

FINAL REPORT

Project 3.21

December 2024

Identifying priority datasets of relevance to the Gippsland declaration area and pathways for their use in decision making

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#### Milestone number 5

Research Plan number: 2023 - Project 3.21

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#### Preferred citation

Evans, K. (2024) Identifying priority datasets of relevance to the Gippsland declaration area and pathways for their use in decision making. Report to the National Environmental Science Program. CSIRO.

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#### Acknowledgement

This work was undertaken for the Marine and Coastal Hub, a collaborative partnership supported through funding from the Australian Government's National Environmental Science Program (NESP).

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The Australian Institute of Marine Science, Bioplatforms Australia, Bureau of Meteorology, Charles Darwin University, Central Queensland University, CSIRO, Deakin University, Edith Cowan University, Flinders University, Geoscience Australia, Griffith University, Integrated Marine Observing System, James Cook University, Macquarie University, Murdoch University, Museums Victoria, NSW Department of Planning and Environment (Environment, Energy and Science Group), NSW Department of Primary Industries, South Australian Research and Development Institute, The University of Adelaide, University of Melbourne, The University of Queensland, University of New South Wales, University of Technology Sydney, The University of Sydney, University of Western Australia, The University of Wollongong

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#### Appendices

The appendices linked to this report (Data holder and data user survey, Workshop report, Outputs of literature search and Communication and outreach) are also available separately in the document:

Evans, K. (2024) Identifying priority datasets of relevance to the Gippsland declaration area and pathways for their use in decision making – Appendices. Report to the National Environmental Science Program. CSIRO.

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# Executive summary

#### Background

This project was undertaken across the period August 2023 to April 2024 with the aim of identifying datasets and information sources relevant to priority species identified by DCCEEW and NOPSEMA for the Gippsland declaration area. In doing so it aimed to:

- 1. Identify datasets and information sources relevant to priority species identified by DCCEEW and NOPSEMA for the Gippsland declaration area;
- 2. Identify the source of these datasets and information and their level of accessibility;
- Evaluate the utility of datasets and information identified in 2) for assessments/regulatory processes required to be undertaken by DCCEEW and NOPSEMA: and
- 4. Identify what activities would need to be undertaken to improve the accessibility and utility of datasets and information sources identified in 3) that are not currently accessible in useable formats.

The project focused on identifying information associated with baseline understanding of:

- Presence/absence, including frequency of occurrence on seasonal and multi-year time scales;
- Distribution, including movement dynamics and habitat use (for feeding, breeding, resting etc.) on seasonal and multi-year time scales;
- Population dynamics, including abundance and trends and reproduction metrics; and
- Behavioural understanding of forage (dietary), species dynamics (distribution, abundance), and connections to migratory timing and movement dynamics.

The project contributes to an emerging program of work conducted by the NESP Marine and Coastal Hub focused on offshore renewable energy (ORE) initiated as part of the Hub's 2023 Research Plan.

#### Approach

The project consisted of three primary activities:

- 1. a multi-stakeholder workshop;
- 2. a data-holder and user survey; and
- 3. a literature and repository search to build a resource focused on relevant data and information relevant to the priority species and Gippsland declaration area.

The workshop aimed to bring key data holders and research-users together to facilitate an exchange of information on assessment and regulation processes associated with offshore renewable energy, the data and information currently available for supporting those assessments, and current initiatives underway gathering relevant data and information. In

considering data and information already collected or being collected it also aimed to identify a set of priority action areas for improving the discoverability, accessibility and utility of information on hand for the Gippsland declaration area for use in planning, assessment and regulation. The data-holder and user survey focused on three primary areas: (i) datasets, (ii) data products and (iii) data use and data use requirements.

Given the widespread distribution of many of the priority species identified and their ability to move across considerable distances, this project regarded data and information beyond the declaration area itself and focused on the whole of the Bass Strait region.

#### Results

Although the workshop survey and literature suggested that a diverse range of datasets had been, and were being collected from a range of species, metadata describing datasets and/or data products were not reflected in various repositories. This lack of discoverability of data and information was reiterated in discussions during the workshop, where it was identified that there is a disproportionate amount of data and information that is held in individual files or databases that are not linked to data repositories or metadata aggregators. or do not have external features that could facilitate discoverability. This includes the majority of industry generated data, data and information held by consulting agencies and datasets held by individuals or agencies that are yet to be digitised, analysed or published. Overall, there is a general lack of documentation of datasets other than presence (based on sightings) and movement/tracking datasets, via formal metadata records. This lack of discoverability limits the ability to assess data and information for use in assessment/regulatory processes and what might need to be undertaken for uptake of data and information into assessment and regulatory frameworks. When guestioned as to whether the current limitations to discoverability could be addressed, approximately half of respondents identified that they could partially be resolved through direct collaboration with data and information holders and development of data agreements.

All metadata records identified through the repository search are available via the IMAS Metadata Catalogue (<u>https://doi.org/10.25959/GB51-RW44</u>), Australian Ocean Data Network (AODN;

https://catalogue.aodn.org.au/geonetwork/srv/eng/catalog.search#/metadata/48689b26-395e-4095-999f-0860e77cca36) and Research Data Australia. Direct links to the original metadata record, associated information and where available datasets or data products are provided for each species record.

Overall presence information for some species appeared to be dense both spatially and temporally with some datasets consisting of 10's of thousands of sighting records and spanning substantial periods (40+ years). However, once spatially limited to the area of Bass Strait, the number of records and associated spatial and temporal coverage decreased substantially. This resulted in large spatial areas with no information available from which temporal or spatial variability in presence within the Bass Strait region could be established. For those regions where sightings are dense (i.e. coastal, nearshore areas), however some indication of spatial and temporal use could be determined. When movement data derived from tracking studies is regarded similarly, the same reduction in information relevant to the

Bass Strait region occurs for many of the species tracking data is available. The exception to this is the tracking dataset from shy albatross, which spans 1993-2019 and consists of over 200 individual tracks. When combined, these tracks provide information that that is spatially more comprehensive for some parts of Bass Strait than presence data alone.

# Recommendations and next steps for improving discoverability and accessibility

A number of recommended next steps are proposed by the project based on the discussions and recommendations arising from workshop and the review of metadata records and literature:

Further effort, beyond this project, will need to be placed into data discovery, particularly given that many datasets are not represented by metadata records in repositories. This will require developing better connections between data generators and data users and establishing collaborative agreements with data holders. Developing mechanisms that bring government, proponents, researchers, and infrastructure providers together will support improved communication, awareness and exchange of information across those generating and using data and information on priority species across the region. Communities of practice or forums and regular stakeholder workshops could be considered.

Identifying mechanisms through which improved provision of metadata describing datasets and submission of those metadata into repositories can be facilitated will be essential for ensuring that data collected of relevance to assessments are discoverable, interoperable and reusable and meet internationally recognised FAIR data principles. This will need to involve greater engagement with researchers to improve knowledge in the use and application of metadata standards as well as more stringent adherence to those standards by research infrastructure.

There is a clear need to establish the relevance of many species that have been identified as priorities for the Gippsland declaration area. As a first step in identifying priority species for focusing future efforts on, both in understanding impacts and implementing monitoring programs for quantifying impacts, a structured information mapping exercise should be carried out to determine the relevance of a species to the declaration area.

Traditional approaches to modelling or quantifying impacts may need to be expanded and further developed to account for evolving infrastructure including altered above and below water noise propagation profiles, expanding interaction zones, site-specific operation schedules and development of multi-use platforms. Determining a priority list of impacts that moves beyond the current broad identification and provides greater specificity is needed in order to identify the key datasets needed to quantify impacts and track these at the population level through time.

To assist building a clear and transparent process for identifying species of relevance, priority impact areas needing quantification and establishing the key

elements needed for monitoring populations key data and information already available across multiple websites could be brought together within the context of Australian assessment and regulation needs through a data and information mining and aggregation mechanism. Examples of information and data aggregators already exist and infrastructure for bringing diverse data and information streams together could be utilised in a similar way to support assessment and regulation needs.

#### Conclusion

This project provides a starting point in gathering information on datasets, data products for such an exercise and provides direction on the activities that will need to be focused on to progress meeting the information needs for assessment processes. It has engaged Commonwealth and State agencies, the research community and industry in its activities and delivered information throughout the lifetime of the project directly to relevant Commonwealth agencies and the ORE industry.

Keywords: threatened, endangered and protected species, offshore renewable energy, threatening processes, research priorities.

# 1. Introduction

The offshore renewable energy (ORE) sector is rapidly developing in Australia's Commonwealth and State waters with six priority areas for offshore wind identified in August 2022. An infrastructure area consisting of three defined areas off Gippsland, Victoria was declared in late 2022 (Figure 1) with further infrastructure areas declared off the Hunter region in New South Wales in 2023 and the Southern Ocean off western Victoria, off the Illawara region in New South Wales and Indian Ocean off Bunbury in 2024. Public consultation on an infrastructure area off northern Tasmania was completed in early 2024 (see https://www.dcceew.gov.au/energy/renewable/offshore-wind/areas). There are several Commonwealth and State and Territory agencies responsible for administering the licensing and regulation of infrastructure projects, including assessing environmental management plans associated with infrastructure activities under Commonwealth and State or Territory legislation.



Figure 1. Declaration area for offshore renewable energy off Gippsland, Victoria.

There are three key documents that have been produced by The Department of Climate Change, Energy, Environment and Water (DCCEEW) and the National Offshore Petroleum Safety and Environment Authority (NOPSEMA) that identify governmental regulatory priorities for the offshore renewable energy sector. These include:

- Key environmental factors for offshore windfarm environmental impact assessment under the Environment Protection and Biodiversity Conservation Act 1999 (DCCEEW 2023, available at: https://www.dcceew.gov.au/environment/epbc/publications/keyfactors-guidance);
- Offshore renewables environmental approvals (Australian Government 2023, available at: https://www.oir.gov.au/sites/default/files/Brochure%20-%20Offshore%20renewables%20environmental%20approvals%20-%20Nov%202023.pdf);
- NOPSEMA OIR Research Strategy 2023-2025 (NOPSEMA 2023, available at: https://consultation.nopsema.gov.au/environment-division/nopsema-researchstrategy-2023-2025/).

The priorities identified in these documents provide the foundation for information needs and collaborations required across government, industry and research providers. Specifically, they identify that:

- Sufficient environmental data and ecological baselines be available to assess projects at the appropriate temporal and spatial scale;
- All stakeholders take a regional view of the environment and understand how impacts from individual projects will contribute to cumulative pressures at the regional scale; and
- Environmental regulation and management across the lifecycle of projects will require regional approaches to assessment and approval and to monitoring, reporting and adaptive management.

To meet these priorities, agencies will need to rely on a strong scientific evidence base to support decisions made and to determine effective regulatory processes. Building this scientific evidence base requires efficient and timely access to quality environmental data that can be applied effectively for legislative and regulatory processes. This includes information that falls into two broad categories:

- Baseline conditions and long-term reference datasets; and
- Methods and techniques for monitoring, mitigation and management of interactions and impacts.

A number of species protected under the *Environmental Protection and Biodiversity Conservation Act* 1999 (EPBC Act) are known to occur throughout the broader region that encompasses the Gippsland declaration area and therefore have the potential to interact with ORE infrastructure during construction, operations and decommissioning. Further, under the EPBC Act, all Commonwealth marine areas are considered matters of national environmental significance and any impacts caused by actions associated with ORE need to be considered and assessed under the EPBC Act. Given the fast pace at which the sector is developing, there is an urgent need to identify information on species likely to interact with, and environments that are likely to be impacted by, ORE infrastructure that can assist in supporting assessment of ORE activities, guiding monitoring programs required to be undertaken by proponents (including assessment of cumulative effects), identifying mitigation and management measures for reducing interactions and associated impacts and informing future research programs for filling knowledge gaps. While some of the information available for planning, assessment and regulation of ORE activities is available in the public domain, there is much that is either embedded in scientific literature, detailed in grey literature, held privately, or is in the form of datasets that are yet to be fully analysed. Further, while some datasets might be publicly available, they may not be in formats that are easy to access or can be used by those agencies responsible for administering the licensing and regulation of ORE infrastructure projects.

Collectively DCCEEW and NOPSEMA have identified the need for a rapid assessment of information available for a subset of species that are listed as critically endangered or endangered under the EPBC Act and considered as relevant to the Gippsland declaration area specifically (Table 1). This represents the species considered to be potentially at greatest risk to ORE activities for this area.

Common Name	Scientific Name						
Birds, shorebirds and seabirds							
Amsterdam Albatross	Diomedea amsterdamensis						
Australian Gould's Petrel	Pterodroma leucoptera leucoptera						
Curlew Sandpiper	Calidris ferruginea						
Far Eastern Curlew	Numenius madagascariensis						
Grey-headed Albatross	Thalassarche chrysostoma						
Mongolian Lesser Sand Plover	Charadrius mongolus mongolus						
New Siberian Islands Red Knot	Calidris canutus piersmai						
North-eastern Siberian Red Knot	Calidris canutus rogersi						
Northern Royal Albatross	Diomedea sanfordi						
Orange-bellied Parrot	Neophema chrysogaster						
Swift Parrot	Lathamus discolor						
Shy Albatross	Thalassarche cauta						
Southern Giant-Petrel	Macronectes giganteus						
Tasmanian Wedge-tailed Eagle	Aquila audax fleayi						
Yakutian Bar-tailed Godwit	Limosa lapponica menzbieri						
Cetaceans							
Blue whale	Balaenoptera musculus sp.						
Southern right whale	Eubalaena australis						
Humpback whale	Megaptera novaeangliae						

Table 1. The priority species identified by DCCEEW and NOPSEMA for the Gippsland declaration area.

### 1.1 Objectives

In response to those needs articulated by DCCEEW and NOPSEMA, the National Environment Science Program (NESP) Marine and Coastal (MaC) Hub and the CSIRO are undertaking the project "Identifying priority datasets of relevance to the Gippsland declaration area and pathways for their use in decision making". This project aims to:

- 5. Identify datasets and information sources relevant to priority species identified by DCCEEW and NOPSEMA for the Gippsland declaration area (Table 1);
- 6. Identify the source of these datasets and information and their level of accessibility;
- Evaluate the utility of datasets and information identified in 2) for assessments/regulatory processes required to be undertaken by DCCEEW and NOPSEMA; and
- 8. Identify what activities would need to be undertaken to improve the accessibility and utility of datasets and information sources identified in 3) that are not currently accessible in useable formats.

The project will focus on identifying information associated with baseline understanding of:

- Presence/absence, including frequency of occurrence on seasonal and multi-year time scales.
- Distribution, including movement dynamics and habitat use (for feeding, breeding, resting etc.) on seasonal and multi-year time scales.
- Population dynamics, including abundance and trends and reproduction metrics.
- Behavioural understanding of forage (dietary), species dynamics (distribution, abundance), and connections to migratory timing and movement dynamics.

# 2. Approach

To facilitate meeting its objectives, the project was facilitated through three primary activities:

- 1. a multi-stakeholder workshop;
- 2. a data-holder and user survey; and
- 3. a literature and repository search to build a resource focused on relevant data and information relevant to the priority species and Gippsland declaration area.

Given the widespread distribution of many of the priority species identified and their ability to move across considerable distances, this project regarded data and information beyond the declaration area itself and focused on the whole of the Bass Strait region.

This project has connections with Marine and Coastal Hub Project 3.3 "Guiding the sustainable development of offshore renewables and other emerging marine industries in Australia". Contributors to project 3.3 were engaged in the multi-stakeholder workshop.

# 2.1 The multi-stakeholder workshop

The workshop brought key data holders and research-users together to facilitate an exchange of information on assessment and regulation processes associated with offshore renewable energy, the data and information available to support those assessments, and initiatives underway gathering relevant data and information. In considering data and information already collected or being collected it also aimed to identify a set of priority action areas for improving the discoverability, accessibility and utility of information on hand for the Gippsland declaration area for use in planning, assessment and regulation. The workshop was held in hybrid mode to maximise inclusivity and scheduled to account for the various time zones of participants. Workshop participants included Commonwealth and State managers, consultants and researchers that have historically or are currently gathering baseline understanding/datasets relevant to the priority species, those conducting assessments under the EPBC Act and the *Offshore Electricity Infrastructure Act* 2021 (OEI Act) and offshore renewable energy proponents relevant to the declaration area.

#### 2.2 Data holder and user survey

To support discussions during the workshop, particularly in identifying the current limitations to the discoverability, accessibility and utility of information that has been collected from the Gippsland declaration area and adjacent regions, a pre-workshop survey was sent out to all those invited to the workshop. The data-holder and user survey focused on three primary areas: (i) datasets, (ii) data products and (iii) data use and data use requirements and was provided to workshop participants as a Google survey.

Survey questions aimed to identify what types of datasets were currently held by participants, whether the data sets or the metadata describing the datasets were discoverable or accessible and whether those datasets had or were currently being utilised in any state/Commonwealth planning, assessment or regulation process associated with state/Commonwealth legislation. Further, questions aimed to identify whether any data products had been produced from datasets for each of the species and whether those data products were discoverable and available for use. Finally, survey questions aimed to identify

what types of datasets and data products were currently being used by participants, what data sets and data products participants regarded as most useful and how familiar participants were with utilising data and metadata repositories. The full set of survey questions are provided in Appendix A. Responses to the survey were collated and anonymised to provide a summary that could be discussed during the workshop. Information on publications and repositories gathered through the survey contributed to the outputs of the literature and repository search.

# 2.3 Literature and repository search

Relevant literature on the relevant priority species were identified via four approaches:

- i. Use of reference lists included in the 2021 Australia State of the Environment report (see <u>https://www.dcceew.gov.au/science-research/soe</u>) and previous NESP projects;
- ii. Literature searches conducted utilising the platforms Google scholar and Web of Science using the search terms based on the species "common name" and species "scientific name", in combination with "status", "abundance", "distribution", "movement", "population", "diet", "demographics" (in various combinations) conducted across the period of the project. To ensure that literature reflected contemporary research understanding and was able to be collated within the time limits of the project literature searches were limited to 1990-2024. Noting the time limits of the project, the literature search was limited to the first ten pages of results based on relevance, noting that after the first ten pages, in most searches literature became increasingly irrelevant or repetitive;
- iii. Direct engagement with researchers; and
- iv. Publications listed in primary repository metadata records. This included searching the seabird tracking database, MoveBank, Birdlife International, the Ocean Biodiversity Information System, the Atlas of Living Australia, the Australian Ocean Data Network, eBird, Australian Antarctic Division Data Centre, the Australian Research Data Commons Research Data Australia, the Victorian Biodiversity Atlas and the Tasmanian Natural Values Atlas.

While it is recognised that some literature may not be captured, it was assumed that in combining multiple approaches, including direct interaction with researchers working in the region and on the priority species, the search was broad enough to capture relevant information on each of the priority species of relevance to the Gippsland declaration area.

Each publication was then qualitatively evaluated to identify:

- The distribution of the species and whether the species occurred within the wider Bass Strait region;
- Whether it contributed information on the four baseline information needs (presence, distribution, population dynamics, behavioural understanding as listed in section 1.1); and
- Details on datasets related to the publication and relevant repositories.

The above repositories were also searched individually to identify metadata records associated with data on each species.

In undertaking the literature and repository search, it became obvious that for some of the species identified as priorities for consideration by the project, there was no evidence that they occur in the region of Bass Strait. This included the Amsterdam albatross (*Diomedea amsterdamensis*), New Siberian Islands red knot (*Calidris canutus piersmai*) and Yakutian bar-tailed godwit (*Limosa lapponica menzbieri*). Information supporting this lack of evidence of occurrence within Bass Strait include Wilson et al. (2007), Schuckard et al. (2020), Piersma et al. (2021) and Delord et al. (2022). Datasets within repositories also provide information that supports a lack of evidence for these species occurring the region of Bass Strait. These include:

- the tracking datasets collected by the French agency CEBC-CNRS from Amsterdam albatross available in the Birdlife International Seabird Tracking Database (<u>https://data.seabirdtracking.org/</u>)
- sightings and occurrence records in the Atlas of Living Australia (<u>https://bie.ala.org.au/species/https://biodiversity.org.au/afd/taxa/0068714f-cc38-49e8-9541-7ff0e796b5f9#data-partners)</u>

The closest to Bass Strait an Amsterdam albatross has been recorded in metadata records and the literature is one individual that was estimated via geolocation (light-based) tracking technologies to have occurred at the edge of the Australian Exclusive Economic Zone south of Tasmania (Delord et al. 2022). Both the New Siberian Islands red knot and Yakutian bartailed godwit have been recorded from sub-tropical and tropical areas in Australia with no records from the Bass Strait region (Wilson et al. 2007; Schuckard et al. 2020; Piersma et al. 2021). Follow-up discussions with experts confirmed the literature identifying that the Yakutian bar-tailed godwit has a distribution limited to north-west Australia and it is only *Limosa lapponica baueri* that occurs in southern Australia (and New Zealand).

Uncertainties associated with the occurrence of these three species were discussed at the project workshop, with workshop participants confirming a lack of evidence supporting a distribution that includes Bass Strait (see section 2.3.2 of Appendix B). Given the lack of evidence supporting their occurrence in Bass Strait, these species were not considered further in terms of the literature and repository search. Whether they should continue to be considered in assessment and regulatory processes is beyond the scope of this project and should be a decision made by the relevant agencies in weighing up the evidence for the relevance of these species (see also section 4.3). It is noted that the scope of project 3.3 includes gathering information for species of relevance to ORE from across Australia (not just Bass Strait) and therefore information on all three species should be included in the outputs from project 3.3, This information could be utilised by those agencies tasked with assessment and regulatory processes in such a evaluation of relevance.

It should also be noted that positively confirming the subspecies of the two species of shorebirds (red knots comprise six subspecies, while godwits comprise at least five subspecies – see Avibase – The World Bird Database: https://avibase.bsc-eoc.org/avibase.jsp) and discerning Amsterdam albatross from wandering albatross (*Diomedea exulans*) in the field is challenging (see the Agreement on the Conservation of Albatross and Petrels species list: https://acap.aq/acap-species/233-amsterdam-albatross/file), impacting the accuracy of identification of the three birds throughout their distribution. Confirming whether these species indeed occur in Bass Strait and are therefore relevant to assessments of ORE activities within the Gippsland declaration area, will require further effort that is beyond the scope of this project.

In considering some of the other species that had been identified as priorities, repository records and the literature often did not acknowledge sub-species. For example, the Ocean Biodiversity Information System (OBIS), which is the largest global repository for metadata and data on ocean species does not recognise *Charadrius mongolus mongolus*, instead only listing records for *Charadrius mongolus*. Given that many records in OBIS are then replicated in national repositories such as the Atlas of Living Australia, Australia's national biodiversity database, recognition of the sub-species identified as priorities is also lacking from these repositories. To ensure that information gathering was a broad as it could be, both the species and sub-species was considered in literature and repository searches.

# 3. Results

# 3.1 Data and information discoverability

The multi-stakeholder workshop and the data-holder and user survey were summarised in a workshop report provided to all workshop participants in December 2023. This ensured rapid communication of the outputs from the workshop and survey. This report is provided in Appendix B.

The outputs of the literature search are provided in Appendix C and all metadata records identified through the repository search are available via the IMAS Metadata Catalogue (<u>https://doi.org/10.25959/GB51-RW44</u>), <u>Australian Ocean Data Network</u><sup>1</sup> (AODN) and <u>Research Data Australia</u><sup>2</sup>. Direct links to the original metadata record, associated information and where available datasets or data products are provided for each species record.

Although the workshop survey and literature suggested that a diverse range of datasets had been, and were being collected from a range of species, metadata describing datasets and/or datasets were not reflected in various repositories (Table 2). This lack of discoverability of data and information was reiterated in discussions during the workshop, where it was identified that there is a disproportionate amount of data and information that is held in individual files or databases that are not linked to data repositories or metadata aggregators, or do not have external features that could facilitate discoverability. This includes the majority of industry generated data, data and information held by consulting agencies and datasets held by individuals or agencies that are yet to be digitised, analysed or published. Overall, there is a general lack of documentation of datasets, other than presence (based on sightings) and movement/tracking datasets, via formal metadata records (Table 2). This lack of discoverability limits the ability to assess data and information for use in assessment/regulatory processes and what might need to be undertaken for uptake of data and information into assessment and regulatory frameworks.

Metadata that was provided in repositories varied in detail and in some cases, linkages provided either directly connecting the metadata record to datasets or to owners of datasets

<sup>&</sup>lt;sup>1</sup> https://catalogue.aodn.org.au/geonetwork/srv/eng/catalog.search#/metadata/48689b26-395e-4095-999f-0860e77cca36

<sup>&</sup>lt;sup>2</sup> https://researchdata.edu.au/collated-inventory-priority-mac-

<sup>321/3385338/?</sup>refer\_q=rows=15/sort=record\_created\_timestamp%20desc/class=collection/p=1/q=Gip psland/

were out of date or did not work. This resulted in a lack of information on individual datasets that allowed for the evaluation of the relevance and applicability of those datasets, including the evaluation of data quality and what might be needed to facilitate the uptake of data and information into assessment and regulatory frameworks.

Table 2. Summary of data and information available for the species considered by the project. Data and information indicated in grey represent information has been collected, but is not currently discoverable through a formal data or metadata repository. Where data and information are identified by a black cross, the details of the associated metadata records have been provided at <u>https://doi.org/10.25959/GB51-RW44</u>.

Species	Presence	Distribution/	Population dynamics	Diet/ forage
Australian Gould's Petrel	Х	X^	X	Х
Curlew Sandpiper	Х	Х		
Far Eastern Curlew	Х	X*		
Grey-headed Albatross	Х	Х	Х	Χ^
Mongolian Lesser Sand Plover	Х	X*		
North-eastern Siberian Red Knot	Х	X*		
Northern Royal Albatross	Х	Xv	Xv	
Orange-bellied Parrot	Х	Χ*	Х	Х
Swift Parrot	Х	Χ*		
Shy Albatross	Х	Х	Х	Х
Southern Giant-Petrel	Х	X^	X	X
Tasmanian Wedge-tailed Eagle	Х	X^	Х	Х
Blue whale	Х	X^	X#	X#
Southern right whale	Х	Xv	Xv	X#
Humpback whale	Х	X	X#	X#

\*Determined from presence data

^Information available, but limited to areas outside of Bass Strait

#Information available, but given the age of the data, likely out of date

Noting that a number of species are either migratory or have broad distributions, information and datasets able to be identified by the project were, in a number of cases, derived from research efforts conducted either outside of the Bass Strait or outside of the Australian region. Further, while data and information on a species might be available, it may not be associated with the Bass Strait region. For example, information on the movements of many shorebirds is contributed to by studies conducted in other parts of Australia or in other countries that are part of the East Asian-Australasian flyway (e.g., Nebel 2007). Information on the movements of northern royal albatross (*Diomedea sanfordi*) is limited to populations located in New Zealand and is associated with regions that do not include Bass Strait (e.g., Nicholls et al. 2002; Waugh et al. 2005; Thomas et al. 2010). Similarly movement data

available from Tasmanian wedge-tailed eagles only describes movements within Tasmania and does not extend into Bass Strait (e.g., Pay et al. 2022). For some species, particularly blue whales (*Balaenoptera musculus* spp.), data and information on population dynamics, such as breeding metrics, is largely limited to the period during which whales were harvested (e.g., Branch and Mikhalev 2008; Branch and Monnahan 2020). Given the age of these datasets (50+ years old), it is unclear if information on these aspects of the biology of these species is still accurate.

The workshop and associated survey identified that data and information users were a mixture of those wanting to access and use primary datasets to develop their own products, such as spatial distribution maps or population metrics, and those that would prefer to be able to access data products that allowed for rapid evaluation of changing distributions or trends. Survey respondents identified that a number of data products had been developed from species datasets, including species distribution maps, abundance metrics and habitat use maps, but again, metadata records associated with these products were lacking, limiting their discoverability and broader utility. When questioned as to whether the current limitations to discoverability could be addressed, approximately half of respondents identified that they could partially be resolved through direct collaboration with data and information holders and development of data agreements. In identifying a desire to access data products, participants in the workshop identified that the uncertainties associated with those products should be clearly identified and made available.

Most participants did not have a good understanding or working knowledge of the metadata and data repositories holding data and information on species and identified that they would need some guidance in finding and accessing repositories and then locating relevant data and information records.

# 3.2 Utility of data and information for assessment/regulation

Noting the data and information currently discoverable and therefore available for assessment and regulation (predominantly presence information, Table 2), and the guidance on information needs provided in the "Key environmental factors for offshore windfarm environmental impact assessment under the Environment Protection and Biodiversity Conservation Act 1999" and the "Offshore renewables environmental approvals" documents (DCCEEW 2023; Australian Government 2023), the utility of data and information was considered in relation to two aspects:

- Where species are located in Bass Strait and the relationship with the declaration area; and
- What period of time species utilise Bass Strait and in particular, the declaration area.

Being able to consider any further aspects associated with the biology of species or factors associated with determining potential impacts is limited because of the lack of discoverability of data and information beyond that associated with presence and movement.

#### 3.2.1 Estimating measures of spatial and temporal use

Overall presence information for some species (all of the shorebird species, swift parrot, shy albatross; see https://doi.org/10.25959/GB51-RW44) appeared to be dense both spatially and temporally with some datasets consisting of 10's of thousands of sighting records and spanning substantial periods (40+ years). However, once spatially limited to the area of Bass Strait, the number of records and associated spatial and temporal coverage decreased substantially (Figure 2). This resulted in large spatial areas with no information available from which temporal or spatial variability in presence within the Bass Strait region could be established. Further, spatial biases in the data are evident, with the majority of sightings limited to coastal areas frequented by the public and therefore where the majority of effort associated with sightings is located. Because of these biases and a lack of information associated with effort, estimation of robust measures of spatial and temporal use is limited (see also section 3.2.4. of Evans et al. 2022 for a detailed discussion of biases associated with opportunistic sightings datasets). For those regions where sightings are dense (i.e. coastal, nearshore areas), however some indication of spatial and temporal use could be determined. This is particularly relevant to shorebirds, where the distribution of species is predominantly limited to nearshore coastal areas within the Bass Strait region (Figure 3) and as a result, presence datasets are likely to be informative in determining spatial and temporal use of the Bass Strait region.



Figure 2. Sightings records for shy albatross (*Thalassarche cauta*) accessed from the Atlas of Living Australia July 2024.

When movement data derived from tracking studies is regarded similarly, the same reduction in information relevant to the Bass Strait region occurs for many of the species tracking data is available (curlew sandpiper, eastern curlew, grey-headed albatross, northern royal albatross, wedge-tailed eagle, humpback whale, see <a href="https://doi.org/10.25959/GB51-RW44">https://doi.org/10.25959/GB51-RW44</a>). The exception to this is the tracking dataset from shy albatross, which spans 1993-2019 and consists of over 200 individual tracks. When combined, these tracks provide information that that is spatially more comprehensive for some parts of Bass Strait than presence data alone (Figure 4).

It should be noted that most sightings datasets, due to their opportunistic nature, are not subject to quality assurance processes. This results in many containing an unknown number of errors either introduced in the original recording or compilation process. It is beyond the scope of this project to undertake quality assurance of each dataset identified and should be something that any future efforts utilising the metadata records compiled by this project undertakes before using datasets.



Figure 3. Sightings records for eastern curlew (*Numenius madagascariensis*) accessed from the Atlas of Living Australia July 2024.

# 4. Recommendations and future steps

This project provides an overview of the information and datasets that have been gathered for a set of priority species and the publications produced for use in understanding the research conducted and datasets generated for the Bass Strait region. The workshop, and searches of the literature and repositories all identify that datasets on priority species are dispersed, have been generated by a diverse range of data producers and have varying levels of discoverability and accessibility. These data producers include Australian government agencies, state agencies, universities, non-governmental organisations, citizen science groups and the public.



Figure 4. Movement tracks of shy albatross from GPS tags deployed at Albatross Island 2013-2019, accessed from the Birdlife International seabird tracking database July 2024.

Bringing datasets together for use in assessment and regulation will require some effort, not only in compiling datasets, but also in ensuring that data are checked for errors and are formatted in standardised ways and ensuring understanding of the data itself. Further effort will need to be placed into data discovery, particularly given that many datasets are not represented by metadata records in repositories. This will require developing better connections between data generators and data users and establishing collaborative agreements with data holders. The list of stakeholders generated by this project as part of the process of coordinating the workshop detailed in Appendix B provides a starting point for building a network of data generators and data users. While beyond the scope of this project, in order to support understanding and facilitate the exchange of information between data generators and users, mechanisms that connect the many stakeholders such as communities of practice or forums and regular stakeholder workshops could be considered.

Priority action areas for improving the discoverability of, access to and generation of data and information on the species considered by this project were identified by the workshop and include those associated with (i) improving metadata to support discovery and evaluation of use (ii) connecting and compiling datasets and (iii) recognition and attribution of data generators (see Appendix B). A number of priorities for addressing current information gaps associated with determining impacts on species were also identified through the workshop conducted by the project. These are expanded on in the following sections.

# 4.1 Accessing and evaluating datasets

Where datasets are housed in a formal repository (such as the BirdLife International Seabird Tracking Database or Movebank), datasets need to comply with standardised formats for archiving and provision of metadata, thereby supporting interoperability. However, not all repositories require standardised formatting of datasets, nor require that all metadata information is provided, resulting in varying amounts of metadata being provided and varying formats of datasets. Determining the details of datasets and their suitability for application within assessments can be difficult as a result, and if metadata records are not maintained the ability to identify data owners can be compromised. This is a not uncommon problem (see for example Espinosa et al. 2018), and there are many initiatives being implemented internationally that aim to address a lack of data and metadata standards including those being coordinated through OBIS (e.g., https://obis.org/2023/10/02/obis-data-course/), Ocean Best Practices System (e.g., https://www.oceanbestpractices.org/ocean-best-practices-systems/news-and-events/workshop/workshop-viii/) and Ocean Teacher Global Academy (https://classroom.oceanteacher.org/).

Most state government environment and conservation agencies have placed substantial effort into managing datasets collected by themselves and submitted by the public. Many have a mandate to manage and archive the data they produce appropriately. Most government repositories are linked to metadata aggregators such as the Atlas of Living Australia nationally or OBIS internationally, which facilitate discovery and provision of metadata associated with datasets and contact points for accessing data. However, if metadata standards are not compatible between repositories and aggregators, this can result in discrepancies in the metadata provided by databases, lags in updating of information or exclusion of records.

Metadata standards exist, and within Australia, ANZLIC provides a technical definition of standards (AS/NZS ISO 19115:2022). The Australian Research Data Commons refers to the ISO standards in its Metadata Guide<sup>3</sup>, and also provides reference to a number of other standards that are based on the ISO standards. **Greater engagement with researchers to improve knowledge in the use and application of metadata standards as well as more** 

<sup>&</sup>lt;sup>3</sup> https://ardc.edu.au/resource/metadata/

stringent adherence to those standards by research infrastructure would assist in not only ensuring that good metadata associated with datasets is provided, but also assist in guiding standardised provision of datasets through the application of detailed data schemas. This will be highly critical for ensuring interoperability of datasets and ensuring that data collectors are meeting the information requirements of assessments and regulation.

Even with national metadata aggregators such as the Atlas of Living Australia, bringing datasets together, at national or regional levels will require some effort placed into compilation, particularly where data may not be directly accessible and where metadata or data detail has not been provided, or is unclear. This will require substantive engagement with original owners in order to determine what datasets might be held, what format or state those datasets are in and what might be required for compilation, translation and use. Given the number of datasets for which associated metadata has not been made available, **determining broadly applicable mechanisms for engagement with individual data owners will be essential for being able to assess what information relevant to assessments has been collected and what might be available for use under collaborative agreements.** 

Moving forward, **identifying mechanisms through which improved provision of metadata describing datasets and submission of those metadata into repositories can be facilitated will be essential for ensuring that data collected of relevance to assessments are discoverable, interoperable and reusable and meet internationally recognised FAIR data principles** (Bayer et al. 2023). Given that the vast majority of biodiversity related research is carried out with the support of government funding (either at the state or the national level and either directly or indirectly), this will require engagement by funding programs to actively implement FAIR principles for data collected more broadly. In association, funding programs will need to partner with research infrastructure to facilitate delivery of quality metadata into repositories.

# 4.2 Attribution and interpretation

The workshop identified that amongst many attendees, attribution of data collectors and correct interpretation of datasets was highly important and primary reasons for maintaining some control over data access and sharing. There was broad recognition that **inclusion of datasets in compilation and translation activities should be undertaken within formal partnerships between data providers and data users**. This would ensure that datasets are not misinterpreted, use of datasets met the principles and objectives of data producers, outputs were co-created and co-delivered with data providers and that outputs were of use to data providers. While some agencies have developed data sharing agreements that can facilitate such partnerships, some agencies have not, and data agreements addressing that gap will need to be developed. Data users will need to place some effort into engaging with data providers and determining approaches for use of datasets that are of mutual benefit.

# 4.3 Prioritising research efforts

In addition to identifying where effort needs to be placed into the compilation of datasets, the workshop, and searches of the literature and repositories, identify priorities for focusing research efforts. These cover three areas (i) developing transparent and robust approaches for identifying species that research efforts should be focused on (ii) developing a better understanding of the area of overlap of interactions between infrastructure and species (across multiple dimensions); and (iii) identifying a set of priority impacts that need to be focused on and mapping the associated data requirements for determining those impacts.

#### 4.3.1 Identifying relevant species

# The need to establish the relevance of many species that have been identified as priorities for the Gippsland declaration area was identified by the workshop as a clear information need.

For some species, in the absence of information on movements of animals, there is an assumption that because they occur in Tasmania and/or Victoria that species overlap with the declaration area. For others, because they have been recorded at least once in the region, it is assumed that they spend substantial amounts of time in the region of the declaration area. However, for many species, several uncertainties in their distribution, movements and behaviours limit the ability to determine their degree of overlap with the declaration area and therefore their relevance to assessments and regulation. This includes a lack of information on (i) variability in the areas utilised within the region of Bass Strait, (ii), variability in the time spent in the region of Bass Strait (iii) the populations and the proportion of each utilising the region of Bass Strait (and associated variability across life stages and sexes) and (iv) activity/behaviour whilst in the region of Bass Strait (e.g., directed movement, substantial utilisation, foraging, socialising, resting etc.).

As a first step an information mapping exercise should be carried out to determine the relevance of a species to the declaration area (see also above). This could consist of a combination of a literature review, expert consultation and/or metadata exploration that would allow a rapid evaluation of the likelihood that a species occurs within the region of interest (e.g., Bass Strait). In addition, the workshop identified that to support transparency and robustness in any prioritisation of species, the criteria used should be provided.

Part of this process has already been facilitated by this project and the NESP Marine and Coastal Hub project 3.3 "Guiding the sustainable development of offshore renewables and other emerging marine industries in Australia". These projects have undertaken the literature review and identification of discoverable datasets for a wide range of species and provide the foundation for a rapid evaluation of species relevance. Further, the outputs from the two projects provide for clear identification of datasets utilised in such a mapping exercise.

To assist with facilitating information gathering and generation, the workshop identified that stakeholders need to better connected. **Developing mechanisms that bring government, proponents, researchers, and infrastructure providers together will support improved** 

communication, awareness and exchange of information across those generating and using data and information on priority species across the region. This will also facilitate understanding of novel infrastructures and technologies that can both introduce new impacts and assist with the mitigation of impacts. This will also assist with avoiding efforts that are duplicative and/or contradictory and ensure that synergies can be identified, and collaborative efforts supported.

#### 4.3.2 Determining spatial and temporal overlaps with infrastructure

The most direct approach to establishing the spatial and temporal variability in the use of Bass Strait by a species, the populations utilising the region and their behaviour whilst in the region is through tracking studies. Such studies:

- 1. provide for spatial and temporal linkages between a population with use of the Bass Strait region when individuals are tagged at an originating colony or can be associated with a particular population (e.g., through genetics);
- 2. provide for the determination of the sex and life stages utilising the Bass Strait region and variability across these;
- provide information on behaviour (including flight behaviours) while utilising the Bass Strait region and associated spatial and temporal variability in behaviour, particularly given that many of the technologies and methods for tagging now allow for tracking of individuals over substantial amounts of time; and
- 4. provide for the determination of population level patterns in movements and behaviour through multi-year studies conducted at an originating colony or on a particular population.

Key to being able to establish the impacts of interactions with ORE on species is an ability to be able to determine the source of individuals utilising the Bass Strait area. Without doing so, quantification of impacts (both in space and time) will be challenging, because monitoring efforts will not be able to be focused appropriately on relevant populations of a particular species, particularly where those populations utilising the declaration area are cross boundary/jurisdictional.

For some species information on the populations utilising the Bass Strait area is already available, either because species are endemic to the region (e.g., shy albatross, *Thalassarche cauta*) or because a large proportion of the population likely to be utilising the Bass Strait region has been monitored for some time (e.g., Gould's petrel, *Pterodroma leucoptera leucoptera*; orange bellied parrot, *Neophema chrysogaster*). In these cases, partners needing to be engaged to fill information gaps on overlaps between species populations and infrastructure can be readily identified and collaborative efforts developed.

Not all species however will be of a size, weight or robustness that can tolerate tags or not have their behaviours altered by tags. They also might not be accessible or have a behaviour that could facilitate such studies. Further, accessing populations to support effective monitoring programs that could robustly identify and quantify impacts might be challenging. An evaluation of the "suitability" of individual species to such studies should be a first step in

establishing the feasibility of determining the spatial and temporal degree of interaction, the population or stock that is interacting with the Bass Strait region and quantifying any impacts at the population level (i.e. can population changes be monitored through time). Further, while beyond the scope of this project and not explored at the workshop, novel ways of combining of multiple approaches to build similar understanding should also be considered.

In undertaking an evaluation of the "suitability" of species, the outputs from the NESP Marine and Coastal Hub projects 1.20 "Threatened and migratory species scoping study", 1.21 "Australia's coastal shorebirds: trends and prospects", 3.3 "Guiding the sustainable development of offshore renewables and other emerging marine industries in Australia", 3.15 "Monitoring aggregation areas and approaches to improve data effectiveness for southern right whale conservation", "4.17 "Migratory shorebird populations: research for management and recovery", 4.8 "Potential impacts of offshore wind developments on eastern Indian Ocean pygmy blue whales", and 4.9 "Assessing the vulnerability of southern right whale and blue whale populations to disturbance from windfarm developments" will be somewhat useful. These will allow for the identification of tagging studies that have already been conducted and what studies are planned in the near future. Projects 1.20, 1.21, 3.3 and 4.17 in particular provide highly useful information on data that is available or will be generated on the population dynamics of several threatened and migratory species.

In addition to those projects completed or underway by the NESP Marine and Coastal Hub and its partners, a number of projects generated by the NESP Marine Biodiversity Hub over the period 2015-2021 provide information on population parameters of relevance. Threatened species recovery plans, conservation management plans and conservation advice (see <u>https://www.dcceew.gov.au/environment/biodiversity/threatened/recovery-plans</u>) are also of use in identifying what population parameters are known for those species of focus by the plans and identify additional impacting processes that will need to be considered in assigning and quantifying impacts resulting from offshore renewable energy activities.

#### 4.3.3 Identifying impacts and mapping data requirements for determining impacts

The "Key environmental factors for offshore windfarm environmental impact assessment under the Environment Protection and Biodiversity Conservation Act 1999" and the "Offshore renewables environmental approvals" documents (DCCEEW 2023; Australian Government 2023) list broad impact areas associated with ORE. They do not however identify what information or data is needed to understand what species might be impacted, to what extent they might be impacted and what monitoring would be needed to measure impacts, particularly the cumulative effects of impacts, and the effectiveness of mitigative measures through time. Further, with the development and expansion of the sector, novel and emerging technologies are rapidly being introduced into infrastructure. This has the potential to both modify and introduce new impacts, but also provide for new approaches to mitigating impacts. Traditional approaches to modelling or quantifying impacts may need to be expanded and developed to account for evolving infrastructure including altered above and below water noise propagation profiles, expanding interaction zones, site-specific operation schedules and development of multi-use platforms (Mathern et al 2021; Edwards et al. 2023). Determining a priority list of impacts needing to be understood and the key datasets needed to quantify impacts was therefore a priority action identified by workshop participants.

Substantial effort has been placed in identifying potential impacts to a range of marine species and environments in regions where offshore wind energy projects are established (e.g., Europe, the USA). The outputs of these efforts provide a highly useful starting point for Identifying priority datasets of relevance to the Gippsland declaration area and pathways for their use in decision making Page | 23

focusing efforts on identifying and mapping impacts and the data requirements needed to quantify impacts in the Bass Strait region. Useful resources where information on potential impacts that are common across regions and infrastructure types include the Bureau of Ocean Energy Management (www.boem.gov), the European Marine Spatial Planning Platform (www.maritime-spatial-planning.ec.eruopa.eu), OES-Environmental (https://tethys.pnnl.gov/) the UKERC Energy Data Centre (https://ukerc.rl.ac.uk/DC/cgi-bin/edc\_search.pl?GoButton=Detail&WantComp=289) and the Offshore Renewables Joint Industry Program (http://www.orjip.org.uk/). In addition, there is a substantive amount of peer reviewed literature available that has amassed over the last decade identifying primary impacts and methods for quantifying those impacts (e.g., Desholm et al. 2006, Bailey et al. 2014, Bergström et al. 2014; Masden et al. 2021, Croll et al. 2022, Galparsoro et al. 2022, Lloret et al. 2022).

Any exercise identifying impacts and mapping data requirements would benefit from these resources, particularly in identifying lessons learned and avoiding duplication of unproductive efforts. Further, these resources could be used to develop clear guidance on the assessment of cumulative effects that within the context of assessment and regulatory requirements. Without totally redeveloping similar web-based platforms, **key data and information already available across multiple websites could be brought together within the context of Australian assessment and regulation needs through a data and information mining and aggregation mechanism. Examples of information and data aggregators already exist (e.g. the Ocean Data Information System; https://odis.org/) and infrastructure for bringing diverse data and information streams together could be utilised in a similar way to support assessment and regulation needs.** 

The NESP Marine and Coastal Hub project 4.7 "Development of regional modelling and risk assessments to inform offshore renewable decision-making" aims to examine potential impact pathways for key threatened and migratory species and associated cumulative effects. In doing so, it provides an opportunity to undertake a process of identifying and mapping impacts for those species across the breeding, over-wintering, foraging and migration regions, both within Australian waters, and outside of Australian waters. Given the limited data available for many threatened and migratory species, particularly in quantifying population dynamics, and the lack of monitoring for tracking impacts at the population level, the project also provides the opportunity to map out the data requirements for determining impacts and associated cumulative effects. Outputs such as this will be highly useful for identifying where information gaps need to be filled to provide the data needed for robust individual species modelling and risk assessments of threatened and migratory species. This would provide the information needed to ensure that effective monitoring programs can be put in place to fill information gaps and establish trends in population parameters that are informative for quantifying impacts. In this regard, project 4.9 "Assessing the vulnerability of southern right whale and blue whale populations to disturbance from windfarm developments" will also provide a useful contribution to mapping out the data requirements for determining impacts on two whale species within Australian waters and, in particular, those declaration areas located offshore of Victoria.

# 5. Outreach and communication

This project has benefited from close and regular communication with the regulatory and assessment teams located at DCCEEW and NOPSEMA throughout its lifespan, particularly in planning and conducting the workshop conducted by this project. It has purposely been built around activities that engage directly with Commonwealth and state agencies, the research community and industry, providing pathways for direct outreach and exchange of information. In addition to the activities detailed in this report, the project has also:

- Contributed to the development of NESP projects 3.3. "Guiding the sustainable development of offshore renewables and other emerging marine industries in Australia" and 4.7 "Development of regional modelling and risk assessments to inform offshore renewable decision-making", particularly in provision of projects ideas and scope to NESP;
- Attended and contributed to a NESP-CSIRO-DCCEEW-NOPSEMA-AIMS workshop on offshore renewable energy research needs (May 2023);
- Provided a project update at a NESP showcase event (January 2024);
- Contributed to an informal steering committee for project 3.3 (2023-2024);
- Provided a presentation to the Clean Energy Council Directorate on the outcomes of the project workshop (February 2024);
- Reviewed a series of reports generated by a series of consultancies facilitated by DCCEEW identifying research priorities for parrots, albatross and petrels and cetaceans (February-March 2024);
- Contributed to the establishment of NESP Hub Offshore Renewable Energy Program Advisory Committee; (March-April 2024);
- Provided a presentation to the "Research to support the sustainable development of offshore renewables energy in Australia" session at the joint Australian Marine Sciences Association and New Zealand Marine Sciences Society conference (September 2024); and
- Contributed to NESP communication products developed from the project (see https://www.nespmarinecoastal.edu.au/story/whos-talking-about-offshore-wind-energy/).

Presentations provided to the NESP showcase event and Clean Energy Council provided in Appendix E.

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This project is supported with funding from the Australian Government under the National Environmental Science Program.