



MARINE ESTATE MANAGEMENT STRATEGY ANNUAL REPORT 2020–21

IMPLEMENTATION STAGE 2 – 2020–21

MARINE ESTATE MANAGEMENT AUTHORITY



Marine Estate Management Strategy Annual Report 2020–21: Implementation Stage 2

ISBN: 978-1-76058-507-5

Published December 2021

PUB21/553

This report is a supplementary report to the [Marine Estate Management Authority Annual Report 2010-2021](#)

This report covers the period 1 July 2020 to 30 June 2021

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Disclaimer: The information contained in this publication is based on knowledge and understanding at the time of writing. However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the author or the user's independent advisor.

Aboriginal 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 NSW Government seeks to work collaboratively with Aboriginal people to maintain their social, cultural, economic and spiritual connections to the marine estate now and into the future.



Photo 1. **Yuin Country:** Passing on Sea Country knowledge to the next generation – South Coast Sea Country Education Program. Photo: Ian Kerr DPI.

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Introduction

This Marine Estate Management Strategy Implementation Annual Report (the Strategy Annual Report) describes the annual progress of the ten-year [Marine Estate Management Strategy 2018–2028](#) (the Strategy). The Strategy Annual Report describes annual progress of the Strategy actions and initiatives, risk management and finances. This report is the third annual report and covers the third year of Strategy implementation from 1 July 2020 to 30 June 2021.

A total of \$73.9 million of funding has been allocated to the Strategy over its first three years:

- \$45.7 million for Stage 1 – the two years from August 2018 to June 2020
- \$28.3 million for Stage 2 – year 3 of the Strategy, from July 2020 to June 2021 (the focus of this report).

The funding in Stage 2 has been critical to maintaining the momentum of projects that commenced in Stage 1, providing regional jobs and helping with the recovery of bushfire and flood affected regions.

The Strategy

Ongoing funding supports a significant investment in managing one of our greatest natural assets – the NSW marine estate. 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 three nautical miles offshore.

The Strategy provides the overarching framework for coordinated management of the marine estate to deliver its vision for *‘a healthy coast and sea, managed for the greatest wellbeing of the community, now and into the future’*. This framework is underpinned by the [NSW Marine Estate Threat and Risk Assessment \(TARA\)](#). It outlines a series of management actions across nine initiatives to address the priority threats to environmental assets and social and economic benefits derived from the marine estate through nine initiatives:

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

About this report

The Strategy Annual Report is informed by the compilation of the [four previous public quarterly reports](#) in the 12-month period and is the final report for the year in review. This Strategy Annual Report is in two sections:

1. The year in summary, which provides an overview of the projects delivered, outcomes, fast facts, financial summary and key challenges
2. Progress of the Strategy’s key initiatives.

This Strategy Annual Report does not evaluate performance of the Strategy. Management evaluation occurs at strategic periods throughout the ten-year life of the Strategy to enable adaptive management. Evaluation is guided by the [Marine Integrated Monitoring and Evaluation Framework](#). An [evaluation of progress](#) against short-term outcomes occurred at the end of Stage 1. Subsequent evaluations will happen five years into the Strategy (the midterm review) and again at 10 years. This Strategy Report accompanies the [Marine Estate Management Authority Annual Report](#) (Authority Annual Report), which reports on the broader marine estate reform progress each year.

More information is available on the marine estate website: www.marine.nsw.gov.au/

Section 1 – The year in summary

A new stage – Stage 2

Stage 2 of the Marine Estate Management Strategy started in July 2020 (the third year of the Strategy). The Marine Estate Management Authority (MEMA) continued to work across agencies and with partners to implement the Strategy's 100+ projects during the COVID-19 pandemic. Work has included:

- completion of the first [baseline evaluation of the Marine Estate Management Strategy](#)
- provision of ongoing project management support – including risk assessments, rescheduling and reprioritising in response to the floods of March 2021 and the ongoing COVID-19 pandemic
- commencement of several new projects – two new marine pollution and litter projects (Initiative 1), several new Aboriginal projects (Initiative 4), offshore vessel anchoring research (Initiative 7), marine estate valuation model and maritime heritage (Initiative 8), improved management for marine parks and reserves and governance coordination (Initiative 9)
- establishment of the Marine Estate Instagram channel, continuation of monthly newsletters, and improvements to functionality of the marine estate website, all of which have had an immediate positive impact for stakeholders
- creation of project profile webpages and an [interactive map](#) for the 100+ Strategy projects to provide more up-to-date information for projects
- release of the Strategy quarterly snapshot reports on the Marine Estate website.

There were more than 100 projects across the nine initiatives in 2020–21.
Good governance and collaboration underpin the implementation of the Strategy.

Adaptive management

During 2020–21, NSW experienced continued challenges from the COVID-19 pandemic, including lockdowns and constantly changing restrictions. COVID-19 impacted almost every Strategy initiative, particularly projects involving on-ground work. Projects that involved field-based research, education and training, stakeholder engagement, and social research were especially affected. The NSW floods in March 2021 also delayed several projects, especially in field-based research and on-ground works in the Hunter–Newcastle region.

We have adapted to these challenges to minimise the impacts of these events on Strategy delivery.

Strategy evaluation

In December 2020, the Strategy commenced an independent evaluation that drew on quantitative and qualitative information in accordance with monitoring indicators, interviews, administrative data, Strategy strategic documents, Strategy reporting documents and MEMA reports.

The [baseline evaluation of the Marine Estate Management Strategy](#) found the first two years of implementation (Stage 1, 2018–2020) have:

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

The evaluation found achievements against all short-term outcomes set out in the [Marine Integrated Monitoring and Evaluation Framework](#). There is also evidence of early progress against a range of intermediate outcomes. This indicates that the Strategy is on track to continue to deliver outcomes in the future.

Thirteen recommendations from the evaluation aim to support continued improvement in the Strategy's delivery and will guide implementation in future years.

Enhancing and expanding connections

The Strategy's success continues to hinge on extensive and meaningful collaboration with a range of stakeholders, from agency partners through to industry, local government and the NSW community (Figure 1).

Figure 1. Our partners in the delivery of the actions. Achieving Stage 2 actions relied on collaboration across government, business, land managers, interest groups and the community



2020–21, this third year of the Strategy, has strengthened collaboration and coordination across agencies and partners and improved stakeholder and community communications. Examples include:

- sharing regular updates on Strategy progress through the public snapshot reports
- establishing the Marine Estate Instagram channel, which has attained more than 800 followers since it was launched in January 2021
- creating project profile webpages and an [interactive map](#) for the 100+ Strategy projects to provide more information and contacts for projects, especially for local governments wanting specific project information
- launching the Sea Country School Education program online to enable primary school students and their schools to access the program remotely – this was especially valuable during COVID-19 restrictions
- surveying more than 3,300 people in the NSW coastal residents and visitors' surveys to better understand the ways people benefit from the marine estate and impacts to these benefits.

Other forms of collaboration are included in Table 1. A complete list of communications and engagement activities for the period is in Appendix A.

Table 1. Collaboration with stakeholders

Collaboration tool	Outcome
Workshops	<p>We conducted a series of workshops and training to involve agency partners in planning, implementation and reporting across initiatives.</p> <p>We facilitated eight fish-friendly council workshops across Northern NSW.</p>
Newsletters	<p>Seven Marine Estate Management Authority newsletters were published, covering more than 35 marine estate news stories.</p>
Meetings	<p>We collaborated with councils and other partners through various meetings.</p> <p>Nine Harvest Strategy Working Group meetings involving industry representatives were held to collaboratively develop management frameworks for trawl whiting and lobster fisheries.</p> <p>Several meetings with industry partners were held, including the Professional Fishers Association and OceanWatch Australia, to develop and test new and novel ways to reduce interactions with non-target species</p>
Media	<p>10 media releases were issued</p>
Social media	<p>90 Instagram posts were published to the Marine Estate Instagram channel from January 2021 to 30 June 2021.</p> <p>A Facebook campaign supporting the survey on community environmental values and uses of waterways in coastal NSW reached over 150,000 users</p>
International showcase	<p>We coordinated and successfully hosted the 20th International Conference on Shellfish.</p>
Scientific papers	<p>15 peer-reviewed scientific papers were submitted or published</p>
Consultation	<p>10 consultation processes on Strategy projects were completed.</p> <p>Public consultation on community environmental values and uses of waterways in coastal NSW was held, with 3200 survey responses</p>
Community survey	<p>3300+ residents and visitors were surveyed as part of community wellbeing surveys.</p> <p>500+ people were interviewed for the statewide Sea Country Survey during the period.</p>

Stakeholder feedback

Examples of feedback from stakeholders include the following:

'these types of programs are an amazing way to boost local economies and create jobs in regional areas ...'

'M&J recognises the economic benefits from the MEMS project including job creation for several businesses.'

'[The economic stimulus] has opened up more work opportunities and allowed me to employ more people. The opportunity fast-tracked my company's growth, which gave me a more substantial standing within the marine construction industry.'

Statement provided by M&J Marine Services – Oyster reef restoration project

'Funded on-ground initiation works have led to an additional spend by industry of \$650,000 to ensure completion of the drainage management plans.'

Statement provided by Australian Macadamia Society – Clean coastal catchments project

'The research being conducted as part of the Strategy promises to provide essential evidence to help improve farm productivity and management of nutrients and sediments for not only the protected cropping industry, but all industries that utilise the precious natural resources.'

Statement provided by Protected Cropping Australia - Clean coastal catchments project

'I was lucky enough to be able to attend the first Livestock FSG meeting on July 29. It provided useful perspective on the role agriculture plays as a key component of the "upstream" environment for our coastal catchments.'

'It emphasised the critical need for advisors and farmers to work together to ensure that nutrients applied to pastures and from other farm sources are applied responsibly and based on good soil test data as well as pasture and crop growth targets – if this is done, both production and environmental goals will be optimised and should not be seen as being mutually exclusive outcomes.'

Statement provided by Neil Moss, Farm Consultant - Clean coastal catchments project

Coastal councils

Coastal councils are critical Strategy partners. They help identify coastal and marine areas that are under threat at a local scale. The councils are essential for helping to address these threats: they provide a necessary link to the community and facilitate actions that enhance the community benefits we all derive from the marine estate.

The Strategy investment has benefited many coastal councils. Initiatives 1–3, in particular, focus on water quality, marine litter, the health of estuarine and marine habitats, coastal management and climate change. These all have strong alignment with council-led coastal management programs.

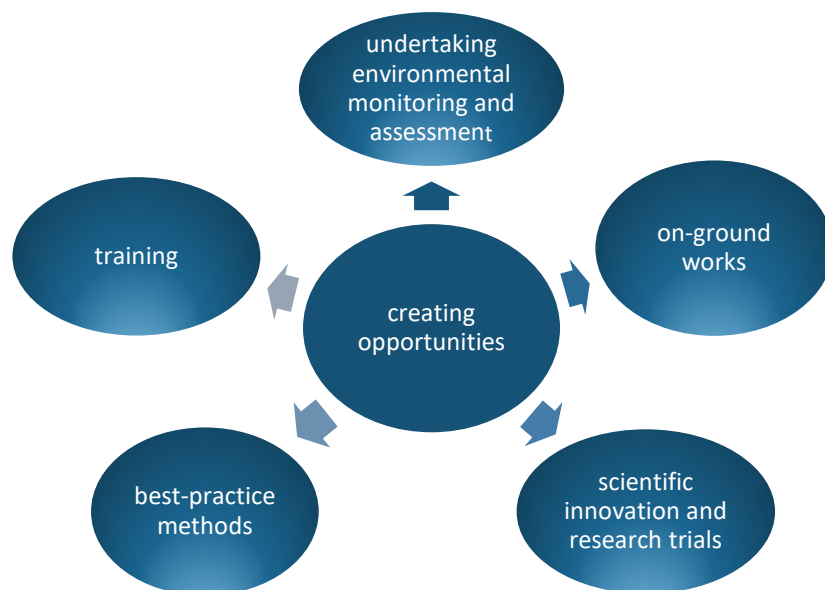
These partnerships continued to be strengthened in 2020–21. Project staff in all regions continued to liaise with council staff on projects in their local government area and to identify new partnerships and projects into the future, making sure they are relevant and complement council programs.

MEMA staff also attended and presented at the 2020 NSW Coastal Conference. One of the key areas for discussion was the NSW coastal management framework and how that affected councils' coastal management programs. The integration of the Strategy with coastal management programs, where relevant, has also been a focus with councils.

Industry

Economic benefits are a vital component of the Strategy. Projects contribute to improved viability and sustainability of coastal and marine industries, providing new economic opportunities and supporting industry innovation. Specific industries involved in Strategy projects include tourism, fishing, aquaculture, agriculture and emerging horticulture industries. The Strategy aims to enhance social, cultural and economic benefits while ensuring activities are sustainable. Business owners and staff from various industries collaborate with the Strategy in some projects across the initiatives by attending training, joining advisory groups, providing feedback and participating in research trials (Figure 2).

Figure 2. Creating opportunities for industry



Aboriginal people

Coastal Aboriginal people have been managing Land and Sea Country for tens of thousands of years, but their involvement in coastal and marine management decision-making to date has been limited. The Strategy addresses this by:

- employing Aboriginal people
- providing training and skills development in marine industries and natural resource management
- facilitating a range of actions to improve the management of Sea Country.

Eight identified positions were filled in Stages 1 and 2 to ensure meaningful input into the management of Sea Country. Several new projects also commenced in Initiative 4 – Protecting Aboriginal cultural values of the marine estate, although some work has been postponed due to COVID-19.

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:

- Strategy actions were promoted through print editions of the [Marine Estate Management Authority newsletters](#), which were distributed to approximately 1,200 community members (as well as being published on the website), and through websites and Instagram.
- The benefits of the Strategy were communicated to stakeholders via the [NSW Marine Estate website](#). People wanting to read the details of specific Strategy benefits can download it from that website.
- Graphics and detailed planning documents showed [how the Strategy is being implemented](#).

More information about the Strategy communication and engagement for 2020–21 is in Appendix A – Communications and engagement.

Achievements

As a result of Stage 2 of the Strategy, communities across the marine estate continue to benefit from cleaner waterways, better engagement and consultation, training and employment opportunities and protection of important coastal and marine species (Figures 3 and 4).

Figure 3. Strategy achievements in 2020–21



Strategy achievements in 2020–21

Healthy coastal habitats

estuarine mapping



5,245 ha of seagrass, mangrove and saltmarsh mapped in **9** estuaries



4,482 artificial structures mapped across **7** estuaries

COASTAL DESIGN GUIDELINES



prepared for exhibition to improve environmentally friendly planning and infrastructure for coastal cities and towns

streamlining environmental assessments for foreshore structures

285 km in Richmond River assessed
102 km in Brunswick River assessed – online mapping tool launched for suitable sites for jetties and pontoon

improving fish passage



3 barriers to fish passage identified for removal to reinstate approx. **1,325** km of fish passage

Climate change



predicting future impacts of **climate change on underwater forests** completed

CITIZEN SCIENCE



using community data to map changes in marine species distributions due to climate change



2021 habitat and fish assemblage data in NSW completed, providing a three-year baseline to measure future change

Aboriginal cultural values



20 Aboriginal people trained in **marine wildlife responses**



SEA COUNTRY SCHOOL EDUCATION PROGRAM

delivered and extended to Worimi and Yaegl nations



70 Elders participated in the **Elders as Mentors day** at Batemans, Jervis Bay and Solitary Islands marine parks

Strategy achievements in 2020–21



12 Aboriginal people trained and awarded **Certificate II in Tourism**

2021 COASTAL WEEDS and MARINE DEBRIS PROGRAM



completed and employed Sea Rangers from Eden, Bega, Merrimans, Wagonga and Cobowra Local Aboriginal Land Councils



supported community involvement in the **climate adaptation project** near Batemans Bay in partnership with DPIE-EES and Heritage NSW



Commenced construction of **3** purpose-built **Aboriginal cultural education trailers** to improve community engagement and appreciation of cultural values

Threatened and protected species



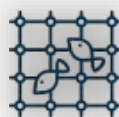
Gamay Rangers, ORRCA and Sydney Sea Life staff trained to improve marine wildlife strandings response and entanglements in Sydney Harbour

shorebird identification and management training



at **7** sites on the north and central coasts

OCEAN TRAP AND LINE FISHERIES



more than **130** fishing trips observed in the line fishing (Western Zone) fishery

White's Seahorse



educational products, signs and brochures installed and distributed

Sustainable fishing and aquaculture

EAT MORE SEAFOOD 2021



\$500,000 to build marketing and promotion capability within NSW seafood businesses

NSW FISHERIES HARVEST STRATEGY

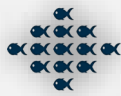


public consultation on the draft policy and guidelines completed



Tweed offshore artificial reef installed

Strategy achievements in 2020–21



75,000 Dusky Flathead fingerlings released into St Georges Basin



90,000 juvenile Mulloway produced at the Port Stephens Fisheries Institute released in the Georges and Hastings rivers

New marine
AQUACULTURE LEASES
established in Jervis Bay



enhancing sustainable,
locally grown seafood

**NSW Marine Waters
Sustainable Aquaculture
Strategy framework**

developed and implemented
to attract and guide future
aquaculture investment



**MARINE BIOSECURITY
AWARENESS**

statewide survey
completed informing
behaviour change

Safe and sustainable boating

NSW BOATING HANDBOOK



updated, making boating
rules and regulations clearer



underwater video surveys to
**assess potential impact of
large commercial vessels
anchoring** completed and
analysis now underway

**Online private mooring
map launched**



a streamlined platform to
search and apply for a
mooring

Community benefits

**MARINE ESTATE EDUCATION
STRATEGY**



targeted stakeholder
consultation on a draft
Education Strategy

**MARINE INTEGRATED
MONITORING and
EVALUATION FRAMEWORK**



completed to track the
Strategy's success

**COMMUNITY WELLBEING
FRAMEWORK**



developed to guide the
strategic collection of social,
cultural and economic data

Strategy achievements in 2020–21

NSW coastal residents and visitors' surveys

3,300+

participants in the surveys

MARITIME HERITAGE REVIEW



Woolgoolga jetty pile public installation nearing completion, including interpretive signage and web accessible information

Sea Country Survey



500

interviews to better understand how Aboriginal people value and culturally connect to Sea Country

Effective governance

PUBLIC SNAPSHOTS REPORTS



improved transparency by regular reporting on
100+ projects

Improving Project Governance



28 projects reducing red tape
34 projects aimed at improving governance

Fisheries compliance



improved through education and agency collaboration
1300+ inspections

Better geographic information systems (GIS)



revised distribution maps of *Posidonia australis* endangered seagrass ecological communities

CASE STUDY – RESTORING THE RICHMOND RIVER

The Richmond River in the Northern Rivers region of NSW is a spiritual place for Aboriginal people that also provides habitat for fish and birds, supports agriculture, fishing, recreation and tourism. The river and its catchment have been substantially modified over the past century.

The Strategy presents an opportunity for collective action to restore the health of the Richmond River throughout the life of the 10-year Strategy. Projects from all nine initiatives in the Strategy work together to improve the health of the river and deliver benefits to the community, industry and the environment.

Work completed to date (2018–2021) in the Richmond River is shown in Figure 4.

Figure 4. Progress in the Richmond River



Restoring the Richmond River



BLUEBERRY RESEARCH



a new, purpose-built facility constructed dedicated to blueberry nutrition and fertiliser research



rehabilitation option studies for the Tuckean Swamp



2 fertiliser industry education events



next phase of a governance project commenced in the Richmond River catchment for improved collaboration with government, industry and the community



347 observations on commercial fishing vessels to monitor bycatch of non-target species



9 local vets trained in specialist marine wildlife rescue, care and treatment



1025 fishery observer mud crab trap lifts and 2,522 crabs measured



40+ first responders completed MARINE WILDLIFE RESPONSE PREPAREDNESS TRAINING



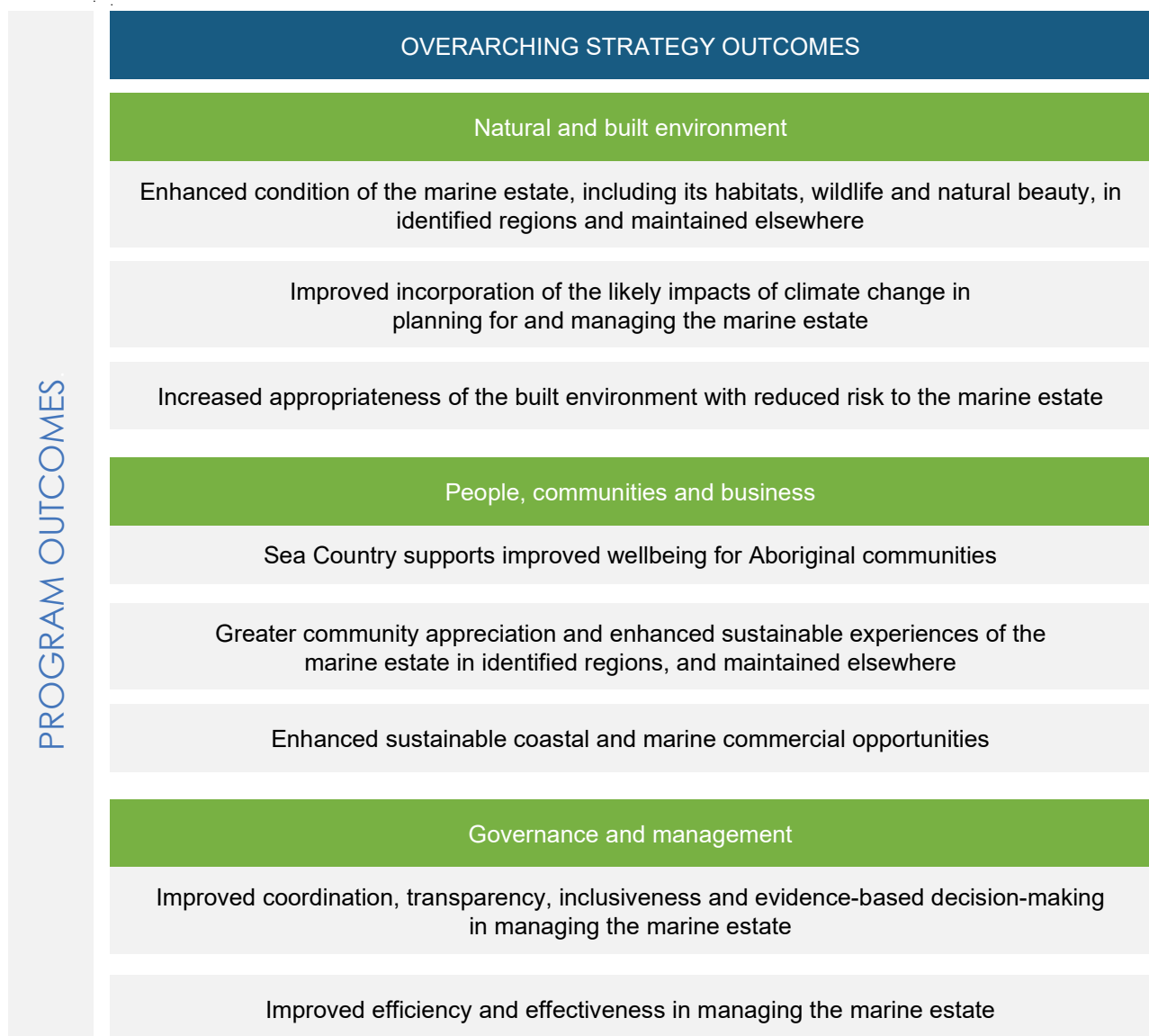
7 monitoring sites off Ballina assessing marine climate change impacts

What we want to achieve

Eight overarching program outcomes describe what we want to achieve by implementing the Strategy's initiatives over 10 years.

They are included in the Marine Integrated Monitoring and Evaluation Framework, which guides how we measure the long-term success of the Strategy and assesses its delivery, process and achievements.

PROCESS EVALUATION	Focuses on the delivery of management actions
OUTCOME EVALUATION	Focuses on assessing the extent to which outcomes are achieved or are on track to be achieved



Financials and staffing

Finance

A total of \$73.9 million of funding has been allocated to the Strategy over its first three years:

- \$45.7 million for Stage 1 – the two years from July 2018 to June 2020
- \$28.3 million for Stage 2 – year 3 of the Strategy, from July 2020 to June 2021.

Figure 5 illustrates funding allocated to each Strategy initiative in 2020–21 (Stage 2). More than \$16 million was allocated to improve water quality including more than \$4.6 million allocated for on-ground works (Figure 5).

Due to the challenges in 2021 with COVID 19, actual expenditures were less than planned for most initiatives (Figure 6). The majority of the underspend was primarily due to the inability to finalise the purchase of land for wetland rehabilitation by June 2021 under Initiative 1. The funding was carried forward to 2021–22 to complete the purchase.

Figure 5. 2020–21 Strategy budget – delivering for each initiative

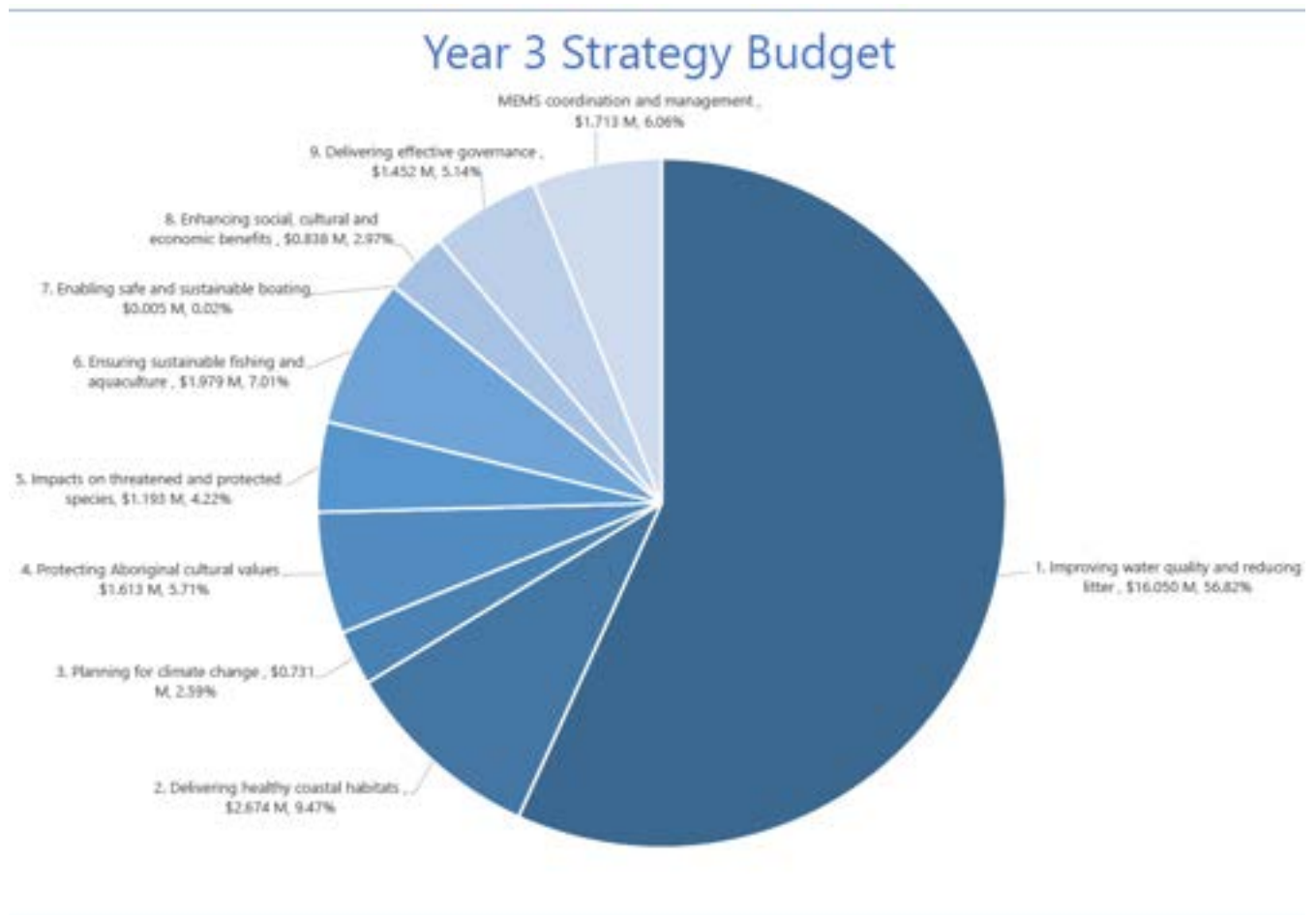
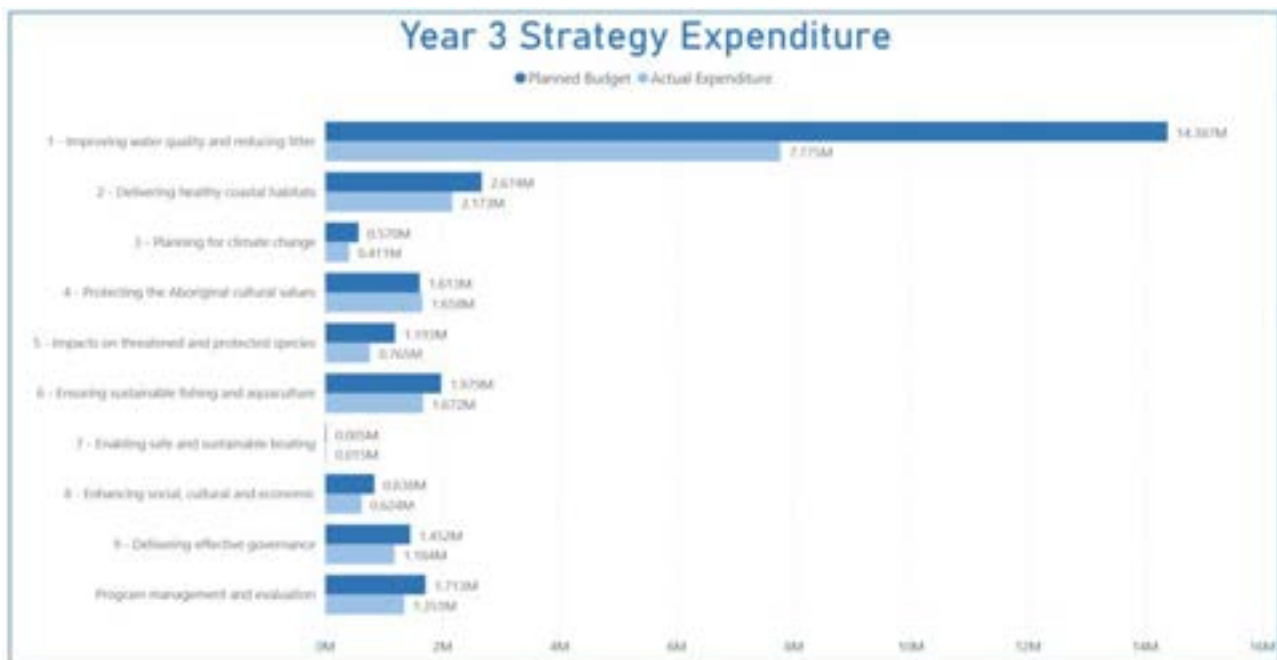


Figure 6. Planned and actual expenditure for the Strategy initiatives, 2020–21



Staffing

The Strategy has generated jobs across the NSW coast in 2020–21 by the creation of new staff positions in government and by engaging with contractors and consultants for research, on-ground works and community engagement.

Of the 95 staff positions allocated to the Strategy:

- 68% of these roles are located in the regions
- 8 of the roles are Aboriginal Identified positions.

This equated to 86.76 full-time equivalent roles across multiple government agencies:

- DPI – Fisheries – 57 positions
- DPI – Agriculture – 3 positions
- DPIE – Planning and Assessment – 1 position
- DPIE – Water – 4 positions
- DPIE – Crown Lands – 2 positions
- DPIE – Environment, Energy and Science – 23 positions
- Local Land Services – 3 positions
- Natural Resources Access Regulator – 2 positions.

Most of these positions are temporary. They enable the delivery of the Strategy and facilitate broadscale benefits to the community over time. Ongoing staff from across the Strategy government agencies also provide substantial support on an in-kind basis.

Section 2 – Progress of the Strategy’s key initiatives



Photo 2. Floodplain fieldwork. Photo: NSW DPI Clean Coastal Catchments 2021©

Initiative 1 – Improving water quality and reducing litter

Initiative objective	
To improve water quality and reduce marine litter for the benefit of marine habitats, wildlife and the community.	
Initiative long-term outcomes	
<ul style="list-style-type: none"> 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 year 2020–21	\$ 16,050,000





Management challenges and opportunities






Healthy marine and estuarine environments with clean water are highly valued by the NSW community. The [statewide TARA](#) identified 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 that.



The first three years of the Strategy have taken up the opportunity to improve the health of the marine estate by improving water quality through habitat improvements, addressing litter and reducing land-based runoff.



Project	Initiative 1 highlights for 2020–21
Risk-based framework for urban waterway health	<p>New environmental standards for protecting and restoring the blue-grid in the Western Parkland City have been developed.</p> <p>The standards have been used to benchmark the extent of stormwater infrastructure required in the Aerotropolis and Mamre Road Precincts.</p>
Build capacity to implement the Risk-based Framework	<p>A capacity-building program was established to support stakeholders using the Risk-based Framework.</p> <p>A newly developed tool brings together all the water-related clauses of Local Environment Plans (LEPs) in coastal NSW. It is a search tool that local councils use in their LEP reviews as they evaluate water-related clauses.</p>
Fish-friendly workshops for councils	<p>Four fish-friendly videos were published to help councils understand their obligations when working in waterways.</p> <p>They are published on the NSW marine estate website:</p> <ul style="list-style-type: none"> • harming marine vegetation • obstructing fish passage • an overview of the <i>Fisheries Management Act 1994</i>, permits and orders • dredging and reclamation works.
Marine litter campaign	<p>The Don't be a Tosser marine litter campaign was launched.</p>
Review of the NSW Water Quality Objectives	<p>Engagement with stakeholders on the update of the NSW Water Quality Objectives commenced. This included an approach to engaging with Aboriginal people on Country to enable the inclusion of cultural and spiritual values in the objectives.</p>
Oyster reef restoration	<p>The oyster reef restoration team successfully hosted an international conference on shellfish restoration with more than 100 delegates attending in-person and online.</p> <p>The team shared information with experts and contributed information to increase capacity for shellfish restoration around the world.</p>
NSW Litter Prevention Strategy	<p>Confirmation was received that the State's 40 per cent litter reduction target has been achieved, with a 43 per cent reduction in NSW litter volume since 2013–14.</p>
Estuarine water quality monitoring	<p>The NSW water quality database was finalised and used to deploy current data onto the Sharing and Enabling Environmental Data (SEED) website. Water quality monitoring data from the past 15 years is now publicly available on the SEED website.</p>



Putting the Strategy into action

	Project	Location	Our achievements
	Risk-based framework for urban waterway health	Central Region Sydney, South Creek	A Risk-based Framework has been adopted as a key tool by the Western Sydney Planning Partnership, Sydney Water and DPIE–EES to inform precinct plans and development controls on protection and restoration of waterways in South Creek. This includes planning for the Aerotropolis through the draft Aerotropolis Precinct Plan and its Development Control Plan (DCP) and the stormwater development controls, Sydney Water's Stormwater and Water Management Cycle Strategy.
		The Hills, Hawkesbury Camden, Campbelltown, Liverpool, Fairfield, Blacktown and Penrith	A new set of stormwater development controls was developed for Wianamata-South Creek. The controls explicitly protect and restore the creeks in the Aerotropolis.
		Hornsby, Northern beaches, Wollongong and Shellharbour	Reports on the outcomes of the Risk-based Framework pilot projects have been provided by several councils.
	Risk-based framework for regional waterway health	Northern region (Richmond Valley Council, Ballina Shire Council, Kyogle Council, Lismore City Council, Rous County Council)	A catchment support officer was recruited. Coastal Management Program development has started for the Richmond River, and opportunities for improved governance are under consideration. There were project delays due to COVID-19.
	Diffuse Source Water Pollution Strategy	Statewide	New consultation arrangements to help improve the effectiveness of the NSW Government's Diffuse Source Water Pollution management are being developed. These new arrangements will provide greater clarity of roles and responsibilities across government and improve coordination among state agencies.
	Build capacity to implement the Risk-based Framework	Statewide	An advisory committee was established. Planning has started to develop materials to assist stakeholders to implement the Risk-based Framework. Draft materials are under review and some materials have been published, including: <ul style="list-style-type: none"> a LEP Health Assessment Tool a dataset on vulnerable estuaries and ICOLLS




	Project	Location	Our achievements
			<ul style="list-style-type: none"> an Approach to Engaging with Country.
	Review of the NSW Water Quality Objectives	Statewide	<p>An online survey in December 2020 identified how communities value and use local waterways. This was used to inform the review of the NSW Water Quality Objectives.</p> <p>Seven public webinars and engagement forums were held to inform the community.</p>
	Water Quality Working Group	Statewide	<p>Regular working group meetings were held in the first half the year.</p> <p>The objectives and terms of the working group are now being reviewed in relation to the Diffuse Source Water Pollution Strategy project.</p>
	Coastal floodplain study	Tweed, Byron, Ballina, Lismore, Richmond Valley, Clarence, Port Macquarie-Hastings, Kempsey, Port Stephens, MidCoast, Shoalhaven	<p>DPI-Fisheries presented information on the project at the NSW Coastal Conference, November 2020.</p> <p>Coastal floodplain study draft reports were circulated to participating local governments and agencies.</p> <p>Consultation sessions on draft reports were held with Clarence, Richmond and Tweed Councils, Water Research Lab and DPI staff.</p> <p>Additional floodgate survey contracts for Tweed, Hastings, Macleay, Shoalhaven and Manning catchments were signed and data collected for Tweed and Shoalhaven.</p>
	Aquatic biodiversity offsets	Statewide	<p>A draft key fish habitat offset policy has been reviewed internally.</p> <p>An updated economic valuation of key fish habitats was developed by an expert panel, and the draft report is now being finalised.</p> <p>Investigations into key fish habitat values in the Richmond River estuary have been published</p> <p>The outcomes of the key fish habitat valuation process, including carbon sequestration values, are being included in discussions on the development of the NSW Net Zero Plan Stage: 2020–30.</p>
	Fish-friendly workshops for councils	Statewide	<p>An audit of construction sites has been completed. All 13 local government areas (LGAs) on the NSW North Coast have been audited: more than 160 sites were inspected.</p> <p>Four workshop videos were produced for LGA, contractor and State agencies.</p>






	Project	Location	Our achievements
			<p>They are available on the NSW marine estate website:</p> <ul style="list-style-type: none"> • Harming marine vegetation • Obstructing fish passage • Dredging and reclamation works • An overview of the Fisheries Management Act, Permits and Orders. <p>Other educational videos are in production. These will ensure best practice on construction works for erosion and sediment control, remediation orders, temporary crossings and dewatering.</p> <p>Drafting of priority best-practice management resource guidelines for local councils has started.</p> <p>Eight fish-friendly council workshops were held in Northern NSW.</p> <p>Workshops from 2019 to March 2021 have now reached 231 participants.</p>
	Construction sediment management	Statewide	<p>Environmental planning instruments were reviewed to determine current practice in construction sediment management. The aim is to develop suitable policy options.</p> <p>A set of model erosion and sediment conditions were published as part of the Standard Conditions of Development Consent for Residential development. The conditions were updated in response to council feedback ahead of implementation in late 2021.</p> <p>Draft guidance to accompany the new model conditions are completed and ready for publication in 2022.</p>
	Oyster reef restoration	Statewide	<p>Mapping and planning of potential oyster reef restoration sites in north, central (Botany Bay in partnership with The Nature Conservancy) and south coast locations has progressed.</p> <p>The Shellfish Reef Restoration Survey of the recreational fishing community was launched.</p> <p>An international webinar attracted 140 participants.</p> <p>MEMA hosted the 20th International Conference on Shellfish Restoration. More than 100 delegates attended.</p> <p>The NSW Shellfish Reef Restoration guidelines and statewide site selection criteria were released.</p>

	Project	Location	Our achievements
			The NSW oyster reef mapping video was released and further mapping undertaken.
		Port Stephens	An additional 1.5 hectares of reef area was added to Myall and Karuah sites in the Port Stephens–Great Lakes Marine Park (total now 2.5 hectares).
	Oyster reef restoration research	Port Stephens	<p>Monitoring of the Port Stephens pilot oyster reef revealed an increase in biodiversity and fish abundance.</p> <p>The University of Newcastle highlighted the results during National Science Week.</p> <p>A peer-reviewed, multi-author paper was published: Estuarine fishes associated with intertidal oyster reefs characterised using environmental DNA and baited remote underwater video. The paper was the result of a collaboration between DPI, the University of Newcastle and Curtin University.</p>
	Riverbank vegetation improvements	Ballina, MidCoast Shoalhaven, Eurobodalla, Bega Valley	<p>South East Local Land Services (LLS) entered into 14 landholder agreements for works across Middle, Tilba, Lake Curalo, Moruya, Clyde, Tuross, Narrawallee, Shoalhaven and Lake Illawarra catchments.</p> <p>Nine agreements were completed. Floods and ongoing wet conditions hindered the completion of revegetation works in places.</p> <p>9.2 hectares of native vegetation were protected and enhanced by fencing along 3.1 kilometres of stream. A further 10.9 hectares were revegetated.</p> <p>10 of the outstanding Stage 1 sites were also completed this year. This left only two sites to be completed. These works protected and enhanced 26 hectares of vegetation along 7.9 kilometres of stream length. 12 hectares were revegetated.</p> <p>A Riparian rehabilitation for Tilba Tilba video was released on YouTube.</p> <p>North Coast LLS entered into seven landholder agreements. As a result:</p> <ul style="list-style-type: none"> • more than 1,600 trees were planted • 3.92 hectares of bush was regenerated along 1.87 kilometres, with protective fencing of 0.26 hectares • maintenance works of 58.95 hectares over 33 kilometres were completed.

	Project	Location	Our achievements
			<p>Hunter LLS: Six landholder agreements were established in the Manning catchment.</p> <p>Works were of significant size and exceeded the target outcomes, protecting or enhancing:</p> <ul style="list-style-type: none"> • 66.4 hectares of riparian vegetation along 14.4 kilometres of stream • 4.6 hectares of sensitive coastal wetlands. <p>One landholder protected another 126 hectares of high conservation value terrestrial land, including the Threatened Ecological Community – Sub-tropical lowland rainforest.</p> <p>Hunter LLS led the engagement and workplan. They negotiated to leverage some \$140,000 co-investment from the partnerships, against about \$22,000 of Strategy funding.</p>
	Clean coastal catchments on-ground	Coffs Harbour, Clarence Valley	<p>North Coast LLS: Seven works projects were funded. There are three erosion repair and management on blueberry farms (managed by Coffs Harbour Regional Landcare) and four irrigation improvements.</p>
		Bega Valley, Eurobodalla	<p>South East LLS: Six farms were funded: two on dairy and four on beef in the Merimbula, Tilba, Moruya, Buckenbowra, Congo and Shoalhaven catchments.</p> <p>Outputs achieved included:</p> <ul style="list-style-type: none"> • 15.7 hectares of native vegetation protected and enhanced along 2.4 kilometres of stream length • 7.3 hectares of revegetation along 1.7 kilometres of stream length.
	Clean coastal catchments research	Lismore, Ballina, Coffs Harbour, Bega Valley	<p>A macadamia nutrient trial has been completed. Key findings are being compiled.</p> <p>Agreement details were reached in collaboration with North Coast LLS, Greater Sydney LLS and South East LLS to deliver the blueberry, greenhouse vegetable, beef and dairy incentive grant programs.</p> <p>Macadamia and blueberry demonstration sites were set up with nitrate and turbidity probes and flow meters installed and collecting data.</p> <p>Pilot Fertcare agronomist training was accredited, but it was postponed until early 2022.</p>

	Project	Location	Our achievements
			<p>Growers in the Coffs Harbour area benefited from industry training at the blueberry research facility at Wollongbar.</p> <p>The preliminary results of monitoring of erosion mitigation methods in macadamias were presented to Clean Coastal Catchments (CCC) project team, industry liaisons and at the Australian Soil Science Conference (27 June – 2 July 2021).</p> <p>A rainfall simulation study for blueberries was completed and the report is in development.</p> <p>Data from a blueberry pilot trial is being analysed.</p> <p>A report, 'Describing seasonal leaf nitrogen for index leaf sampling of southern highbush blueberry grown as an evergreen crop in Australia', was presented at the virtual International Symposium on Mineral Nutrition of Fruit Crops (29–30 June).</p>
		Eurobodalla and Bega Valley	<p>South Coast dairy industry consultation interviews have been completed. Monitoring sites have been selected and updated land-use mapping conducted.</p> <p>Current irrigation practice in the dairy and beef sectors on the South Coast has had an initial assessment. Reports will be provided to producers in December 2021.</p> <p>A grazing monitoring site adjacent to Tilba Tilba Lake, South Coast, was established with DPIE–EES.</p>
	Riverbank stabilisation	Ballina, Manning, Kiama, Eurobodalla	<p>North coast LLS: Sites are being identified for bank stabilisation works, including Punkally Creek, Minnamurra River, Manning River and sites in the Ballina area.</p> <p>Bank stabilisation works totalling 760 metres were completed on two sites. The works included 100 snag hotels.</p> <p>Hunter LLS: 800 metres of high-risk, actively eroding riverbank was prioritised for treatment along two adjoining landholder boundaries.</p> <p>The delivery of works by June 30 was delayed by the extreme flood events experienced on the Manning River in March 2021</p> <p>South East LLS: Bank erosion works completed at two sites totalling 285 metres of bank protection works.</p> <p>One remaining site from Stage 1 (the 2019–2020 financial year) was also completed. This</p>

	Project	Location	Our achievements
			<p>delivered another 10 metres of bank protection.</p> <p>Bank stabilisation works were completed along the Clyde River, Minnamurra River and Wapengo Creek.</p>
	Coastal wetland rehabilitation	MidCoast, Kempsey, Port Stephens, Shoalhaven, Tweed	<p>MidCoast Council: MEMA engaged with council about potential projects in the Manning.</p> <p>Tweed Shire Council: Rehabilitation options for Christies Creek were developed. Wetland rehabilitation was progressed in Christies Creek.</p> <p>A new design to repair and reinforce Tomago wetland auto-tidal flood gates was finalised. Floodgate repair works were implemented at Tomago and Kalang. The Tomago wetland is now rehabilitating well after repairs and after tidal flushing were reintroduced.</p> <p>Shoalhaven Council: Engagement for a project on the Crookhaven River has started and MEMA is preparing to engage a consultant.</p> <p>The National Parks and Wildlife Service (NPWS), DPIE-Coastal Lands Protection Scheme, and Transport for NSW are working with the Strategy Wetland Rehabilitation team to secure several priority properties to enable rehabilitation of vast areas of floodplain wetland.</p> <p>A monitoring program was initiated at Clybucca and Crookhaven sites.</p>
	Improving roads and tracks	Ballina, MidCoast, Shoalhaven, Bega Valley	<p>North Coast LLS: 1,852 metres of road has been sealed or remediated; three road segments were remediated.</p> <p>Hunter LLS: 760 metres of road was sealed or remediated across eight sites.</p> <p>South East LLS: 1,465 metres of road was sealed across five sites.</p>
	Marine litter campaign	Statewide	<p>The marine litter campaign that was launched in February 2021 has now been completed. The campaign evaluation included a statewide survey of 1,700 NSW residents. The evaluation results will inform the delivery of the next campaign in 2022.</p>

	Project	Location	Our achievements
	Marine Debris Working Group	Statewide	The results from the marine debris threat and risk assessment were compiled. A summary report is being published.
	NSW Litter Prevention Strategy	Statewide	<p>Confirmation received that the State's 40 per cent litter reduction target has been achieved. There has been a 43 per cent reduction in NSW litter volume since 2013–14.</p> <p>A new target – 60 per cent litter reduction by 2030 – was announced in the new Waste and Sustainable Materials Strategy 2041. The Key Littered Item Study, a new marine-based litter monitoring program, was confirmed as the indicator to track progress against the target.</p>
	Estuarine water quality monitoring	Statewide	<p>The estuarine water quality database has been finalised. It is used to deploy recent data onto the Sharing and Enabling Environmental Data (SEED) website. Historical water quality monitoring data from the past 15 years are now publicly available on the SEED website.</p> <p>Data from the 2020–21 estuarine water quality sampling are also available on the SEED website.</p> <p>Two new tools have been developed and will be released on the NSW environment website by the end of 2021:</p> <ul style="list-style-type: none"> the redeveloped estuaries webpages (a community information tool) the Health of the Estuaries reporting dashboard.
	Mapping outflow events	Statewide	The draft high-resolution underwater seabed habitat maps have been completed for the NSW open coast (nearshore 0–30 metres depth). The maps were derived from recent airborne laser bathymetry surveys.
	Land-use pressures on the marine estate	Statewide	<p>A comprehensive diffuse source runoff and ecosystem health monitoring program across intensive land-use areas in case study areas was established at:</p> <ul style="list-style-type: none"> Northern Beaches (urban land use) South Creek (urban land use) Eurobodalla Shire (agricultural land use). <p>Data will inform updated land-use models that are being developed in 2022.</p>

	Project	Location	Our achievements
			A stormwater control measure effectiveness monitoring program is being established in the Tuggerah Lakes catchment through a collaboration with Central Coast Council.



Photo 3: Warringah drain with rudimentary control, capturing organic matter. Photo by Aaron Wright, DPIE–EES

Table 2. On-ground work outputs in the North Coast, South East and Hunter local land services

Output description	Unit	Local Land Service (2020–21 total output)			Overall total
		North Coast	Hunter	South East	
Riverbank vegetation improvements and Clean Coastal Catchments projects					
Area of wetland vegetation enhanced or rehabilitated	Hectares	-	2.3	-	2.3
Area of wetlands with connectivity reinstated	Hectares	-	1.31	-	1.31
Area planted with riparian native species	Hectares	1.67	-	10.9 7.3	19.87
Area of riparian native vegetation enhanced or rehabilitated	Hectares	11.24	33.24	9.2 15.7	69.38
Area of pest plant control measures – weeded only	Hectares	11.24	30.82	-	42.06
Area of riparian native vegetation protected by fencing	Hectares	1.89	33.99	10.5 15.7	62.08
Number of plants planted	Number	5,303	-	9,850 1,400	16,553
Length of riparian native vegetation enhanced or rehabilitated	Kilometres	5.25	7.19	3.1 2.4	17.94
Length of riparian native vegetation protected by fencing	Kilometres	0.79	7.19	3.1 2.4	13.47
Riverbank stabilisation project					
Length of stream bank stabilised with engineering works	Kilometres	0.76	-	0.29	1.05
Improving roads and tracks project					
Length of roads sealed or removed from use and rehabilitated	Kilometres	2.23	-	0.62	2.85



Photo 4. Panoramic view of the coastline near Newcastle. Photo: iStock.com-Charlie Blacker

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

Initiative objective	
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	
<ul style="list-style-type: none"> 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 2020–21	\$2,674,000

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 for better coordination of management of activities that impact coastal habitats and species in the marine estate so they align with community values.

Initiative 2 highlights for 2020–21

Domestic waterway structure strategies	<p>Draft maps were created for priority estuaries along the south coast of NSW and circulated to marine estate agency staff for review.</p> <p>Final reports for the Richmond River and Brunswick River estuary were completed and are now waiting on final approval.</p>
Fish-friendly breakwater project	<p>The first audit of breakwater structures along the NSW coastline for their multi-use and eco-features was completed. Information from a multidisciplinary team of experts and the audit outcomes was used to develop guidelines for the installation of multi-use and eco-features during maintenance and upgrade works.</p>
Estuary foreshore management strategies	<p>A Decision Support Tool has been developed to help experts:</p> <ul style="list-style-type: none"> • identify erosion • qualify its severity • consistently recommend best-practice management and treatment that can be mapped for an estuary-wide context. <p>The tool is in testing and refinement. This process is underway at more than 60 sites in different estuary types in NSW and will continue into 2021–22.</p>

Putting the Strategy into action

	Project	Location	Our achievements
	Breakwater audit	Statewide	<p>The statewide audit of breakwater structures was completed.</p> <p>Community consultation on breakwater maintenance and upgrades guidelines for multi-use and eco-features has been completed.</p> <p>A scientific paper about maximising opportunities for multi-use and eco-features on existing breakwater structures was submitted to the journal <i>Ocean and Coastal Management</i>.</p>
	Commercial dredging audit	Statewide	<p>The draft commercial dredging audit report was finalised and reviewed internally by DPIE–Crown Lands staff and marine estate agencies. The report will be released for consultation with external stakeholders.</p>
	Intermittently closed and open lakes and lagoons (ICOLL) management	Statewide	<p>The interagency ICOLL audit steering committee was established. The project implementation plan is being prepared.</p>

	Project	Location	Our achievements
	Coastal design guidelines review	Statewide	Draft Coastal Design Guidelines were completed and are pending public exhibition. Accompanying communication materials to support public exhibition are completed.
	Domestic waterway structure strategies	Ballina, Lismore, Richmond Valley, Byron, Tweed, Wollongong, Shell Harbour, Kiama, Shoalhaven	<p>Strategies for Richmond and Brunswick estuaries were completed.</p> <p>Final draft strategies have also been prepared for Evans River, Lake Illawarra, St Georges Basin and Lake Conjola. A review of the Tweed 2008 Strategy has started.</p> <p>Commercial fishers and oyster farmers were consulted about the development of strategies for Minnamurra, Werri Lagoon, Shoalhaven/Crookhaven, Currambene Creek, Narrawallee Creek, Burrill Lake and the Clyde rivers.</p> <p>Draft maps were created for priority estuaries across south coast NSW and awaiting public release.</p> <p>The NSW Soil Conservation Service was contracted to remove three unauthorised, unclaimed, unsafe structures in St. Georges Basin to reduce priority threats and risks to environmental, social, cultural and economic values. The removal was postponed to late 2021 due to COVID-19.</p>
	Marine vegetation strategies	Ballina, Lismore, Richmond Valley, Tweed, Wollongong, Shell Harbour, Shoalhaven	<p>Consultation and peer review of the draft marine vegetation (mangroves and saltmarsh) strategy methodology was completed.</p> <p>Draft strategies for Tweed and Richmond estuaries are complete and ready for internal review.</p> <p>The biophysical analysis for estuaries from Bulli to Batemans Bay is ready for the next stage of marine vegetation strategy development.</p> <p>DPI-Fisheries collaborated with Southern Cross University to host the Australian Mangrove and Saltmarsh Network conference in Ballina. This was originally scheduled for 2020 but was postponed to August 2021 then again to March 2022 due to COVID-19.</p> <p>DPI-Fisheries consulted with other agencies on a report prepared in collaboration with the University of Wollongong on prioritising coastal wetland restoration using a first-pass prioritisation for blue carbon and co-benefits in NSW.</p>

	Project	Location	Our achievements
	Estuary bank management strategies	Tweed, Byron, Wollongong, Shell Harbour, Shoalhaven	The Decision Support Tool developed in Stage 1 was extensively tested for its applicability across estuary types throughout NSW.
	Coastal floodplain drainage management	Statewide	<p>20 local government consultation meetings were held to discuss floodplain regulatory issues.</p> <p>Key industry meetings were held with agriculture and fisheries stakeholders.</p> <p>A 'what we heard' summary report on local government and industry feedback and consultation was prepared.</p>
	Reconnecting fish habitats	Statewide	Environmental assessments and approvals were completed and contracts finalised for the removal of Cooke's Weir on the main stem of the Richmond River in spring 2021.
	Mapping seagrass, mangrove and saltmarsh	Statewide	<p>A scientific paper on changes in seagrasses across NSW over the past 40 years was accepted for publication in the journal <i>Estuarine Coastal and Shelf Science</i>.</p> <p>More than 5,000 hectares of estuarine macrophytes were mapped in nine estuaries. The maps are available on the NSW Fisheries Spatial Data Portal.</p> <p>The draft Data Dashboard with all DPI estuarine habitat mapping was developed. It will be ready for public release in 2021–22.</p>
	Innovative technology research	Statewide	<p>Machine learning technologies were used to refine the methods for mapping mangrove and saltmarsh.</p> <p>Machine learning techniques for mapping artificial structures such as jetties, pontoons and groynes were developed.</p> <p>Methods were trialled for discriminating mangrove species (River Mangrove (<i>Aegiceras</i>) versus Grey Mangrove (<i>Avicennia</i>)), but without success.</p>
	Threats to estuarine vegetation	Statewide	More than 4,500 artificial structures were mapped in eight estuaries including Richmond River, Port Stephens, Cooks River, Botany Bay, Georges River, Brisbane Water and Jervis Bay.




	Project	Location	Our achievements
			<p>Mooring scars in seagrass meadows were mapped in three estuaries: Botany Bay, Jervis Bay and Brisbane Waters.</p> <p>Off-road vehicle damage to saltmarsh habitat was mapped in five estuaries: Richmond River, Port Stephens, Botany Bay, Jervis Bay, Brisbane Water. There was a total of 59.5 hectares of vehicle damage.</p>
	Subtidal reef monitoring	Central region – Newcastle to Wollongong	<p>Underwater video surveys to assess biodiversity patterns across the Greater Sydney coastline were compiled, processed and analysed.</p> <p>An open access scientific paper explaining the distribution of snapper along the Greater Sydney Region coastline was published so that it could be used by the public and management agencies.</p> <p>Maps of the coverage of biologically important habitat forming macroalgae and sessile invertebrates across Greater Sydney rocky reefs were published for use by the public and management agencies.</p>
	Reviewing jetty designs	Central region – Sydney, Port Hacking	<p>Fieldwork assessing the best jetty designs to preserve seagrass in Port Hacking has been completed.</p> <p>A statistical analysis was used to assess jetty design features on seagrass distributions in Port Hacking.</p> <p>Scientific findings are being drafted for publication in an open access journal for access to the community and Government.</p>
	Threats to estuarine fish assemblages	Central region – Sydney	<p>COVID-19 lockdowns in the Greater Sydney Region resulted in the postponement of fieldwork for this research. It is now planned to start in November 2021.</p>



Photo 5. Coffs Harbour marina breakwall. Photo: iStock.com-Sunnypics-oz

Initiative 3 – Planning for climate change

Initiative objective	
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 2021–21	\$731,000

Management challenges and opportunities

The effects of climate change on the marine estate are often poorly understood and not well planned for. Although the climate is changing, the likelihood and consequence of these effects are not 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.





Due to funding constraints in Stage 1, the investment in climate change research and monitoring was substantially limited. Stage 2 seeks to:

- improve funding to begin and implement all five actions
- fill key knowledge gaps about response and resilience to climate change
- collaborate with other agencies and institutions focusing on climate change adaptation.

This will ensure that the likely future effects of climate change are better understood, anticipated and planned for in policy and management.

Project	Initiative 3 highlights for 2020–21
Climate change threats to seagrass, mangrove and saltmarsh	A first-pass method to predict migration of mangrove and saltmarsh under sea-level rise was developed. A scientific paper describing the method was submitted for acceptance in a peer-reviewed journal.
Climate change monitoring	<p>Modelling of the future impacts of climate change on kelp distributions along the NSW coast was completed. A scientific paper about Climate refugia for kelp within an ocean warming hotspot was published in <i>Marine Environmental Research</i>.</p> <p>In 2021, a collection of habitat and fish assemblage data in NSW was completed. This provides a three-year baseline from which future change can be measured.</p>

Putting the Strategy into action

	Project	Location	Our achievements
	Climate change threats to seagrass, mangrove and saltmarsh	Statewide	A first-pass method to predict migration of mangrove and saltmarsh under sea level rise was completed. A scientific paper describing the method was submitted for acceptance in a peer-reviewed journal.
	Climate change adaptation	Statewide	Two staff were recruited to develop an engagement approach with coastal and marine estate managers for future delivery (pending further funding).
	Climate change research	Statewide	<p>Staff were recruited to commence the project.</p> <p>Samples were collected to assess the adaptability of harvested species to climate change.</p>
	Climate change monitoring	Statewide	<p>An analysis of changes to NSW marine habitats from 2019 to 2020 was completed.</p> <p>Modelling of the future impacts of climate change on kelp distributions along the NSW coast was completed. A scientific paper about Climate refugia for kelp within an ocean warming hotspot was published in <i>Marine Environmental Research</i>.</p> <p>Biota on rocky reefs along the coast were analysed. DPI-Fisheries is currently examining the addition of other vulnerable range retracting species for monitoring.</p> <p>An internal DPI-Fisheries workshop on climate change was held to target future research.</p>


	Project	Location	Our achievements
			<p>In 2021, the collection of habitat and fish assemblage data in NSW was completed. This work provided a three-year baseline from which future change can be measured.</p> <p>Monitoring of climate-driven storm damage to kelp forests commenced.</p> <p>A scientific paper, 'Predictions of habitat distributions under future climate scenarios', is in review.</p> <p>Monitoring data from the 2019 and 2020 statewide habitat monitoring programs were uploaded to the Fisheries Spatial Data Portal.</p>
		Port Macquarie	<p>Snorkel surveys examining the northernmost populations of Crayweed (<i>Phyllospora comosa</i>) examined climate change impacts.</p>
	Climate change citizen science	Statewide	<p>Project planning was completed to support citizen science observations of out-of-range species in NSW to the website REDMAP.</p> <p>There are plans for a report card for NSW.</p> <p>DPI-Fisheries maintained and promoted the REDMAP website and smartphone application.</p>



Photo 6. Conducting surveys of kelp health. Photo: Tom Davis, DPI



Photo 7. Three canoes. Photo of artwork by Leanne Barford, Uladulla Local Aboriginal Land Council

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

Initiative objective

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 2020–21

\$1,613,000

Management challenges and opportunities





Conservation of Sea Country, a large part of the marine estate, is central to the overall health and wellbeing of Aboriginal people, their cultural practices and traditions.




Aboriginal people and their cultural values are not yet appropriately represented or engaged in management of the marine estate, even though there are significant knowledge gaps relating to cultural values.






There are high-risk threats that cumulatively affect Aboriginal cultural heritage associated with Sea Country. Involving Aboriginal people will help identify cultural values and undertake coastal management works to protect these values on Country.

Project	Initiative 4 highlights for 2021–21
Reviving culture	<p>The online South Coast Sea Country School Education program was launched. The program supports students learning about Sea Country from traditional owners using videos and classroom activities.</p> <p>Additional funding from Parks Australia was secured to extend the Sea Country school education program with the Worimi and Yaegl nations.</p>
Elders as mentors	The Elders as mentors project commenced in Batemans, Jervis Bay and Solitary Islands marine parks with approximately 70 Elders in attendance at three meet-and-greet days.

Putting the Strategy into action

	Project	Location	Our achievements
	Sea Country management	Statewide	Eight Aboriginal positions were retained. These positions assist with cultural fisheries management and community engagement associated with delivery of this initiative.
	Aboriginal engagement	Statewide	<p>The National Aboriginal Design Agency was engaged to provide design concepts for an Aboriginal identifier (saltwater and freshwater) for multipurpose corporate use.</p> <p>Three purpose-built Aboriginal cultural education trailers wrapped in Aboriginal branding commenced construction. They provide a new experience between DPI and Aboriginal communities that aims to improve engagement.</p> <p>Support was provided for an Indigenous workshop as part of the Australian Marine Science Association conference. The aim was to improve engagement and participation of Aboriginal people in research and science. The workshop was postponed due to COVID-19.</p>
	Sea Country plans	Statewide	The start of this project was postponed due to COVID-19.
	Cultural Resource Use Agreements	Port Stephens	Work continued to pursue the finalisation of the Cultural Resource Use Agreement between the Worimi people and Port Stephens–Great Lakes Marine Park.

	Project	Location	Our achievements
	Elders as mentors	Byron, Coffs Harbour, Port Stephens, Shoalhaven, Eurobodalla and Bega	<p>Local Elders and cultural knowledge holders mentored staff from the five mainland marine parks to increase their understanding of local cultures to enhance the protection of Sea Country.</p> <p>This project was launched in 2020 with on Country meet-and-greet days held at Batemans, Jervis Bay and Solitary Islands marine parks. 70 Elders were in attendance across the three events.</p>
	Cultural interpretations	Port Stephens, Clarence Valley and Byron	<p>Discussions with Yaegl, Worimi and Arakwal on cultural interpretation projects started, but further progress was postponed due to COVID-19.</p> <p>The 'Repainting Our Shellfish Reef and Cultural Landscape' project at the River of Art Festival was supported. It included cultural story-telling and paint workshops.</p>
	Sea Country rangers	Statewide	<p>The Sea Country ranger activities on the South Coast continued. They included ongoing local employment and continued work to care for Sea Country.</p> <p>The second Sea Country Custodians training was delivered to an additional 20 people from Bundjalung, Gumbaynggirr and Dunghutti nations. Training was in marine wildlife responses and events.</p> <p>An additional 20 people from the Yaegl nation successfully completed and acquired a general boat licence and safety training. This project was expanded to the North Coast.</p> <p>The Sea Country Custodians video has started and is currently in development.</p> <p>The following ranger projects were delivered:</p> <ul style="list-style-type: none"> the Wallaga Lake Boardwalk, which generated local employment and ensured traditional owners were engaged to protect this significant place to the Yuin people the 2021 Coastal Weeds and Marine Debris program, which employed rangers from Eden, Bega, Merrimans, Wagonga and Cobowra Local Aboriginal Land Councils the Clean River Clean Sea Country project, which was delivered through Aboriginal rangers the Tura Headland walking track, which employed Aboriginal rangers to prevent further damage to the cultural heritage site.

	Project	Location	Our achievements
	Reviving culture	Statewide	<p>The Sea Country School Education program was launched online to enable primary school students and their schools to access the program remotely, especially during public health restrictions.</p> <p>This program has had more than 2,700 views. It includes a series of seven virtual excursion videos and associated curriculum-based learning activities for upper primary school students.</p> <p>In partnership with Parks Australia, MEMA extended the Sea Country School Education program with the Worimi and Yaegl nations. Initial scoping meetings have been held.</p>
	Cultural tourism	Eurobodalla Shire and Shoalhaven Council	<p>12 Aboriginal people on the South Coast were supported to obtain their Certificate II in Tourism so they could work in tourism-related industries. This resulted in subsequent discussions with several Aboriginal communities. Corporations progressed feasibility assessments to commence cultural tourism ventures. This ultimately led to Gadu Aboriginal Charters starting.</p>
	Cultural economic development	Northern and Central regions	<p>120 Aboriginal people were supported for training to receive their NSW general boat licence and safety training.</p> <p>In addition:</p> <ul style="list-style-type: none"> • Seven Aboriginal community members from the south coast completed their Coxswains training • 21 candidates from both the south and north coast engaged with completing their sea time associated with this training • 17 people have completed the initial Certificate II in maritime operations (deckhand).
	Cultural fishing funds	Statewide	<p>Targeted funds were directed into the Aboriginal Fishing Trust Fund to increase economic opportunities for Aboriginal people in the fishing and seafood industry.</p>
	Cultural research and monitoring	Statewide	<p>A Sea Country culture and science camp was held at Mystery Bay. Local Yuin people gathered to celebrate and share their culture and learn from marine scientists.</p> <p>A research project to collect and assess cultural fishing data as part of a local management plan trial was supported. If the methodology is successful, this project can be rolled out further.</p>




	Project	Location	Our achievements
			It will not be limited to catch data. It can also gather information about cultural and social values related to cultural fishing in order to begin to address the lack of cultural fishing data available in NSW.
	Cultural fish traps	Eurobodalla and Bega	This project has been hindered by COVID-19. The Muranna Point shell midden sorting and identification project on the South Coast was supported.
	Pipi harvest	Tweed Heads, Byron Bay, Ballina, Clarence Valley, Port Macquarie, Port Stephens and Jervis Bay	Initial discussions on Stage 2 of the Safe and Sustainable Harvest of Shellfish program started, but community consultations across several NSW coastal areas were postponed due to COVID-19.
	Climate change on culture	Southern Region	We supported community involvement in the climate adaptation project at a site near Batemans Bay in partnership with three Local Aboriginal Land Councils, traditional owners, DPIE–EES and Heritage NSW.



Photo 8. Wagonga Local Aboriginal Land Council Rangers – Marine debris and coastal weeds project (from left to right – Paul Brown Southern MEMS Aboriginal Project Officer, James Cook Far South Coast Landcare Officer and Wagonga Local Aboriginal Land Care Rangers Peter Moore, Martin Mason and Jason Davison). Photo: Ian Kerr, Department of Primary Industries



Photo 9. Green turtle. Photo: David Harasti, Department of Primary Industries ©

Initiative 5 – Reducing impacts on threatened and protected species

Initiative objective

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 2020–21

\$1,193,000

Management challenges and opportunities

NSW is home to an abundance of 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 of 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.

Project

Initiative 5 highlights for 2020–21

Partnerships to protect marine wildlife

16 research and partnership workshops were held with key universities, research bodies, and conservation groups to discuss research priorities and opportunities for collaboration. Greater Sydney Branch training days for large whale disentanglement and general marine wildlife event preparedness were held with DPIE and external stakeholders, including Gamay Rangers, ORRCA and Sydney Sea Life.



Planning to protect marine wildlife


The National Parks and Wildlife Service (NPWS) declared the first ever marine mammal special protection order under the Biodiversity Conservation Regulation 2017 on 29 June 2021. The order required boats, aircraft, drones and swimmers to stay more than 500 metres away from a Southern Right Whale that entered and stayed several days in Wallis Lake near Forster.



Strategies for mitigating species interactions

Collaboration with OceanWatch Australia and commercial fishers developed 10 vessel-specific seabird management plans that identify the main threats to seabirds.

Putting the Strategy into action

	Project	Location	Our achievements
	Planning to protect marine wildlife	Statewide	<p>Two meetings of the newly established Marine Wildlife Response Working Group led to a better-coordinated marine wildlife response.</p> <p>Annual reporting for target marine species was completed as part of Saving Our Species.</p> <p>The NPWS Marine Wildlife Management Manual was updated to improve marine wildlife responses.</p> <p>A contract to review rescue and large whale disentanglement training against new National Units of Competencies was started.</p> <p>The Interagency Whales Entering Sydney Harbour, Ports and River Operations Procedure was updated</p> <p>Marine wildlife operations community of practice meetings were held with NPWS. Operations Branches staff were involved in marine wildlife response.</p> <p>Wildlife rescue and rehabilitation groups were funded through grants to improve threatened and protected species outcomes.</p> <p>NPWS declared the first ever marine mammal special protection order under the Biodiversity Conservation Regulation 2017 on 29 June. The order required boats, aircraft, drones and swimmers to stay more than 500 metres away from a Southern Right Whale that stayed several days in Wallis Lake near Forster.</p>
	Partnerships to protect marine wildlife	Statewide	<p>Three new publications were released:</p> <ul style="list-style-type: none"> • a Code of Practice for injured and sick sea turtles and sea snakes • Sea Turtle and Sea Snake Rehabilitation Training Standards for the volunteer wildlife rehabilitation sector • guidelines for the initial treatment and care of rescued sea turtles. <p>Priority rescue gear was distributed along the NSW coastline including seal signs, turtle rescue mats, dolphin slings and satellite tracking tags.</p> <p>MEMA participated in two Australian Government Roundtables for Marine Turtles and Cetaceans.</p> <p>Necropsy investigations increased to support identification of key and emerging threats.</p> <p>16 research and partnership workshops were held with key universities, research bodies and conservation groups to discuss research priorities and opportunities for collaboration.</p>

	Project	Location	Our achievements
			<p>Cultural values were incorporated into several marine wildlife events along the NSW coast. The events involved the Worimi people, Dungutti people, Gumbaynggirr people and Arakwal people and people from the Sydney region.</p> <p>Aboriginal marine wildlife rescue overview training was delivered in Coffs Harbour.</p> <p>34 NPWS staff were trained in new seal identification, risk assessment, triage and initial first aid training with Taronga Conservation Society. This was a trial program.</p> <p>Whale disentanglement and marine wildlife event preparedness was held with staff and Gamay Rangers, ORRCA and Sydney Sea Life.</p> <p>A Beaked Whale mortality event was investigated. This involved a collaboration with Dolphin Marine Rescue, Australian Registry for Wildlife Health, Australian Antarctic Division, Wildlife Health Australia and interstate conservation agencies.</p> <p>Training for large whale disentanglement and marine preparedness was delivered across the state to more than 136 people from partner organisations including ORRCA, Marine Rescue, Local Government, Aboriginal Community, local veterinarians, Dolphin Marine Conservation Park, and Australian Seabird Rescue.</p> <p>97 marine wildlife Elements events were held.</p> <p>The 2021 winter compliance program was completed. It identified non-compliance from two marine mammal operators.</p>
	Education to protect and conserve marine wildlife	Statewide	<p>Shorebird training and support was provided at seven sites:</p> <ul style="list-style-type: none"> • Gaagal Wanggaan National Park • Urunga Island • Corrie Island • Smith Lake • Myall lakes National Park • Worimi National Park • Karagi Point. <p>Opportunities for community education and engagement were explored for <i>Posidonia</i> seagrass and other threatened marine species at specific sites. The work was a cross-agency collaboration with Northern Beaches Council.</p> <p>Temporary signs warning of 'seal approach distance' were distributed to the Organisation for the Rescue and Research of Cetaceans in Australia (ORRCA). Trial seal approach distance signs were produced with</p>

	Project	Location	Our achievements
			<p>Transport for NSW and deployed for use on private pontoon leases and public spaces to address ongoing seal haul outs. Signs for foreshores were finalised.</p> <p>A seal colony site at Barrenjoey Head was investigated to assess the impact on visual amenity of:</p> <ul style="list-style-type: none"> • a proposed 'approach distance' compliance sign • best-practice installation options. <p>The Southern Right Whale ID project was developed, and volunteers were recruited and trained in using drones for science. The project used drones to advocate safe and legal image capture of endangered Southern Right Whales. It contributed to education and research while improving drone compliance.</p> <p>NPWS webpages were updated in response to changes in legislation for marine mammal approach distances.</p> <p>Educational products on White's Seahorse were developed. This includes installing signs and distributing brochures to key locations across Greater Sydney.</p> <p>Hammerhead shark ID guides were sent to district fisheries offices for distribution to targeted stakeholders.</p> <p>Interpretive seagrass educational products were developed: signs were installed and primary school educational booklets were delivered.</p> <p>A marine threatened species video was completed for the DPI-Fisheries website. The video and a social media campaign focused on Grey Nurse Shark, Black Rockcod and Queensland Groper.</p>
	Improve reporting of interactions with marine wildlife	Statewide	<p>Improvements are being made to the online wildlife reporting system, Elements, based on user feedback.</p> <p>External organisations (ORRCA, Dolphin Marine Rescue, Sydney Sea Life, Sea World) completed user agreements and were onboarded to Elements. The aim is to improve coordination for marine wildlife emergencies.</p> <p>Rehabilitation group data was prepared for import into Elements.</p>
	Observer survey prioritisation	MidCoast, Port Stephens, Newcastle, Central Coast, Northern Beaches	<p>Ocean Fish Trawl Fishery observed data was analysed to revise sampling designs. The aim was to provide effective and statistically robust coverage for estimating total catch and interactions with high-risk species, including threatened and protected species.</p> <p>The draft report, 'Prioritisation of the NSW commercial fisheries scientific observer program informing future</p>

	Project	Location	Our achievements
			research priorities and effective sampling designs', was completed and is now in internal review.
	Ocean Trap and Line Fishery observer survey	Tweed to Port Stephens	<p>There were 131 observed sea days on board participating commercial vessels from several northern NSW ports. The proposed level of sampling of the entire program has been completed.</p> <p>More than 250 observed sea days have been completed so far.</p>
	Estuary General Fishery observer survey	Northern and Central regions	<p>Preliminary analyses of data collected during Stage 1 has been completed:</p> <ul style="list-style-type: none"> • 397 fishing trips were observed across seven estuaries • 12,330 trap lifts were monitored for catches • 4,477 wildlife observation periods were completed over two years • 47 commercial fishers voluntarily participated in the survey. <p>A scientific paper, 'Disparity among recommended and adopted escape gaps and their utility for improving selection in an Australian portunid trap fishery' was submitted to a peer-reviewed journal for publication.</p>
	Ocean Trawl Fishery observer survey	Statewide	<p>A scientific paper, 'Understanding discarding in trawl fisheries: A model based demersal case study with implications for mitigating and assessing impacts', was submitted to a peer-reviewed journal. The paper details the analysis of observer data collected from the Ocean Prawn Trawl Fishery. It contributes to our understanding of the impact of environmental and vessel operational forces on discards.</p>
	Strategies for mitigating species interactions	MidCoast, Port Stephens, Newcastle, Central Coast	<p>In collaboration with OceanWatch Australia and commercial fishers, 10 vessel-specific seabird management plans were developed. A series of port meetings facilitated:</p> <ul style="list-style-type: none"> • the voluntary adoption of seabird management plans • the distribution of physical mitigation devices. <p>A whale entanglement workshop with NPWS partners was facilitated by OceanWatch Australia and the Professional Fishers Association.</p> <p>A collaborative project with Sydney Institute of Marine Science and University of NSW started. It is investigating the effects of oceanic conditions on the probability of humpback whale entanglements in NSW fishing gear.</p>


	Project	Location	Our achievements
	Fishing industry sustainability	Statewide	<p>Projects with OceanWatch Australia, Coffs Harbour Fishermen's Cooperative and the Professional Fishers Association developed and tested gear modifications that reduce non-target interactions and improve industry social licence.</p> <p>Negatively buoyant rope was distributed to demersal fish trap and spanner crab fishers to extend gear trials that had been initiated during the East Coast Whale Mitigation project.</p>



Photo 10. An unwell turtle being assessed by experts at Dolphin Marine Conservation Park as part of its rehabilitation. Photo: Shona Lorigan, DPIE



Photo 11. Illuka ocean prawn trawl fleet. Photo: Stephen Ward, DPI

Initiative 6 – Ensuring sustainable fishing and aquaculture

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 2020–21

\$1,979,000

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.

Initiative 6 highlights for 2020–21


Harvest strategy development	Public consultation on Draft NSW Fisheries Harvest Strategy Policy and Guidelines was completed.
Recreational fishing environmental assessment	<p>Six livestream ‘The Fishing Stream’ events were delivered over Facebook. The topics were:</p> <ul style="list-style-type: none"> • Snapper • Mulloway • Dusky Flathead • Kingfish • responsible Summer family fishing • responsible family fishing for Easter. <p>The Fishing Stream events promote responsible recreational fishing and have reached hundreds of thousands of viewers.</p>
Marine aquaculture	The NSW Marine Waters Sustainable Aquaculture Strategy was developed to attract and guide aquaculture investment to NSW, including South Coast Mariculture’s new aquaculture leases in Jervis Bay. It was reported through ABC Landline .
Fisheries enhancements	Installation of the Tweed Offshore Artificial Reef was completed. The reef is part of a network of artificial reefs across NSW that enhance fishing opportunities by creating additional habitat for local aquatic organisms and fish.
Eat more NSW seafood	A collaboration between DPI-Fisheries and the Seafood Industry Council was developed. The Eat More NSW Seafood 2021 grants program was launched.

Putting the Strategy into action

	Project	Location	Our achievements
	Harvest strategy development	Statewide	<p>Public consultation on Draft NSW Fisheries Harvest Strategy Policy and Guidelines was completed.</p> <p>Harvest strategy working groups were established for Trawl Whiting, Lobster, Spanner Crab and Mulloway fisheries.</p> <p>The Trawl Whiting Harvest Strategy Working Group completed seven working group meetings. Preliminary advice to Fisheries Management was finalised and target reference points were agreed.</p> <p>A call for Expressions of Interest to participate in the Abalone Harvest Strategy Working Groups was made.</p> <p>The lobster working group completed two working group meetings in development of the draft harvest strategy.</p>

	Project	Location	Our achievements
	Harvest strategy research	Statewide	<p>Draft harvest strategy processes were developed for Trawl Whiting. It includes methods for data collection, assessment and management. It has been reviewed by working groups.</p> <p>Preliminary harvest strategy research components were developed through a collaboration with CSIRO. It covers Eastern School Whiting, Silver Trevally, Pipi, Spanner Crab, Mulloway, Yellowtail Kingfish and Abalone.</p> <p>A scientific paper, Prioritising fished stocks for monitoring and assessment was published in <i>Ocean and Coastal Management</i>. The paper details a method for prioritising 141 fished species in NSW for population monitoring and assessment, which contributes to harvest strategies development.</p> <p>A review of available data sources for recreational fisheries in NSW was completed with the University of Tasmania. It aimed to develop performance indicators with an initial focus on Yellowtail Kingfish and Bream.</p> <p>Performance indicators from NSW recreational fishing data informed harvest strategy development for multi-sector fisheries and identified and prioritised recreational fishing objectives.</p> <p>Ecological risk assessment for harvest strategies has been identified as a standard process for NSW fisheries. Development and technical review was supported by international collaboration and independent expert review.</p> <p>Preliminary ecological risk assessment for by-product species of the Ocean Trawl Fishery was completed. The results were presented to the Working Group.</p>
	Recreational fishing environmental assessment	Statewide	<p>Six livestream 'The Fishing Stream' events were delivered over Facebook. The topics were:</p> <ul style="list-style-type: none"> • Snapper • Mulloway • Dusky Flathead • Kingfish • responsible Summer family fishing • responsible family fishing for Easter. <p>The Fishing Stream events promote responsible recreational fishing and have reached hundreds of thousands of viewers.</p> <p>New bag limit for cockles were announced and commenced in October 2020. The rule changes</p>

	Project	Location	Our achievements
			<p>address overharvesting, community concerns and black marketing.</p> <p>A workshop was completed with government and industry stakeholders to examine the impacts of recreational fishing on the social and economic benefits derived from the marine environment.</p>
		Wollongong to Bega	Signs to encourage responsible fishing around stingrays at boat ramps were installed at 12 locations along the south coast from Bellambi to Tathra.
	Marine aquaculture	Statewide	<p>The NSW Marine Waters Sustainable Aquaculture Strategy was developed. It is being used to attract and guide aquaculture investment to NSW, including new South Coast Mariculture's aquaculture leases in Jervis Bay. It was reported on ABC Landline.</p>
	Best practices in oyster aquaculture	Statewide	Research examining oyster aquaculture infrastructure risk to the environment in seagrass areas was presented at the Australian Marine Sciences Association conference.
	Oyster aquaculture business and environment	Statewide	<p>The NSW Oyster Industry Sustainable Aquaculture Strategy was reviewed and released.</p> <p>Seven consultative meetings with the oyster industry were held to discuss industry recovery following flood and fire natural disaster events along the NSW coastal areas. Participants included the NSW Food Authority, OceanWatch, NSW Farmers, LLS, Rural Financial Councillors, Rural Mental Health, Rural resilience, aquatic biosecurity and the aquaculture unit.</p>
	Socioecological research	Statewide	<p>The University of Tasmania Centre for Marine Socioecology entered into a research agreement to identify the barriers to integrating socioecological research and management in multi-agency programs and how to address them.</p> <p>A University of Tasmania report was delivered to internal managers of the NSW marine estate. It addresses the social dimensions and governance challenges of implementing integrated management. The report provides an evidence base for the Strategy to refine current implementation approaches and, where necessary, invest in capacity-building across the implementation teams.</p>

	Project	Location	Our achievements
	Recreational fishing values	Statewide	This project did not proceed in 2020-21.
	Marine estate benefits	Statewide	This project did not proceed in 2020-21.
	Cultural fishing monitoring	Statewide	Project planning progressed with a view to project implementation in 2021–22.
	Wild catch fish stocks	Statewide	<p>NSW Stock status summary reports for 2020–21 were completed and published.</p> <p>An external review of assessments was completed with members of the Ocean Trap and Line Fishery and the Ocean Trawl Fishery.</p> <p>Industry consultation and stock assessment reports were completed for hand-gathering quota-managed species.</p> <p>The Status of Australian Fish Stocks (SAFS) reports for 2020 was released.</p>
	Fisheries enhancements	Statewide	Responsible fishing gear – crab traps and nets, release weights, and catch and release mats – were provided to DPI education officers for distribution in 2021–22.
		Tweed	The Tweed Offshore Artificial Reef , NSW's most northern reef complex, was installed.
		Port Macquarie-Hastings, Greater Sydney	90,000 juvenile Mulloway were produced at the Port Stephens Fisheries Institute and released in the Georges and Hastings rivers.
		Botany Bay	590 juvenile Yellowtail Kingfish were stocked into Botany Bay. They were about 20–25 centimetres long on average.
		Shoalhaven	75,000 juvenile Dusky Flathead were released into recreational fishing havens in the region.
		Batemans Bay	A Request for Tender process for the Batemans Bay Offshore Artificial Reef led to a design and




	Project	Location	Our achievements
			construct contract agreement with the successful tenderer.
	Fishing industry marine stewardship	Statewide	This project did not continue as planned. DPI managers worked with industry partners to identify new and novel approaches to build capacity and increase the social licence of commercial fishers.
	Eat more NSW seafood	Statewide	<p>A collaboration between DPI-Fisheries and Seafood Industry Council delivered the Eat More NSW Seafood 2021 grants program. A governance committee and program guidelines were established.</p> <p>The campaign received many applications in both grant categories for consideration by the selection committee.</p>
	Marine biosecurity awareness	Statewide	<p>Charles Sturt University designed and delivered social research into the barriers, benefits and drivers for biofouling management on small-to-medium sized vessels.</p> <p>The marine biosecurity awareness survey was released in December 2020 to target small-to-medium sized recreational vessel owners. The aim was to better understand the current knowledge of biosecurity and the benefits and drivers to managing biofouling on these vessels.</p> <p>Targeted stakeholder interviews were conducted for about 20 key groups. The interviews aimed to identify the barriers, benefits and drivers to managing biofouling on small-to-medium sized recreational vessels.</p> <p>Social research survey responses were compiled and analysed to identify barriers, benefits and drivers for managing biofouling.</p> <p>A monitoring and evaluation plan was produced to quantify a change in understanding or uptake of communications messaging.</p>

Figure 7. Overarching drivers of the Fishery Harvest Strategy

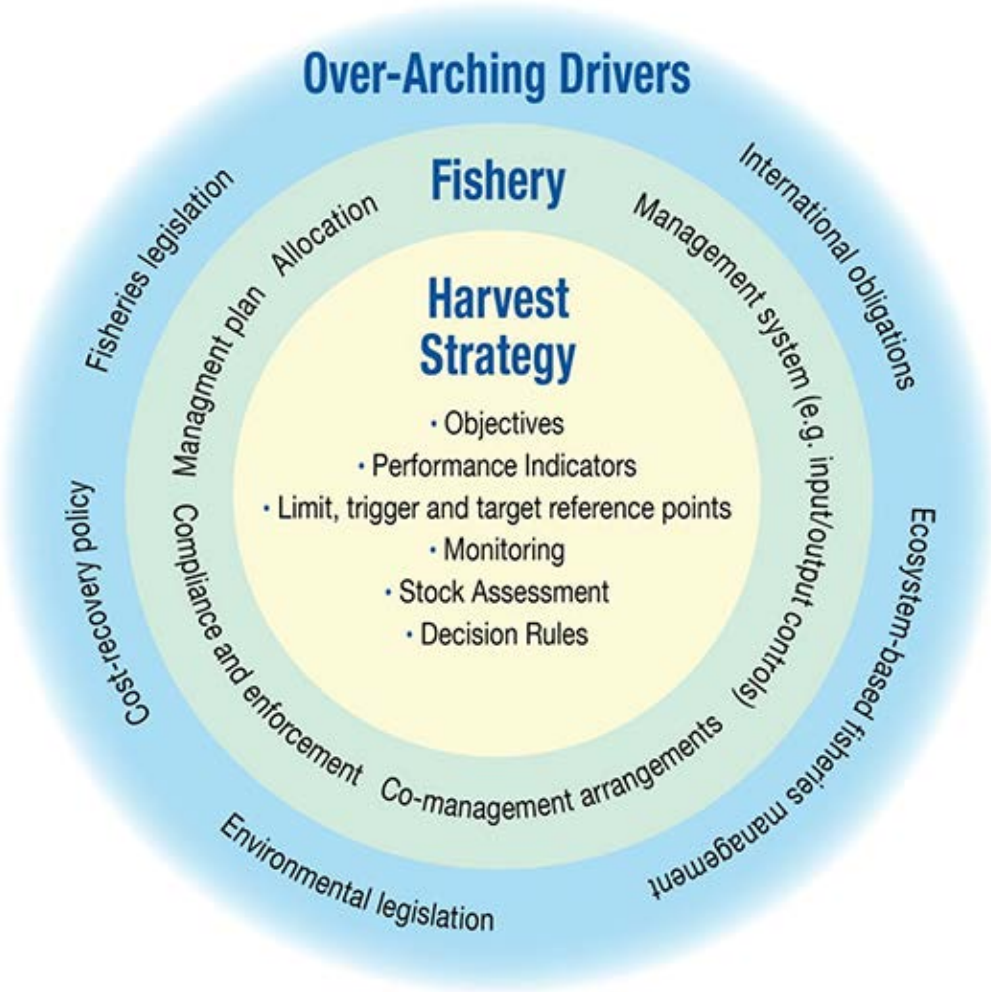




Photo 12. Coffs Harbour marina. Photo: iStock.com-funky-data

Initiative 7 – Enabling safe and sustainable boating

Initiative objective

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 2020–21

Initiative 7 is funded by Transport for NSW with the addition of **\$5,000** 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 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.

Project	Initiative 7 highlights for 2020–21
Recreational boater education	An updated Boating Handbook was published to make boating rules and regulations clearer for boaters.
Mooring strategy	An online private mooring map that enables boat owners to search and apply for a mooring was launched.
NSW Boating Now	Successful projects under Round 3 of the NSW Boating Now program have been announced. Sixty-nine projects have received funding to improve maritime infrastructure and facilities across NSW. This investment supports the needs of recreational and commercial boaters and enables broader economic and social benefits for communities.
Marine Pollution Legislation	<p>The Marine Pollution Amendment (Review) Bill 2021 was passed in Parliament with amendments in March 2021 and commenced on 26 March 2021. The Bill:</p> <ul style="list-style-type: none"> • improved the consistency of coverage of vessels across NSW • strengthened the protection of NSW State waters from pollution from vessels • brought the Act into alignment with national and international best practice in shipping and port operations.
Review of offshore anchoring	<p>All planned underwater video surveys that assessed the potential impact of large commercial vessels anchoring were compiled and processed.</p> <p>A scientific paper reviewing the global impacts of Anchor and chain scour as disturbance agents in marine life and seabed environments was published in <i>Marine Pollution Bulletin</i>.</p>

Putting the Strategy into action

	Project	Location	Our achievements
	Environmentally friendly moorings (EFM)	Statewide	<p>Transport for NSW has engaged CSIRO to inform a greater understanding of the suitability and performance of different EFM designs and their application in NSW waterways. The first stage of the project has started – a desktop research and literature review.</p> <p>The findings of the CSIRO research will support the development of standards to improve the safety and environmental outcomes of EFMs. It will also deliver targeted education programs to improve boaters' understanding of how to protect seagrass.</p>
	Mooring strategy	Statewide	<p>An online private mooring map is now live. It allows boat owners to:</p> <ul style="list-style-type: none"> • search for available private moorings • inquire about wait lists and applicable restrictions

	Project	Location	Our achievements
			<ul style="list-style-type: none"> submit applications for private mooring licences (PML). <p>In the 2020–21 financial year, there was a:</p> <ul style="list-style-type: none"> 23% increase in PML 24% increase in PML applications processed 0.3% increase of occupied moorings. <p>The total PML waiting list on 30 June was 17,378. This was a 0.03% increase compared to previous financial years.</p> <p>PMLs that were 'No longer required' accounted for 87% of mooring cancellations.</p>
	Mooring audits	Statewide	<p>100% of occupied moorings in NSW were audited in 2019 and 2020 through the Mooring Audit Program in those years.</p> <p>In 2021, ongoing mooring inspections and management of non-compliance and defect issues are business as usual. Indications are that compliance with licence conditions has increased.</p>
	Mooring access	Statewide	<p>Mooring access is being addressed by the Mooring Reform Program, which contains a policy initiative to ensure the policy and regulatory framework is modern and flexible so that it can respond to growing demand for boat storage. The private mooring map assists with access to moorings.</p>
	End of Life vessel management	Statewide	<p>Transport for NSW has completed an extensive review of the issues associated with End of Life Vessels and also conducted targeted consultation with stakeholders.</p> <p>Transport for NSW is developing a policy options paper which will be released for public consultation.</p>
	Marine pollution responsibilities	Statewide	<p>Following an amendment to the Protection of the Environment Operations General Regulation 2021, Transport for NSW is declared to be the appropriate regulatory authority for non-scheduled activities that involve a non-pilotage vessel in navigable waters, including in a marine park, except in specified circumstances.</p>

	Project	Location	Our achievements
	Marine pollution legislation	Statewide	<p>The Marine Pollution Amendment (Review) Bill 2021 passed Parliament with amendments in March 2021 and commenced on 26 March 2021.</p> <p>This project is now complete.</p>
	Vessel environmental standards	Statewide	<p>Preparation for implementation of the Sewage Pollution Prevention Certification Scheme is complete. Final consultation with the industry on the recommended standards (guidelines) will occur shortly. This was delayed until the Marine Pollution Amendment (Review) Bill 2020 was passed by the Legislative Council, on 16 March 2021.</p>
	Recreational boater education	Statewide	<p>The Boating Handbook was updated to make boating rules and regulations clearer for boaters.</p> <p>This project is now complete.</p>
	Review of offshore anchoring	Central region - Wollongong	<p>A scientific paper reviewing the global impacts of Anchor and chain scour as disturbance agents in marine life and seabed environments was published in <i>Marine Pollution Bulletin</i>.</p> <p>All of the planned underwater video surveys that assessed the potential impact of large commercial vessels anchoring were compiled and processed.</p> <p>Data examining the impacts of large ships anchoring on NSW reefs was analysed. An open access scientific article on the effects of offshore anchoring on reefs and reef biodiversity is ready for submission in the near future.</p>
	Vessel monitoring	Statewide	<p>DPI is leading Strategy program evaluation and developing the community wellbeing framework program. Transport for NSW contributed boating reports and data to the program evaluation in December 2020 and will continue to do so.</p>
	Boating Now	Statewide	<p>Successful projects under Round 3 of the NSW Boating Now program were announced in July 2020. Sixty-nine projects received funding, including boat ramps, jetties, wharves, car and trailer parking, dinghy storage racks and sewage pump-outs.</p> <p>Projects under the NSW Boating Now program were delivered in collaboration with stakeholders.</p>



	Project	Location	Our achievements
	Maritime infrastructure	Statewide	<p>Most works are linked to actions under the NSW Boating Now program.</p> <p>In October 2020, the NSW Government announced the \$205 million Maritime Infrastructure Stimulus Program to stimulate the NSW economy while generating long-term benefits by:</p> <ul style="list-style-type: none"> • activating maritime and foreshore precincts • attracting more visitors and private investment in these areas. <p>Projects being funded under the program include upgrades to regional harbours, breakwaters, wharves, jetties and vessel maintenance facilities, plus priority dredging works and major maritime property upgrades in Sydney Harbour and Botany Bay.</p> <p>Action is ongoing.</p>
	Waterway compliance	Georges River	<p>A trial of fixed enforcement cameras in specific areas along the Georges River to explore available technology and broader options was completed.</p> <p>The use of this technology will be considered as part of the implementation of the Maritime Safety Plan 2026.</p> <p>This project is now complete.</p>



Photo 13: Upgrade to the Bermagui River Boat Ramp – NSW Boating Now Round 2 completed in early 2020. Photo: Bega Valley Shire Council



Photo 14. Woman kayaking in the ocean. Photo: iStock.com.Onfokus

Initiative 8 – Enhancing social, cultural and economic benefits

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 2020–21

\$838,000



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.

Project	Initiative 8 highlights for 2020–21
Marine Education Strategy	The Marine Estate Education Strategy was drafted and then reviewed through targeted consultation with stakeholders.
Maritime heritage review	A localised pilot project was completed at Woolgoolga in the Coffs Harbour City Council LGA to identify, interpret and protect maritime heritage.
Community wellbeing framework	<p>More than 3,300 people were surveyed in the representative NSW coastal residents and visitors' surveys to better understand the ways people benefit from the marine estate and what affects those benefits.</p> <p>500 Sea Country (Marine Estate) surveys were completed (of a possible total 600 surveys) across 11 locations along the NSW coast to provide statewide baseline data on the ways Aboriginal people value and culturally connect to Sea Country.</p>

Putting the Strategy into action

	Project	Location	Our achievements
	Marine Estate Education Strategy	Statewide	<p>The Marine Estate Education Strategy has been drafted, and targeted consultation with stakeholders has finished. It is now being finalised with the Marine Educators Steering Committee.</p> <p>A curriculum-based primary schools 'Marine Estate Agents' pilot program was developed with a newly established working group.</p> <p>The Marine Estate Agents pilot project plan was finalised with the internal interagency working group.</p>
	Maritime heritage review	Coffs Harbour City Council	<p>A local threat and risk assessment was completed.</p> <p>Innovative ways of interpreting items and sites were explored.</p> <p>Ways of rebuilding sand dunes around the Buster shipwreck were investigated.</p> <p>Temporary signs were produced and installed at the Buster shipwreck site at Woolgoolga Beach to help protect the now exposed wreck from large crowds.</p> <p>The Woolgoolga jetty pile public installation is nearing completion. The site has been prepared, and interpretive signs have been installed with web accessible information via QR code.</p> <p>Interpretive signs on maritime heritage around Woolgoolga are ready for installation. They include site-specific information at the jetty pile</p>





	Project	Location	Our achievements
			<p>and Buster shipwreck and a QR code that links to web accessible information.</p> <p>A CoastSnap phone cradle was installed at the Buster shipwreck site to collect long-term citizen science data on erosion patterns around the Buster shipwreck. This will aid in developing future management initiatives for the Buster shipwreck.</p> <p>A YouTube video highlighting the Strategy maritime heritage project at Woolgoolga and NSW was completed.</p>
	Community wellbeing framework	Statewide	<p>Fieldwork and analysis was completed for the NSW coastal residents and visitors' surveys, with over 3,300 participants to monitor the ways people benefit from the marine estate and what affects those benefits.</p> <p>Administration data for cultural indicators was collected.</p> <p>500 face-to-face interviews out of a target of 600 interviews were completed for the statewide Sea Country Survey.</p> <p>An internal Strategy agency staff survey was developed in collaboration with DPIE-EES.</p> <p>A youth survey was designed to monitor how 14 to 17-year-olds benefit from the NSW coast and what affects those benefits.</p>
	Economic benefits monitoring	Statewide	<p>An economic technical working group was reconvened. The group commenced an economic valuation study, which includes review and collection of data on economic indicators.</p>
	Capturing local ecological knowledge	Central Coast	<p>The project plan for this project has been completed. Implementation has been deferred until 2021–2022.</p>
	Marine estate valuation model	Statewide	<p>The initial scoping for the design and development of an economic valuation model has been completed. The model is to be based on international best practice in ocean accounting.</p>

Figure 8. NSW marine estate community wellbeing framework illustration by Catfish Creative



Initiative 9 – Delivering effective governance



Photo 15: iStock.com/Gerasimov174

Initiative objective	
Improve governance arrangements across the marine estate to support coordinated, transparent, inclusive and effective decision-making.	
Initiative long-term outcomes	
<ul style="list-style-type: none"> Improved coordination, transparency, consistency and inclusiveness of managing the marine estate Improved efficiency and effectiveness in managing the marine estate 	
Budget year 2020–21	\$1,452,000

Management challenges and opportunities


There is a need for governance models that support 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 better support for effective management of the marine estate and deliver social, cultural, economic and environmental benefits.




The Strategy has presented an opportunity to enhance interagency coordination and streamlining of agency effort. It is also an opportunity to test contemporary approaches to regulation and compliance, and actively involve communities in managing the marine estate.

Project	Initiative 9 highlights for 2020–21
Improving project governance	<p>A desktop survey of projects identified that of the 100+ Strategy projects:</p> <ul style="list-style-type: none"> • 34 are anticipated to improve governance • 28 reduce red tape in the marine estate. <p>About half of the projects aim to improve consistency, coordination, integration, efficiency and effectiveness in managing the marine estate. Most projects intend to deliver on more than one aspect of governance for improvement.</p> <p>A Stage 1 Strategy Baseline Evaluation progressed and includes recommendations that will further improve project governance.</p>
Better geographic information systems (GIS) for the marine estate	<p>The DPI Key Fish Habitat dataset was made available for public download through the Fisheries Spatial Data Portal.</p> <p>Key Fish Habitat is a core dataset for several Strategy initiatives.</p>
Greater Sydney region compliance focusing on marine protected areas	<p>Greater Metropolitan Mobile Squad Fisheries officers conducted more than 2,791 inspections in 2020–21. The average observed compliance rate was 86%.</p> <p>The officers reported a total of 749 offences, which comprised:</p> <ul style="list-style-type: none"> • 42 pending actions • 9 verbal cautions • 402 written warnings • 295 penalty notices • 2 prosecutions. <p>The most significant offences were possessing prohibited size fish (237), fail to pay fishing fee (236), and exceed possession limits (232).</p> <p>A total of 13,549 invertebrates and fish were seized, including 7,260 cockles and 5,032 mixed shellfish.</p>

Putting the Strategy into action

	Project	Location	Our achievements
	Improving project governance	Statewide	<p>A desktop survey of projects identified that, of more than 100 Strategy projects:</p> <ul style="list-style-type: none"> • 34 are anticipated to improve governance • 28 reduce red tape in the marine estate. <p>These projects were identified and categorised using the outcomes for Initiative 9 from the Marine Integrated Monitoring Program framework.</p> <p>About half of the projects aim to improve consistency, coordination, integration, efficiency and effectiveness in managing the</p>

	Project	Location	Our achievements
			marine estate. In addition, most projects intend to deliver on more than one aspect of governance for improvement.
	Improved marine park management planning	Statewide	<p>Development of a new draft management plan for the network of mainland marine parks involved around 65 specific workshops with external and internal stakeholders in 2020–21.</p> <p>Most external workshops were held with the marine park advisory committees for the five mainland marine parks. Advisory councils were also included.</p> <p>This engagement helped to set out the values, threats, management objectives and management actions that will build the new draft management plan.</p> <p>Further engagement is scheduled for 2021–22, including community consultation on the draft plan that was prepared in 2020–21 (commenced 1 November 2021).</p>
	Improved management of aquatic reserves and high value sites		<p>The 40th anniversary of the declaration of Long Reef Aquatic Reserve was celebrated through:</p> <ul style="list-style-type: none"> • development of dedicated webpages • production of two education videos • installation of interpretative signs to support community and school education • development of interactive activities for school children. <p>Materials were provided to two volunteer groups to assist in conducting guided tours.</p> <p>A consultant was engaged to develop a program logic for improving the management of aquatic reserves in NSW.</p>
	Better geographic information systems (GIS) for the marine estate		<p>Cadastral data analysed and produced GIS layers for domestic foreshore structures strategies project (Initiative 2).</p> <p>Spatial data was collated for an audit of coastal breakwalls (Initiative 2).</p> <p>An online citizen science tool (Shellfish Reef Reporter) was developed to support the oyster reef restoration research project (Initiative 1).</p>

	Project	Location	Our achievements
			<p>Remnant oyster reef maps were completed for Port Stephens, Botany Bay and Georges River (Initiative 1).</p> <p>Input to habitat classification of oyster reefs was provided to the Australian Government.</p> <p>An updated and improved Key Fish Habitat dataset was made available for public download through the Fisheries Spatial Data Portal. Key Fish Habitat is a core dataset for several Strategy initiatives. It is widely used by councils and consultants.</p> <p>The maps component of the DPI FishSmart app was upgraded to use Mapbox software. The upgrade also expanded the app's coverage to include spearfishing closures.</p> <p>Distribution maps of <i>Posidonia</i> endangered ecological communities were revised to incorporate the latest available information.</p> <p>Available bathymetry were collated and processed with newly acquired data to inform the Offshore Artificial Reefs project (southern region).</p>
	Reducing red tape		<p>Six internal project management training sessions including governance and red tape were delivered to Strategy project leads.</p> <p>A desktop survey of projects identified that 28 of the 100+ Strategy projects are anticipated to reduce red tape in the marine estate.</p>
	Reducing red tape for marine parks		<p>The project did not commence.</p> <p>It will proceed in 2021–22.</p>
	Streamlining authorisation processes		<p>More than 150 pages of existing DPI-Fisheries document-based permit application forms have been mapped into a single draft online permit application form across various fisheries and marine park activities. This draft form is being tested and refined ready for implementation in the coming months.</p> <p>A DPI-Fisheries team was established to support streamlined authorisation processes and improved customer service into the future.</p>

	Project	Location	Our achievements
	Greater Sydney region compliance focusing on marine protected areas		<p>Greater Metropolitan Mobile Squad Fisheries officers conducted more than 2,791 inspections in 2020–21. The average observed compliance rate was 86%.</p> <p>The officers reported a total of 749 offences, which comprised:</p> <ul style="list-style-type: none"> • 42 pending actions • 9 verbal cautions • 402 written warnings • 295 penalty notices • 2 prosecutions. <p>The most significant offences were:</p> <ul style="list-style-type: none"> • possessing prohibited size fish (237) • fail to pay fishing fee (236) • exceed possession limits (232). <p>A total of 13,549 invertebrates and fish were seized, including 7,260 cockles and 5,032 mixed shellfish.</p> <p>Emerging high-risk locations for illegal invertebrate collection were identified. These areas were not previously patrolled by District Fisheries Officers.</p> <p>A range of activities has produced positive compliance outcomes and improved transparency, consistency and inclusiveness of managing the marine estate. These include:</p> <ul style="list-style-type: none"> • coordinated patrols • education and awareness opportunities • information sharing with NSW Police Marine Area Command, Transport for NSW, NPWS, Crown Lands and local councils. <p>Offshore compliance work in the region commenced.</p>

Program management, monitoring, reporting, evaluation and engagement



Photo 16. Scuba divers. Photo: /iStock.com-ultramarinfoto

Objective	
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	
<ul style="list-style-type: none"> 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 Marine Integrated Monitoring Program for the marine estate 	
Budget year 2020–21	\$1,182,341

Management challenges and opportunities

To ensure effective program management of the Strategy, a governance structure and program management framework have been implemented to support the Strategy's delivery across NSW.


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



MEMA is committed to working collaboratively with the broader NSW community to realise the benefits of a healthy coast and sea through the Strategy. Keeping all stakeholders engaged in, and informed of, the progress and achievements of the Strategy is important to its success.

The implementation of the [Marine Integrated Monitoring Program](#) (MIMP) facilitates centralised and efficient coordination, reporting and integration of environmental, social, cultural and economic information for the NSW marine estate. The MIMP gives the community confidence that the management of the marine estate is being continually assessed to drive adaptive management.

Project	Highlights for 2020-21
Strategy program management	<p>All key project partners in the Strategy signed memorandums of understanding in 2020–21.</p> <p>Program efficiencies were reviewed and applied to:</p> <ul style="list-style-type: none"> • new project proposals • prioritisation of ongoing work • budget builds for the next financial year. <p>Extensive internal and external consultation will ensure the best outcomes.</p>
Strategy communications, engagement, education and stakeholder liaison	<p>The NSW Marine Estate Instagram channel was launched in January 2021 to regularly inform the community and stakeholders about the Strategy's success and to provide program updates and relevant information.</p> <p>A major redesign of the NSW marine estate website is improving accessibility and functionality in line with the NSW Government's Digital Design Standards.</p>
Monitoring Program – program management	<p>Development of a data management strategy to store, manage, and communicate monitoring data and threat and risk information is underway and includes architecture for a MIMP-specific database that will inform public-facing reporting from the MIMP.</p> <p>Scoping for the statewide threat and risk assessment five-year review has continued, including a workshop in June 2021 to discuss the review approach. Participants included MEMA agency staff and the Marine Estate Expert Knowledge Panel.</p> <p>Interviews, data collection and analysis for the baseline evaluation of the Strategy have been completed and final reports published to the marine estate website.</p>

Putting the Strategy into action

	Project	Location	Our achievements
	Strategy program management	Statewide	<p>All key project partners in the Strategy have signed memorandums of understanding in 2020–21.</p> <p>A project management workbook was provided to all project leads. Project management training was delivered to all Strategy project leads.</p> <p>Ongoing project management support and training was provided across all Strategy agencies.</p>

	Project	Location	Our achievements
			<p>Program efficiencies include:</p> <ul style="list-style-type: none"> • new project proposals • prioritisation of ongoing work • budget builds for the next financial year. <p>Extensive internal and external consultation will ensure the best outcomes.</p> <p>The MEMS Implementation Annual Report 2019–2020 and Strategy quarterly snapshot reports for quarter 1, quarter 2 and quarter 3 were published.</p>
	Strategy communications, engagement, education and stakeholder liaison	Statewide	<p>The NSW Marine Estate Instagram channel was launched in January 2021 to regularly inform the community and stakeholders about the Strategy's success and to provide program updates and relevant information.</p> <p>There were 90 Instagram posts in 2020–21.</p> <p>The functionality of the marine estate website has been improved: the new Strategy reporting page was launched along with new project profile pages and updates to content.</p> <p>A major redesign of the NSW Marine Estate website is improving accessibility and functionality in line with the NSW Government's Digital Design Standards.</p> <p>The September and December newsletters were published. From March 2020, NSW Marine Estate newsletters were published each month instead of quarterly. There are now more than 1,100 subscribers.</p> <p>Development of project profiles, news stories and media releases continues.</p>
	Monitoring Program – program management	Statewide	<p>A program plan and governance arrangements were developed.</p> <p>The MIMP Steering Committee was established, and regular meetings were held.</p> <p>Technical working groups are progressing environmental, social, cultural, and economic monitoring, including the development of the draft Environmental Condition and Community Wellbeing Frameworks.</p> <p>Interviews, data collection and analysis for the MEMS baseline evaluation report was completed, and the report was prepared by an independent reviewer.</p> <p>Initiative monitoring plans in the Integrated Monitoring and Evaluation Framework are</p>

	Project	Location	Our achievements
			<p>under review. The review is based on the preliminary findings of the program evaluation.</p> <p>A data management strategy is being developed to store, manage, and communicate monitoring data. It includes architecture for a MIMP-specific database. This will inform public-facing reporting from the MIMP.</p> <p>Scoping for the five-year review of the statewide Threat and Risk Assessment (TARA) is ongoing, including a cross-agency workshop and Marine Estate Expert Knowledge Panel held in June 2021.</p>

Conclusion

The foundations for successful Strategy implementation were built in Stage 1 (2018–2020). This included the development of project management and governance framework, recruitment of staff, creating partnerships and relationships with stakeholders, and commencing the development of the MIMP. In addition, 41 of the 53 actions in the Strategy commenced in Stage 1 and continued into Stage 2 in 2020–21. Five additional actions commenced in Stage 2.

The Strategy has continued to deliver tangible outcomes across the NSW marine estate. The overall budget for 2020–21, the third year of the Strategy, was \$28.3 million. This was used across the initiatives to continue addressing the threats to the NSW marine estate.

Total investment by NSW Government to date (2018–2021) is \$74 million. Strategy achievements to date are showcased in Figure 9.

Delivering outcomes

Figure 99. Strategy achievements 2018–2022

Water quality and litter

OYSTER REEF RESTORATION



7,500 tonnes of rock and
180 m³ of shell substrate to
rehabilitate 2.5 ha of oyster reef in
the Port Stephens–Great Lakes
Marine Park



130+ km of
riverbank
vegetation
rehabilitated to
improve water
quality



MONITORING

170+ estuaries measured for water quality and ecosystem
health, **90%** now have an 'estuary health grade' of
A, B or C (**good condition** to moderate)



erosion control works on **50**
macadamia orchards on the
North Coast to reduce on-farm
sediment runoff into
waterways

Water quality and litter



\$50 m REDUCING WATER POLLUTION

25% increase in community understanding that dropping litter in the street will hurt marine life



13% reduction in litter volume between 2018 and 2020

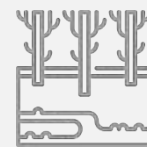
90% of NSW residents now agree that littering has a negative impact on waterways and beaches



213 ha of riverbank vegetation improved 16,500 native species



268 ha of riverbank protected by fencing
48 km of foreshore protected from stock access



4.8 km of riverbank stabilised to reduce erosion and sediment entering waterways



surveyed **3500** NSW residents to identify their environment values and uses of waterways



302 ha of coastal wetland now protected



\$18 m delivering on-ground works



assisting local government to keep fish and coastal habitats healthy

9 workshops
4 educational videos



RISK-BASED FRAMEWORK

- adopted in strategic and local planning instruments as best practice for managing cumulative impacts of urban development
- co-designed statewide capacity-building program

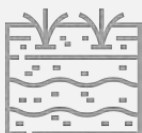
Water quality and litter



Over **850 tonnes** per year of sediment kept from entering Wallagoot Lake by sealing 230 m of unsealed road



18 km of gravel roads sealed at **55** sites to reduce pollutants and erosion entering coastal waterways



improved extent and condition of protected saltmarsh following rehabilitation works in Tilba



development of cutting edge indicators to rapidly assess fish biodiversity in **63** estuaries



184 coastal catchments mapped for high ecological value aquatic ecosystems

Delivering healthy coastal habitat



DREDGING AUDIT
of commercial dredging and sand extraction activities in estuaries **completed**



COASTAL DESIGN GUIDELINES
prepared for exhibition



COASTAL FLOODPLAIN STUDY
700+ floodgate structures on coastal floodplains assessed for threats to water quality and **880** soil samples tested



Delivering healthy coastal habitat



IMPROVING FISH PASSAGE

3 barriers for removal to collectively reinstate

1,325 km fish passage

STREAMLINING ENVIRONMENTAL ASSESSMENTS

285 km in the Richmond River and

102 km in the Brunswick River

assessed using an online mapping tool for suitable sites for jetties and pontoons



6,805 artificial structures mapped – jetties, pontoon, breakwalls groynes
in **9** estuaries



BLUE CARBON

78 priority fish barrier sites identified for removal to

reinstate **61** km² of mangrove and saltmarsh to sequester carbon



CLIMATE CHANGE RESILIENCE

37 priority sustainable sites to rehabilitate **1254** km² of marine vegetation

Planning for climate change



seagrass, mangrove and saltmarsh maps finalised for Botany Bay

CLIMATE CHANGE MONITORING



early warning signs identified: distribution and abundance of kelp, coral and urchins monitored on reefs statewide



predicted mangrove and saltmarsh response to sea-level rise assessed in **110** significant estuaries

CITIZEN SCIENCE

using community data to map changes in marine species distributions due to climate change



predicting the future impacts of climate change on underwater forests completed

Protecting Aboriginal cultural values of the marine estate



120 Aboriginal people trained,
and obtained their boat licence
9 obtained Coxswains
certification



Sea Country School Education program extended to the
Worimi and Yaegl Nations and released online with more
than **2,700** views



**REVIVING TRADITIONAL
CULTURAL PRACTICES**
making boats and nets, Elders
sharing knowledge with school
children on the South Coast



ENGAGING WITH COMMUNITY

direct engagement with
500+ community members
in Sea Country management
• launched the Elders as
Mentors project



20 Aboriginal people trained
in marine wildlife responses
and events
28 awarded Certificate II in
Tourism



facilitating and promoting
Aboriginal engagement
across all Strategy initiatives

Reducing impacts on threatened and protected species



800+ people attended
marine wildlife stranding
and disentanglement
training



**ENGAGING WITH FISHING
INDUSTRY**
to test innovative fishing gear to
reduce interactions with threatened
and protected species



monitoring of turtle nests
200+ successful
hatchlings from seven
nests

Reducing impacts on threatened and protected species



9 threatened seahorse hotels installed in Sydney Harbour housing
140 bred and tagged seahorses



COMMERCIAL FISHING OBSERVER PROGRAM
680+ days **40,000** hook deployments
• 12,680 trap lifts monitored



fabrication of marine wildlife rescue gear including dolphin slings, turtle mats and satellite tracking buoys for entangled whales



80 vets trained in marine wildlife to improve survivorship and understanding of threats



21 volunteer drone operators involved in the Right Whale ID citizen science project pilot

\$50,000 in grants provided to support wildlife rescue and rehabilitation groups targeting welfare and survivorship



87% of seal event response training attendees reported an increase in confidence in responding to an event

Sustainable fishing and aquaculture



130+ commercial fishers completed best-practice training

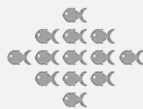


TIDE TO TIP CAMPAIGN



22,550 kg waste removed in oyster industry-led clean up

Sustainable fishing and aquaculture



Partnering with NSW Recreational Fishing Trusts projects to release **175,000+** fingerlings into recreational fishing havens



NSW FISHERIES HARVEST STRATEGIES
Policy and Guidelines developed through extensive consultation and guiding robust and transparent decision-making rules



EAT MORE NSW SEAFOOD PROGRAM
\$1.5m+ in grants delivered to NSW Seafood industry for marketing and promoting NSW seafood



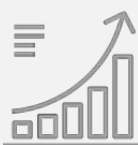
Tweed Heads offshore artificial reef, installed

THE FISHING STREAM

670,000+ views of live events promoting NSW fishing businesses and responsible fishing practices



8,000 newly designed crab traps and lift nets to NSW recreational fishers to reduce fishing footprint



Marine Waters Sustainable Aquaculture Strategy
developed to guide effective and sustainable business growth



MARINE BIOSECURITY AWARENESS
statewide survey completed informing behaviour change campaign

Enabling safe and sustainable boating



NSW BOATING NOW PROGRAM

\$28 m round-3 funding available for maritime infrastructure and facilities needed across NSW for safe, accessible and enjoyable recreational and commercial boating

258+ projects delivered since the program was launched



950+ commercial vessel inspections in 202–21 for safety and environmental standards



4 hybrid environmentally friendly moorings installed at Shoal Bay. Trialling innovative moorings to protect sensitive seagrass communities while keeping boaters safe



MARITIME INFRASTRUCTURE PLAN 2019–2024 released to guide future investments in maritime infrastructure



NSW BOATING HANDBOOK updated to make boating rules and regulations clearer



PRIVATE MOORING MAP launched streamlined online platform to search and apply for a mooring



ABORIGINAL MARITIME SAFETY PLAN 2020–2022 promoting boating safety in NSW Aboriginal communities

Enhancing social, cultural and economic benefits



COMMUNITY WELLBEING FRAMEWORK developed to guide the strategic collection of social, cultural and economic data



MARINE EDUCATION STRATEGY draft developed

Enhancing social, cultural and economic benefits



MARINE INTEGRATED MONITORING and EVALUATION FRAMEWORK
completed to track the Strategy's success



SUPPORTING COMMUNITIES

90+ jobs created; **65+** in regional NSW

50+ Aboriginal rangers caring for Sea Country



3,300+ participants in the NSW coastal residents and visitors' surveys



BUSTER SHIPWRECK
threats assessed and developing management strategies for marine historic heritage



SEA COUNTRY SURVEY
statewide baseline data on the ways Aboriginal people value and culturally connect to Sea Country

Delivering effective governance



100+ projects implemented cross-agency governance and collaboration rated STRONG



RICHMOND RIVER CATCHMENT
governance and funding framework finalised



\$45 m to partner agencies through memorandums of understanding



IMPROVING FISHERIES COMPLIANCE

1,300+ inspections through education and agency collaboration

IMPROVING PROJECT GOVERNANCE

28 projects reducing red tape

34 projects aimed at improving governance

Abbreviations and acronyms

CCC	Clean Coastal Catchments
DCP	Development Control Plan
DPI	Department of Primary Industries
DPIE	Department of Planning, Industry and Environment
DPI-EES	Department of Planning, Industry and Environment – Environment, Energy and Science
EFM	Environmentally friendly moorings
DPI-Fisheries	Department of Primary Industries – Fisheries
FSG	Fertiliser Stewardship Group
GIS	Geographic information systems
ICOLL	Intermittently closed and open lakes and lagoons
LEP	Local Environment Plan
LGA	Local government authorities
LLS	Local Land Services
MEMA	Marine Estate Management Authority
MEMA agencies	MEMA and the Department of Regional NSW, Department of Planning, Industry and Environment (Environment, Energy and Science as well as Planning and Assessment groups) and Transport for NSW
MEMS	Marine Estate Management Strategy
MIMP	Marine Integrated Monitoring Program
NPWS	National Parks and Wildlife Service
NSW	New South Wales
ORRCA	Organisation for the Rescue and Research of Cetaceans in Australia
PML	Private mooring licences
SAFS	Status of Australian Fish Stocks
SEED	Sharing and Enabling Environmental Data
TARA	Threat and Risk Assessment

Appendix A – Communications and engagement

Communications and engagement with a wide variety of stakeholders and the community about the Strategy were undertaken during the year.

Key communication and engagement activities are summarised and in Figure 10 and below.



Figure 1010. Summary of communication and engagement in 2020–21

Table 3. Communication and engagement activities during 2020–21

Date	Stakeholder	Activity	Initiative	Communication and engagement
July	NSW Community	Media release	7	\$28 million to ramp up boating facilities
	Blueberry industry	Webinar	1	Digging the dirt on blueberry mound fertiliser management
	NSW community	Media release	7	Transport for NSW Boating Now Round 3 Successful projects
	NSW community	Facebook livestream event	6	The Fishing Stream - snapper
August	NSW community	Industry newsletter	1	Fertiliser Stewardship Group (FSG) Newsletter - August 2020
	NSW community	Marine estate news	1	NSW Marine Estate Newsletter (September)
September	NSW community	Marine estate news	1	How do you make a local council fish friendly
	NSW community	Media release	9	Fishing for fines in Georges River and Botany Bay
	NSW community	Marine estate news	1	Environmentally-friendly mooring trial in Port Stephens
	NSW community	Marine estate news	1	Responding to the impacts of recent storms on bushfire affected catchments
	NSW community	Marine estate news	4	Funding helps float cultural tourism on NSW south coast
	NSW community	Facebook livestream event	6	The Fishing Stream - mullocky
	NSW community	Scientific paper	6	Prioritising fished stocks for monitoring and assessment
	Industry	Webinar	1	Lab Tests and Tales from the Wollongbar Labs
	NSW community	Media release	8	Maritime cash splash creates hundreds of jobs
October	NSW community	Media release	1	Collaboration stopping waterway-polluting sediment at its sources
	NSW community	Marine estate news	2	Release of educational video for Greater Sydney Harbour Coastal Management Program
	NSW community	Marine estate news	5	Saving soft coral
November	NSW community	Marine estate news	4	New resource gives students a virtual experience of Sea Country
	NSW community	Marine estate news	4	Restoring Sea Country back to health
	Local councils	Marine estate news	1	Fish friendly council videos
	NSW community	Marine estate news	7	Charting a course to more sustainable boating and shipping
	Aboriginal community	Media release	7	Aboriginal Maritime Safety Plan launched

Date	Stakeholder	Activity	Initiative	Communication and engagement
	Commercial and recreational fishers	Media release	6	Fishers given greater input into harvest strategies
	Land managers	Mediarelease	1	Grants available for horticulture to keep nutrients on-farm
	Industry	Webinar	1	Identifying and addressing soil constraints and their impact on nutrient management
	NSW community	Facebook livestream event	6	The Fishing Stream – Dusky flathead
	NSW community	Industry newsletter	1	Fertiliser Stewardship Group (FSG) Newsletter - November 2020
	NSW community	Marine estate news	5	Hiding in plain sight
December	NSW community	Marine estate news	5	NSW trawl fishers get on-board with seabird friendly practices
	NSW community	Marine estate news	1	Seahorse conservation project is a 'wild' success
	NSW community	Marine estate news	5	Understanding how our coastal communities' value and use local waterways in NSW
	NSW community	Marine estate newsletter	1	Marine estate newsletter
	NSW community	Facebook livestream event	6	The Fishing Stream - Responsible Summer family fishing
	NSW community	Instagram	1	It is time for a clean start
January	NSW community	Instagram	1	Summertime blues
	NSW community	Instagram	1	Hiding in plain sight
	NSW community	Instagram	1	Dive right in!
	NSW community	Instagram	1	Macquarie Light station
	NSW community	Instagram	1	Leaf oysters
	NSW community	Instagram	6	Did you know harvest strategies are world's best practice?
	NSW community	Instagram	2	The grass is always greener
	NSW community	Instagram	3	Deep dive on the health of NSW's coast
	NSW community	Instagram	8	Living on the edge
	NSW community	Instagram	8	Wash over me
	NSW community	Instagram	5	A giant among cuttlefish
	NSW community	Instagram	8	NSW Marine Estate
	NSW community	Instagram	5	Saving soft coral
	NSW community	Instagram	5	Go the blues!
	NSW community	Instagram	2	It's a long stretch
	NSW community	Instagram	5	A living museum

Date	Stakeholder	Activity	Initiative	Communication and engagement
	NSW Community	Instagram		Macquarie Light Station
	NSW community	Instagram	2	Dive right in!
	NSW community	Instagram	5	Hiding in plain sight
	NSW community	Media release	7	New look boating handbook
	NSW community	Media release	5	107 endangered turtle hatchlings returned to the ocean after successful nest rescue
	NSW community	Media release	7	5000 dollar fine for diesel spill in Lake Macquarie
February	NSW community	Instagram	1	Today is World Wetlands Day!
	NSW community	Instagram	1	Putting the 'wet' back into wetlands
	NSW community	Instagram	3	Climate of knowledge
	NSW community	Instagram	1	Improving water quality for our ocean, estuaries and coastal wetlands
	NSW community	Instagram	7	NSW Boating Now
	NSW community	Instagram	2	Marine Biosecurity awareness survey
	NSW community	Instagram	1	Emigrant Creek - stopping sediment pollution at its source
	NSW community	Instagram	2	You're a star!
	NSW community	Instagram	4	Volunteers clean up
	NSW community	Instagram	1	Have your say on water quality
	NSW community	Instagram	1	Have your say on water quality
	NSW community	Instagram	8	Paddle power
	NSW community	Instagram	2	Soldier on
	NSW community	Instagram	8	Lord Howe Island
	NSW community	Instagram	8	Galapagos sharks
	NSW community	Instagram	8	Anemone fish at Lord Howe Island
	NSW community	Instagram	8	Discover the underwater world at Lord Howe
	NSW community	Marine estate news	1	Tilba: A community partnership
	NSW community	Facebook livestream event	6	The Fishing Stream - Kingfish
	NSW community	Industry newsletter	1	Fertiliser Stewardship Group (FSG) Newsletter - February 2021
March	NSW community	Instagram	1	"Don't be a tosser"
	NSW community	Instagram	1	Growing blueberries webinar
	NSW community	Instagram	1	Port Stephens clean up
	NSW community	Instagram	3	Have you seen any bull kelp?
	NSW community	Instagram	1	Oyster reef restoration project
	NSW community	Instagram	1	Baby oysters

Date	Stakeholder	Activity	Initiative	Communication and engagement
	NSW community	Instagram	1	A new rock oyster settlement
	NSW community	Instagram	4	Closing the Gap
	NSW community	Instagram	1	Oysters filter and clean our water
	NSW community	Instagram	1	What next for the Port Stephen's pilot shellfish reef restoration?
	NSW community	Instagram	7	Online map streamlines NSW mooring service
	NSW community	Instagram	1	Fish friendly council workshops
	NSW community	Marine estate news	1	Works completed on Bega River log wall
	NSW community	Marine estate news	1	Don't be a tosser
	NSW community	Marine estate news	2	NSW boating access dredging program launched
	NSW community	Facebook livestream event	6	The Fishing Stream – Responsible family fishing for Easter
	Blueberry Industry	Webinar	1	Growing blueberries in substrate - a nutrition case study with a focus on ammonium and nitrates
April	NSW community	Instagram	1	Saltmarsh damage
	NSW community	Instagram	1	Don't be a Tosser
	NSW community	Instagram	1	Don't be a Tosser
	NSW community	Instagram	1	Don't be a Tosser
	NSW community	Instagram	1	Becoming a citizen scientist is a snap
	NSW community	Instagram	1	Work completed on Bega River log wall
	NSW community	Instagram	2	Coastal Habitat forum
	NSW community	Instagram	5	Preventing whale entanglement
	NSW community	Instagram	5	A long way from home
	NSW community	Instagram	2	Boating access dredging program
	NSW community	Instagram	5	Learning to save seals
	NSW community	Instagram	3	Celebrating seaweed
	NSW community	Instagram	9	Keeping track of 100 projects
	NSW community	Instagram	5	Stranded whale at Coffs Harbour
	NSW community	Instagram	2	Riparian rehabilitation at Tilba Tilba
	NSW community	Instagram	6	See you at the Narooma Oyster Festival
	NSW community	Marine estate newsletter		Marine Estate News April 2021
	NSW community	Marine estate news	5	Learning to save seals
	NSW community	Marine estate news	5	Stranded whale at Coffs Harbour
	NSW community	Marine estate news	9	Keeping track of 100 projects
	NSW community	Marine estate news	5	Preventing whale entanglement

Date	Stakeholder	Activity	Initiative	Communication and engagement
May	NSW community	Marine estate news	5	What's the catch?
	NSW community	Instagram	1	Marine Estate at the Narooma Oyster Festival
	NSW community	Instagram	8	Feedback from the Narooma Oyster Festival
	NSW community	Instagram	1	20th International Conference on Shellfish restoration
	NSW community	Instagram	1	Australia's biggest oyster
	NSW community	Instagram	5	What's the catch?
	NSW community	Instagram	2	Water quality focus on big projects
	NSW community	Instagram	6	Monitoring the NSW Ocean Trap and Line Fishery
	NSW community	Instagram	1	Webinar on erosion control for macadamia growers
	NSW community	Instagram	1	Helping macadamia growers
	NSW community	Instagram	5	Turtle hatchlings at Fingal Beach
	NSW community	Instagram	8	Whale watching
	NSW community	Instagram	4	National Reconciliation week
	NSW community	Instagram	6	Eat more seafood
	NSW community	Instagram	6	More fish for recreational fishers
	NSW community	Instagram	4	National Reconciliation week
	NSW community	Instagram	8	Hiking at Gosangs Tunnel
	NSW community	Instagram	8	Never too cold for a surf
	NSW community	Instagram	4	National Reconciliation week
	Subscribers and stakeholders	Marine estate Newsletter		MEMS May newsletter
	NSW community	Marine estate news	1	Webinar on erosion control for macadamia growers
	NSW community	Marine estate news	6	Progress on NSW harvest strategies
	NSW community	Marine estate news	1	Winners of our Water Quality Objectives community survey
	NSW community	Marine estate news	6	Eat more seafood NSW grants
	NSW community	Marine estate news	1	Community science night at Tilba Tilba
	Macadamia Industry	Webinar	1	An update on the Clean Coastal Catchments erosion control incentives program for macadamia growers
June	NSW community	Instagram	1	Restoring water quality to Wapengo Lake
	NSW community	Instagram		World Oceans Day
	NSW community	Instagram	1	Tilba Tilba science night
	NSW community	Instagram	1	Reef revival wrap up

Date	Stakeholder	Activity	Initiative	Communication and engagement
	NSW community	Instagram	1	Oyster reef restoration project
	NSW community	Instagram	8	Cape Byron NSW
	NSW community	Instagram	6	What did you have for breakfast?
	NSW community	Instagram	1	Fertiliser Stewardship newsletter
	NSW community	Instagram	6	Where do the snapper live?
	NSW community	Instagram	8	Soaking up the winter sun
	NSW community	Instagram	1	\$5000 fine for diesel spill in Lake Macquarie
	Subscribers and stakeholders	Marine estate Newsletter		MEMS June Newsletter
	NSW community	Marine estate news	6	Snapper-razzi 'catch' Greater Sydney's underwater life
	NSW community	Marine estate news	1	Ready, set, action
	NSW community	Marine estate news	5	Cauliflower soft coral
	NSW community	Marine estate news	2	News Wollamia boat ramp
	Industry	Industry newsletter	1	Fertiliser Stewardship Group (FSG) Newsletter - June 2021

Table 4. Scientific papers during 2020–21

Project	Initiative	Paper details
Risk-based framework for urban waterway health	Initiative 1	Tool for the evaluation of water related clauses in Local Environment Plans (LEPs) published on the DPIE–EES SEED Platform. The tool brings together all the water-related clauses of LEPs available for coastal NSW. It functions primarily as a search tool of what the LEPs cover. Local Governments are using the tool for their LEP reviews.
Oyster reef restoration research	Initiative 1	Scientific papers on Baited Remote Underwater Videos (BRUVs) and eDNA for detecting assemblages with oyster reefs (with University of Newcastle) were published.
Mapping seagrass, mangrove and saltmarsh	Initiative 2	A scientific paper on changes in seagrasses across NSW over the last 40 years was accepted for publication in the journal Estuarine Coastal and Shelf Science.
Subtidal reef monitoring	Initiative 2	An open access scientific paper was published. It explains the distribution of snapper along Greater Sydney Region coastline for use by the public and management agencies.
Climate change threats to seagrass, mangrove and saltmarsh	Initiative 3	Development of a first-pass method to predict migration of mangrove and saltmarsh under sea-level rise was completed. A manuscript describing the method submitted for acceptance in a peer-reviewed journal.
Climate change monitoring	Initiative 3	Modelling of the future impacts of climate change on kelp distributions along the NSW coast has been completed. Research paper on climate refugia for kelp published in Marine Environmental Research.
Climate change monitoring	Initiative 3	A scientific paper 'Predictions of habitat distributions under future climate scenarios' is in review.
Estuary General Fishery observer survey	Initiative 5	Two papers summarising project findings have been submitted to peer-reviewed journals for publication: <ul style="list-style-type: none"> • 'Multiple benefits from the deployment of bycatch reduction devices in east Australian portunid fisheries: An observer based investigation' • 'Bycatch reduction devices reduce catches of undersize target species in a portunid fishery'.
Ocean Trawl Fishery observer survey	Initiative 5	A paper 'Understanding discarding in trawl fisheries: A model based demersal case study with implications for mitigating and assessing impacts' was submitted to a peer-reviewed journal. It details the analysis of observer data collected from the Ocean Prawn Trawl Fishery. This contributes to understanding the impact of environmental and vessel operational forces on discards.
Harvest strategy research	Initiative 6	Peer reviewed publication detailing a method for prioritising 141 fished species in NSW for population monitoring and assessment, contributing to harvest strategies development.

Project	Initiative	Paper details
Review of offshore anchoring	Initiative 7	The peer-reviewed paper reviewing the global the impacts of anchoring on marine life and seabed environments was published in Marine Pollution Bulletin.

Table 5. Consultation and engagement on Strategy projects in 2020–21

Project	Initiative	Consultation
Review of the NSW Water Quality Objectives	Initiative 1b	Engagement with stakeholders on the update of the NSW Water Quality Objectives through an online survey – this included an approach to engaging with Aboriginal people on Country to enable inclusion of cultural values in the objectives
Coastal floodplain study	Initiative 1b	Consultation on draft coastal floodplain study reports
Construction sediment management	Initiative 1b	Consultation with coastal councils across NSW to consider a range of current LEP conditions about construction sediment management and development of suitable alternative policy options
Coastal design guidelines review	Initiative 2	Internal and targeted external consultation on draft Coastal Design Guidelines
Domestic waterway structure strategies	Initiative 2	Consultation with commercial fishers to recognise important commercial fishing grounds has been completed for the Richmond River estuary
Coastal floodplain drainage management	Initiative 2	Consultation with 20 coastal Councils to discuss key issues with the current regulatory approval processes for coastal floodplain drainage management
Pipi harvest	Initiative 4	Initial discussions on Stage 2 of the safe and sustainable harvest of shellfish program commenced; however, community consultations across several NSW coastal areas were postponed due to COVID-19
Harvest strategy development	Initiative 6	Consultation on the draft Harvest Strategy development Policy and Guidelines completed
Wild catch fish stocks	Initiative 6	Industry consultation and stock assessment reports completed for hand-gathering quota-managed species
Marine Education Strategy	Initiative 8	Targeted consultation with stakeholders on the draft Marine Estate Education Strategy