National Environmental Science Program

National Environmental Science Program (NESP)

Marine and Coastal Hub Annual Progress Report
1 January to 31 December 2023

Version	Date of issue	Author	Comments
1.1	April 4	Alan Jordan, Damien Burrows	Submitted for assessment on April 5, 2024
1.2	April 4	Tim Moltmann	
1.3	April 5	Alan Jordan, Damien Burrows	Version for submission
1.4	June 12	Alan Jordan, Damien Burrows	Response to APR2023 DCCEEW review

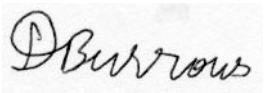
Certification of annual progress report

Hub Leaders certification

As Hub Leaders, We certify that we have taken adequate steps to reasonably assure that:

- each required report component is attached
- the contents of each component of the report are complete and accurate in all material respects
- funds have been used for the purpose for which they were provided and all funding conditions have been met, Recipient and Other Contributions have been received, and appropriate oversight has been maintained of hub projects, their progress, performance and budgets during the reporting period
- all relevant risks to project delivery have been notified to the department in this and previous reports and that appropriate steps are being taken to manage those risks
- the hub and its sub-contractors have current workers compensation and public liability insurances, as required under the Funding Agreement
- any carryover of project funds has been allocated as required under the Funding Agreement, to projects or hub Activities in the next reporting period/research plan.

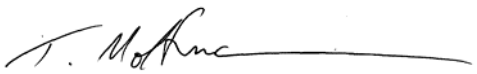
Signature	
Name:	Assoc. Prof. Alan Jordon
Position:	Co-Hub leader
Date:	5/4/2024

Signature	
Name:	Prof Damien Burrows
Position:	Co-Hub leader
Date:	5/4/2024

Hub Steering Committee Chair certification

As Steering Committee Chair, I certify that any issues of concern or matters raised during steering committee meetings where the draft progress report was discussed have been adequately resolved, amended or incorporated into the final report submitted to the department.

This annual progress report was endorsed by the steering committee on 5th April 2024.

Signature	
Name:	Tim Moltmann
Position:	NESP MaC Hub Steering Committee, Independent Chair
Date:	5th April 2024

Contents

Acknowledgement of Country

The Marine and Coastal (MaC) Hub acknowledges the Traditional Custodians of country throughout Australia and their connections to land, sea and community. We pay our respect to their Elders past and present and extend that respect to all Aboriginal and Torres Strait Islander peoples.

Letter from the Hub Leaders

During the 2023 reporting period, the Marine and Coastal (MaC) Hub has continued to deliver on Research Plan 2022 (RP 2022) and 2023 (RP 2023) projects and research-user engagement and finalised submission of RP 2024 in September. The reporting period also included the delivery of the 2022 Annual Progress Report (APR) in April and continued engagement with the Department of Climate Change, Energy, the Environment and Water (DCCEEW) and other relevant stakeholders.

In particular, the Hub has continued to work with research-users to understand the specific needs and priorities of the Department's numerous sections with responsibility for marine and coastal environments. While aiming to address the key research outcomes defined in the funding agreement, Hub leaders have continued to engage with DCCEEW during 2023 to ensure projects respond to research-users' changing priorities. This included responding to species information for threatened and migratory species, investigating the use of blue carbon for alternative economic outcomes for Indigenous communities and the provision of information required for sustainable regional development of an emerging offshore renewable energy industry.

There was also a continued focus on building awareness of the MaC Hub, its goals, outputs, and outcomes within DCCEEW, broader research-user communities, and research partners through knowledge brokering and communication. This includes increasing awareness of NESP research and impact at a local, regional, and national scale by building and establishing partnerships and engaging with relevant networks. It also included a significant refresh of the Hub's website design and content to ensure ready access to project information and outputs.

The year involved a considerable investment in developing projects in RP 2024, which includes 23 new projects that deliver to a range of priority needs identified by research-users. Many of these projects built on research and/or scoping activities conducted within RP 2021and RP 2022 projects to fill priority knowledge gaps required to support management decisions. The research plan was approved by DCCEEW in December 2023.

During the year the Hub staff also worked with the Hub Steering Committee to develop and endorse a revised Hub 'narrative' around six focus research areas:

- Regional planning in Northern Australia
- Offshore windfarms and renewable energy impacts
- Indigenous research and monitoring priorities for Sea Country
- Marine and coastal habitat restoration
- Protected places
- Threatened and migratory species and ecological communities

The Hub held a showcase day with DCCEEW in Canberra on 15 March 2023, which included short presentations from 13 completed Hub projects, as well as discussions on priorities going forward. A wide range of Departmental staff attended, with total attendance at around 50 in person and 210 online. This event was well received, and while the Hub intends to continue with similar events, these are likely to be structured around specific research focus areas. A number of targeted webinars were also conducted during the year focusing on specific projects or program areas, such as offshore renewable energy. The Mac Hub reinstated regular distribution of its newsletter 'The Blue Drummer',

with two newsletters distributed in 2023. The newsletter shares stories, reports and data related to Hub research with approximately 800 stakeholders.

In an operational context, the two nodes are continuing to work well together and rising to the challenges of the Hub, which includes 30 institutional partners and key national research agencies. In the course of 2024, the Hub will continue to engage closely with research-users and partners and participate in a NESP conference event in Canberra in April 2024 to discuss the Hub's strategic direction, key research outcomes, and planning for future investments. The next 6 to 12 months will see the delivery of final reports and end-user engagement across all RP 2022 projects, and several of the projects in RP 2023. This includes supporting Australian Marine Park management objectives (Project 2.3), establishing an inventory of environmental information for offshore renewable energy regions (Projects 3.3, 3.21), development of additional national marine standards and best practice (Project 2.2), informing threatened species recovery plans (Project 2.6 and 2.7), and progressing a regional planning network and efforts in northern Australia (Project 3.1, 3.4, 3.9 and 3.19). The timing of these will be influenced by the end date of projects and complexity of end-user engagement. The Hub will also sponsor and lead the delivery of the Australian Coastal Restoration Network annual meeting in Sydney in May 2024. The hub will also make significant sponsorship and contribution to the Australia Marine Sciences Association conference in September 2024 in Hobart with two symposia focused on Offshore Renewal Energies and Indigenous Partnerships in Sea Country Management.

Management

The National Environmental Science Program (NESP) is a long-term commitment by the Australian Government. The program funds environmental and climate research. The second phase of NESP (NESP2) builds on the foundations of past work, and funds 4 research hubs from 2020–21 to 2026–27.

The MaC Hub completed a broad range of management activities in 2023, which involved the continuation of the overall program Steering Committee and Hub Executive Team within the University of Tasmania (UTAS), Reef and Rainforest Research Centre (RRRC) and James Cook University (JCU) (including Hub leaders, executive officers, knowledge brokers, communications officers, data wranglers, Indigenous facilitators and administrative support). There were several changes to the Hub Steering Committee membership during 2023, including new representatives from DCCEEW and a change in representative from Seafood Industry Australia. Support for the implementation of the Hub's Protected Place Management Initiative also continued.

The RP 2023 was developed and accepted by the Department (milestones 12 and 13 in the Funding Agreement). The 32 projects of RP 2021 were completed and made publicly available on the website. As of December 2023, the Hub was managing 26 active projects as part of RP 2022 and RP 2023 at various stages of delivery. A total of 22 RP 2024 projects were collaboratively developed with the Hub's research partners, research-users and Indigenous organisations, with the research plan approved by the Department (Milestones 16 and 17) in December 2023.

The Hub's knowledge brokers have been coordinating evaluation processes for the Hub's strategies, and are working closely with the Hub leaders, Indigenous facilitators, communication managers and data wranglers to progress the evaluations. Evaluation processes include the following parts:

- Determine if the Hub has/has not implemented the commitments outlined in the strategies and the current status of each commitment,
- Provide insights about where the Hub needs to make improvements for implementing commitments in strategies,

- Provide a summary of evaluation findings and recommendations to improve strategy outcomes.

The Hub has informed DCCEEW about our processes, and the department is interested in the processes and outcomes of our plan. The review process is now complete.

Research

NESP hubs deliver world-class, practical, evidence-based research to inform decisions. This investment helps build adaptation capacity and resilience in our natural environment and communities.

NESP research has real impact through partnerships and collaboration between researchers and research-users, including policymakers, to deliver proven outcomes. Environmental decision-makers are key partners and are encouraged to articulate their needs to researchers; provide feedback on the quality and usefulness of the research outputs; and be engaged in the communication of how this information has informed policy.

NESP research listens to and prioritises the research needs of Indigenous land and sea managers, weaves together Indigenous and western environmental knowledge systems and celebrates Indigenous-led approaches to strengthening and sharing knowledge.

New and existing NESP research findings are available to use and accessible at Australian Government and hub websites (https://www.nespmarinecoastal.edu.au/).

As the Hub's portfolio of research project expands and its engagement with stakeholders matures, it is important to be able to describe the key outcome areas and not just have a long list of funded projects.

Through consultation with the Hubs steering committee, the Marine and Coastal Hub have defined six strategic focus areas:

1.1 Regional planning in Northern Australia

Northern Australia is a place of significant economic opportunity, with the future well-being of its communities depending on the growth of existing industries—agriculture, grazing, mining, energy, and tourism—alongside the infusion of innovative enterprises. Yet, the key to successful economic development lies in adopting a holistic approach that integrates considerations for people, culture, the environment, and the economy as a unified whole.

Careful and comprehensive planning is especially critical across the north, given its unique and significant environmental values and cultural importance to the resident Aboriginal and Torres Strait Islander communities which extend across the entire region and who hold legal rights to a substantial portion.

To achieve effective planning, active engagement of all communities and stakeholders is essential in the governance, planning, management, and decision-making processes relevant to the Northern Australian landscape. Robust scientific data, relevant information, and community aspirations should inform decisions. The Hub's research focuses on improved methods for undertaking regional planning and inclusively engaging all stakeholders.

1.2 Offshore windfarms and renewable energy impacts

Offshore renewable energy (ORE) generation is expanding rapidly as the world transitions towards clean energy sources. Australia has abundant, high-quality, offshore wind resources in many locations and the federal government has recently declared two areas on the continental shelf suitable for ORE development -- the eastern Bass Strait and the Hunter region (NSW), with a further two areas offshore of the Illawarra (NSW) and Portland (Vic) regions currently undergoing public consultation. Further areas on the west coast are also expected to be declared.

The installation of ORE facilities in Australian waters will simultaneously create novel risks (e.g., bird collisions with turbines) while augmenting (e.g., acoustic disturbance and vessel strikes) or changing (e.g., access to commercial and recreational fishing) the distribution of existing pressures in the marine environment. The Hub's research focuses in understanding the cumulative effects of offshore wind farms on marine and coastal environments and key species with scientific evidence to inform decision making for regulating a new and rapidly expanding offshore industry.

1.3 Indigenous research and monitoring priorities for sea Country

Indigenous Australians own more than 16% of Australia's land and have a variety of other rights and management obligations over much more, including coastal habitats. In order to manage the vast marine and coastal estate of Australia, Indigenous people will have to be more meaningfully engaged in this endeavour. This includes building the capacity of Indigenous groups to design and undertake monitoring and environment management and including their Traditional Knowledge and desired priorities in any such programs. Incorporation of their knowledge and building of their capacity will lead to improved outcomes and employment opportunities.

NESP MaC Hub research is addressing this issue by working with Indigenous groups on the use of various technologies and co-designing and jointly implementing monitoring and other environmental management plans between scientists and Traditional Owners. Where appropriate, user friendly technologies and analysis systems are built, and training activities co-delivered. Research reports, information sheets and posters are designed to meet their needs.

1.4 Marine and coastal habitat restoration

Australia's seagrass meadows, coral and shellfish reefs, coastal wetlands, and mangrove and kelp forests promote resilient, productive coastal and marine environments. They protect shorelines, improve water quality, nurture biodiversity and fisheries, and hold cultural and social values, supporting people and the economy. Many of these ecological systems have been lost, degraded, or face ongoing threats from human activities and climate extremes. Some are listed as locally or nationally endangered, and managers and practitioners need help to refine and upscale conservation and restoration activities. Hub research is mapping focus areas, defining ecosystem services and threats, and identifying research needs and practical solutions. This ranges from accounting frameworks and local reparation techniques to strategies for coordinated and cost-effective regional and national-scale investment.

1.5 Protected places

Australia's extensive network of marine and coastal protected places includes Australian Marine Parks, Ramsar sites, World Heritage Areas, the National Reserve System and Indigenous Protected Areas. Scientific understanding and collaboration are needed to continually improve the care and management of these unique and valuable places. Managers such as Traditional Owner groups, national and state and regional agencies also need research strategies that align with environmental, economic, social and cultural goals. The hub is engaging research-users, knowledge brokers and

Indigenous facilitators to better coordinate research for protected places. Priorities are to consolidate and expand regional knowledge of coastal biodiversity and ecosystems, define standard research and monitoring approaches, and develop tools to evaluate management success.

1.6 Threatened and migratory species and ecological communities

Australian governments have legal obligations to promote the recovery of threatened species and ecological communities. They assess nominations for threatened category listings, develop and monitor recovery actions, identify important habitats, and set policies to regulate development. This requires timely scientific advice on the status of populations and communities, the threats they face, are how these are changing. The hub conducts research to provide this advice for selected threated and migratory marine species and ecological communities. Our projects bring people together to consolidate and provide access to available knowledge, identify research needs, and collect data through surveys, tagging, mapping, citizen science and experimentation. We advise on the movements, distribution, connectivity and status of populations, and develop restoration strategies and techniques for ecological communities.

Progress towards research delivery

The portfolio of projects in RP 2023 reflects the high priority research needs identified through engagement between Hub research partners and research-users. The projects are also those that could address the high priority needs within the timeframe and available budget, had capacity for co-design with research-users, and more broadly addressed the defined NESP project assessment criteria.

Across the 21 projects in Research Plan 2023 the expected high-level outcomes for the consecutively numbered projects include:

- Building a northern Australian community of practice for regional planning, using the network foundations established in Project 1.32, and focus on scanning best practice approaches across the north, exploring innovative ways to communicate these approaches, and ensuring this network is strengthened.
- Experiment with conceptual models for establishing a working NIERN to provide evidence that will guide Indigenous organisations, policy makers and researchers that aim to support Indigenous leadership and participation in environmental research.
- Research relating to offshore renewable energy that enables regulatory decisions to be compliant with EPBC Act and OEI Act requirements, identifies existing data and best-practice monitoring standards, and identifies where knowledge gaps exist.
- Fast-tracking understanding and management about the potential impacts of development, in northern Australian catchments, to improve the quality of decision-making around the impact of terrestrial runoff on the marine environment, to provide a template for decision-makers.
- Establishing seagrass habitat monitoring programs with coastal Indigenous communities to better understand habitat health in a both-ways knowledge framework and apply adaptive management to species and resources on sea country.
- Improved understanding of the extent and ecological composition of the seagrass habitats around Tayaritja (Furneaux group of Islands, Tasmania), including evaluation of the blue carbon value of these habitats and their cultural significance to local Indigenous communities.
- Research that aims to address implementation barriers to coastal and marine restoration, including those associated with policy & permitting issues, understanding and up-take of

Nature-based solutions (NbS) by the engineering sector; and promoting inclusion of Aboriginal and Torres Strait Islanders in habitat restoration and NbS.

- Working with Traditional Owners, academics and governments to characterise the benefits of feral ungulate control in wetlands, providing science that will underpin development of an Emission Reduction Fund method, where payments for carbon credits and biodiversity enhancements would fund management of feral ungulates on Country.
- Explore common methods, skills and experience in management of feral animal management without impacting local decision making and participation in the socially and environmentally diverse Indigenous managed landscapes of northern Australia.
- Addressing key knowledge gaps about the spatial and temporal patterns in the distribution, abundance, connectivity and health of dugong populations.
- Improving the reporting of sawfish along with other EPBC listed species in northern Australian fisheries.
- Improve safety, accuracy, and consistency of sea snake bycatch reporting and the generation of broadscale data to assess species- and fisheries-specific population status for at least 20 species of sea snakes, two of which are EPBC-listed as critically endangered.
- Improved abundance and trend estimate for the eastern Australian population of grey nurse shark and the potential for range expansion into Victorian waters, information important to inform the assessment of current conservation arrangements such as spatial closures.
- Add significantly to a 13-year time series of black cod to evaluate changes in abundance, distribution and length to assess effectiveness of recovery actions, including protected areas.
- Improved information on population trends, determination of aggregation areas and movement, and development of approaches to increase data flow efficiencies required to assess the Conservation Management Plan for Southern Right Whales and development of future management plans.
- Improved knowledge base on population abundance of the endangered Maugean skate in Macquarie Harbour, Tasmania to inform conservation strategies.
- Using satellite imaging techniques to map northern Australia region based on methods consistent with existing reef mapping of the Great Barrier Reef, Torres Strait, and the Coral Sea.
- Maximising the quality of data collected by citizen scientists on key habitats by combining machine and human learning while conducting rigorous testing of data quality and operationalising a field deployment strategy that maximises the value of citizen data for management and mapping.
- Delivering a marine and coastal research strategy that will provide guidance on both *what* research needs to be done and *how* it should be conducted in Kakadu.

In order to continue to build capacity and understand Indigenous needs, the Hub continued the success of past Indigenous workshops and symposia by coordinating the 2023 Indigenous symposia *Better Together and* contributing to the organisation of the Australian Marine Science Association Indigenous workshop at the annual conference in Gold Coast in July. The Hub has also been successful in its bid to host a similar symposium – *Better Together - partnerships for better sea country outcomes in 2024* at the 2024 AMSA conference and continues to provide support for the 2024 Indigenous workshop. For RP 2024 the Hub Indigenous Facilitators assisted in the review of Indigenous engagement categorisation and helped in the consideration of appropriate Indigenous engagement within each of the projects.

The Hub continues to contribute as a member of the National Marine Science Committee (NMSC), with attendance at NMSC meetings in February, May and November 2023. The Hubs involvement is an essential component of broader engagement with the key marine science research institutions and agencies to help inform research planning and wider delivery of outcomes. This contribution is also reflected in Hub executive co-authorship of two NMSC working group reports that were released in early March. These are part of the National Marine Science Plan 2015-25 deliverables and include:

- Establishing and supporting a national marine baseline and monitoring program
- Implementing Integrated Ecosystem Assessments (IEAs)

In addition, MaC Hub project leaders have engaged with line areas within DCCEEW relevant to their project, including contribution to workshops, meetings and one-on-one engagement to discuss knowledge gaps and priority needs. Hub researchers have also consulted with numerous community and industry partners and research end-users from both State and local government to better understand the need and potential research impact.

The Protected Places Management Initiative has been an important activity focus for the Hub during the reporting period, and for more information on the Initiative see the Research section above and Cross-cutting initiatives below.

Research projects

Attachment A lists the projects funded under the MaC Hub and provides information on the project status, information on outputs and links to products for all projects (where available). Exceptions to the *NESP data and information guidelines* are also noted there.

A total of 60 projects are assessed in Attachment A across RP 2021, 2022 and 2023. Overall, a total of 32 RP 2021 projects are completed. Overall, of the 7 RP 2022 projects that were due by end of December 2023, 2 projects are completed, 2 projects have draft reports with research-users, and 3 project reports are delivered in early April 2024. Three projects have requested formal project extensions to allow completion of reporting and research-user engagement. For RP 2023, the majority of projects are progressing well. Only 2 projects were due during the reporting period (both due by the end of December 2023). However, both of these have required short extensions to the end of March 2024 in order to finalise end-user engagement and review of draft reports. There are no significant difficulties and/or risks emerging due to these delays. There are no ‘amber’ projects where there are real or potential difficulties and risks to project delivery.

The Hub has also been successful in generating cash co-investment for our research projects in RP 2022, RP 2023 and 2024. On top of in-kind contributions of >$17.6M, >$3.0M cash was also contributed towards our research. These contributions indicate the support for our work from relevant partners.

Cross-cutting initiatives

During 2023 the Hub continued to advance the Protected Places Initiative. As part of the Initiative, Hub staff engaged extensively with research-users (including numerous relevant sections in the Department), research partners and stakeholders to collaboratively advance a co-design approach to the Initiative during the reporting period.

Several projects that support the Protected Places Initiative were included in both RP 2023 and RP 2024. Projects include developing a deeper understanding of the Initiatives focus areas, vision,

activities and outcomes, with five co-designed research project proposals developed to advance the Initiative in RP 2023 including:

- Developing a National Indigenous Environmental Research Network
- Eastern Grey Nurse Shark population abundance and trend
- Assessing changes in black rockcod abundance and size
- Progress research on values and pressures, data standards and delivery to support sustainable development of offshore renewables and other emerging marine industries
- Locating Unidentified Reef and Habitat Features in the Northern Australian Seascape
- Addressing Kakadu's strategic marine research needs

The Hub has worked collaboratively with other Hubs during the reporting period to advance all four NESP cross-cutting Initiatives. All Initiative leaders are meeting monthly to promote a collaborative, cross-Hub approach to the initiatives. The Hub co-leads and knowledge brokers also continued to meet with Initiative leaders to promote cross-Hub approaches. The Hub has met with Initiative leads in other Hubs to explore and advance approaches for waste management (e.g. Release and impact of chemicals, antimicrobials and microplastics into the marine environment), climate adaptation and protection of the assets in the coastal zone, and conservation planning for threatened and migratory marine species and ecological communities (e.g. southern right whales, sawfish, Maugean skates). These advances have instigated important discussions that will advance in 2024.

Emerging priorities

In RP 2023 two additional Emerging Priorities projects were developed, with project 3.20 'A National Approach to Indigenous Engagement in Australia's Blue Carbon and Environmental Markets' commencing in June 2023, and project 3.21 'Identifying priority datasets of relevance to the Gippsland declaration area and pathways for their use in guiding decision-making' commencing in September 2023. Both project deliverables are on track and progressing well.

Performance against milestones

Performance against funding agreement milestones

All milestones for the reporting period and to date have been met as per the funding agreement (Milestones 1 (Signing of Agreement by the Department) to 17 (Acceptance of final Research Plan 2024 by the department).

Performance against the research plan milestones

Information on project progress and performance is provided in Attachment A.

Measuring success

Hub outcomes and outputs

Build awareness of the Marine and Coastal Hub, its goals, outputs and outcomes: The Hub has continued to build shared understanding about the Hub goals, outputs and outcomes with relevant research-users and its researcher partners. Targeted knowledge brokering, communication and Indigenous facilitation continued over the course of the reporting period, particularly with regard to research priorities and research planning processes. The second, third and fourth research plan built on the foundational outputs developed in RP 2021 that were key to building shared understanding.

Work with the Department to increase the awareness of NESP research and impact at a local, regional and national scale: The Hub continued to prioritise engagement with DCCEEW in the reporting period to establish a clear understanding of the Australian Government research needs, priorities and links with other research-users at local, regional and national scales. This has included developing working relationships with new DCCEEW staff following the agency re-structure and staff movements. The Hub has increased awareness of the NESP research across the key Divisions of the Department, including how best to engage with the Hub to co-create and co-design research proposals. This has included delivery and promotion through the Hub website, media releases, social media and national presentations to research users.

Re-establish and build partnerships and relationships with previous and new networks to co-design and co-deliver research projects: Hub leaders, Initiative leaders, knowledge brokers and the Indigenous facilitator have built a broad range of partnerships critical to co-create, co-design and co-deliver research during the reporting period. This has included a focus in 2023 on building on partnerships among the Hub's 30 research partners, research users outside of the Department such as the FRDC, and Indigenous organisations (e.g. NAILSMA, Malgana Aboriginal Corporation and Kimberley Land Council), State and territory governments and non-government organisations (NGOs) (e.g. The Nature Conservancy and Ozfish).

Deliver priority research areas and questions to be addressed in future Research Plans: Shared understanding among research partners and research users in developing projects in RP 2022, RP 2023 and RP 2024 in the reporting period continued to build on the co-design and co-delivery of projects, many of which were informed by the Hub research scoping projects. This included insights into priority research areas and questions that were used to identify 21 priority research topics to be advanced in RP 2023 and 23 priority research topics to be advanced in RP 2024. These formed the basis of the portfolio of research projects developed and approved within RP 2022, RP 2023 and RP 2024.

The Hub continued implementation of its Data Management Strategy to generate shared understanding among research partners and research-users about expectations and requirements for availability and access to the outputs and products. The data managers have met with all project leaders to agree on data requirements and responsibilities at the project level. The foundational outputs for the Hub (i.e. RP 2022, 2023 and 2024 project plans, research summaries and Hub strategies) are available to the public on the Hub's website.

Key outputs relate to the final reports arising from projects, which cover a broad range of thematic areas including:

- Evaluation of recreational fishing compliance, with the project providing a foundation for improving the design, implementation and evaluation of behavioural interventions to improve

regulatory compliance as part of a considered, longer-term approach to voluntary compliance with marine reserve regulations.

- Continued information on population trends for the western population of Southern Right Whales to allow ongoing monitoring of this endangered species
- Improved understanding of wastewater discharges and emerging contaminants (chemicals of emerging concern, antimicrobials and microplastics) which is providing new insights for prioritising future investments for understanding, assessing and managing risks.
- Reporting and analysis of the Australian coastal outfalls and rankings according to the total flow volume and nutrient loads to prioritise the potential degree of impact of each source to the environment and human health.

A number of projects have extended their reporting into 2024 and will be available to inform the development of projects in Research Plan 2025.

The outputs extended into the publication of a large number of metadata records which are fundamental to the ongoing coordinated management and delivery of research data through a range of national marine data portals.

Short- to medium-term outcomes – quantitative measures

Table A: Quantitative performance measures (short- to medium-term outcomes)

Notes: For the third year of NESP2 hubs, the reporting period is 1 January 2023 to 31 December 2023. Unless specified otherwise, the term 'research-user' refers to departmental and/or external users. The data below will ideally provide numbers derived from routine Hub monitoring and reporting. Where an estimate is provided, please explain how it was determined.

No.	Performance measure	Result for reporting period (numerical only)	Explanation, if any
1	Proportion of projects (active or completed in the reporting period) for which there is a research-user actively engaged in the project: a) Co-design b) Research delivery c) Use and research uptake	a) 100% b) 100% c) 100%	a) 28/28 co-design b) 28/28 research delivery c) 28/28 use and uptake
2	Research outputs in the reporting period provided to research-users on time and as identified in the approved research plans: a) Total number b) Proportion	a) 69 b) 81%	56 outputs delivered on time 13 outputs were delayed due to a combination of factors, including delayed contract signoff, late finalisation of technical reports due to extended periods of engagement with research-user feedback or requested final technical report improvements required by the Hub with the lead researchers.
3	Proportion of completed research projects that are confirmed to meet the needs of departmental research-users as identified at project co-design stage.	100%	(28 completed projects meeting DCCEEW end-user needs / overall completed research projects)
4	Number of projects that: a) Are Indigenous-led b) Meet research and management priorities of Indigenous stakeholders c) Are Indigenous-led projects that also meet research and management priorities of Indigenous stakeholders.	a) 7 b) 16 c) 7	
5	Number of peer-reviewed, NESP-funded publications during the reporting period	16	13 technical reports 3 published manuscripts

No.	Performance measure	Result for reporting period (numerical only)	Explanation, if any
6	Number of NESP research citations in other researchers' publications during the reporting period.	81	The number provided in this KPI was obtained from citations in Google Scholar for all published manuscripts produced for NESP MaC Hub to date. The majority of these citations (67) are attributed to one article from Project 1.11—Australian Surface Elevation table-marker Horizon data set.
7	Number of completed NESP products, research publications, datasets and metadata that are discoverable and accessible in accordance with *NESP data and information guidelines* and the funding agreement.	78	Technical reports (13), published manuscripts (4) information sheets (15), media releases (4), metadata records (28), published datasets (9), video/film (5)
8	a) The number of datasets and management tools produced by hub research and made public. b) The number of other datasets and management tools that benefited from hub research and outcomes. Management tools include but are not limited to monitoring systems; web-based decision support systems; environmental management tools for Indigenous communities, waters and land management; plans of management for Indigenous Protected Areas (IPAs), co/jointly managed parks, marine park plans of management, conservation agreements.	a) 7 datasets 2 management tools b) 8	2 management tools: Seamap Australia eAtlas
9	Number (full-time equivalent) during the reporting period of: a) PhD students b) Post-doc and early-career researchers c) Mid-career researchers d) Indigenous researchers e) Individual volunteers (total) f) Individual Indigenous volunteers (total) g) Indigenous sub-contractors	a) 8 b) 35 c) 42 d) 20 e) 0 f) 8 g) 33	
10	Number of knowledge-sharing and communication events and activities held or shared: a) With on-ground managers (general) b) Jointly with Indigenous researchers and Traditional Custodians c) That are Indigenous-led	a) 84 b) 63 c) 17	On-ground managers are defined as working in a place where practical work is done to manage Country or an environmental or climate change issue; that is, where things are actually happening on-ground (not at a distance or in theoretical manner).

No.	Performance measure	Result for reporting period (numerical only)	Explanation, if any
11	Proportion of hub staff and researchers who have completed: a) Indigenous cultural capability training b) Indigenous cultural and intellectual property training c) Both Indigenous cultural capability training and Indigenous cultural and intellectual property training	a) 39% b) 44% c) 38%	
12	Proportion of hub projects overall that fall within the categories of the Three-category approach: a) Indigenous led b) Co-design c) Communicate	a) 35% b) 35% c) 30%	Total of 28 projects
13	Proportion of hub projects that have been developed in consultation with the hub Indigenous facilitator or the Indigenous Facilitation Network	93%	26/ 28 projects
14	Number of guidelines about best-practice that the hub has produced or co-produced in the reporting period, for: a) Knowledge brokering (e.g., https://www.nespthreatenedspecies.edu.au/publications-and-tools/connecting-research-with-policy-guide-to-writing-for-policy-makers) b) Indigenous partnerships and products (including design of flagship engagement activities e.g., Our Knowledge Our Way; Three Category Approach) c) Environment and climate management within the scope of the hub's research (e.g. Guidelines for the translocation of threatened plants in Australia, Third Edition; https://www.nespmarine.edu.au/project/project-d2-standard-operating-procedures-survey-design-condition-assessment-and-trend	a) 1 b) 0 c) 0	NESP Marine and Coastal Hub data management guide for researchers

Longer-term outcomes – qualitative measures

Although the full impact of the Hub's research investment will take time to fully express itself, there are shorter-term emerging signs we are heading toward successful outcomes.

The completion of scoping projects (e.g. projects 1.5, 1.20, 1.31 and 1.32) funded in Research Plan 2021 developed shared understanding among researchers and research-users. These scoping studies provided the basis for significant NESP investments (and other investments) in 2022 and 2023 to align with priority needs of research-users. For example, scoping project 1.31 recommended the development of a National Indigenous environmental advisory body, the development of which is the subject of Project 3.2. Outcomes from scoping project 1.20 led to the development of projects on dugongs (3.10), seagrass (3.5) and scoping project 1.25 directly led to our investment in the sawfish project 3.11. The Hub's investments in Northern Australia are establishing communities of practice (projects 1.32, 3.1) to share knowledge and contributing to more efficient and effective sustainable development in Northern Australia. The Hub is progressing pathways for Aboriginal and Torres Strait Islanders to participate in the nature repair market (e.g. projects 1.29, 3.9 & 3.20) and improving understanding of natural and culturally significant habitats (projects 1.12, 1.13 & 3.5) to inform decision making under the EPBC Act.

Protected places investments are underpinning the development and evolution of a scientific evidence base to inform implementation and review of Australian Marine Park network management plans. Investments in the development (project 2.2) and deployment (project 2.1) of best practice methods are generating tailored knowledge outputs for AMP managers. A roadmap (project 2.3) developed collaboratively with park managers identifies investment priorities to broaden the base of tailored knowledge outputs for park managers to meet their responsibilities under the EPBC Act.

The Hub's Indigenous led-projects are effectively establishing much-needed Indigenous research networks (1.29, 1.31 & 3.2) and addressing the priority research needs of Indigenous peoples (e.g. 1.8, 1.12, 1.14, 3.5, 3.9, 3.19, & 3.20). In 2023 the Hub supported and contributed to the 8th consecutive Indigenous workshop at the annual Australian Marine Sciences Association conference, this informal Indigenous network continues to generate a broad range of benefits for attending Indigenous people and the Hub.

The impact stories in the next section provide more insights on how specific projects are contributing to longer-term outcomes of the Hub's research investments.

NESP impact stories

NESP impact stories are provided at Attachment B.

Four impact stories have been collated around the six key focus areas that represent the Hub 'narrative'. These six key focus areas were developed with the steering committee during 2023, and are reflected in the followed four case studies:

- Protected places: understanding options for effective interventions and management
- Top 100 – understanding status, trends and habitat use of priority threatened species
- Supporting First Nations leadership in marine and coastal restoration
- Research supporting development of offshore renewable energy

These stories showcase the contribution of NESP -funded research beyond contributions to academia, including to the environment, the economy, society, culture, public policy and quality of life.

Collaboration and partnerships

NESP encourages a collaborative, multi-disciplinary approach to environmental and climate research. Key to the success of the hub will be the capacity to foster partnerships across hubs and with a wide range of decision-makers across the Australian community, including Indigenous communities, to achieve positive environmental, social and economic outcomes.

Knowledge brokering

In the Marine and Coastal Hub knowledge brokers facilitate the exchange of information between researchers, policy makers, managers and Indigenous organisations to generate shared understanding and to capture and transfer knowledge about:

- information needs and priorities of targeted research-users to inform
- available research options for meeting the needs of research-users
- requirements for co-design of projects including research-user engagement and participation to maximise research impact
- packaging research outputs to ensure knowledge is effectively captured and transferred to meet the specific needs of research-users.

Knowledge brokering in the Marine and Coastal Hub is a team effort involving Hub directors, initiative leaders, project leaders, Indigenous facilitators, communication and media specialists and data wranglers. The Hub's specialist knowledge brokers were actively involved during the reporting period to support the implementation of approved research plans (i.e. RP2021, RP2022 and RP2023) and to develop the RP 2024 research plans. A key focus for knowledge brokers was to enhance coordination and support for the Indigenous facilitators to implement the Hub's Indigenous Partnerships Strategy. The knowledge brokers also coordinated the evaluation and review of the Hub's strategies for knowledge, brokering, communication, Indigenous partnerships and data management. The Marine and Coastal Hub's Knowledge Brokering Strategy is available on the Hub's website (www.nespmarinecoastal.edu.au).

Communication

The Marine and Coastal Hub's Communications Strategy was evaluated and reviewed in March 2023 (Marine and Coastal Hub - www.nespmarinecoastal.edu.au). The MaC Hub has been developing a detailed communications implementation plan to provide a finer level of detail on the implementation of the objectives defined in the broader *Marine and Coastal Hub Communication Strategy*. The communication implementation plan provides a consistent structure for each of the focus areas for communication that align with the key research areas endorsed by the Steering Committee. This includes a description of key messages, identification of target audiences and key projects, investment required and key events. The plan also aims to enable a shared understanding and coordination of efforts between the Hubs northern and southern node communication teams.

The Hub has also supported reestablishment of the Australian Coastal Restoration Network. This was functional during the previous NESP when supported by both the previous Tropical Water Quality Hub and the Marine Biodiversity Hub, along with financial support from the Nature Conservancy. Given the importance of coastal restoration to our program, we have now committed to reigniting it, which started with a symposium held in Townsville in May 2023, with the Hub the major sponsor and host of

this event. The event was attended by ~90 researchers and research-users from Commonwealth and State governments, NRM groups and NGO's such as The Nature Conservancy and OzFish.

The MaC Hub sponsored the 2023 AMSA (Australian Marine Science Association) conference and the AMSA2023 Indigenous Workshop held on the Gold Coast 2-6 July 2023. Many NESP researchers, prospective researchers and several end-users attended. The MaC Hub coordinated the symposium – 'Better Together: Genuine Indigenous Partnerships'. This involved 22 presentations across three sessions highlighting collaborative projects between scientists and Indigenous partners. It has also provided support and coordination for the symposium 'Seabed, habitat mapping and photogrammetry – opportunities for learning together on Sea Country'.

The MaC Hub also sponsored the Climate Adaptation 2023 conference held in Adelaide 25-27July 2023. This conference was coordinated by the NESP Climate Systems Hub.

The Mac Hub distributed its newsletter 'The Blue Drummer' in March and November, and will continue to do so quarterly going forward, which shares stories, reports and data related to Hub research. On-line statistics indicate that following distribution the newsletter was opened ~1300 times, with ~85% of all recipients opening the document.

The new Marine and Coastal Hub website is a key mechanism for delivery of the plan which was finalised and launched in October 2023. It provides a new look across all pages, with enhanced functionality including search features, interactive maps and clickable cross-linkages throughout for easy navigation. It has specific landing pages for all identified focus areas. The website was developed by the same team that developed the Resilient Landscape Hub website and ours will look very similar, providing consistency with our most closely aligned NESP Hub.

Indigenous partnerships

The Hub continues to undertake significant engagement and co-design with Indigenous people and Traditional Owner groups across the country. The Marine and Coastal Hub developed an Indigenous Partnership Strategy which was evaluated and reviewed in mid-2023. This document outlines in detail our approach to Indigenous engagement and participation (Marine and Coastal Hub - www.nespmarinecoastal.edu.au). In 2023 the Hub engaged with Indigenous groups, where appropriate, across the country to co-create and co-design high priority research directions for RP 2024 and to co-deliver approved research plans (i.e. RP 2021, RP 2022 and RP 2023). This has also included engagement with other NESP Hubs, especially the Resilient Landscapes Hub. This is important to avoid engagement fatigue and to gain the benefit of cross-Hub fertilisation of ideas.

The Indigenous facilitators have participated in the NESP Indigenous Facilitation Network (IFN) to develop Indigenous networks and inform development of the three-category approach to Indigenous engagement. Through the Hub Leadership, the IFN and other networks (e.g. AMSA Indigenous network), we have established an extensive network of Indigenous contacts. We are also assisting other NESP Hubs with Indigenous partnerships where required (e.g. Melythina Tiakana Warrana Aboriginal Corporation in NE Tasmania).

The key elements of the Hub's approach to Indigenous partnerships are:

- Provide support to the Hub Indigenous Facilitators with research brokering, development and implementation for identified Indigenous research needs.
- Drive adoption of best practice Indigenous participation and inclusion to ensure NESP2 research is ethical, relevant, innovative, measurable, and delivering enduring economic, social and cultural benefits that are currently being missed. This includes emphasis of the

importance of obtaining FPIC and human ethics approval (where required), and use of collaborative research agreements and ICIP agreements (where required)

- Ensure the research paradigm is compatible with culturally based (collective consensus) decision making and is ethical and recognises the ownership of natural resources (land, biota, knowledge and Indigenous cultural and IP.
- Create efficient governance reflecting local and regional input into program co-design, co-implementation and knowledge repatriation.
- Amplify the recognition, use and value of Traditional knowledge, customs and practice while increasing the opportunity for intergenerational knowledge transfer in the Indigenous community.
- Create succession and leadership pathways for the Indigenous research sector, including training early career researchers.

Data management

The Marine and Coastal Hub has produced a Data Management Strategy which was evaluated and reviewed in mid-2023 (www.nespmarinecoastal.edu.au). This Strategy enables the Hub to take a systematic and standards-based approach to identifying, cataloguing, packaging, and presenting its research outputs to stakeholders and the public.

The Hub has two Data Wrangler's. Their activities include working with the Hub, researchers, the Department and other stakeholders to translate data and information into relevant data products and tools and to help integrate research outputs into national information repositories, digital systems and decision support tools. This includes ensuring data management aligns with the FAIR data principles to maximise the use and reuse of public data. The Data Wranglers are responsible for coordinating and conducting data discussions with research projects, providing guidance to projects on best practice data management, reviewing project data management plans, tracking data management milestones, and the review of final datasets.

The focus during 2023 reporting period was to engage in data discussions with the new RP2023 projects. Data discussions were had with all the new projects and identified that several of them will be generating very large datasets requiring significant data management. Metadata records representing the projects were set up and published, and data wranglers have been coordinating the submission of project photos.

To understand the spatial footprint of NESP MaC projects both data wranglers have been mapping the project activity extents in collaboration with the project leaders. These maps are intended to be used by the NESP Hub website, the NESP Data Portal being developed by DCCEEW, and on project metadata pages. In this reporting period data wranglers have collaborated to create a single consolidated database of maps and subsequently published this as a dataset on the eAtlas. A MaC Hub case study for the structure and reasoning behind eAtlas data stories has also been developed. These are articles that synthesise information and data about important topics that environmental manager value. These articles aim to highlight key NESP datasets within articles that present the state of knowledge on these topics. A unique element of these stories is they will dynamically adjust their content depending on region of interest of the reader. This will allow regionally specific information to be included without the article becoming cluttered with content not relevant for the region of interest.

The Data Management Guide for Researchers, was also completed and is available for use. This document is intended as a starting guide on data management for researchers of the National Environmental Science Program (NESP) Marine and Coastal (MaC) Hub. It covers the Hub expectations on data management and general guidance on how research data should be managed and published. This document is an extension to Marine and Coastal Hub Data Management Strategy.

Hub-level risk management

All risks identified in the hub's risk management plan are being actively managed. The Hub maintains an ongoing risk register which is reviewed, and if required, updated, at every Hub Steering Committee meeting. The four identified key risk areas are:

1. Co-led, two-Node model – risk of divergent strategy and process across Nodes, inability to deal with different needs across north and south, duplication/omission across Nodes.
2. NESP a long-term commitment – risk of being too reactive to operational needs and failing to 'shift the dial' over the longer term
3. Co-design – risk it's not achieved
4. Indigenous participation – risk it's not achieved

Below is a table representing the Steering Committee's risk status and mitigation.

Risk	**Mitigation**	**Status**
1. There is a possibility that the co-led, two- Node model Hub will not • deliver an integrated national program • respond to differing research needs across northern and southern Australia • coordinate effectively across other Government initiatives to avoid duplication and omission	• Single, effective steering committee • Clear strategy identifying where the Hub will engage, where it will lead or partner • Joint process for project approval • Focus on national priorities, even where implementation is regional • Joint planning and budgeting for indigenous partnerships, knowledge brokering, data management, and communication • Project development and approval driven by user and stakeholder needs	Stable
2. Given the Hub's broad user and stakeholder base there is a risk of being reactive to issues highlighted by those most involved rather than being genuinely responsive to national priorities.	• Focus on national priorities, even where implementation is regional projects • Project development and approval driven by user and stakeholder needs	Stable
3. The Hub aspires to co-design its project portfolio with research users to ensure research has relevance and	• Well-designed, well-led, well-resourced scoping studies to set the tone	Stable

impact. There is a risk that the Hub will not devote the time, resources, and focus on cultural change required to do this well.	• Review mechanisms to monitor progress • Strong research user engagement via the steering committee	
4. The Hub aspires to go beyond current levels of indigenous engagement to enable meaningful indigenous participation in its research program. There is a risk that the Hub will not devote the time, resources, and focus on cultural change required to do this well.	• Well-designed, well-led, well-resourced scoping studies to set the tone • Review mechanisms to monitor progress • Strong Traditional Owner engagement via the steering committee	Stable