous improvement of governance structures and the program management framework to ensure collaboration and coordination across all agencies
- planned monitoring, reporting and evaluation projects in place to measure success.

We started the year with a focus on planning, looking at budgets, cross-agency agreements, and implementation planning for the Strategy for this year (2022–23), the next 2 years (2022–24) and the next 6 years (2022–28).

This year, our work in the MIMP focused on:

- scoping and progressing the 5-year review of the TARA
- finalising technical reports outlining the monitoring of community wellbeing (Community Wellbeing Framework) and environmental condition (Environmental Condition Framework).

Work also progressed on developing a database and data support systems for monitoring and reporting, building the capacity of the team, and initiating data collection for the mid-term evaluation of the Strategy (outcomes monitoring).

Geographical Information Systems (GIS) support is also facilitated at this strategic level. A highlight has been the production of updated webmaps for all NSW Aquatic Reserves on the DPI website. These maps use embedded mapbox technology that is optimised for mobile devices. They allow users to locate themselves in relation to the reserve and provide information about permitted activities through a text popup and standard symbols. Other GIS support includes developing, obtaining and publishing datasets, map production, spatial planning advice and spatial data analysis.

The education and stakeholder liaison team led the delivery of a range of marine estate engagement, education and communication programs, activities and projects to inform the community and enable engagement in marine estate initiatives. These included maintaining the marine estate website, writing and distributing our stakeholder e-newsletter and managing the marine estate Instagram.

Work this period focused on developing an internal Marine Estate Management Strategy Communication and Stakeholder Engagement Framework and supporting documents in response to stakeholder feedback from the 2022 MEMS Communications and Engagement Review. The framework and supporting documents will guide ongoing communication and stakeholder engagement about the marine estate.

What people say

[MEMS triannual snapshot reports] tell a very positive story of hard work and achievement on the MEMS.

Chair, Dr Russell Reichelt – Marine Estate Management Authority

More information

[Triannual snapshot reports – see actions under Program Management](#)

[Implementation plan](#)

[2021-22 Marine Strategy Implementation Annual Report](#)

Publications

- [Strategy achievements infographic](#)
- [Strategy Snapshot Report \(November 2022-February 2023\)](#)
- [The Strategy Implementation Plan 2022-2024](#)
- [Online map projects 2022-2024](#)

Abbreviations and acronyms

Abbreviation	Full name
Authority	Marine Estate Management Authority
ALAN	Artificial Light At Night
DPI	Department of Primary Industries
DPE	Department of Planning and Environment
DPI-Fisheries	Department of Primary Industries – Fisheries
FTE	Full-time equivalent
GIS	Geographic information systems
ICOLL	Intermittently closed and open lakes and lagoons
MEMA agencies	Department of Regional NSW, Department of Planning and Environment (Environment & Heritage as well as Planning and Assessment groups) and Transport for NSW
MEMS	Marine Estate Management Strategy
MIMP	Marine Integrated Monitoring Program
MoU	Memorandum of understanding
NPWS	National Parks and Wildlife Service
NSW	New South Wales
SCU	Southern Cross University
Strategy	Marine Estate Management Strategy
TARA	Threat and Risk Assessment

Appendix A – communication and engagement

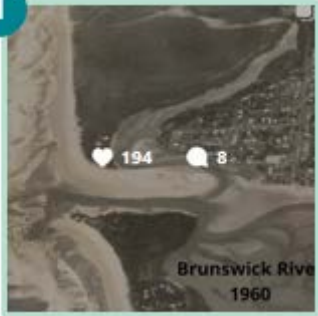


Marine estate Instagram – #nsw_marineestate

1,900 followers, increased by 18.3% compared to 2021–22.

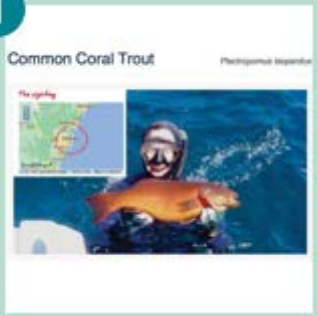


127 Instagram posts

44 Instagram stories

Top posts by likes, views or shares (boosted)

Image	Caption and likes	Description
	<p>Brunswick River 1960 compared to 2020</p> <hr/> <p>194 likes</p>	<p>These 2 images show how different river entrances on the NSW coast have changed due to the construction of breakwater structures.</p>
	<p>Bass are back at Kyogle Weir fishway</p> <hr/> <p>154 likes</p>	<p>Recent monitoring at Kyogle Weir fishway found 12 native fish species travelling upstream through the fishway, including the iconic Australian bass and freshwater Eel-tailed catfish species.</p>
	<p>A flexible fish, the moray eel can tie itself in knots</p> <hr/> <p>3,779 views 167 likes</p>	<p>A flexible fish, the moray eel can tie itself in a knot to lever out prey. Green morays in the Solitary Islands Marine Park have been recorded tying 5 different types including 2 previously unnamed knots.</p>

Top posts by likes, views or shares (organic)

Image	Caption and likes	Description
	<p>Fish on the move due to ocean warming</p> <hr/> <p>158 shares</p>	<p>Coral trout off the coast of Sydney ... What's going on?</p> <p>Common Coral Trout usually call the warmer waters of Queensland home; however, recently they have been spotted as far south as the waters off Sydney.</p>
	<p>Rangers from Bowraville have been collecting and recycling oyster barrels</p> <hr/> <p>100 likes</p>	<p>Look what these 4 Sea Country rangers are doing to protect their local waterways from plastic waste.</p> <p>The MiiMi Rangers from Bowraville have been collecting and recycling oyster barrels and processing them to make other valuable recycled plastic items.</p>
	<p>Riverbank stabilisation project</p> <hr/> <p>81 likes</p>	<p>It's official! Bank protection works can result in more carbon storage as well trapping sediment to keep waterways healthier.</p> <p>The incredible power of mangroves to store carbon, well-known amongst scientists, was put to the test by Southern Cross University researchers.</p>

Definitions

Boosted is paid (\$30 is the Strategy average). Boosting makes a post appear to people who don't follow you. It is a method to gain more views and engagement. It can be targeted by interest, location etc.




Organic unpaid. This content is seen by followers, people who follow the hashtags used and followers of anyone who shares the post.

Stories are temporary and last 24 hours; posts are permanent

Marine estate newsletter – Connect with us (nsw.gov.au)

Subscribers increased by 16.3% during the year.
from 1,049 subscribers at 1 July 2022
to **1,221 subscribers** at 30 June 30, 2023

Top stories – based on how many times readers clicked to the story

Image	Caption and clicks	Description
	<p>1</p> <p>Bass are back at Kyogle Weir fishway</p> <hr/> <p>364 clicks</p>	<p>Recent monitoring at Kyogle Weir fishway found 12 native fish species travelling upstream through the fishway, including the iconic Australian bass and freshwater eel-tailed catfish species.</p> <p>This story appeared in the May issue.</p>
	<p>2</p> <p>New research shows bank protection works reduce erosion and store carbon</p> <hr/> <p>222 clicks</p>	<p>The ability of mangroves to trap sediment and in doing so store carbon was put to the test by Southern Cross University (SCU) researchers recently at a research site at Emigrant Creek near Ballina.</p> <p>This story appeared in the June issue.</p>
	<p>3</p> <p>New videos highlight opportunities for Aboriginal people on Sea Country</p> <hr/> <p>208 clicks</p>	<p>There are now more than 20 new ways to explore opportunities for Aboriginal people to be involved in Sea Country management with the release of the NSW Sea Country Marine Estate YouTube playlist.</p> <p>This story appeared in the June issue.</p>

Marine estate website – marine.nsw.gov.au

In 2022–23, traffic to the website increased, with:
19,654 page views (16.6 % increase from last year)
15,637 unique page views (24.2% increase from last year)

Top pages visited

1. Marine estate management strategy (nsw.gov.au)
2. Strategy implementation
3. New South Wales Marine Estate Threat and Risk Assessment Report
4. Knowledge centre and news section

Top 3 project pages visited

1. Domestic waterfront structure strategies (nsw.gov.au)
2. Oyster reef restoration
3. Mapping seagrass, mangroves and saltmarsh

Definitions

The unique pageviews in Google Analytics show how many users visited a specific page, whereas the pageviews display the total number of times any pages were visited, including multiple views from the same user.

For example, if the user visits a page twice during the same session, it will be viewed as 1 unique pageview and 2 pageviews. A session is a measure of time.

