



MARINE ESTATE MANAGEMENT STRATEGY

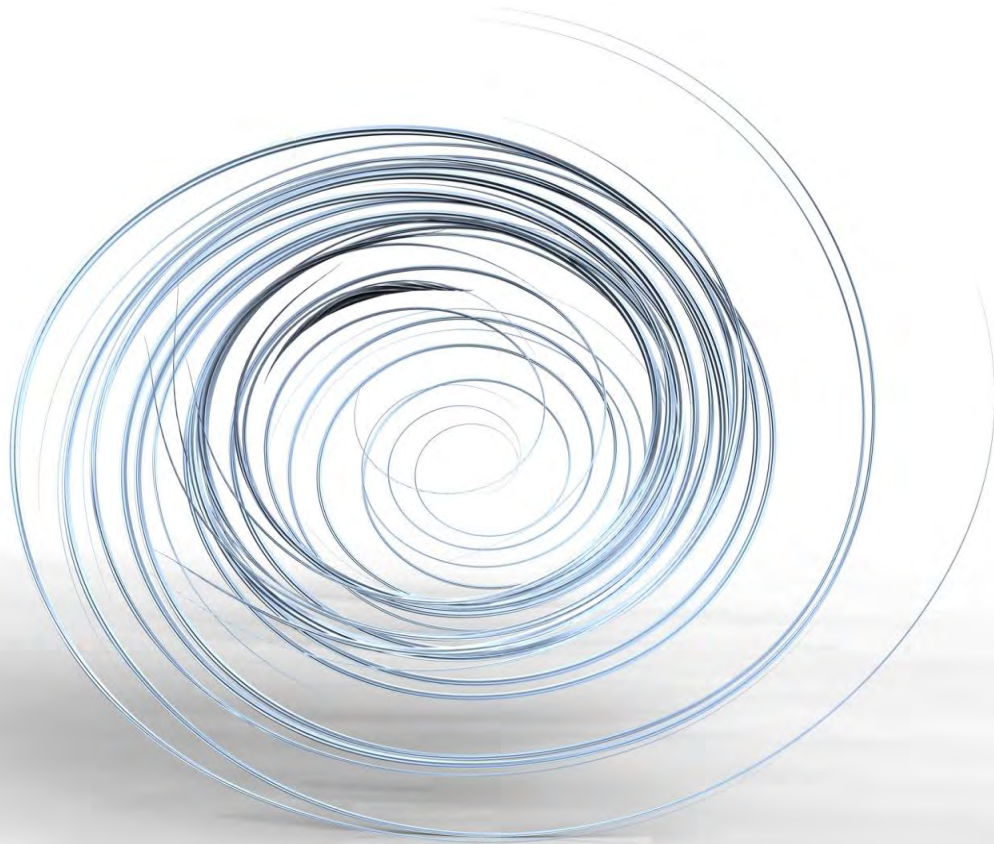
Stage 1: Status update report for local government (Initiatives 1 – 3)

Reporting Period: Stage 1 & Quarter 1 Stage 2

Up to 30 September 2020

MARINE ESTATE MANAGEMENT AUTHORITY

INT20/362283



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List of abbreviations

Abbreviation	Definition
Authority	Marine Estate Management Authority
CMP	Coastal Management Program
DPI Agriculture	Department of Primary Industries – Agriculture
DPI Fisheries	Department of Primary Industries – Fisheries
DPIE Crown Lands	Department of Planning, Industry and Environment – Crown Lands
DPIE PA	Department of Planning, Industry and Environment – Planning and Assessment
DPIE Water	Department of Planning, Industry and Environment – Water
EES	Department of Planning, Industry and Environment – Environment, Energy and Science
EPA	New South Wales Environment Protection Authority
LGA	Local Government Area
NRAR	Natural Resources Access Regulator
Risk-based Framework	Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land-use Planning Decisions
RTO	Registered Training Organisation
SEED	The NSW Government’s central resource for Sharing and Enabling Environmental Data
SEPP	State Environmental Planning Policy
Strategy	Marine Estate Management Strategy
TARA	threat and risk assessment
TfNSW	Transport for NSW
WRL	University of NSW Water Research Lab

Part 1: Introduction

Reporting period

Information included in this report covers the entire period of Stage 1 and the first quarter of Stage 2 (August 2018 – 30 September 2020).

Purpose

The purpose of this report is to provide an update that guides and informs local government on the progress of Marine Estate Management Strategy (Strategy) initiatives 1 to 3. These initiatives focus on water quality, marine litter, the health of estuarine and marine habitats, coastal management and climate change, all of which have strong alignment with Coastal Management Programs (CMPs).

Since its release in August 2018, staff implementing the Strategy have been liaising with councils to identify partnerships, plan projects and ensure they are relevant to, and complement council programs where possible. This report aims to support the current communication channels by providing a written update on the progress of key Strategy initiatives and management actions. This information is intended to inform and assist councils when developing their CMPs but should not replace continued contact with regional agency staff who are working day to day on these issues (See Appendix A - Strategy and CMP integration contacts).

This report is not intended to be a regular update but rather a once-off snapshot of progress. This report is supplemented by our regular quarterly snapshot reports as well as the Strategy's Implementation Annual Report. These reporting mechanisms will be a useful ongoing communication tool for councils and other stakeholders to receive regular updates on management actions. The annual report and the quarterly snapshots can be found on the publications page on the [marine estate website](#), under the section, [Marine Estate Management Strategy progress reporting](#).

The [Strategy's implementation webpage](#) is an important communication tool. Project updates are regularly communicated through project webpages and the Strategy newsletters. The implementation webpage includes updates on all nine initiatives delivered under the Strategy. The initiative pages are a key source of up-to-date information for a range of Strategy management actions.

Background

Marine Estate Management Strategy

The [Strategy](#) is a framework for the NSW Government to coordinate the management of the marine estate over a ten year period (2018 – 2028). It identifies management actions to address [statewide priority threats](#) to the marine estate.

The Strategy was developed by the Marine Estate Management Authority (Authority) drawing on input from stakeholders, including local government, peak interest groups and the broader community.

The Strategy's nine initiatives are as follows:

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.

Marine Estate Management Authority

The Authority advises the NSW Government on the management of the NSW marine estate. The Authority brings together the heads of the NSW Government agencies with key marine estate responsibilities. The Authority is established under the *Marine Estate Management Act 2014* and reports to the Ministers responsible for the marine estate – the Minister for Agriculture and Western NSW and the Minister for Energy and the Environment. The Authority brings together the heads of the following NSW Government agencies with key marine estate management responsibilities:

- NSW Department of Primary Industries
- NSW Department of Planning and Environment – Environment, Energy and Science
- NSW Department of Planning and Environment – Planning and Assessment
- Transport for NSW.

Delivering long term outcomes

The Strategy's nine initiatives will contribute to: delivering healthy waterways, coastal habitats and sustainable land use; planning for climate change; protecting Aboriginal cultural values of the marine estate; reducing impacts on marine life; delivering sustainable boating and fishing; enhancing social, cultural and economic benefits; and delivering effective governance.

Stage 1 (ending June 2020) focused on addressing the most severe threats to the health of the marine estate, particularly water pollution, which was identified as the greatest threat to the marine estate by the NSW community and through an evidence-based [threat and risk assessment](#) in 2017. Building on the foundations laid in Stage 1, Stage 2 commenced on 1 July 2020 and is supported by an Implementation Plan for (2020-2021).

Some Strategy management actions have included pilot projects in Stage 1 in specific locations along the NSW coast, such as natural oyster reef restoration in Port Stephens. Other management actions have statewide benefits, such as the application of a Risk-based Framework for water quality in estuaries and their main tributaries. Information about where Strategy management actions are being implemented in Stages 1 and 2 can be found in the following maps:

- [Local Government Areas – NSW Statewide \(Stage 2 - 2020-2021\)](#)
- [Local Government Areas – NSW Statewide \(Stage 1\)](#)
- [Local Government Areas – Greater Sydney \(Stage 1\)](#).

Additional resources for local government

The following resources have been developed for local government to help identify links to CMPs and ways to integrate the Strategy with CMPs:

- [FAQ for local government](#)
- [Marine Estate Management Strategy Implementation Plan \(Stage 2 - 2020-2021\)](#)
- [Marine Estate Management Strategy Implementation Plan \(Stage 1 - 2018-2020\)](#)
- [Annual Implementation Reports](#).

Part 2: Initiative updates

Initiative 1: Improving water quality and reducing litter

Taking action to stop water pollution and litter before it gets into our waterways. Read more here: <https://www.marine.nsw.gov.au/strategy-implementation/putting-strategy-into-action/water-quality-and-litter>

Initiative Leads:

Neil Gemmell (actions led by EES) – neil.gemmell@environment.nsw.gov.au

Kylie Russell (actions led by DPI) – kylie.russell@dpi.nsw.gov.au

Management Action 1.1	Improve water quality in agricultural and urban catchments using a pilot-based implementation of the <i>Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land use Planning Decisions</i> .
Spatial extent & key LGAs	1.1.1 has had a focus in urban areas, including, Hornsby Shire, South Creek (the Hawkesbury), Northern Beaches and Illawarra. 1.1.2 is focused on the Richmond River catchment area.
Project	Progress on deliverables <i>Deliverables listed below in bold are taken directly from the Strategy's implementation plan.</i>
1.1.1 <i>In progress</i>	<p>Stage 2 will see the completed application of the <i>Risk-based Framework</i> in South Creek, through a collaboration with Sydney Water and the Western Sydney Planning Partnership by:</p> <ul style="list-style-type: none"> • consulting with local and state governments, and other stakeholders to define local water quality and ecosystem health objectives needed to achieve the community's environmental values and uses of waterways and water dependent ecosystems • defining contemporary stormwater quality and quantity management targets • adoption of objectives and stormwater management targets in relevant planning instruments, and the stormwater and water cycle management strategy for the Aerotropolis.

<p>Management Action 1.1</p>	<p>Improve water quality in agricultural and urban catchments using a pilot-based implementation of the <i>Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land use Planning Decisions</i>.</p>
	<p>Work is continuing in the South Creek pilot, predominantly through in-kind contributions of project partners. Expected delivery date is timed with public releases of the Precinct Plans and Development Control Plans for the Western Sydney Aerotropolis. Work includes:</p> <ul style="list-style-type: none"> • Engaging industry experts (and hence building capacity) to undertake field monitoring to map the condition of riparian corridors and waterways. The outcomes will inform a map of strategic priorities for protecting or restoring high ecological value waterways and water dependent ecosystems. The map will go into Precinct Plans and influence the urban and landscape design of the precincts. Using the field data to model and develop local water quality and flow objectives for protecting and restoring the high ecological value waterways and water dependent ecosystems • Demonstrating how the objectives inform stormwater infrastructure and water sensitive urban design requirements. Initial outcomes of this work have been released in Sydney Water’s ‘Urban Typologies and Stormwater Management – achieving a cool green liveable Western Parkland City. • Case study to inform guidance on implementing the Risk-based Framework, with a focus on establishing context for integrated land use and water cycle management <p>Contact: Jocelyn Dela-Cruz - EES</p>
<p>1.1.2 <i>In progress</i></p>	<p>At the end of Stage 1, local councils in the pilot areas will have applied the <i>Risk-based Framework</i>, by:</p> <ul style="list-style-type: none"> • Investigating the options for and feasibility of applying the Risk-based Framework in a rural setting. <p>The Richmond River catchment has been chosen as a pilot study for the application of the Risk-based Framework in a rural catchment. Local councils within the Richmond River catchment, including Ballina Shire Council, Richmond Valley Council, Lismore City Council, Kyogle Shire Council, Byron Shire Council and Rous County Council are being kept informed of the project’s progress. The Risk-based Framework will inform development of a coastal management program (CMP) that will be developed by local councils for the Richmond River.</p> <p>Under MEMS Stage 1, EES has developed a Richmond River Water Quality Monitoring Strategy (monitoring strategy) to support application off the Risk Based Framework in the Richmond. The monitoring strategy is designed to provide data at appropriate scales. It will also establish sentinel monitoring sites for ecosystem health to measure the</p>

<p>Management Action 1.1</p>	<p>Improve water quality in agricultural and urban catchments using a pilot-based implementation of the <i>Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land use Planning Decisions</i>.</p>
	<p>effectiveness of the Strategy actions over time. Commencement of the monitoring strategy is an important component in progressing the application of the Risk-based Framework in the Richmond River.</p> <p>As a fundamental component for the implementation of Phase 1 of the monitoring strategy new monitoring equipment/infrastructure has been designed to allow reliable and consistent water sample analysis. Arrangements are currently being finalised for implementation of the infrastructure. Phase 1 monitoring is explicitly aimed at filling key knowledge gaps to assist in application of the Risk-based Framework in the Richmond River. In addition, the new monitoring infrastructure funded under this arrangement will provide significant ongoing monitoring support for Stage 2 of the Strategy projects (pending funding). The specialised auto-sampler technology was successfully trialled by EES and Southern Cross University in early 2020.</p> <p>Relevant local councils within the Richmond River catchment continue to receive progress updates on the application of the Risk-based Framework in the Richmond River via the existing Richmond River Coastal Zone Management Plan Implementation/CMP Development Committee convened by Rous County Council.</p> <p>The Stage 1 project will continue to apply the Risk-based Framework in the Richmond River as an agricultural diffuse source water pollution pilot throughout Stage 2 of MEMS.</p> <p>Stage 2 will see employment of a Senior Project Officer for 12 months to continue development of a new Richmond catchment governance and funding framework and assist in the development of a coastal management program for the Richmond catchment in collaboration with key stakeholders. Both these focus areas of governance and CMP development will integrate the Risk-based Framework principles. Improving governance in the Richmond River catchment will streamline natural resource management investment for improved diffuse source water pollution outcomes and is a pilot project for improving ecosystem health at a catchment scale.</p> <p><i>Contact: Angus Ferguson and Ben Fitzgibbon – EES</i></p>

Management Action 1.2	Improve the management of diffuse source water pollution by: <ul style="list-style-type: none"> • clarifying NSW Government and local government roles and responsibilities • building capacity to implement the Risk-based Framework • using mechanisms within existing policy, planning and legislative frameworks to improve outcomes • improve minimum requirements for industry standards and ensure compliance with regulations and best practice through social research, education campaigns and compliance programs.
Spatial extent & key LGAs	Statewide
Project	Progress on deliverables <i>Deliverables listed below in bold are taken directly from the Strategy's implementation plan.</i>
1.2.1 <i>In progress</i>	Clarified governance arrangements for managing diffuse source water pollution, including arrangements at the state, regional and local government scale. See below update.
1.2.2 <i>In progress</i>	Reviewed the NSW Diffuse Source Water Pollution Strategy and recommended to government the changes needed to effectively manage diffuse source water pollution. During Stage 1 the current governance arrangements and approaches to managing diffuse source water pollution in NSW were reviewed. This work was undertaken to inform Stage 2 and initiate a process to improve the management of diffuse source water pollution in NSW through the Strategy. The anticipated outcomes of this work will include an articulation of a vision for diffuse source water pollution management in NSW, the design of management actions to improve current practices and the establishment of clear expectations and obligations for stakeholders involved in implementation. <i>Contact: Neil Gemmell - EES</i>
1.2.3 <i>Completed</i>	Strengthened provisions in the NSW planning system for achieving the NSW Water Quality and River Flow Objectives, through the Risk-based Framework. This is a statewide project aimed at strengthening provisions for water quality policy and the Risk-based Framework in various state and local planning instruments, and CMPs.

<p>Management Action 1.2</p>	<p>Improve the management of diffuse source water pollution by:</p> <ul style="list-style-type: none"> • clarifying NSW Government and local government roles and responsibilities • building capacity to implement the Risk-based Framework • using mechanisms within existing policy, planning and legislative frameworks to improve outcomes • improve minimum requirements for industry standards and ensure compliance with regulations and best practice through social research, education campaigns and compliance programs.
	<p>At the end of Stage 1, the NSW Water Objectives and Risk-based Framework has now been incorporated in the following:</p> <p>Regional Plans</p> <ul style="list-style-type: none"> • A metropolis of three cities • Illawarra-Shoalhaven regional plan. <p>District Plans</p> <ul style="list-style-type: none"> • Five Greater Sydney District Plans. <p>Land Use Infrastructure and Implementation Plans</p> <ul style="list-style-type: none"> • Greater Macarthur Growth Area • Wilton 2040. <p>Local Strategic Planning Statements</p> <ul style="list-style-type: none"> • Northern Beaches Local Strategic Planning Statement • Hornsby Local Strategic Planning Statement. <p>Coastal Management Programs</p> <ul style="list-style-type: none"> • The Risk-based Framework is identified as one tool under the Coastal Management Manual Toolkit for assessing the Coastal Environment Areas under the Coastal Management SEPP. • Applied in the draft Lake Illawarra CMP • Considered in the Port Stephens Council CMP scoping study <p>Key spatial datasets have been developed to support implementation of the Risk-based Framework. These include:</p>

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	<ul style="list-style-type: none"> • high ecological value waterways and water dependent ecosystems in Greater Sydney and all NSW coastal catchments • estuary health risk maps to inform scoping studies of CMPs. <p>Technical reports as evidence base for inclusion in plans, including Wilton and Greater Macarthur and CMPs, are currently being finalised and expected to be delivered by end June 2021.</p> <p>No further work is planned for this project with the exception of the work and outcomes of the pilot application of the Risk-based Framework in South Creek (1.1.1). Outcomes include the adoption of the Risk-based Framework, water quality objectives and contemporary stormwater management targets in Precinct Plans and Development Control Plans for the Aerotropolis.</p> <p><i>Contact: Jocelyn Dela-Cruz - EES</i></p>
<p>1.2.4 Phase 1 Completed Phase 2 In progress</p>	<p>Consulted with key stakeholders, including the stormwater industry, water utilities, peak urban development groups and local councils on their information needs to apply the Risk-based Framework and improve stormwater management in NSW (phase 1).</p> <p>Delivered key guidance material, tools and foundational datasets to support stakeholders and the community to implement the Risk-based Framework (phase 2).</p> <p>This is a statewide project to determine what data, information and other materials are needed by government and industry to implement the Risk-based Framework (phase 1), and deliver foundational materials using outcomes of pilots (phase 2).</p> <ul style="list-style-type: none"> • In the first phase of this action the NSW Government engaged stakeholders, including councils, to identify the tools required to support the implementation. Work on developing a toolkit and an online portal underway and

<p>Management Action 1.2</p>	<p>Improve the management of diffuse source water pollution by:</p> <ul style="list-style-type: none"> • clarifying NSW Government and local government roles and responsibilities • building capacity to implement the Risk-based Framework • using mechanisms within existing policy, planning and legislative frameworks to improve outcomes • improve minimum requirements for industry standards and ensure compliance with regulations and best practice through social research, education campaigns and compliance programs.
	<p>scheduled for release at end of June 2021. This work includes: Engagement of industry leaders to develop industry standard guidance/practice notes for each step of the Risk-based Framework</p> <ul style="list-style-type: none"> • Formation of an advisory committee to oversee the guidance/practice notes and ensure they are fit for use in the NSW Planning System, and informing needs for managing Coastal Environment Areas in Coastal Management Programs • Range of tools to support implementation of Risk-based Framework including: <ul style="list-style-type: none"> ○ flow chart/decision tree to align Risk-based Framework to NSW Planning system, CMP and other catchment planning processes ○ case studies on using the Risk-based Framework under varying urban land use development scenarios, including state significant developments (brings in outputs of pilots (1.1.1) from Stage 1) ○ tender and/or business case templates on applying the Risk-based Framework ○ webinar and fact sheets • Toolkit/website on Risk-based Framework to disseminate the guidance and tools • Development of an in-house and industry standard training program on how to use the guidance, tools and online portal for the Risk-based Framework. <p><i>Contact: Jocelyn Dela-Cruz - EES</i></p>
<p>1.2.5 <i>In progress</i></p>	<p>Reviewed the NSW Water Quality and River Flow Objectives for each catchment in coastal NSW to reflect contemporary values and expectations and, where appropriate, updated these objectives in consultation with the community.</p> <p>This is a statewide project aimed at updating the NSW Water Quality Objectives which were developed almost 20 years ago.</p>

Management Action 1.2	<p>Improve the management of diffuse source water pollution by:</p> <ul style="list-style-type: none"> • clarifying NSW Government and local government roles and responsibilities • building capacity to implement the Risk-based Framework • using mechanisms within existing policy, planning and legislative frameworks to improve outcomes • improve minimum requirements for industry standards and ensure compliance with regulations and best practice through social research, education campaigns and compliance programs.
	<p>The NSW Water Quality Objectives inform the first step of the Risk-based Framework and are an operational form of the state water quality policy. They consist of community environmental values and uses of the state's waterways, and indicators and numerical criteria.</p> <p>The update of the NSW Water Quality and River Flow Objectives has been rescoped due to the compounding impacts of the 2019/2020 bushfires and Covid-19. Current outputs for delivery at end June 2021 include:</p> <ul style="list-style-type: none"> • guidance/method on deriving community environmental values and uses, based on online and face to face community engagement • guidance/method on deriving Aboriginal cultural heritage values of the waterways • guidance/method on deriving regional and site-specific objectives for freshwater ecosystems • updated NSW Water Quality Objectives website. <p>Contact: Jocelyn Dela-Cruz - EES, Neil Gemmell - EES</p>
<p>1.2.7 (& 2.4.1) In progress</p>	<p>Investigated options to address the complex approvals process for coastal floodplain drainage works and prepared proposed changes to legislative framework.</p> <p>This project has been moved to Initiative 2 in Stage 2 of MEMS. Please see update below (2.4.1)</p> <p>Contact: Kylie Russell – DPI Fisheries</p>
<p>1.2.8 In progress</p>	<p>Filled knowledge gaps and identified constraints and opportunities of coastal floodplain land use, infrastructure and resilience to future risks in priority catchments.</p> <p>Improved knowledge of floodplain infrastructure, landscape risks (such as acid sulfate soils), tenure, landscape values and vulnerability to climate change impacts are vital to inform decision making across coastal floodplains. The UNSW WRL coastal floodplain study is filling many of these knowledge gaps and providing uniform landscape prioritisation information for seven large coastal floodplains across NSW (Tweed, Richmond, Clarence,</p>

Management Action 1.2	<p>Improve the management of diffuse source water pollution by:</p> <ul style="list-style-type: none"> • clarifying NSW Government and local government roles and responsibilities • building capacity to implement the Risk-based Framework • using mechanisms within existing policy, planning and legislative frameworks to improve outcomes • improve minimum requirements for industry standards and ensure compliance with regulations and best practice through social research, education campaigns and compliance programs.
	<p>Macleay, Hastings, Manning and Shoalhaven). Data analysis, prioritisation and report drafting is under way, with internal review to occur during October. The final draft reports are expected to be circulated to local councils and relevant industry later in 2020. This research can be used to inform local government decision making and will also inform regulatory review projects in 2.4.1.</p> <p>Contact: Kylie Russell – DPI Fisheries</p>
<p>1.2.9 In progress</p>	<p>Investigate opportunities for improved coastal vegetation community outcomes using private land and other conservation measures.</p> <p>Changes in the NSW planning system have increased the opportunity to use offset mechanisms to achieve triple bottom line outcomes. Provisions for critical state significant infrastructure and the offsetting scheme for terrestrial systems provided by the Biodiversity Conservation Act 2016 have been designed to meet this need. Refinement of the existing policy framework supported by the Fisheries Management Act 1994 for offsetting impacts to aquatic habitats is necessary to maintain or improve key fish habitats. The Offset Policy project scope has been refined, linkages with other Strategy projects determined and collaborations established with internal (DPI Fisheries) and discussions commenced with partners including EES, Biodiversity Conservation Trust, DPIE Crown Lands and DPIE Water. A draft document outlining DPI Fisheries offsetting policy has been circulated internally for review and will be circulated amongst other relevant agencies in late-2020 as a draft for review.</p> <p>A project investigating offset amounts for key fish habitats using several case studies is underway and outcomes are expected toward the end of 2020.</p> <p>Contact: Patrick Dwyer – DPI Fisheries</p>
<p>1.2.10 1.2.13</p>	<p>Increased the capacity, knowledge and minimum standards of the construction industry, including local councils, to achieve improved water quality outcomes.</p>

Management Action 1.2	<p>Improve the management of diffuse source water pollution by:</p> <ul style="list-style-type: none"> • clarifying NSW Government and local government roles and responsibilities • building capacity to implement the Risk-based Framework • using mechanisms within existing policy, planning and legislative frameworks to improve outcomes • improve minimum requirements for industry standards and ensure compliance with regulations and best practice through social research, education campaigns and compliance programs.
<i>In progress</i>	<p>1.2.10: Local councils play a key role in keeping waterways healthy. They oversee the construction, operation and maintenance of waterway structures like culverts and bridges and undertake works in and around waterways. Councils can make sure these structures and works are conducted in a ‘fish friendly’ way.</p> <p>DPI Fisheries is working with local councils to hold fish friendly workshops. The workshops look at ways councils can manage and build structures and undertake works in and around waterways that are friendly for fish and protect water quality. A pilot of this program is under way on the NSW North Coast during 2020-2021. The program aims to expand across NSW in Stage 2 of the Strategy implementation (pending funding).</p> <p>DPI Fisheries earlier delivered a Fish Friendly Workshop for Richmond Valley Council with over 35 participants, however more face-to-face workshops have been postponed due to Covid-19 restrictions.</p> <p><i>Fisheries Management Act</i> permit audits were completed in nine LGAs, with over 85 audits completed across North region. Audits are an essential part of this project as, in addition to determining whether councils are complying with DPI Fisheries permit conditions, they assist with the identification of components of councils’ works that require improvement, and these are then incorporated into targeted workshop delivery. Councils that expressed interest for workshops include Ballina, Kempsey, Nambucca, Tweed, Byron and Port Macquarie.</p> <p>A Fish Friendly Workshop resource kit and a series of videos on compliance under the <i>Fisheries Management Act</i> to be used within the Fish Friendly Council workshops will be released in late 2020.</p> <p><i>Contact:</i> Patrick Dwyer – DPI Fisheries</p> <p>1.2.13: This project focuses on developing model conditions for erosion and sediment control on construction sites approved under the local development pathway. The aim of the project is to develop a set of conditions that councils can implement to guide improving water quality in their local area.</p>

<p>Management Action 1.2</p>	<p>Improve the management of diffuse source water pollution by:</p> <ul style="list-style-type: none"> • clarifying NSW Government and local government roles and responsibilities • building capacity to implement the Risk-based Framework • using mechanisms within existing policy, planning and legislative frameworks to improve outcomes • improve minimum requirements for industry standards and ensure compliance with regulations and best practice through social research, education campaigns and compliance programs.
	<p>Soil Conservation Service have reviewed a sample of council conditions and developed a draft set of model conditions. A discussion paper will be circulated to interested councils to give them opportunity to comment on the draft conditions early in 2021.</p> <p><i>Contact: Phoebe Laing – DPIE - PA</i></p>
<p>1.2.11 1.2.12 <i>In progress</i></p>	<p>Work to better understand industry barriers to implement improved land use management practices and develop strategies and tools to address these barriers.</p> <p>This action forms part of the 'Clean Coastal Catchments' program.</p> <p>Stage 1 of this sub-action focused on the northern region of NSW, and is blueberry, greenhouse vegetable and macadamia nut industry specific.</p> <p>1.2.11: Review of the blueberry industry has shown the complexity of farming systems and the factors that influence fertiliser behaviours. On-ground irrigation assessments and the trial of Hort360 benchmarking surveys on blueberry farms, confirmed the inter-connectedness of on-farm behaviours and fertiliser management. To address behaviour change and reduce fertiliser exports from farming systems, a comprehensive framework and clear pathway to improved land use management needs to be in place that includes infrastructure (e.g. diffuse policy and industry accepted best management practice), people and culture.</p> <p>An upstream social marketing strategy has been successfully implemented with the formation of the Fertiliser Stewardship Group. The Group provides an outlet for the fertiliser supply chain to access evidence-based information to underpin advice given to farmers. The forum has highlighted knowledge gaps in nutrient management in both blueberry and macadamia industries informing future research projects.</p> <p><i>Contact: Sarah Dadd – DPI Agriculture</i></p> <p>1.2.12: The development of industry-focused education tools to address the impacts of land-use practices on the NSW marine estate is ongoing. Fertcare Accredited training for agronomists has been planned. An experienced</p>

Management Action 1.2	<p>Improve the management of diffuse source water pollution by:</p> <ul style="list-style-type: none"> • clarifying NSW Government and local government roles and responsibilities • building capacity to implement the Risk-based Framework • using mechanisms within existing policy, planning and legislative frameworks to improve outcomes • improve minimum requirements for industry standards and ensure compliance with regulations and best practice through social research, education campaigns and compliance programs.
	<p>RTO consultant is currently adapting course material successfully utilised in the grains sector to suit agronomists and advisors in the target industries.</p> <p>Councils are provided updates on these actions through the Blueberry Interagency Committee.</p> <p><i>Contact: Luke Jewell – DPI Agriculture</i></p>

Action 1.3	Facilitate and deliver on-ground activities that reduce diffuse source water pollution through investigation and provision of cost-effective funding programs and financial incentives.
Spatial extent & key LGAs	Location varies, refer to each project for details.
Sub-action	<p>Progress on deliverables</p> <p><i>Deliverables listed below in bold are taken directly from the Strategy's implementation plan.</i></p>
<p>1.3.1</p> <p><i>In progress</i></p>	<p>Research and monitoring programs for innovative new techniques in oyster reef restoration.</p> <p>DPI Fisheries has developed strategic research collaborations to help identify restoration methods specific to NSW. Collaborations include:</p> <ul style="list-style-type: none"> • Working with Southern Cross University regarding research on Leaf Oysters in northern NSW as a possible future subtidal native reef forming species. • Working with University of Newcastle using e-DNA to determine species using oyster reefs in Port Stephens. • Contributing to University of NSW's work on aspects of oyster reef restoration constraints, benefits and methodology.

Action 1.3	Facilitate and deliver on-ground activities that reduce diffuse source water pollution through investigation and provision of cost-effective funding programs and financial incentives.
	<ul style="list-style-type: none"> Assisting with research on novel substrates for creating oyster reefs with Macquarie University in numerous estuaries along the NSW coast. <p>Pre and post monitoring of the Port Stephens reef restoration sites also continues. Results to date are extremely promising with strong recruitment and growth of oysters on the placed rocks and increases in surrounding fish populations.</p> <p>Contact: Kylie Russell – DPI Fisheries, Victoria Cole (research lead) – DPI Fisheries</p>
<p>1.3.1 <i>In progress</i></p>	<p>Oyster reef restoration</p> <p>The first large scale oyster reef restoration project in NSW was completed in Port Stephens in March 2020, with one hectare of hard substrate deployed at two locations (Myall and Karuah River mouths), using 3,300T of rock and 180m³ of recycled oyster shell. Plans for phase 2 are underway. Monitoring is continuing but oyster settlement had begun within weeks of the rock being deployed. The International Conference on Shellfish Restoration in Nelson Bay was postponed due to Covid-19 and is now rescheduled for late April 2021. An interim free Shellfish Reef Webinar will be held on 27th October, open to any interested people. Works are progressing for mapping remnant reefs in priority estuaries (including citizen science opportunities), a guide for implementing oyster reef projects in NSW, policy development for managing the habitat type, planning for further works (regional and metro) and assisting with a range of collaborative research projects is progressing in many locations along the coast. Advice for councils to consider oyster reef restoration in CMPs was developed and is available on the marine estate website. More information about this project and regular updates on progress can be found here.</p> <p>Contact: Kylie Russell – DPI Fisheries</p>
<p>1.3.2 1.3.4 1.3.6 <i>In progress</i></p>	<p>On-ground works in priority locations that will result in water quality improvements over time.</p> <p>Local Land Services (LLS) in the North Coast (NC), Hunter (H) and South East (SE) regions are leading this project to reduce diffuse pollutants entering the marine estate by:</p> <ul style="list-style-type: none"> undertaking riparian revegetation, bush regeneration and stock control fencing to buffer against nutrient and sediment run-off. upgrading unsealed roads to reduce sediment loss into adjacent waterways. constructing instream erosion control works to stabilise vulnerable riverbanks.

Action 1.3	Facilitate and deliver on-ground activities that reduce diffuse source water pollution through investigation and provision of cost-effective funding programs and financial incentives.
	<p>For more information:</p> <ul style="list-style-type: none"> • Reducing water pollution fact sheet • Reducing water pollution – putting strategy into action <p>1.3.2 Riparian vegetation improvements & stock fencing</p> <p>The combined area of riparian native vegetation enhanced/rehabilitated in Stage 1 was over 257 hectares spread over 110 kilometres of riverbank. Over 300 ha of wetland was also protected by fencing.</p> <p>Planning for Stage 2 projects is underway. All LLS regions are re-engaging similar Local Governments in 2020-21 due to the short funding opportunity and to build on Stage 1 achievements. Additional maintenance and monitoring will ensure the long-term benefits of Stage 1 investments are realised.</p> <p>NC LLS: Riparian enhancement works have been undertaken at 32 sites, predominantly with macadamia farmers and Ballina Shire Council managed land along 35 kilometres of streamline / 61 hectares of riparian area within Emigrant Creek catchment.</p> <p>H LLS: H LLS, in partnership with MidCoast Council and Landcare Australia funding in Stage 1, worked in The Branch section of the Karuah River, Wallis Lake, Myall River, Wallamba River, Lansdowne River and the Manning estuary. During Stage 1 106ha of riparian vegetation was improved over 44km of riverbank, and 301 ha of wetland protected.</p> <p>SE LLS: In the South East achievements included almost 90 hectares of vegetation being protected and enhanced along 31 kilometres of stream length. Works were undertaken in partnership with private landholders, local government, national parks and local aboriginal land councils.</p> <p>Locations: MidCoast, Ballina, Bega Valley, Eurobodalla, Shoalhaven, Shellharbour, Kiama and Wollongong council areas.</p> <p>1.3.4 Bank protection</p> <p>The bank management strategy is being trialled in the North East region (see 2.3.3).</p>

<p>Action 1.3</p>	<p>Facilitate and deliver on-ground activities that reduce diffuse source water pollution through investigation and provision of cost-effective funding programs and financial incentives.</p>
	<p>NC LLS: Soil Conservation Service have constructed 1,690 metres of works in Stage 1. Works include an innovative mangrove embayment approach to erosion control. Works were undertaken on a priority reach within Emigrant Creek (in the Richmond River).</p> <p>H LLS: HLLS worked with MidCoast Council and the Soil Conservation Service to deliver protection to the Lansdowne and Wallamba riverbanks through 1,130 meters rock revetment, rock fillets and constructed rock flumes to manage eroding mitre drains between the road and river.</p> <p>SE LLS: In the South East on-ground works achieved 1,005 metres of bank protection using large woody debris, rock work, coir logs and sandbag protection structures. Works occurred in the Bega, Wagonga, Pambula, Wapengo, Tomaga and Shoalhaven Catchments.</p> <p>1.3.6 Road improvements</p> <p>NC LLS: NC LLS, via Ballina Shire Council, have completed a total of 15 sites resulting in approximately 9,340 metres of road surface sealed to reduce sediment input. The estimated road base material conserved and prevented from entering aquatic environments is well over 1000 tonnes per flood event. This work was done with Ballina Shire Council’s road management team under a grant agreement with NC LLS.</p> <p>H LLS: In partnership with MidCoast Council, Hunter LLS provided sealing of 4,880 metres of roadways in the Wallis Lake area and on The Branch Lane.</p> <p>SE LLS: In the South East, of the 23 contracted projects completed just under 4,000 metres of sealing, and dirt road upgrades. Projects occurred in partnership with NPWS, Bega Valley Shire Council, Eurobodalla Council and Shoalhaven Council.</p> <p><i>Contact: Shaun Morris – North Coast LLS, Shannon Brennon - South East LLS, Geoff Le Messurier – Hunter LLS</i></p>
<p>1.3.3 <i>In progress</i></p>	<p>On-farm improvements</p> <p>This action forms part of ‘Clean Coastal Catchments’</p> <p>Incentive grants have been provided to 50 macadamia farms in the Richmond region for the completion of integrated orchard management works to reduce soil and nutrient loss through erosion. Five incentive grants for</p>

Action 1.3	Facilitate and deliver on-ground activities that reduce diffuse source water pollution through investigation and provision of cost-effective funding programs and financial incentives.
	<p>blueberry farms around Coffs Harbour were successful and these farms have undertaken a range of on-farm works that will help to improve water, nutrient and erosion management.</p> <p>Further on-farm assessments and incentive grants will be offered to eligible Blueberry and greenhouse vegetable growers in Stage 2 for continued on-farm works, as well as expansion into livestock industries in the Far South Coast, that will help to improve water, nutrient and erosion management. This is being administered by Local Land Services.</p> <p>Contact: David Cordina – DPI Fisheries, Emmaline Froggatt – North Coast LLS, Shannon Brennon - South East LLS</p>
1.3.3 In progress	<p>Capacity building programs and education campaigns that help land managers reduce their impacts on water quality.</p> <p>This action forms part of the ‘Clean Coastal Catchments’ program.</p> <p>Farming technology trials on two blueberry demonstration farms has progressed and another is expected to be commissioned in Stage 2. The above sub-actions 1.2.11 and 1.2.12 feed into this. Councils may be provided with updates on these actions through the Blueberry Interagency Committee or other fora.</p> <p>Contact: David Cordina – DPI Fisheries, Luke Jewell – DPI Agriculture</p>
1.3.3 In progress	<p>Establish a research program that addresses knowledge gaps in nutrient use within intensive agriculture.</p> <p>This action forms part of ‘Clean Coastal Catchments’</p> <p>The Wollongbar Blueberry Nutrition Research Facility is progressing and is due to be commissioned by the end of the year to enable research trials to commence. Progress has slowed due to Covid-19 related restrictions for travel and site attendance, however a contingency plan has been enacted to see the construction of the facility to completion. Research evidence from these trials will inform fertiliser guidelines for Blueberry production. Soil amendment and erosion research to assess the efficacy of a range of erosion treatments to manage soil erosion is well under way and is expected to conclude next quarter.</p> <p>Contact: David Cordina – DPI Fisheries, Luke Jewell – DPI Agriculture</p>

Action 1.3	Facilitate and deliver on-ground activities that reduce diffuse source water pollution through investigation and provision of cost-effective funding programs and financial incentives.
<p>1.3.3 <i>In progress</i></p>	<p>Better understand movement of nutrient and sediment within and from intensive agriculture by establishing a monitoring program.</p> <p>This action forms part of the ‘Clean Coastal Catchments’ program.</p> <p>Water and nutrient monitoring networks are fully operational on five demonstration farms (three blueberry farms and two macadamia farms) and baseline data on the water and nutrient loss pathways in these systems is being collected. Vegetable greenhouse monitoring trial has been completed and a Southern Cross University report has been completed and published. Rainfall simulation trials have also been completed and a Southern Cross University report is being prepared.</p> <p>Contact: David Mitchell – DPI Fisheries</p>
<p>1.3.5 <i>In progress</i></p>	<p>Coastal Floodplain Wetland Rehabilitation works</p> <p>The focus for the Coastal Floodplain Wetland Rehabilitation project is to develop collaborative projects to reinstate more natural floodplain and wetland hydrology to improve water quality (by remediating sites that produce acid water and water with very low dissolved oxygen) entering estuaries and minimise other key threats and risks to the marine estate. A decision matrix and criteria were developed to ensure project sites and actions that address the most significant threats and risks to the marine estate, and are achievable, are prioritised.</p> <p>Work has been undertaken with Clarence Valley Council, North Coast Local Land Services and NPWS to develop and implement a collaborative NPWS/DPI Fisheries (MEMS) co-funded land purchase, from a willing seller, of a property adjacent to an existing national park. Private holdings within the same wetland as areas of reserved estate can limit the potential to reinstate more natural hydrology in the wetland to improve environmental values. Consequently, such purchases and funding of on-ground hydrologic restoration works can lead to permanent improvements in water quality and biodiversity. This project is working towards improving water quality in Sportsmans Creek – Clarence River estuary.</p> <p>Hydrologic restoration works were funded at Port Stephens Councils’ Tomago Wetlands within the Hunter Wetlands National Park (modelling and retrofitting an existing floodgate to enable tidal flushing) to improve water quality in Hunter River.</p>

Action 1.3	Facilitate and deliver on-ground activities that reduce diffuse source water pollution through investigation and provision of cost-effective funding programs and financial incentives.
	<p>Hydrodynamic modelling was funded at the Tuckean Nature Reserve (a collaborative council project with Rous County Council, Richmond Valley Council and Ballina Shire Council). Any remediation works at this site will reduce acid discharge and improve water quality in Richmond River.</p> <p>Collaborations have also been developed to progress projects with Shoalhaven City Council (modelling completed and planned on-ground works on the Crookhaven River) Tweed Shire Council (modelling and assessment works for a site that causes very poor water quality); A collaboration with TfNSW has seen preliminary investigations and planning completed to remediate a wetland in Bellingen Shire Council area. On-ground works are planned to be undertaken in MEMS Stage 2 at this site.</p> <p>Substantial contributions have been provided to an ongoing multi-agency and local council project to improve water quality in Clybucca Creek – Macleay River and the hydrology of the Clybucca coastal wetlands located in Kempsey Shire. Works completed include a detailed geotechnical assessment and plan development for on-ground works. Funding has been provided to co-fund the installation of 3 weirs at the site to create 285 Ha of semi-permanent open water wetland and reduce acid production from over 1000 Ha of TfNSW property.</p> <p>In association with North Coast Local Land Services and the Recreational Fishing Trust (DPI Fisheries Flagship Fish Habitat Grants), the Action is co-funding a remediation options report for the East Kinchella Swamp, also located in the Kempsey Shire. Remediation of this site would improve the water quality in Kinchella Creek and Macleay River.</p> <p>A site assessment study has been funded on a TfNSW property on the Manning Floodplain in association with Mid Coast Council to assist with wetland rehabilitation planning for the site to improve water quality in Lansdowne River.</p> <p>The project continues to collaborate with an interagency group to work towards implementation of remediation options for Woodberry Swamp in association with Maitland Council,</p> <p>A promising project with Coffs Harbour City Council has been placed on hold until further notice. <i>Contact: Patrick Dwyer - DPI Fisheries, Max Osborne – DPI Fisheries</i></p>

Action 1.4	Implement a targeted marine litter campaign and establish a Marine Litter Working Group.
Spatial extent & key LGAs	Statewide
Sub-action	Progress on deliverables <i>Deliverables listed below in bold are taken directly from the Strategy's implementation plan.</i>
1.4.1 <i>In progress</i>	<p>A targeted marine litter campaign across NSW, supported by targeted campaigns in local litter hotspots. Campaign materials are publicly available to support community and local government action research and information on the effects of marine debris, to inform the development of priority actions for reducing marine litter.</p> <p>Leveraging off the existing Don't be a Tosser campaign, the campaign will educate the community on the effects of marine debris, and NSW Litter Program grants will align with the marine campaign to provide resources for practical on-ground litter prevention projects.</p> <p>The marine litter campaign will be delivered across three main components, which will work together to create a strong campaign message.</p> <ul style="list-style-type: none"> • Visual social media campaign that explains how litter impacts marine life. • Immersive community engagement experiences that show how litter affects the marine environment. • A public relations campaign that educates the community about the impacts of litter on the health of our marine environment. This will include working with experts and key social influencers. <p>This campaign was set to start in May 2020. Because of Covid-19, the timeline will be revised, with a new launch plan in November 2020.</p> <p>The NSW Litter Program will work with relevant local councils to identify media and other opportunities to promote campaign messages into their communities. The campaign materials are publicly available in the online Litter Library.</p> <p>Community litter grants and cigarette butt litter grants have recently closed. Successful litter grantees will be announced in September 2020. Funded programs can align local projects with the upcoming marine litter campaign where appropriate.</p>

<p>Action 1.4</p>	<p>Implement a targeted marine litter campaign and establish a Marine Litter Working Group.</p>
	<p><i>Contact: Rupert Saville – EES</i></p>
<p>1.4.2 <i>In progress</i></p>	<p>Research that has identified marine litter priorities and informed the development of marine litter campaigns that raise awareness of the impact of litter on the marine estate and change behaviours.</p> <p>The Marine Debris (Marine Litter) Working Group has been established since 2019. The group is composed of agency representatives from DPI, DPIE, NPWS and Taronga Conservation Society, as well as academic and industry experts from various marine debris related fields. Currently, the main objective of the working group is to oversee the application of a marine debris specific threat and risk assessment (assessment), statewide for NSW. It is in its third and final stage.</p> <p>The assessment will be the primary output of the working group to date. The results will be, publicly available, reported to stakeholders and will include a priority ranking of marine debris items. The assessment will be available for use by all stakeholders and levels of government to maximise the benefits of management actions that address the threats imposed by marine debris. The prioritisation will use the results of the assessment to rank types of marine debris by their potential harm to wildlife populations, ecosystems or biodiversity, environmental assets, social, cultural or economic values.</p> <p>The results will propose priorities for management intervention to address the greatest threats identified. This will enable government, at all levels, to identify and target policy and management responses.</p> <p>The threat and risk assessment will be completed in late 2020, after some earlier delays in the formation of the working group. It will direct Stage 2 of the Marine Litter Working Group’s work, which will look to mediate impacts from debris items found to be the greatest threats, under a proposed grants program. Councils will play an important role in the next stage when addressing the threats, which occur at statewide, regional and local scales (i.e. in council areas). The NSW Government will invite additional collaboration with a variety of additional stakeholders in Stage 2 to enable the most effective remediation of the priority threats identified at all scales.</p> <p><i>Contact: Edwina Foulsham – EES</i></p>

Action 1.5	Develop monitoring, reporting and performance indicators for water quality actions, and incorporate them and key knowledge gaps. This action is integrated into the Monitoring Program
Spatial extent & key LGAs	Statewide
Sub-action	Progress on deliverables <i>Deliverables listed below in bold are taken directly from the Strategy's implementation plan.</i>
1.5.1 <i>In progress</i>	<p>Developed indicators for monitoring water quality and ecosystem health.</p> <p>Commenced reporting on water quality and estuary health results is occurring using a report card system.</p> <p>As part of the Strategy EES are continuing statewide water quality monitoring in estuaries, building on statewide monitoring programs that have been underway since 2007. The methods for sampling and analysis of data are already documented in a technical report on the EES website.</p> <p>The monitoring program includes a core set of statewide indicators designed to assess aquatic ecosystem health. The monitoring program targets around 55 estuaries per year, meaning over a 3 year period around 160-170 of the state's 184 estuaries are sampled. The program is designed to assess water quality at a scale reflecting overall condition of an estuary, incorporating the cumulative impact from pressures, and the cumulative benefit from management actions and improvements. EES is working collaboratively with local government to increase the spatial and temporal scale of the monitoring where required, and to include additional indicators to assess locally specific issues. Successful collaborations exist with Mid Coast Council, Central Coast Council, Northern Beaches Council and Lake Macquarie City Council. As part of Stage 2, EES will be working closely with a number of additional councils to develop their own monitoring programs, which use the statewide program and core indicators as a foundation.</p> <p>Data from the monitoring program has been used to develop NSW specific guideline values for water quality indicators based on estuary type, following the principles outlined in the National Water Quality Management Framework. The guideline values provide a benchmark to compare observed data, highlighting systems with poor water quality where community values are not being met which may require further research and management intervention.</p> <p>The data generated supports the implementation of the Risk-based Framework (see action 1.1) by assessing the status of key community values are being met, and enabling monitoring to show whether management actions are</p>

<p>Action 1.5</p>	<p>Develop monitoring, reporting and performance indicators for water quality actions, and incorporate them and key knowledge gaps. This action is integrated into the Monitoring Program</p>
	<p>protecting community values. The data is used in the calculation of report card grades that easily communicate information on aquatic ecosystem health to assist communities to understand the condition of their estuaries.</p> <p>EES are supporting South East LLS to enhance relevant actions in the Strategy (See Action 1.3.2). EES have been carrying out monitoring to determine the effectiveness of on-ground works and management actions aimed at improving water quality in the Tilba Tilba Lake region in Eurobodalla Shire local government area. Monitoring methods and indicators are being developed that are appropriate for community application. These will help communities to assess the impacts and benefits from restoration works such as riparian fencing and revegetation. A series of capacity building documents are being developed so other land managers, community groups and landholders can assess the benefits of improved land management practices.</p> <p>In Stage 2, additional indicators will be tested and developed, to address key knowledge gaps and to assess other community values. These indicators include long term effects of low pH, microbial source tracking, development of a safe seafood metric, estuary fish assemblages and biodiversity, grazing pressure and faecal contamination impacting recreational water quality</p> <p>All the information, including report card grades, will soon be available as an update to the Estuaries pages on the EES website. The Estuaries pages are being developed as an interactive platform that links the website with the data. The data from the monitoring program can also be found on the Sharing and Enabling Environmental Data portal (SEED).</p> <p>Contact: Peter Scanes - EES, Aaron Wright - EES</p>
<p>1.5.1 <i>In progress</i></p>	

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

Taking action to improve the management of foreshore and waterway structures to protect the marine environment. Read more here: <https://www.marine.nsw.gov.au/strategy-implementation/putting-strategy-into-action/delivering-healthy-coastal-habitats-with-sustainable-use-and-development>

Initiative Lead:

Marcus Riches (DPI – Fisheries) – marcus.riches@dpi.nsw.gov.au

Action 2.1	Assess and manage cumulative and legacy impacts for estuary entrance modification and dredging
Spatial extent & key LGAs	Statewide
Sub-action	Progress on deliverables <i>Deliverables listed below in bold are taken directly from the Strategy’s implementation plan.</i>
2.1.2 <i>In progress</i>	<p>Conceptual work method statements for practical design features that can be incorporated into maintenance and upgrade works at existing training walls to maximise aquatic habitat and recreational values.</p> <p>Breakwaters and training walls are large pieces of coastal infrastructure that fix the position of river entrances or create sheltered harbours. By reducing wave action, directing river flows and sand movement some breakwaters cause other unintended or undesirable impacts. Yet, many breakwaters are important places for residents and visitors. This project gathers information to demonstrate some of those impacts with a literature review that is in late draft stage.</p> <p>The project also contributes to addressing these impacts with development of guidelines highlighting ways for breakwater owners to maximise the benefits from breakwaters and minimise the impacts. An audit of existing breakwater features to determine sites where multi-use and eco features have been incorporated is largely complete. The audit found the diversity of structures and their site-specific nature limited the opportunity to develop standard drawings. Instead, draft guidance notes for breakwater maintenance project managers have</p>

Action 2.1	Assess and manage cumulative and legacy impacts for estuary entrance modification and dredging
	<p>been prepared and refined at an expert workshop held in Ballina in March 2020. The majority of breakwaters are owned and managed by the NSW Government. Liaison has occurred with some local councils that own and manage breakwater structures. The final audit report and guidelines will be complete by late-2020.</p> <p>Contact: Patrick Dwyer – DPI Fisheries</p>
2.1.3 <i>In progress</i>	<p>An audit of commercial dredging activities undertaken on Crown land within estuaries and on ocean beaches.</p> <p>A Crown land audit of commercial dredging and extraction approvals has been largely completed. Recommendations arising from the audit to contemporise DPIE Crown Lands' processes for issuing and managing commercial dredging and extraction licences will be developed and report finalised. The following councils are affected by this work (i.e. that have a Crown lands commercial dredging authorisation) are: (north - south) Tweed; Lismore; Richmond Valley; Clarence Valley; Coffs Harbour; Bellingen; Nambucca; Kempsey; Port Stephens; Lake Macquarie; Central Coast; Hawkesbury; Shoalhaven; Bega Valley.</p> <p>Contact: Catherine Knight – DPIE Crown Lands</p>

*Note sub-action 2.1.1 was not funded under the strategy and work has not progressed in Stage 1.

Action 2.2	Assess and manage cumulative and legacy impacts on foreshore development and land use change in the coastal zone.
Spatial extent & key LGAs	Statewide
Sub-action	Progress on deliverables <i>Deliverables listed below in bold are taken directly from the Strategy's implementation plan.</i>
2.2.1 2.2.2 <i>In progress</i>	<p>An update to the Coastal Design Guidelines for NSW (2003) to illustrate how an urban design approach can inform development designs and layouts that are more sensitive to the unique natural and urban characteristics of coastal places in NSW, and to guide decision-making about legacy infrastructure in coastal areas.</p> <p>This project involves an update to the Coastal Design Guidelines for NSW, which will include a consideration of issues arising from legacy infrastructure in coastal areas. The Guidelines apply statewide.</p>

Action 2.2	Assess and manage cumulative and legacy impacts on foreshore development and land use change in the coastal zone.
	<p>A review of the 2003 NSW Coastal Design Guidelines has now been completed, which included undertaking a gap analysis based on the current legislative framework and best practice in urban design. This review is being used to inform the updated Guidelines. An early draft of these Guidelines was completed in mid-2020.</p> <p>Local council play a significant role in the implementation of the Guidelines, including use in both proposal design and assessment. Initial comments were sought from all councils in the NSW Coastal zone in late 2019 and further conversations with councils strategic planning departments have informed the update. Further comment will be sought through the public exhibition process expected in early 2021.</p> <p>Contact: Phoebe Laing – DPIE PA</p>

Action 2.3	Develop and implement a statewide policy for the management of coastal Crown lands (including submerged lands) in collaboration with local government Coastal Management Programs in priority areas.
Spatial extent & key LGAs	Richmond River, Clarence River, Hastings River, Macleay River, Tweed River and the North Coast
Sub-action	Progress on deliverables <i>Deliverables listed below in bold are taken directly from the Strategy's implementation plan.</i>
2.3.0 <i>In progress</i>	<p>A statewide policy for the management of coastal Crown lands (including submerged lands).</p> <p>A draft policy and guidelines have been developed in consultation with marine estate agencies. This policy aligns the management of Crown land with the NSW coastal management framework.</p> <p>Contact: Catherine Knight – DPIE Crown Lands</p>
2.3.1 <i>In progress</i>	<p>Decisions made in accordance with the Coastal Management Program and planning framework to improved coordination in assessment and compliance.</p> <p>Estuary-wide foreshore management strategies that reduce red tape for proposals consistent with the strategies.</p> <p>Developing estuary wide Domestic Foreshore Structure Strategies will guide and streamline future applications for domestic developments along foreshores (such as pontoons and boat ramps) within estuaries throughout NSW.</p>

<p>Action 2.3</p>	<p>Develop and implement a statewide policy for the management of coastal Crown lands (including submerged lands) in collaboration with local government Coastal Management Programs in priority areas.</p>
	<p>Currently, domestic foreshore structure proposals are assessed on an ad-hoc basis. Foreshore Structure Strategies amalgamate all existing legislation, policy and guidelines associated with the current ad-hoc assessment of domestic foreshore structures to form a strategic, upfront method of determining whether domestic foreshore structures would be permitted along the foreshore of the estuary.</p> <p>The development of Domestic Foreshore Structure Strategies are being undertaken by DPI Fisheries in partnership with an Interagency Working Group consisting of DPIE Crown Lands, EES, NRAR, TfNSW, and DPIE PA. Domestic Foreshore Structure Strategies will utilise a robust, repeatable and defensible mapping process to assess the entire foreshore of an estuary against the relevant policy and legislation of the partner state agencies. The foreshore will be colour coded red, amber or green which will clearly show proponents and assessment agencies where domestic foreshore structures comply with and may and would not be allowed, respectively.</p> <p>Two pilot Domestic Foreshore Structure Strategies are currently being developed for the Richmond River estuary within the Ballina Shire Council, Lismore City Council and Richmond Valley Council and the Brunswick River estuary within the Byron Shire Council. Both of these strategies will consist of an online interactive map and a companion booklet.</p> <p>The pilot strategies for Richmond River and Brunswick River are on track for endorsement by the Interagency Working Group by October 2020. Discussions with Councils on referencing Domestic Foreshore Structure Strategies in their CMPs, and other relevant planning policy is ongoing. The pilot strategies are going to inform the methodology and development of additional Domestic Foreshore Structure Strategies in southern estuaries including, Lake Illawarra, Minnamurra River, Werri Lagoon, Shoalhaven/Crookhaven River, Currumbene Creek, St. Georges Basin, Lake Conjola, Narrawallee Creek, Burrill Lake and Clyde River.</p> <p>This project had experienced some delays due to unanticipated mapping issues associated with new software and capabilities of mapping layers. This issue has since been resolved and is hoped that new processes will recover some of this time and expedite the methodology. Some limitations were associated with Covid-19 which have been factored into the anticipated delivery time of future strategies.</p> <p><i>Contact: Patrick Dwyer - DPI Fisheries, Emma Wilkie - DPI Fisheries,</i></p>
<p>2.3.2</p>	<p>Estuary-specific intertidal marine vegetation management strategies aim to improve management of the threats and risks that are: cumulative, take some time to become evident, and are remote from the activity. The</p>

<p>Action 2.3</p>	<p>Develop and implement a statewide policy for the management of coastal Crown lands (including submerged lands) in collaboration with local government Coastal Management Programs in priority areas.</p>
<p><i>In progress</i></p>	<p>strategies will direct management plans to maximise resilience, address key threats and facilitate rehabilitation opportunities.</p> <p>Intertidal marine vegetation (mangroves and saltmarsh), known as macrophytes, provide many valuable services that contribute to community wellbeing in the coastal zone and beyond. These systems are important for fisheries production, foreshore protection, biodiversity values and carbon sequestration. They also provide cultural and social values. Yet many of these systems are degraded due to current and legacy anthropogenic impacts. Furthermore, because of their location in the intertidal macrophytes and the services they provide are vulnerable to sea level rise impacts.</p> <p>A spatial modelling methodology has been developed to model macrophyte potential now and in the future. The model was initially applied to the Richmond and the Tweed estuaries to inform planning and management decisions, via marine vegetation strategies, to maximise the values these systems provide. The methodology uses GIS to identify macrophyte potential in estuaries based on:</p> <ol style="list-style-type: none"> 1. geomorphic condition in landscape 2. anthropogenic impacts we have on these areas 3. maps indicating the vulnerability of tidal wetlands to sea level rise (Strategy sub-action 3.1.1). <p>Estuary specific models for the Richmond and Tweed estuaries were completed in mid-2020, together with a 200m grid overlay providing natural resource managers with a quick overview/summary of the area i.e. the current and historic distribution of macrophytes, summary of the geomorphic condition, summary of the anthropogenic exposure, likelihood of future macrophytes under two scenarios of sea-level rise, land ownership and the proximity to the reserved estate. These spatially explicit models will inform further consultation with Tweed Shire Council and the relevant councils in the Richmond River estuary, to be undertaken in by the end of 2020, to enable completion of marine vegetation strategies for those estuaries. Draft method and strategy documents are near completion (late 2020) for discussion with local councils.</p> <p>Local councils provided key GIS layers to inform some of the anthropogenic impacts have been incorporated into the estuary specific models.</p> <p>These model outputs including other outputs such as the proximity of marine vegetation to existing reserved estate areas and potential sites for the most effective intertidal macrophyte offsets.</p>

<p>Action 2.3</p>	<p>Develop and implement a statewide policy for the management of coastal Crown lands (including submerged lands) in collaboration with local government Coastal Management Programs in priority areas.</p>
	<p>A collaboration with the University of Wollongong to undertake a first pass assessment of blue carbon storage, preservation, generation and permanency for NSW is due for completion by the end of 2020.</p> <p>There is an ongoing collaboration with the Queensland Herbarium to undertake genetic analysis of grey mangroves exhibiting clonal features. The investigation will identify if genetic clones establish from ramet individuals (physiological distinct organism that is part of a group of genetically identical individuals derived from one progenitor i.e. a group of trees that have sprouted from one single parent plant). Remnant growth and reproduction habitat for grey mangroves has not been considered and it may influence management decisions, particularly for intertidal systems that migrate with sea level rise and mangrove sequestration of carbon.</p> <p>Stage 2 focuses on estuaries on the NSW south coast (Coalcliff to Broulee), with this stretch of coastline chosen as a priority based on some of the key threats on intertidal marine vegetation. The geomorphic modelling for these south coast estuaries was completed in mid-2020. Currently, anthropogenic exposure data is being collated from data archives held within local councils, government agencies and satellite records. The anthropogenic exposure modelling will likely be completed by the end of 2020.</p> <p><i>Contact: Patrick Dwyer – DPI Fisheries, Emma Asbridge – DPI Fisheries</i></p>
<p>2.3.3 <i>In progress</i></p>	<p>Three bank management strategies that reduce red tape for proposals and prioritise environmentally friendly approaches.</p> <p>Developing estuary wide Bank Management Strategies will reduce red tape and prioritise environmentally friendly approaches to foreshore bank management proposals within estuaries throughout NSW.</p> <p>The development of Bank Management Strategies will be undertaken by DPI Fisheries in partnership with an Interagency Working Group consisting of DPIE Crown Lands, EES, NRAR, TfNSW, and DPIE PA.</p> <p>Development of Bank Management Strategies will incorporate an investigation into causes and types of estuarine bank erosion and a review of existing best management practice bank treatment options. It will then match common types of erosion with preferred best management practice treatment methodologies, with the outcome of this step being the creation of a decision support tool.</p> <p>The decision support tool will be a robust, repeatable and defensible tool which will be applied to the relevant estuary to create a Bank Management Strategy. The resulting Bank Management Strategy, which will consist of</p>

Action 2.3	Develop and implement a statewide policy for the management of coastal Crown lands (including submerged lands) in collaboration with local government Coastal Management Programs in priority areas.
	<p>online mapping and an explanatory companion document, will provide a strategic, upfront guide that specifies the best practice erosion control treatment method for a particular segment of foreshore within the estuary. This Bank Management Strategy can be used by land owners proposing erosion control treatment works and assessing agencies to determine the most environmentally friendly erosion control treatment approach.</p> <p>Pilot Bank Management Strategies are currently being developed for the Tweed and Brunswick River estuaries within the Tweed and Byron Shire Council LGAs respectively. Quality assurance and control testing of the decision support tool was undertaken by DPI Fisheries, the Interagency Working Group, Councils, and some key stakeholder agencies via desktop and field trials. DPI Fisheries is currently considering options to undertake further testing of the decision support tool using external consultants and peer review. This testing will encompass southern estuaries, and a range of estuarine types such as ICOLLS, trained entrances and drowned river valleys for example. It is anticipated that the decision support tool, and pilot strategies will be ready for endorsement by the Interagency Working Group early 2021.</p> <p>Upon completion of the pilot Bank Management Strategies additional strategies are planned to be developed for southern estuaries relevant councils and the Interagency Working Group will be informed of these locations while discussions with Councils on reference to the Bank Management Strategies in their CMPs, or other relevant policies is ongoing.</p> <p>Contact: Patrick Dwyer - DPI Fisheries, Emma Wilkie - DPI Fisheries, - DPI Fisheries</p>

Action 2.4	Re-establish resilient coastal floodplains and connectivity within coastal catchments.
Spatial extent & key LGAs	Statewide focus; Richmond & North Coast, Singleton.
Sub-action	<p>Progress on deliverables</p> <p><i>Deliverables listed below in bold are taken directly from the Strategy's implementation plan.</i></p>

Action 2.4	Re-establish resilient coastal floodplains and connectivity within coastal catchments.
<p>2.4.1 <i>(see also 1.2.7)</i> <i>In progress</i></p>	<p>A collaborative, multi-agency approach to coastal and floodplain management that investigates options to address the complex approvals process and provides for improved economic, social and environmental resilience across these landscapes.</p> <p>The interagency working group is meeting regularly and considering a variety of options to reduce the complexity of coastal floodplain infrastructure management, balanced with improved water quality outcomes, through regulatory change. This is a statewide internal government process considering a range of works approval path scenarios, with variables such as land tenure, infrastructure ownership, project proponent, zoning (such as Coastal SEPP) and landscape/water quality risk. Agencies involved in the project include DPIE Water, DPIE Crown Lands, DPIE PA, DPI Fisheries, NRAR and EES (EPA, Biodiversity Conservation).</p> <p>A consultation process has recently begun with key Local Government stakeholders regarding their concerns, experiences and ideas for solutions in the regulation of coastal floodplain works. This process is expected to be completed in November 2020 and results considered by agencies in their options analysis for recommended changes. Key floodplain industry stakeholders will also be consulted with in coming months.</p> <p>The group is also facilitating collaborative work and ease of interagency communication and input into a range of other projects occurring under Initiative 2, such as the foreshore structure, marine vegetation and bank management strategies and updated coastal design guidelines.</p> <p><i>Contact: Kylie Russell – DPI Fisheries</i></p>
<p>2.4.2 <i>In progress</i></p>	<p>Fish passage works planned or completed at priority barriers in coastal rivers.</p> <p>DPI Fisheries is currently undertaking remediation of two high priority coastal fish passage obstructions. These are on track for delivery by the end of 2020 calendar year and early 2021 respectively.</p> <p>Works are at detailed design stage for the design and construction of a fishway at Jerrys Plains Weir on the Hunter River in partnership with AGL Macquarie. A prefabricated rock ramp fishway is the preferred design. A second site on the Richmond River known as Cookes Weir, upstream of Casino, is scheduled for removal in early 2021 after completing environment assessments and stakeholder consultation. This structure can be removed as it no longer serves its original water holding function. An online article will be developed for the Jerrys Plains site and will be located on the marine estate website.</p>

Action 2.4	Re-establish resilient coastal floodplains and connectivity within coastal catchments.
	<p>As part of Stage 2, priority sites are continuing to be investigated and progressed in the Kyogle, Lismore City, Clarence Valley, Mid Coast, Singleton, Liverpool City, and Eurobodalla Shire. An overview of this will be available on the 're-connecting fish habitats' webpage.</p> <p>We encourage contact from councils if road crossings or weirs are being investigated for upgrade/replacement to determine if they correspond to identified priority sites.</p> <p><i>Contact: Scott Nichols – DPI Fisheries, Dr Matthew Gordos – DPI Fisheries</i></p>

Action 2.5	Undertake research and monitoring to address key knowledge gaps, such as techniques to minimise the impact of trained estuary entrances and methods for determining marine vegetation resilience and assess the effectiveness of the management actions within this initiative. This action will be integrated into the Monitoring Program.
Spatial extent & key LGAs	Statewide
Sub-action	Progress on deliverables <i>Deliverables listed below in bold are taken directly from the Strategy's implementation plan.</i>
2.5.1 <i>In progress</i>	<p>Statewide assessment of stability and fragmentation of estuarine vegetation over time.</p> <p>Since the beginning of Stage 1, maps of estuarine vegetation (seagrasses, mangroves, saltmarshes) have been completed for the following estuaries (north to south): Richmond River, Wallis Lake, Brisbane Water, Pittwater, Port Jackson, Botany Bay, Georges River, Lake Illawarra, Minnamurra River, Jervis Bay, Lake Conjola, Burrill Lake, Wagonga Inlet.</p> <p>Preliminary habitat maps have been prepared for St. Georges Basin, Bermagui River, Hastings River, Manning River and are pending field validation (delayed due to Covid-19 travel restrictions).</p> <p>The most recent habitat maps for each estuary are available on the Fisheries NSW Spatial Data Portal.</p> <p>Estimates of habitat fragmentation will be develop for the above estuaries in Stage 2 and will be made available together with summaries of change in habitat areas over time.</p>

Action 2.5	Undertake research and monitoring to address key knowledge gaps, such as techniques to minimise the impact of trained estuary entrances and methods for determining marine vegetation resilience and assess the effectiveness of the management actions within this initiative. This action will be integrated into the Monitoring Program.
	<i>Contact: Tim Glasby – DPI Fisheries</i>
2.5.2 <i>In progress</i>	<p>New methods for assessing condition of vegetation using remote sensing.</p> <p>Methods for estimating condition of mangroves are being trialled in Port Stephens using multispectral satellite and drone imagery. Methods for discriminating different species of saltmarsh and mangrove plants are also being developed.</p> <p><i>Contact: Tim Glasby – DPI Fisheries</i></p>
2.5.3 <i>In progress</i>	<p>Maps of pressures on estuarine habitats.</p> <p>A method for mapping artificial structures in estuaries (pontoons and jetties) is being developed. One map is available for Pittwater which can be made available on request. Once maps are available for other estuaries they will be uploaded to the Fisheries NSW Spatial Data Portal. The extent of damage to mangroves and saltmarshes from the 2019/2020 bush fires is currently being prepared for all affected estuaries. The fire-affected south coast estuaries are: Berrara Creek, Narrawallee Inlet, Burrill Lake, Tabourie Lake, Durras Lake, Clyde River, Tomaga River, Candlagan Creek, Twofold Bay and Wonboyn Lake. North coast estuaries include: Wallis Lake, Khappinghat Creek, Manning River, Camden Haven, Lake Innes and Lake Cathie.</p> <p><i>Contact: Tim Glasby – DPI Fisheries</i></p>

Initiative 3: Planning for climate change

Understand, adapt and increase resilience, to help mitigate the impacts of climate change on the NSW marine estate. Taking action to identify marine environments and species at threat from climate change. Read more here: <https://www.marine.nsw.gov.au/strategy-implementation/putting-strategy-into-action/planning-for-climate-change>

Initiative Lead:

Melinda Coleman (DPI Fisheries) – Melinda.coleman@dpi.nsw.gov.au

Due to funding constraints in Stage 1, the investment in climate change was substantially limited to research and monitoring (actions 3.1 and 3.5 only).

Action 3.1	Enhance mapping of estuarine communities (such as saltmarsh and mangroves) to identify those communities most at threat from sea level rise expected under climate change scenarios and use this information to model areas of land suitable for retreat and those that should be prioritised for protection. Apply this information in decision making.
Spatial extent & key LGAs	Statewide
Sub-action	Progress on deliverables <i>Deliverables listed below in bold are taken directly from the Strategy's implementation plan.</i>
3.1.1 <i>In progress</i>	Maps indicating the vulnerability of tidal wetlands to sea level rise. Action 3.1 is focused on predictive modelling based on mapping from action 2.5. First pass predictive modelling has been tested in eight estuaries; Manning River, Wallis Lake, Hawkesbury River, Tilba Lake, Tweed River, Lake Macquarie, Port Hacking and Lake Conjola. Predictive maps of future wetland distribution have been completed for all estuaries with significant wetlands north of the Manning River and are being generated for estuaries between the Manning River and Sydney for completion mid-2020. Stage 2 will see the completion of the above work. This work will be shared with councils via an online spatial data package through SEED.

Action 3.1	Enhance mapping of estuarine communities (such as saltmarsh and mangroves) to identify those communities most at threat from sea level rise expected under climate change scenarios and use this information to model areas of land suitable for retreat and those that should be prioritised for protection. Apply this information in decision making.
	<p>The following resources have been used to inform this work:</p> <ul style="list-style-type: none"> • NSW Estuary Tidal Inundation Exposure Assessment Report • A Regional Scale Approach to Assessing Current and Potential Future Exposure to Tidal Inundation in Different Types of Estuaries • Mapping the habitats of NSW estuaries <p>Contact: Tim Glasby – DPI Fisheries, Michael Hughes – EES</p>
3.1.1 <i>In progress</i>	<p>Method for prioritising sites for potential future protection.</p> <p>This project is using data on previous losses of intertidal wetland habitat and predicted future losses due to sea level rise. As such, it will be progressed when results of the first pass assessment described above are available for all NSW estuaries. This project will be integrated with Action 2.3.2 (marine vegetation management strategies).</p> <p>Contact: Tim Glasby – DPI Fisheries</p>

Action 3.5	Research and monitor the effects of climate change on the marine estate to fill knowledge gaps and inform future management actions, focusing on marine biodiversity and coastal communities. This action will be integrated into the Marine Integrated Monitoring Program.
Spatial extent & key LGAs	Statewide
Sub-action	<p>Progress on deliverables</p> <p><i>Deliverables listed below in bold are taken directly from the Strategy's implementation plan.</i></p>
3.5.1 <i>In progress</i>	<p>Research and monitoring programs to fill knowledge gaps and assess the condition of key habitats within the marine estate.</p>

Action 3.5	Research and monitor the effects of climate change on the marine estate to fill knowledge gaps and inform future management actions, focusing on marine biodiversity and coastal communities. This action will be integrated into the Marine Integrated Monitoring Program.
	<p>Subtidal monitoring of key marine habitats has been completed for the entire state, with baseline data secured in 2019 at six locations; Cape Byron, Coffs Harbour, Port Stephens, Sydney, Batemans Bay and Eden. A presentation on the results of the 2019 statewide baseline was given at the 2019 NSW Coastal Conference. In 2020, ongoing monitoring was conducted at the same six locations. Additionally, knowledge gaps have been filled about the role that upwellings, at Cape Byron and Smokey Cape, play in driving local marine habitat distributions. Two peer reviewed scientific papers are publicly available:</p> <ul style="list-style-type: none"> • Environmental drivers and indicators of change in habitat and fish assemblages within a climate change hotspot • Costs and benefits of towed videos and remotely operated vehicles for sampling shallow reef habitats and fish <p>This is the first two years of a ten-year monitoring program. Long term data is required to robustly detect change. Various smaller projects are under way to fill priority knowledge gaps relating to climate change. Any data will be communicated and published once research is complete. Much of this will feed into the Marine Integrated Monitoring Program, and the other sub-actions within Initiative 3 when funded.</p> <p><i>Contact: Melinda Coleman – DPI Fisheries</i></p>

Appendix A. Strategy and CMP integration contacts

