National Environmental Science Program

Marine and Coastal Hub research plan 2024

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Certification of research plan

Hub Leader(s) certification

As the Hub Leader(s), I/we certify that:

- the research projects contained in the research plan are linked to the Activity Outcomes for the Marine and Coastal Hub as outlined in the funding agreement
- funds are available to meet all projects included in this research plan
- this research plan was prepared in consultation with the hub steering committee.

Signature:	
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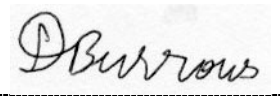
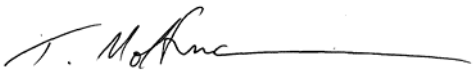
Signature:	
Name:	Damien Burrows
Position:	MaC Hub co-lead
Date:	29/09/2023

Hub Steering Committee Chair certification

As the Steering Committee Chair, I certify that:

- this research plan was prepared in consultation with the hub steering committee
- any issues of concern or matters raised during steering committee meetings or by the department during its assessment process have been adequately resolved, amended or incorporated into this research plan
- this research plan was endorsed by the steering committee on 6th September 2023.

Signature:	
Name:	Tim Moltmann
Position:	Independent Chair
Date:	15 December 2023

Contents

The National Environmental Science Program

The National Environmental Science Program (NESP) is a long-term commitment by the Australian Government to environment and climate research. The program:

- provides evidence for the design, delivery and on-ground outcomes for environmental programs,
- helps decision-makers, including from Indigenous communities, to build resilience,
- supports positive environmental, social and economic outcomes.

The first phase of NESP invested over **$145 million** (2014–15 to 2020–21) into six research hubs and emerging priority research projects. The second phase is investing **$149 million** (2020–21 to 2026–27) into four new research hubs. These hubs are:

- Resilient Landscapes Hub
- Marine and Coastal Hub
- Climate Systems Hub
- Sustainable Communities and Waste Hub

NESP is administered by the Department of Climate Change, Energy, the Environment and Water (the department). More information on NESP is available at dcceew.gov.au/science-research/nesp

Department role

The four NESP hubs have been formed to conduct applied research within their specific themes. Each activity year the department will work with the minister, the hubs and other key stakeholders to identify and refine research priorities and develop projects that align with these priorities.

This annual review and evaluation of research outputs and impact provides the flexibility needed for the hubs to engage in new themes of research in an adaptive manner and ensures that the focus is on the delivery of relevant and practical research. Hubs are responsible for co-design of the research projects in consultation with research-users and in partnership with relevant Indigenous communities. Hubs are also responsible for monitoring and evaluating the research project outcomes during the life of the hub.

The research prioritisation is a rolling process and will be informed by key milestones in each activity year, such as the annual progress report and submission of the next research plan.

Hub role

The NESP will assist decision-makers to understand, manage and conserve Australia's environment by funding world-class biodiversity and environmental research. The NESP Marine and Coastal Hub will research applied issues related to Australia's marine and coastal zone. In close collaboration with the Department and stakeholders the Marine and Coastal Hub will focus on research that supports decision-makers in addressing environmental protection needs, whilst supporting planning for future needs of the nation and addressing the overwhelming impact of the key pressures.

The Hub will work annually with partners and research users to identify and prioritise research needs for marine and coastal systems in Australia. Each annual research plan will fund a portfolio of projects which will reflect these needs and concerns for applied use by research users. Each Research Plan will include the consideration of cross cutting Hub research, where appropriate, as well as research that responds to the Protected Places Initiative.

The national Marine and Coastal Hub will deliver applied scientific products and advice to meet end-user requirements including:

- synthesis reports of current and emerging knowledge for senior decision makers,
- applied science research, analysis, process studies and models to support policy makers, program managers and regulators,
- integrated management decision tools inclusive of scalable state of the environment monitoring and evaluation systems, and
- long-term foundational science to support end-users understand and adapt to our climate.

The Hub will support the two-way communication of this research and research needs to research users via knowledge brokers and communication officers. The Hub will work with the Indigenous Facilitator to maximise the inclusion of Indigenous peoples and Traditional Owners in co-creation, co-design and co-delivery of research needs and the repatriation of this knowledge to communities. The Hub, via the Data Wrangler, will ensure the longevity of this data and information through the delivery of outputs in publicly available data portals.

Purpose of research plan

This research plan was developed by the Marine and Coastal Hub, in consultation with the department and other key stakeholders.

The purpose of the research plan is to outline:

- the research priorities the Hub is funded to investigate, including those related to the crosscutting initiative the Hub is funded to lead,
- the research projects that will address these priorities,
- how the research projects will be co-designed and delivered to research-users,
- how the outputs of the research will be communicated with key stakeholders, and
- how hubs will work collaboratively within and across hubs.

This research plan also provides summary information on the management and governance of the Hub, including the broad funding profile, key staff and research organisations, and the risks that need to be monitored to ensure success.

During the development and implementation phases of the Marine and Coastal Hub research plan, which will span 2024-2026, the main goals are to:

- deliver co-designed, co-developed and co-delivered research to be applied to key challenges and priorities for research end-users and Indigenous landholders
- identify priority research areas and questions to be addressed in future research plans through engagement, consultation and co-design with research end-users and Indigenous landholders.
- continue to build and establish partnerships and engagement with networks as the co-design and co-delivery elements of scoping and developing annual research projects are undertaken.
- continue to build awareness of the Marine and Coastal Hub, its goals, outputs and outcomes within the researcher and research end-user communities through communication and media specialists and knowledge brokering.

Initiatives

In addition to its hub-level research projects, each hub is also responsible for delivering a cross-cutting initiative and contributing research to other initiatives where appropriate. The initiative includes cross-hub collaboration and may include multiple projects to deliver management options, data and information for the themes listed below.

The four initiatives are:

Initiative	Lead hub
Protected place management	Marine and Coastal
Threatened and migratory species and threatened ecological communities	Resilient Landscapes
Waste impact management	Sustainable Communities and Waste
Climate adaptation	Climate Systems

Emerging priorities

Each year, specific emerging priorities may be identified by the department, hubs or third parties for delivery as research projects. If endorsed by the department, the hub will develop research project/s to address the emerging priority.

Hubs will be flexible and adaptable to respond to emerging priorities, with the ability to rapidly scale output, bring in external expertise or respond if additional resources are made available. Hubs are required to set aside 10% of NESP funding being spent per calendar year (in any category) so they can respond to emerging priorities; these funds can be rolled into the subsequent year if they are not used.

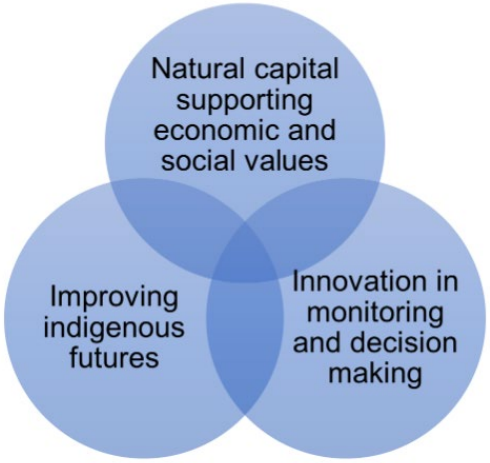
Emerging priority projects will be developed outside the hub's annual research proposal process. Once emerging priority projects have been approved, the hub's research plan and activity budget for the relevant calendar year will be amended, and emerging priorities will be included in the hub's annual progress reports.

Strategic Research Areas

The Marine and Coastal Hub has defined three key integrating areas of strategic focus to describe the Hub's 'narrative'. This narrative links the range of research projects across the lifetime of the Hub to ensure impact in key areas for Australia's Marine and Coastal systems. It also broadly reflects the objectives of the NESP program. These strategic research areas are:

- Natural capital supporting economic and social values,
- Improving Indigenous futures, and
- Innovations in monitoring and decision-making.

All Hub projects aim to address at least two, if not all three of these strategic research areas as a way of 'scaling up' the Hub's research.



In response to user and stakeholder needs, the Hub's narrative has provided a framework for identifying a small number of priority research areas that have guided development of RP 2024, and RP 2023 and 2022 before it. They are:

Natural capital supporting economic and social values

#1 Improve regional planning in Northern Australia by assessing the extent, condition and vulnerability of key environmental resources at regional scale

This research area aims to support effective regional planning which requires an understanding of the abundance and distribution of key resources. To support this process, our goal is to provide an understanding of the distribution of key resources at relevant regional or national scales and improve regional capacity for managing these.

This research area was initially funded in RP2021 as scoping project 1.32 on supporting regional planning in Northern Australia. This project examined current planning frameworks; interviewed planners and others with specific interests; identified information deficits; assessed data storage and access issues; and reviewed planning case studies. This resulted in development of Project 3.1 in RP2023 which aims to build a community of practice and generate knowledge; via consultation with practitioners and stakeholders to collate ideas and experience; and provide input into the design of knowledge management systems. Projects for RP 2024 in this area include: producing a consolidated inventory of seagrass across northern Australia (Project 4.1); assessing the entire Australian population of dugong (Projects 4.2 in the Gulf of Carpentaria and 4.6 in the Kimberley); assessing the condition of mangroves across the Gulf of Carpentaria (Project 4.12); conducting an inventory of shellfish reefs across northern Australia (Project 4.13); and measuring for the first time, the population size of sawfish populations across Qld and NT (Project 4.18).

#2 Offshore windfarms and renewable energy impacts – progress research on values and pressures, data standards and delivery to support sustainable development of offshore renewables and other emerging marine industries

The Hub's investment in this area builds on research conducted in RP2023 (Projects 3.3 and EP3.21) is focused on risks to priority cetaceans, pygmy blue whales (Project 4.8), and southern right whales and blue whales (Project 4.9). These will contribute to the major RP2024 investment in Project 4.7 which is focused on comprehensive regional modelling and risk assessments to inform offshore renewable decision-making. The approach developed will be applicable to any region, though it will use the Gippsland Declaration Area as a case study. A number of other projects will also provide information relevant to the case study, including Project 3.15 (southern right whales), Project 4.15 (grey nurse shark) and 4.3 (Indigenous cetacean knowledge), and Project 4.23 (eDNA in Bass Strait region).

Improving Indigenous Futures

#3 Continue to advance identified Indigenous research and monitoring priorities for Sea Country and approaches for coordinated monitoring across regional groups

Indigenous Australians own or have other rights over 60 % of Australia's land, and large tracts of ocean. This vast resource should bestow great economic, social and cultural advantage. However, for many communities this is not the case. Progress is hampered by inadequate research into Country and culture-based economic opportunities, and relevant ecosystem science.

The Marine and Coastal Hub are supporting a collaborative and inclusive approach to Indigenous research needs and co-ordination by supporting the development and implementation of the National Indigenous Environmental Research Network (NIERN) (Project 1.31, 3.1). The NIERN, comprising a community of Indigenous-led practitioners, is considered the best way to advance, enable and prescribe research participation, influence the Australian research agenda, and oversee relevant

governance for Indigenous Futures. In 2024 this research area includes supporting the development of Indigenous led Healthy Country Planning in north-east Tasmania (Project 4.4), collating and sharing Indigenous ecological knowledge of threatened and migratory whales and dolphins in relation to human and kin (Project 4.3), and our work toward developing an Integrated Pest Management framework for feral pigs (Project 4.5) which is one of the highest priorities of Indigenous groups in northern Australia and which is Indigenous led by the Northern Australian Land and Sea Management Alliance - NAILSMA.

Innovations in monitoring and decision-making

#4 Review the barriers to implementation of coastal and marine restoration and nature-based solutions, with an aim to increase the coordination and transparency of restoration and facilitate uptake and adoption of best practice across all tiers of governments and stakeholders

Large-scale restoration is necessary and is prominent in high-level declarations such as CITES, the UN Sustainable Development Goals (2030), and the UN Decade of Ocean Science for Sustainable Development (2020-2031). Marine restoration projects in Australia, as in most countries, have typically been small-scale, experimental, and lacking coordination. The restoration research area in this plan builds on related projects in RP 2021 (Project 1.6,1.7, 1.8, 1.10, 1.15) and RP 2023 (Project 3.7), with progress to date informing the scoping of an RP 2024 project on de-risking Australian nature repair activities in coastal and marine ecosystems (Project 4.10).

Three other RP 2024 projects are proposed to focus on specific restoration case studies, all of which build on related work in this and previous NESP Hubs – evaluating impacts, recovery and intervention options 10 years after the world's largest mangrove dieback, (Project 4.12) - creating an inventory of shellfish reefs in northern Australia in collaboration with recreational fishers (Project 4.13), and options for reversing seagrass and turtle health decline in Pulu-Keeling National Park (Project 4.11). Other projects on feral pig control and seagrass are relevant to this priority area.

#5 Develop better, more cost-effective approaches to monitoring priority threatened and migratory species and ecological communities to improve reporting on condition and trend

Australia has 1890 threatened species and ecological communities listed as Matters of National Environmental Significance (MNES). There are also additional species listed because of Australia's responsibilities under migratory species and bilateral agreements. Whilst most of these are terrestrial, hundreds occur in the marine and coastal environment. The program of work will focus on researching priorities, needs, and gaps, such as those outlined in the Australian Government Threatened Species Strategy, to help focus the efforts of the Australian Government and partners on threatened species recovery actions.

This research priority area includes by far the largest number of projects, both approved in RP 2023 and proposed in RP 2024, with the majority of these projects strongly related to other priority areas, specifically Northern Australia, Indigenous Futures, and Offshore Renewables. The Hub is making a major contribution to the Threatened Species Initiative led by the Resilient Landscapes Hub.

The species-specific projects proposed under RP 2024 all have a high priority for DCCEEW – Australian sea lions (Project 4.14), grey nurse shark (Project 4.15), shorebirds (Project 4.17), dugongs (Projects 4.2, 4.6) and sawfish (Project 4.18). Additional investment in research on Maugean skate is anticipated to be identified by the department before the end of 2023 and will likely form the basis of an Emerging Priorities project proposal.

#6 Develop approaches to determine status of values and pressures and measure effectiveness of marine protected places. Includes the Protected Places Initiative

Building on a significant body of work undertaken for Parks Australia in this research area over many years, the 2024 research plan includes several new projects aimed at supporting evaluation of the management effectiveness of the Australian Marine Park network (Project 4.20) - delivery of science to support the implementation of a National Marine Park Management Effectiveness system, and - assessing the key natural values within priority temperate Australian Marine Parks to evaluate management effectiveness (Project 4.21). Outcomes defined with the cross-Hub Protected Places Initiative are also identified within the deliverables of Project 4.20.

Other projects working in protected places are relevant to this priority area e.g. shallow reef and seagrass projects in Northern Australia (see above), and the proposed assessment of the ecological and cultural values of reefs in the southern Gulf of Carpentaria including the Gulf of Carpentaria Marine Park (Project 4.24).

Hub projects for Research Plan 2024

A list of research projects to be funded under the Marine and Coastal Hub Research Plan 2024 can be found at Attachment A – research projects list, and in the table below. For more details on each specific project, please refer to the hub website - www.nespmarinecoastal.edu.au.

Project no.	Project partners	Project title	Priority research area as numbered above
4.1	JCU, ECU, CLCAC	Coastal seagrass of the Gulf of Carpentaria: building knowledge and capacity as a foundation for long-term monitoring	1, 3, 6
4.2	CDU, JCU	Assessing dugong distribution and abundance across the southern Gulf of Carpentaria	3, 5
4.3	UoW, UTas	Unbroken whispers – The ripples connecting sea kin	2, 3
4.4	MTWAC, UTas, MQ	An Indigenous-led approach to advance health and wellbeing of Tebrakunna Country, Coastal Plains nation, North-east Tasmania	3, 4
4.5	NAILSMA	Developing an Integrated Pest Management framework for feral pigs in coastal environments	3, 4
4.6	ISWAG, DBCA, JCU, Murdoch Uni	Developing Traditional Owner community-led dugong monitoring in the Kimberley region	3, 1, 5
4.7	CSIRO, AIMS, UTas, Curtin Uni	Development of regional modelling and risk assessments to inform offshore renewable decision-making	2, 4
4.8	AIMS, Flinders Uni	Potential impacts of offshore wind developments on eastern Indian Ocean pygmy blue whales (*Balaenoptera musculus brevicauda*)	2, 5
4.9	UoQ	Assessing the vulnerability of southern right whale and blue whale populations to disturbance from windfarm developments	2, 5
4.10	CSIRO, JCU, UoM, UoQ, UWA, OzFish, UTas	De-risking Australian nature repair activities in coastal and marine ecosystems	4, 1
4.11	JCU, Sea Country Solutions	Scaling-up long-term seagrass restoration in the Cocos (Keeling) Islands	1, 4, 6

4.12	JCU	Protecting valuable shoreline mangroves of northern Australia	1, 4
4.13	Griffith	Mapping and characterising Australia's tropical shellfish reefs	1, 4, 6
4.14	UoA/SARDI, DEW, YAAC, FWCAC, DBDCA, ETNTAC	Enhancing monitoring approaches to evaluate the abundance, life history and critical habitats of the endangered Australian sea lion	5, 2
4.15	UQ, DPIRD, GLaWAC, Deakin, UTas, Deakin Uni, Qld DES, UoSC	Grey Nurse Shark Aggregations	2, 5
4.17	UQ, Deakin	Supporting recovery and management of migratory shorebirds in Australia	5, 1
4.18	CSIRO, CLCAC	Indigenous Ranger-led monitoring of threatened sawfish in the southern Gulf of Carpentaria	1, 5
4.20	CSIRO, UWA, UTas, NSW DPI, JCU	Delivery of science to support the implementation of a National Marine Park Management Effectiveness system	6, 4
4.21	UTas, UWA, Undalup Assoc. Inc., CSIRO, NSW DPI	Assessing the condition of natural values within priority temperate Australian Marine Parks to evaluate management effectiveness	6, 4
4.22	UTAS, SIMS, NSW DPE, Sydney Water, SA Water, COF, UTas	Environmental concentrations of emerging contaminants in coastal stormwater	6, 4
4.23	CSIRO	Environmental DNA for measuring offshore marine biodiversity: what can DNA in water collected from the RV Investigator tell us?	5, 2
4.24	JCU	Towards assessing the values of reefs in the southern Gulf of Carpentaria	1, 6

Protected places management initiative

The Initiative will set out to determine if Australia's protected places are able to deliver the desired outcomes for the long-term conservation of nature with associated ecosystem services, cultural values and sustainable use of these areas. It will work to identify the opportunities to improve outcomes and where pressures and threats to values can be avoided, mitigated or adapted to. The Initiative will engage across all four hubs to deliver this research and will work with all stakeholders of protected places through a co-design process to determine the research needed to deliver this goal.

Research projects and programs will be co-designed with the relevant stakeholders from across governments, industry, and community (including Traditional Owner groups). The primary places considered by the Initiative are Australian Marine Parks, Great Barrier Reef Marine Park, Commonwealth National Parks, the Great Barrier Reef World Heritage Area and other listed Heritage areas, RAMSAR sites and Indigenous Protected Areas, but the Initiative will work across the entire marine and terrestrial Protected Areas networks as appropriate, including State managed marine parks.

Initiative projects

Broadly, the research priorities of the initiative are to:

- improve support for Indigenous communities and organisations to determine, lead and disseminate Indigenous knowledge and science.
- increase the evidence base through consistent approaches to collect, analyse and report relevant data for adaptive management of protected places.
- increase understanding of options for effective interventions and approaches to management.

A large number of projects support the delivery of the identified outcomes across RP 2021 to RP 2024, as identified below:

Initiative Outcomes	**Relevant projects for Marine and Coastal Hub**
To improve support for Indigenous communities and organisations to determine, lead and disseminate Indigenous knowledge and science	RP 2021 - Scoping study: Indigenous partnerships and research needs RP 2023 - Developing a National Indigenous Environmental Research Network RP 2024 - An Indigenous-led approach to advance health and wellbeing of Tebrakunna Country, Coastal Plains nation, North-east Tasmania - Unbroken whispers – The ripples connecting sea kin
To increase the evidence base through consistent approaches to collect, analyse and report relevant data for adaptive management of protected places.	RP 2021 - Characterising values and identifying indicators and metrics of fish and benthic assemblages within the SW Corner Marine Park RP 2022 - Mapping continental shelf seabed habitats across southern Australia - Advancing national standards and best practices to monitor key marine values and pressures - Status and condition of values in Australian Marine Parks and development of information systems to evaluate management effectiveness RP 2023 - Eastern Grey Nurse Shark population abundance and trend - Assessing changes in black rockcod abundance and size RP 2024 - Development of regional modelling and risk assessments to inform offshore renewable decision-making - Potential impacts of offshore wind developments on eastern Indian Ocean pygmy blue whales (*Balaenoptera musculus brevicauda*) - Enhancing monitoring approaches to evaluate the abundance, life history and critical habitats of the endangered Australian sea lion - Grey Nurse Shark Aggregations - Coastal seagrass of the Gulf of Carpentaria: building knowledge and capacity as a foundation for long-term monitoring - Assessing dugong distribution and abundance across the southern Gulf of Carpentaria - Developing Traditional Owner community-led dugong monitoring in the Kimberley region - Supporting recovery and management of migratory shorebirds in Australia - Assessing the condition of natural values within priority temperate Australian Marine Parks to evaluate management effectiveness

	- Environmental DNA for measuring offshore marine biodiversity: what can DNA in water collected from the RV Investigator tell us? - Towards assessing the values of reefs in the southern Gulf of Carpentaria
To increase understanding of options for effective interventions and approaches to management	RP 2021 - Support for Parks Australia's Monitoring, Evaluation, Reporting and Improvement System for Australian Marine Parks RP 2022 - Evaluation of recreational fishing behaviour, use, values and motivations that relate to compliance RP 2023 - Progress research on values and pressures, data standards and delivery to support sustainable development of offshore renewables and other emerging marine industries - Addressing Kakadu's strategic marine research needs RP2024 - Developing an Integrated Pest Management framework for feral pigs in coastal environments - Delivery of science to support the implementation of a National Marine Park Management Effectiveness system

Research projects falling under the initiatives are also identified in Attachment A – research projects list. Some projects will be initiative-specific and some hub research projects will contribute partly to an initiative; these are distinguished in Attachment A. For more detail on each specific project, please refer to the hub website www.nespmarinecoastal.edu.au.

Expected outcomes and outputs

Research outcomes and outputs for research plan 2024

To assist in understanding the proposed project portfolio in line with the MaC Hubs' strategic guidance, the expected high-level outcomes and outputs for the 22 projects in research plan 2024 have been categorised according to the strategic research areas.

Improving Indigenous Futures

- Project 4.1: Expanding our national seagrass mapping program (begun with projects in RP2021 and RP2023) to include major knowledge gaps in the southern Gulf of Carpentaria focusing on areas of importance to Traditional Owners and Marine Parks. This will include 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.
- Project 4.2: Conducting regional aerial surveys for dugongs in the southern Gulf of Carpentaria (complementing our regional aerial surveys in Qld and WA funded under RP2023). This will also include training Indigenous Rangers for drone-based monitoring.
- Project 4.3: Developing and testing a model for collating, analysing and sharing knowledge on Indigenous connections to cetaceans and related species in south-east Australia that could be broadly applied throughout Australia. This will set a unique precedence for connecting Indigenous stories and intergenerational knowledge transfer for participating Indigenous communities in a culturally appropriate way to support the reawakening of cultural practices.
- Project 4.4: Accessing and building on fit-for-purpose data that informs the Indigenous-led development and implementation of a Tebrakunna Healthy Country Planning Process, while

building capacity of the MTWAC community to access, collect and use environmental data and information for Healthy Country Planning.
Project 4.5: Developing an Integrated Pest Management framework for feral pig control in northern Australia to increase strategic approaches to control and realise improved environmental benefit outcomes.

- Project 4.6: Training Indigenous Rangers in the Kimberley to undertake aerial drone surveys for dugong and seagrass monitoring.
- Project 4.18: Undertake population assessments of endangered sawfish using cutting-edge genetic techniques and working with and training Indigenous Rangers to collect the sawfish samples in the field.

Natural capital supporting economic and social values

- Project 4.7: Development of an agreed methodology with end users for risk assessment for offshore renewable energy (with a focus on the impact pathways identified by DCCEEW). The quantitative approaches would use species-specific and whole of ecosystem models to estimate risk, including cumulative risks, within the context of the Gippsland declared region.
- Project 4.8: Detailing the location of important areas for eastern Indian Ocean pygmy blue whales, where these overlap with proposed offshore wind developments, and assessing the potential impacts of these developments on the species in addition to existing impacts from other anthropogenic activities.
- Project 4.9: Develop an interim PCoD model for southern right whales (*Eubalena australis*) and blue whales (*Balaenoptera musculus*) to determine the likelihood of a population level impact of one, or multiple, wind farm developments off the Australian coast. Outputs would contribute to the broader risk assessment project.
- Project 4.11: Provision of an action plan for ongoing restoration and protection interventions and strategies for the Cocos (Keeling) Islands to future-proof local seagrasses and support seagrass-dependent species.
- Project 4.12: Assessing the recovery rate of mangroves killed during the world's largest mangrove dieback, in 2016 where mangroves along 2000km of shoreline were killed in a climate-related event. This builds upon previous NESP research into the dieback event in 2017 and 2019 and will investigate and make recommendations for accelerating recovery and options for mitigating future climatic impacts.
- Project 4.13: Conducting an inventory and ecological assessment of shellfish (oyster) reefs across northern Australia, which have never been mapped before and for which we believe potentially hundreds of reefs have not been documented.
- Project 4.24: Analysing existing, but unpublished data on reefs of the southern Gulf of Carpentaria and engaging with Traditional Owners and Parks Australia on future priorities and management options.

Innovations in monitoring and decision-making

- Project 4.14: Developing cost-effective methods for acquiring Australian sea lions' abundance and critical habitat data from under-surveyed regions, including analysis of demographic data required to under-pin the National Recovery Team conservation efforts.
- Project 4.15: Delivering new information on key grey nurse shark aggregation sites, allowing the development of criteria to allow assessment of new sites to inform population assessment and location of critical habitats.
- Project 4.17: Examining population trends of migratory shorebird species across Australia, many of which are threatened species, including analysing 500,000 existing citizen science observations across Australia.
- Project 4.20: Delivering key science needs identified in the Australian Marine Park Science Plan for evaluating management effectiveness, including agreed monitoring protocols and

priorities, updating key values and pressures information, and delivering a whole of marine protected place assessment across Commonwealth and State jurisdictions.

- Project 4.21: Delivering measurements of ecological condition for a number of the priority temperate marine parks identified in the Australian Marine Park Science Plan to support the 2028 National AMP management plan review.
- Project 4.22: Delivering information to assess the concentrations of contaminants of emerging concern and evaluate the ecological footprint of contamination from stormwater inputs, helping decision-makers scope the research needed to determine guideline values.
- Project 4.23: Provision of a new baseline and unique eDNA-based perspective on the biodiversity of the eastern Bass Strait region and allow for evaluation of eDNA sampling methods and guidance for design of effective, scalable, and non-extractive biomonitoring tools for marine ecosystems, including marine parks.
- Project 4.24: Analysing existing, but unpublished data on reefs of the southern Gulf of Carpentaria and engaging with Traditional Owners and Parks Australia on future priorities and management options.

These projects deliver outcomes to a wide range of Australian Government research users, as well as relevant State agencies, stakeholders and the broader community. A number of projects are nationally focussed (Projects 4.10, 4.17, 4.20), developing approaches that can be applied in different regions (Projects 4.3, 4.7, 4.5), or focussed regionally reflecting the distribution of the environmental asset (4.1, 4.2, 4.4, 4.6, 4.7, 4.9, 4.12, 4.18 and 4.22).

Delivering the outcomes

The expected outcomes of the NESP projects are to produce research that:

- enhances our understanding of Australia's environment and climate,
- is communicated clearly to relevant research users and the public,
- is discoverable and accessible, and
- informs decision-making and addresses environmental priorities.

Research under NESP aims to inform primarily DCCEEW policy and program delivery. More broadly, it will engage and inform key research users with an interest in the outputs of environmental and climate science research, including state and local governments, business and industry, community groups, Indigenous land managers, Indigenous communities, and education institutions.

The Hubs strategic research areas collectively deliver applied scientific knowledge, decision support and practical management options to address the Australian Government's priorities. The Marine and Coastal Hub Research Plan 2024 will provide innovative research for practical solutions to maintain and improve our understanding and management of marine waters. Key areas of knowledge delivery will include:

- *Applied research to support management of Australia's marine and coastal environments including estuaries, coast, reefs, shelf and deep-water:*
    - Threat abatement and recovery actions for estuaries, coasts, reefs, shelf and deep-water
    - Ecosystem recovery after extreme events such as cyclones, storm surge and marine heatwaves
    - Support delivery of the Reef 2050 Long-Term Sustainability Plan and Australian Marine Park Management Plans
    - Support management of Ramsar sites to maintain their ecological character
    - Traditional ecological and cultural knowledge built into resource management
    - Indigenous communities able to apply shared knowledge in the management of their lands
    - Social and economic information on processes that influence conservation

- *Targeted biodiversity and taxonomy products to support efficient system monitoring*:
    - Support environmental offsets policies, management approaches, tools and outcomes
    - Improved monitoring for biodiversity and marine and coastal ecosystem function
    - Protect listed migratory species and reduce impact of human interactions with marine systems
    - Support environmental impact assessments, strategic regional planning assessments and cumulative analysis of impacts

- *Environmental monitoring systems and decision support tools*:
    - Cost-effective marine and coastal monitoring systems, methods and technologies
    - Map the extent and assess the condition of Australia's wetlands
    - Quantification of the economic, social and cultural value of ecosystem functions
    - Improved end-user engagement in co-design and co-delivery of practical science that supports on-ground/sea management

- *Ensure the delivery of Protected Place Management Initiative via a focus on*:
    - Supporting the management of natural, cultural and Indigenous values in protected places, including Australian Marine Parks, Ramsar sites and World Heritage Areas;
    - Identifying key drivers of resilient populations and ecosystems across protected areas; and

- Supporting the improvement of governance mechanisms for protected places.

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.

Multi-disciplinary and multi-institutional teams from the following research institutions will contribute to the Hub as research partners: James Cook University, University of Tasmania, Reef and Rainforest Research Centre, CSIRO, Australian Institute of Marine Science; Integrated Marine Observing System, Deakin University, University of Wollongong, University of NSW, University of Technology Sydney, University of Sydney, Museums Victoria, Sydney Institute of Marine Science, University of Melbourne, Bureau of Meteorology, NSW Department of Primary Industries, NSW Department of Planning, Industry and Environment, Geoscience Australia, Macquarie University, University of Queensland, Griffith University, Central Queensland University, Charles Darwin University, Murdoch University, Edith Cowan University, University of Adelaide, Flinders University, SARDI, University of Western Australia, and Bioplatforms Australia. Other management and research institutions such as the North Australian Indigenous Land and Sea Management Alliance (NAILSMA) are included where their expertise is relevant to specific priorities.

The Hub's partners represent key national and regional research institutions in Australia, and have the capability and resources needed (people, time, access to major equipment) to deliver across the identified Hub priorities at both national and regional scales, and across all regions. Some of the key skills, capabilities and infrastructure that will be available to support projects include field technologies, laboratory and aquarium facilities, computer technologies and socio-economic tools.

The Hub's partners will continue to engage during the life of the program through regional partnerships facilitated through existing arrangements such as the Sydney Institute of Marine Science, Marine Innovations SA and the Indian Ocean Marine Research Centre. The Hub is also represented on the National Marine Science Committee which includes representation from many of the Hub's partners. The knowledge brokers, communication managers and data wranglers will also work across all partners to ensure ongoing engagement and consistency of approach for all aspects of Hub engagement and outputs.

The partners contributing to projects in Marine and Coastal Hub Research Plan 2024 are identified in the project table above and reflects the specific skills and capacity for co-investment required to deliver the outcomes across the diversity of projects. Several of the research projects also involve the contribution of external collaborators who provide specific skills and co-investment into the projects. For more details on Hub partners and external collaborators for each specific project, please refer to the Hub website - www.nespmarinecoastal.edu.au.

The Hub continues to develop and implement a co-create, co-design and co-delivery approach to research collaboration and partnerships that includes the following features: 1) developing a shared understanding of research-user needs and priorities; 2) engaging research-users involved in the design and implementation of research projects; and 3) delivering fit for purpose research outputs. Central to the overall approach is the development and maintenance of networks and trusted relationships with researchers and research end-users, including Indigenous communities and organisations.

The Hub continues to develop a shared understanding of research needs and priorities to inform the development of annual research plans. Regional Reference Groups and the Indigenous Facilitators Network provide important mechanisms for understanding regional information needs and priorities. Understanding of national and regional research needs will be updated annually to ensure understanding is current and responsive. The project leaders and knowledge brokers will work closely to ensure the Hub implements effective participatory approaches to engage research-users in project design and implementation. The Hub will work with research end-users and project leaders to identify project contacts. The project leaders will be the default Hub project contact. Project leaders will identify contacts for relevant research-users and stakeholders.

Indigenous engagement

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 has developed an Indigenous Partnership Strategy which was reviewed in mid-2023. This document outlines in more detail our approach to Indigenous engagement and participation (Marine and Coastal Hub - www.nespmarinecoastal.edu.au). Each annual research plan specifically engages with Indigenous groups, where appropriate, across the country to develop high priority research directions, ensuring co-create, co-design and co-delivery of relevant project funding under current and future research plans. Wherever possible, this engagement will be undertaken collaboratively 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.

Through the Hub Leadership and other networks, we already possess many, though certainly not all of the required contacts. During the Marine and Coastal Hub bid, there was formal support of >40 Indigenous organisation around the country. We will activate and utilise this extended network as part of our Indigenous engagement and help other Hubs with Indigenous engagement where required.

The key elements of our Hub Indigenous engagement and participation aim to:

- Provide support to the Hub Indigenous Facilitators with research brokering, development and implementation for identified Indigenous research needs.
- Drive adoption of best practice Indigenous engagement (United Nations Declaration on the Rights of Indigenous Peoples – UNDRIP/ Free, Prior and Informed Consent-FPIC) to ensure the research is relevant, innovative, measurable, and delivering enduring economic, social and cultural benefits that are currently being missed.
- 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, cultural, Indigenous knowledge 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.

Specific details on the level of Indigenous consultation and engagement on each project in Marine and Coastal Hub Research Plan 2024 are provided in the individual project proposals available in Attachment B and on the Hub website (Marine and Coastal Hub - www.nespmarinecoastal.edu.au). The Indigenous lead (Category 1) projects that have been funded in RP2024 are further discussed in the Strategic Research Areas section of this document (See Priority area #3).

Knowledge brokering, communication and data management

The department expects that each hub will engage and communicate research outcomes with research users and the wider public to facilitate uptake and adoption. As part of this, the program is committed to promoting open access to public sector and publicly funded information, including optimising the use and reuse of data. The department expects that each hub will implement its data management plan to provide timely, open access to the data products and research outputs.

Knowledge Brokering and Communications

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
- 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. Specialist knowledge brokers are tasked with developing, coordinating delivery and periodic review of the Strategy. The Marine and Coastal Hub has developed a Knowledge Brokering Strategy which was reviewed in mid-2023 (Marine and Coastal Hub - www.nespmarinecoastal.edu.au).

The Communication Strategy provides information on the Hub's approach to communicating our research approach, outcomes and impacts to research end-users and other stakeholders. For communications the Hub will implement five broad actions to enable knowledge sharing and engagement via:

- Working with researchers, knowledge brokers and other members of the hub executive team to identify and prioritise communication needs.
- Developing and using the right mix of content, activities, channels and tools to address communication priorities.
- Encouraging, enabling and building the capacity of Marine and Coastal Hub researchers and partner agencies to participate in Hub communication activities.
- Developing, maintaining and implementing an annual schedule of communication priorities and activities.
- Modifying the communication strategy where required in response to the monitoring, evaluation and reporting process.

The Marine and Coastal Hub's Communications Strategy will be reviewed annually (Marine and Coastal Hub - www.nespmarinecoastal.edu.au).

Data Management

The Marine and Coastal Hub has produced a Data Management Strategy which was 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 strategy is a living document that describes:

- who will be responsible for data management related activities
- data management practices used
- who owns and can access and use the Hub's data and products
- metadata standards used
- products and data storage, security, privacy and unique identifiers
- product legacy planning
- facilities and equipment used or required.

The Strategy is supported by resources and infrastructure, such as:

- Hub Data Wranglers, who have a role to work with the Hub researchers, the Department and other stakeholders, to translate data and information into relevant outputs that align with these guidelines.
- allocation of resources to support data management, from the initial data capture through to ongoing delivery and curation.
- information technology infrastructure: hardware, software and other facilities that underpin data-related activities.
- support services: resources allocated to support implementation of metadata management so that data records can be used for both internal and external purposes.

The Hub will have 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.

In order to ensure its sustainability for the long term, the Hub will take advantage of, and contribute to, existing institutional and national data management infrastructure. This will function as a distributed data network to make Hub information publicly and freely accessible via automated workflows.

The Australian Research Data Commons (ARDC) provide a helpful overview of data management plans and the FAIR data principles. Many Australian Universities have data management policies and tools available for use by researchers to create a data management plan at the start of a research project. All data (via metadata records) will be aggregated to the AODN and Research Data Australia (RDA) national information repositories to maximise discoverability and access. Linked Hub- and Project-level metadata records will be created to facilitate organisation of Hub content and will follow ARDC's best-practice for linking publications and grants.

NESP adheres to the objectives of the Global Indigenous Data Alliance (GIDA) with respect to Indigenous data, especially in relation to access of data by non-Indigenous users. Although the *NESP data and information guidelines* follow the FAIR data principles, when working with Indigenous data these guidelines require the complementary use of GIDA's CARE principles for data governance, which consider both people and purpose as part of open data and information.

Knowledge held by Indigenous peoples will be recognised, valued, and protected throughout any partnerships struck with First Nations People throughout the operations of the Marine and Coastal Hub. This will be guided by the CARE principles for Indigenous data governance: Collective benefit, Authority to control, Responsibility, and Ethics.

Specific details on the approach and expected data outputs on each project in Marine and Coastal Hub Research Plan 2024 are provided in the individual project proposals available in attachment B and on the hub website - www.nespmarinecoastal.edu.au).

Funding

The table below summarises the NESP funding available to the Marine and Coastal Hub over the life of the agreement, which ceases on 30 June 2027, and total proposed expenditure of NESP funds. A more detailed budget can be found in Attachment C (Activity budget summary tables).

	2021 Actual $ (GST excl.)	**2022 Actual** $ (GST excl.)	**2023 Budget** $ (GST excl.)	**2024 Budget** $ (GST excl.)	**2025 Budget** $ (GST excl.)	**2026 Budget** $ (GST excl.)	**2027 Budget** $ (GST excl.)	**Total** $ (GST excl.)
Balance carried forward	-	2,139,693	6,248,757	3,617,488	3,644,690	2,746,173	4,154,785	-
Income: NESP funding[1,7]	3,366,500	7,800,000	7,800,000	11,700,000	7,800,000	7,691,874	841,626	47,000,000
Interest[2]	1,027	50,528	185,488	100,000	-	-	-	337,043
Other activity generated income	-	21,171	-	-	-	-	-	21,171
Total NESP funding[3]	3,367,527	10,011,392	14,234,245	15,417,488	11,444,690	10,438,047	4,996,411	**47,358,214**
Approved NESP expenditure[4]	1,227,834	3,762,635	10,616,757	11,772,798	8,698,517	6,283,262	1,663,083	44,024,886
Balance[5]	2,139,693	6,248,757	3,617,488	3,644,690	2,746,173	4,154,785	3,333,328	
Unallocated/unapproved NESP expenditure					1,196,958	1,196,958	939,412	3,333,328
Total forecast NESP expenditure[6]								**47,358,214**

1. As per funding agreement milestone payment schedule.
2. Interest earned on NESP funds held.
3. The sum of the balance carried forward, NESP funding and interest earned on NESP funds.
4. Expenditure figures to be drawn from the Activity budget summary tables (Attachment C).
5. Total NESP funding minus total approved expenditure
6. Total NESP funding plus unapproved NESP expenditure
7. Income has been profiled on the assumption that milestone payment 21 will be made prior to 31 December 2024.

Across the life of the program, the hub funding for applied science, decision tools and practical management options must total at least 70% of the NESP funds. The balance of the NESP funds can be allocated between knowledge capture (10–20%), communication (5–10%), and administration (5–10%). Ten percent of the hub's budgeted NESP expenditure (see above table) for the calendar year (regardless of the expenditure category) must be set aside for emerging priorities; this amount comes from within the above categories.

Below is the Marine and Coastal Hub allocation of funds to these categories.

Item	Required percentage range	Hub percentage
Applied science, decision tools and practical management options	≥70%	70%
Knowledge capture	10-20%	14%
Communication	5-10%	8%
Administration	5-10%	8%

Under the terms of the funding agreement, the funds paid by the department under NESP must be matched by recipient and other contributions, to a minimum total of 100% contribution for the life of the program.

Attachment C presents the activity budget tables for the hub for calendar year 2021 onwards. Budget estimates are provided for current and future years. The tables include recipient and other contributions.

Attachments

- Attachment A – Marine and Coastal Hub research projects
- Attachment B – Marine and Coastal Hub project plans
- Attachment C – Marine and Coastal Hub activity budget
- Attachment D – Marine and Coastal Hub risk assessment and treatment plan