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Strengthening ocean literacy: marine science education and training to ensure Australia's blue future

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ABSTRACT

This white paper sets out a national vision for advancing ocean literacy in Australia and outlines the role of marine science in fostering an informed, engaged society capable of addressing the challenges and opportunities of our changing oceans. As environmental pressures intensify, and marine resource demands increase, Australians' capacity to engage with ocean issues, understand risks and opportunities, and participate in marine decision-making has

KEYWORDS

Ocean literacy; ocean stewardship; marine science education; workforce development; blue economy

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never been more urgent. Marine science will play a central role in building ocean literacy by delivering credible, actionable science, and strengthening education and training systems that enhance understanding of, and connection to, the ocean. Our vision identifies three key enablers: 1/ enhancing ocean literacy for all Australians; 2/ credible, actionable and co-produced marine science; and 3/ future-ready marine science education and training that builds a skilled, adaptable workforce for the blue economy. Building on existing international efforts and frameworks, we outline current gaps, barriers, and opportunities, and make recommendations for coordinated national action, including the development of a National Ocean Literacy Strategy to drive progress. This paper calls for national leadership and cross-sector collaboration. Our vision is to empower all Australians to make informed, responsible choices that contribute to a resilient and thriving future.

1. Introduction (societal benefits)

A combination of pressures including climate change, population growth, and an expanding blue economy will shape future use and management of the marine realm. The actions society takes now, and over the next decade, will determine the sustainability of this use and management. How will society choose to vote, make decisions, and take actions that can ensure ocean sustainability? This is the question around which this white paper centres.

Ocean literacy is of increasing relevance because it reflects public understanding of the ocean and indicates societal connections with, as well as attitudes and behaviours towards, the ocean. Ocean literacy extends beyond knowledge; it encompasses multiple dimensions, including pro-ocean behaviour, active stewardship, and public engagement with the ocean (McKinley, Burdon, and Shellock 2023). The theory of change behind ocean literacy posits its increase can foster more informed and responsible decision-making, resulting in the behaviours and policies needed to support ocean sustainability. For example, embedding tailored and relevant ocean knowledge into engagement, education, and policy, empowers individuals and societies to act as stewards of marine environments. Thus, efforts to achieve or improve ocean literacy involve equipping people with the knowledge, skills, and motivation to engage with marine issues, understand the associated risks and opportunities, and participate actively in decision-making processes and needs related to ocean use and management.

The marine science community has traditionally provided the best available information to Australian stakeholders. However, the landscape of data provision and knowledge transfer has changed dramatically over the last decade, largely because of increasing online consumption of information. Today, a central challenge to delivering the best available marine science for management needs lies not in data provision, but rather, in providing data and information in forms that are trusted, user-tailored, and stakeholder-responsive. This challenge is amplified by the diverse needs and interests of the growing array of stakeholders and rightsholders involved in governance, including: industry leaders in sectors such as fisheries, aquaculture, energy, and tourism; Traditional Owners (TOs) who maintain deep cultural and spiritual ties to Sea Country and have

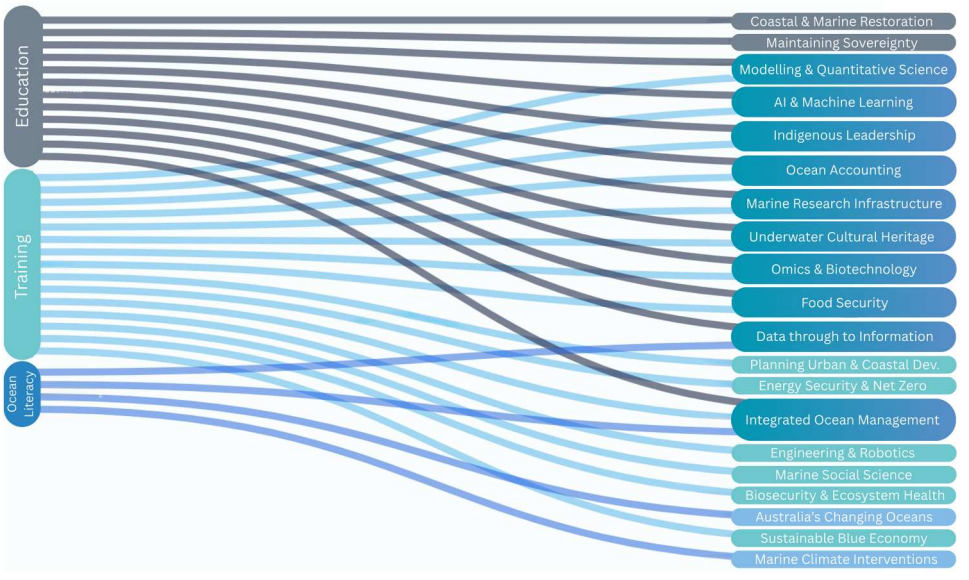

Figure 1. Education, training, and ocean literacy as cross-cutting enablers for Australia's National Marine Science Strategy (2026–36).

established rights within their recognised waters; community groups advocating for local interests; policy-makers charged with regulating marine use; government agencies including regulatory and defence bodies; and scientists generating new knowledge about marine ecosystems. Each group brings its own perspectives, needs, priorities, and knowledge systems, yet all require accurate and accessible information in forms that facilitate easy use and accurate interpretation and ultimately turning understanding into effective action.

This white paper is one of several papers developed to inform Australia's next National Marine Science Strategy (2026–36). Education, training, and ocean literacy function as critical enablers that underpin success across all marine science priorities. As Figure 1 illustrates, strategic investment in education, training, and ocean literacy generates multiplier effects, and simultaneously addresses capability gaps across sectors, with the end goal of empowering all Australians to make informed choices that contribute to a sustainable ocean future.

Australian marine science, including the natural and social sciences, can play a pivotal role in shaping a sustainable ocean by 2036 through supporting national-scale ocean literacy, and providing the education and training needed to equip emerging and future marine scientists for the changes ahead. We emphasise that the marine science community must deliver rigorous interdisciplinary research in collaboration with and/or reflecting the needs of key stakeholders and rightsholders, and improve the way it communicates, extends, and co-produces knowledge with other sectors.

Building on this foundation, we consider ocean literacy in two parts for the purpose of this white paper: first, the role of marine science in advancing ocean literacy across sectors; and second, the development of skills, capacity, and interests of the marine researcher community (including the current workforce and emerging generation), as a

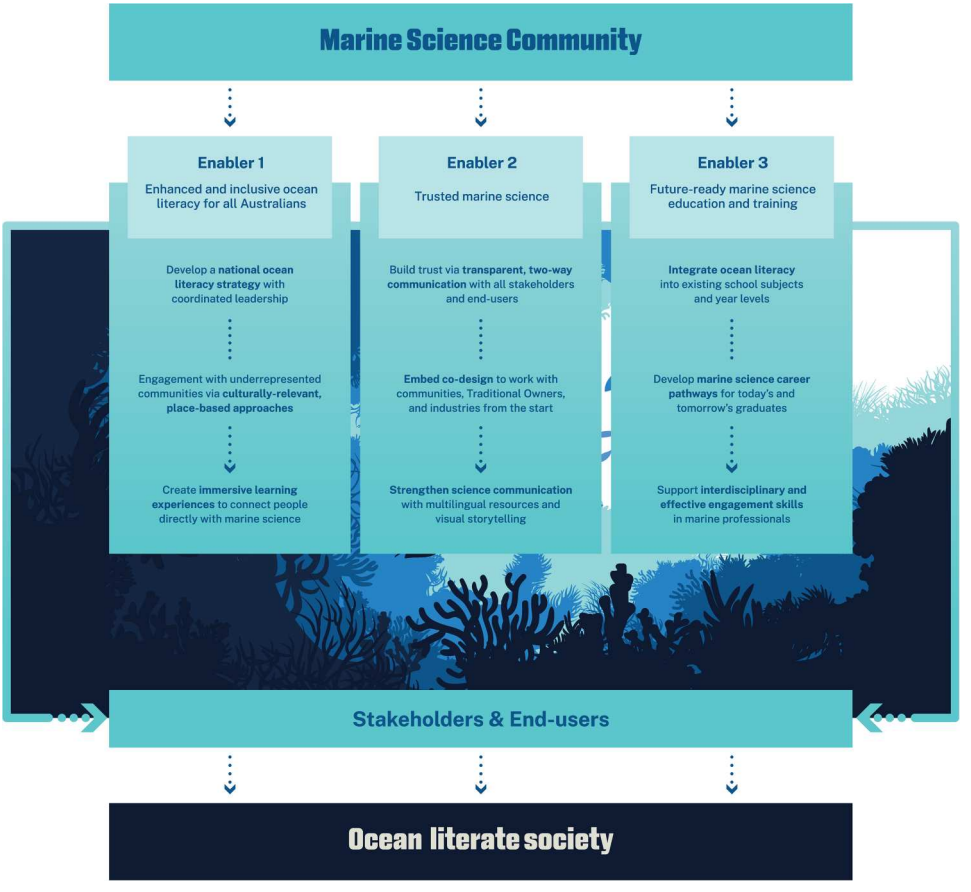

Figure 2. Marine science, in the context of education, training, and ocean literacy, can contribute to advancing ocean literacy (and resultingly, sustainability) by improving, targeting and amplifying efforts to connect to Australian society: including the creation of mechanisms for two-way engagement and fostering stronger education and training systems.

necessary conduit to achieving this (Figure 2). Marine science will play a role in advancing ocean literacy by delivering credible, actionable scientific knowledge to inform policy and practice; and by strengthening cross-sector and interdisciplinary education and training in marine science nationwide. The goal of these efforts will be to ensure a well-prepared, connected, and informed Australian society capable of responding to current and future ocean challenges.

2. Ocean literacy in Australia

First Nations Peoples of Australia are deeply interconnected with Sea Country, encompassing the vast marine environments surrounding this continent, for tens of millennia and continue to care for Country today. This enduring relationship with Sea Country has fostered an extraordinary depth of Traditional Knowledge, built through generations of observation, cultural practice, and sustainable management.

Indigenous knowledge systems offer invaluable insights that can not only enhance scientific understanding but also provide more holistic and applied perspectives that can inform, for example, efforts to advance ocean literacy. Equally important, ocean literacy has the potential to amplify the voices of Traditional Custodians, recognising cultural connections to Sea Country and embedding their perspectives in how wider society understands and cares for the ocean. This creates opportunities for genuine knowledge exchange where Traditional Knowledge systems and contemporary ocean literacy approaches can mutually strengthen each other. Examples of Indigenous collaborations, co-designed research, and Indigenising curricula are highlighted below, however they are not the focus of this paper. The black paper *Flipping the Tide: A First Nations vision for Indigenous Leadership in Sustainable Ocean Culture* provides deeper exploration and recommendations for the meeting of marine science and Traditional Knowledge perspectives in practice.

2.1. Current status of ocean literacy in Australia

The concept of ocean literacy emerged in the early 2000s through collaborations between marine scientists and educators in the United States, leading to the development of seven principles, designed to guide marine science education (Cava et al. 2005). Since then, ocean literacy has evolved into a multi-dimensional concept encompassing knowledge, communication, behaviour, awareness, attitudes, activism, emotional connection, access and experience, adaptive capacity, and trust and transparency (Brennan, Ashley, and Molloy 2019; McKinley, Burdon, and Shellock 2023). It is now recognised as both a global objective and an expanding field of research and practice, as reflected in frameworks like the UN Ocean Decade Barcelona Statement (2024). This shift reflects a broader understanding that fostering ocean connections and stewardship requires more than information-sharing; it also involves emotional, cultural, and experiential engagement.

Situating Australia in the global context, the United Nations Decade of Ocean Science for Sustainable Development (2021–30) has established ocean literacy as a foundational enabler underpinning all ten UN Ocean Decade outcomes; and calls for inclusive, co-designed approaches that engage scientists, educators, industry, Indigenous knowledge holders, youth, and policymakers. The Decade set a key target to embed ocean literacy into national curricula and education policies worldwide by 2025 – yet Australia has not acted on these recommendations. Whilst recent developments have made considerable progress, ocean literacy needs to be further prioritised.

Australia has strong potential to advance leadership in ocean literacy research: the nation is ranked 11th globally for number of ocean literacy publications (Shellock et al. 2024). Much of this work has occurred through international collaborations rather than exclusively Australian initiatives (Paredes-Coral et al. 2021), demonstrating the global relevance of Australian ocean literacy research and growing visibility and impact. For example, a recent interdisciplinary paper highlighted Australia's diverse approaches to ocean literacy research and practice and proposed opportunities to amplify these efforts nationally and internationally via a National Ocean Literacy Strategy (Kelly et al. 2025). Momentum is also building across Australia's marine science community. Conferences such as the Australian Marine Science Association (AMSA) annual meetings in

2024 and 2025 embraced ocean literacy as a core theme, indicating that ocean literacy is increasingly recognised as an interdisciplinary issue, not solely an educational focus.

Ocean literacy is also emerging in national policy dialogues. The draft Sustainable Ocean Plan developed by the Department of Climate Change, Energy, the Environment and Water (DCCEEW) explicitly references the importance of empowering youth, creating marine career pathways, and supporting educator training. This inclusion marks an important step in recognising the need to engage Australians as active participants in ocean sustainability. Ocean Decade Australia – a non-government organisation focused on facilitating national engagement on the ocean – has undertaken surveys of research, industry, government, and community organisations perspectives: results indicate a shared need for improved collaboration and communication between all ocean stakeholders and rightsholders. Further, a 2024 survey highlighted that no single sector could achieve ocean sustainability alone; rather there is a need for systems-based thinking, shared goals and responsibilities, as well as improvement of ocean literacy across sectors (Ocean Decade Australia 2024).

2.2. Marine science and society today

Australia has a well-established marine science community with internationally leading research expertise, robust institutions, and access to world-class infrastructure. However, as pressures on marine systems intensify, there is increasing demand for science that is not only of high standard but is also accessible and trusted by end-users (including decision-makers across public and private sectors). Ensuring that end-users and decision-makers across the private and public sectors can make informed choices about ocean use and management requires the marine science community to improve how it shares and promotes data availability (Morrison et al. 2025).

Relative to other countries, public trust in science in Australia is high. In a recent global study surveying over 70,000 people across 68 countries, Australia ranked 5th globally for public trust in scientists (Cologna et al. 2025). This presents a strong foundation for expanding science-society partnerships but is dependent on the marine science community maintaining (and further enhancing) this trust by actively making science visible, meaningful, and communicated in ways that strengthen ocean literacy across society. Expanding partnerships requires greater effort in delivering co-produced research that integrates diverse knowledge systems, responds to community and management needs, and is communicated in ways that are meaningful and tailored to the varied needs of different groups across society.

Recent years have seen a growing number of successful cross-sector projects that involve partnerships between scientists, policymakers, First Nations communities, and other relevant actors. For example, a partnership initiative between the DCCEEW, Western Australia (WA) Biodiversity Science Institute, WA Marine Science Institution, and Australian Research Data Commons seeks to develop a trusted environmental data and information supply chain – and develop a shared environmental analytics facility.

These collaborations are helping to move marine science beyond academic boundaries and into real-world contexts in which science informs policy and community stewardship. A leading example is the Australian Institute of Marine Science's four-tiered engagement model for Indigenous partnerships, which progresses from communication to

collaboration, co-development, and ultimately community-led partnerships. While developed specifically for Traditional Owner engagement, the framework offers a useful structure for involving a broader range of stakeholders in the research process. This structured pathway can build trust, ensure local relevance, and support more inclusive, place-based approaches to knowledge generation and application.

Similarly, citizen science programs such as *Eye on the Reef* (coordinated by the Great Barrier Reef Marine Park Authority), *Reef Life Survey*, and *Redmap Australia* also demonstrate the potential for public engagement with/in science. Citizen science enables community members to actively contribute to data collection efforts, which can increase transparency, expand research monitoring capacity, advance participants' understanding of marine issues, as well as strengthen local stewardship of marine environments (i.e. contribute to ocean literacy outcomes). However, the success of such initiatives often relies on participants having access to marine environments and the necessary equipment and skills to engage. Geographic and social inequities, as well as cultural needs, remain a significant barrier to making marine science accessible and relevant to potential end-users. For example, regional and remote communities may face reduced access to science infrastructure and receive fewer opportunities to engage with or co-design research. Cultural and language barriers also limit participation for multicultural communities, refugees, and recent migrants, who are further underrepresented in marine science careers and training programs.

3. Marine science education

Education is one of the ten dimensions of ocean literacy (McKinley, Burdon, and Shellock 2023), and particularly relevant to this white paper because of the opportunities to better connect ocean literacy, education, and marine science sectors. This section outlines the current state of marine science and ocean literacy education in Australia, focusing on school and tertiary programs. We identify persistent gaps in learning pathways and capability development, highlight areas of progress, and explore how marine science training is shaping a future-ready workforce equipped to respond to emerging marine challenges and deliver solutions (e.g. Australia's blue economy).

3.1. Current status of marine science and ocean literacy in school-based education

Australia's school-based education system (e.g. K-12-year levels) currently lacks a coordinated and consistent approach to embedding marine science and ocean literacy into the national curriculum. Marine topics are fragmented across subjects such as science, geography, and environmental studies, limiting opportunities for students to build a systems-level understanding of the ocean. Some states offer marine-specific courses (e.g. Marine Studies in New South Wales, Marine Science in Queensland), but these are inconsistent and often non-Australian Tertiary Admission Ranked (ATAR), which can reduce their perceived value.

Overcrowded curricula, limited funding, lack of access to marine resources, limited practical training opportunities, and teachers' lack of confidence in delivering marine content remain key barriers (Freitas et al. 2022). The slow pace of curriculum change

presents further challenges as curriculum documents become quickly out-dated and rely on teachers updating content with their own knowledge of up-to-date case studies, concepts, theories, and research. While research has explored interdisciplinary learning approaches and solutions (e.g. Freitas et al. 2024), these remain limited in scale. International examples offer valuable insights. Countries such as Brazil (via the *Blue Curriculum*), Canada, Portugal, and Sweden have embedded ocean literacy into national curricula, often through cross-disciplinary modules, partnerships, and teacher development programs (Santoro, de Magalhães, and Middleton 2022). These international examples provide reference points for Australia's own progress and ambitions.

Informal education and outreach offer promising opportunities to enhance ocean literacy. Australia has a vibrant network of marine science centres, aquariums, citizen science programs, and non-government organisations that deliver marine education (Kelly et al. 2025; O'Brien et al. 2023). However, as previously discussed, access is not equally distributed across Australia's population.

Digital and virtual resources somewhat address the inequality in access to both formal and informal education programs. For example, a new national *Ocean Literacy Portal*, piloted in Victoria, is one of the first coordinated efforts to bridge the gap between formal and informal marine education. It provides a curated, national resource hub that supports educators to embed ocean concepts across their teaching in different locations.

3.2. Current status of marine science career pathways following school-based education

Marine-related Vocational Education and Training (VET) pathways offer opportunities for students to enter the marine workforce. However, inconsistent government subsidies and limited regional access make it challenging to support high school students into marine careers. Teachers interested in VET training face barriers in securing funding and the ongoing challenge of finding suitable teacher-replacements amidst a growing workforce shortage. Efforts to connect students with marine careers can also be a challenge. Work experience placements are in high demand but difficult to arrange due to logistical challenges (e.g. Work Health and Safety (WHS) regulations), limited industry awareness of marine careers among schools and students, and the absence of formal mechanisms linking schools to research organisations and businesses. More broadly, national STEM shortages and declining maths performance limit the foundational capabilities needed for marine science pathways. The Australian Government is responding through a *National STEM Strategy* and a $9.5 million investment to upskill teachers in mathematics and numeracy.

3.3. Current status of tertiary marine science education

Australia's commitment to marine science education has evolved over the past decade. The *2015–25 National Marine Science Plan* (herein 2015–25 NMSP) identified workforce development as a strategic priority, calling for stronger quantitative skills, cross-disciplinary expertise, and closer alignment with industry and government needs. A follow-up report, *The Midway Point* (2019), noted improvements in quantitative training, but highlighted ongoing gaps in areas like social science, quantitative fisheries science, water

quality, agronomy, engineering and mathematics (see the Modelling and Quantitative Science white paper). Forward-looking industry insights point to growing need for graduates with skills in IT, computing, data analytics, statistics, modelling, artificial intelligence, and machine learning, as well as areas of increasing stakeholder interest and relevance such as social science, law, genetics, and engineering. Flexibility, adaptability, and the ability to collaborate across disciplines remain key workforce priorities. Here we build on these findings, evaluating how undergraduate marine science programs are addressing these needs.

Australia offers diverse undergraduate programs, with at least 14 universities delivering standalone Bachelor of Marine Science degrees or embedded as minors or majors within broader Bachelor of Science programs. While these programs are generally well-regarded, with strong international competitiveness and robust technical training, the structure and focus of marine science education remains highly variable across institutions. This variability is likely a reflection of universities striving to differentiate their offerings in an increasingly competitive higher education landscape. However, it may also reflect limitations in the capacity of individual institutions to teach across the full breadth of marine science disciplines – often influenced by local research strengths.

Recent funding constraints faced by Australian universities, stemming from post-COVID financial pressures and international enrolment caps, have led to consolidation of disciplines due to lower enrolment numbers. This has particularly impacted geosciences, environmental sciences, and Masters coursework programs, resulting in reduced multidisciplinary offerings and fewer specialised marine science degrees at several institutions.

A common strength and continued focus among the current marine degree offerings are the multidisciplinary focus developing technical and scientific knowledge and skills. Most programs emphasise core competencies in field and laboratory methods, data analysis, modelling, scientific writing, and teamwork. Graduates are typically well-prepared to collect, analyse, and interpret environmental data; design and conduct field-based research; and communicate scientific findings to both specialist and general audiences. However, while these technical skills are a key strength, field-based learning opportunities are under increasing pressure from budget constraints because they are often expensive and resource-intensive.

Whilst discipline-focused marine degrees should remain Australia's priority for advancing marine science, there is a growing expectation for graduates who can integrate knowledge across disciplines and work at the interface of science, policy, and community. Programs at James Cook University, University of Tasmania (UTAS), the University of Queensland, Macquarie University, Flinders University, University of New South Wales (UNSW), and the University of Sydney embed interdisciplinary outcomes in their course learning outcomes. Many of the offerings have elective and minor options that allow students to explore interdisciplinary pathways in their degree, however, it is unclear how strongly this is promoted within curricula. The marine degrees at Deakin University, Flinders University, Southern Cross University, UNSW and the University of Sydney offer transdisciplinary or project-based subjects, including project management, policy engagement, and industry-facing challenges. The focus of the Centre for Marine Socioecology at UTAS is to provide interdisciplinary postgraduate degree pathways, and training opportunities for students and researchers; this is enabled via a unique collaboration

between IMAS/UTAS and the CSIRO. Despite these program developments, however, many graduates must still acquire interdisciplinary skills through self-directed learning post-graduation.

Research shows that an increasing number of early career marine scientists are transitioning from natural sciences into social sciences, often earlier in their academic journeys than previous generations (Shellock et al. 2023). These emerging researchers are developing interdisciplinary skills through self-directed learning, gaining expertise in areas such as governance, policy, and community engagement despite limited formal training in social science disciplines (Kelly et al. 2019; Shellock et al. 2023). This trend suggests a gap between current program offerings and the interdisciplinary competencies that graduates need to develop in their careers.

Equipping graduates with the practical skills and industry-relevant experience through Work-integrated learning (WIL) programs remains inconsistently embedded across institutions. While many programs include fieldwork components that build scientific knowledge and technical skills, only a select few, such as those at Deakin University, Curtin University, Griffith University, the University of Newcastle, Flinders University, Macquarie University, and the University of Adelaide (newly formed Adelaide University), mandate WIL or equivalent as a core, assessed component of the degree. In most cases, WIL remains optional or dependent on student initiative and industry availability, limiting access and impact. Limited industry capacity also constrains WIL opportunities, with many organisations lacking the resources or experience to host students. This barrier aligns with *The Midway Point* report's recommendation for stronger partnerships between universities and industry to support structured, career-relevant learning pathways.

Industry engagement is critical for ensuring marine science education remains relevant and aligned with Australia's blue economy goals. While engagement is inconsistent across institutions, positive examples exist. For instance, Deakin University, Flinders University, and the University of Sydney convene course advisory boards where industry representatives provide input on graduate outcomes, workforce needs, course development, industry placements, applied research, and international delivery.

3.4. Current status of First Nation-centred ocean literacy and education

An increasing focus of marine science is the appreciation and integration of Indigenous Knowledges in research (i.e. 'two-eyed' seeing) and management. This includes recognition of First Nation values and understanding of the marine environment, as well as greater efforts to understand, integrate, and collaborate with diverse worldviews. Appreciation of alternative moral and sociopolitical frameworks, knowledge systems, epistemologies, and ontologies are central to achieving meaningful integration of Indigenous perspectives in marine science in practice. Equally, meaningful integration depends on respecting the rights of First Nations peoples to self-determination, with partnerships based on Indigenous leadership and authority rather than extractive use of knowledge. The Australian tertiary sector is well-positioned to foster shared learning and collaboration. As of 2025, teaching on Indigenous Knowledges in marine science is growing, with several universities incorporating cultural perspectives into degree programs (see Annexe 1). In parallel, current pedagogies are not designed with Indigenous ways of learning in mind and may serve to hinder or potentially exclude Indigenous

students at tertiary levels. Science curricula nationwide increasingly incorporate cultural and traditional perspectives, under efforts to Indigenise curricula across disciplines (e.g. UTAS, University of Queensland), and improve cultural competency among students (and teaching staff).

3.5. Current status of marine science training

Outcomes of the 2015–25 NMSP identified training and workforce capability as a national priority. In the context of this white paper, training is addressed across four distinct but interconnected levels:

- **Postgraduate training in marine science** is a national priority in Australia, with the 2015–25 NMSP highlighting the need for more cross-disciplinary graduates and applied research opportunities. Despite opportunities such as *CAPSTAN* program and the National Industry PhD program, challenges persist, particularly due to increasingly stringent WHS regulations. These changes have made it more difficult for students to qualify as research divers and skippers – skills essential for marine fieldwork. Often considered extracurricular, these certifications are typically left to students to arrange and finance, presenting a barrier to comprehensive marine science training. Some universities have, however, started to incorporate vocational training as part of their program. For example, Flinders University runs a professional scientific diver certification, or micro-credential, providing the theoretical and practical scientific diving training mapped against the Australian Standard for Scientific Diver Training and Certification AS2815.6, the ANZSDA (Australia New Zealand Scientific Diver Association), and AAUS (the American Academy for Underwater Sciences). Upon completion, students are certified to undertake scientific diving in Australia and the US. This program has also been extended beyond tertiary students and is being undertaken by industry staff seeking to obtain the certification they did not obtain through their tertiary education.
- **Ongoing professional development for the existing marine science workforce**, which includes opportunities to update technical knowledge (e.g. sea time aboard the CSIRO Marine National Facility's RV *Investigator*), develop interdisciplinary competencies (e.g. Centre for Marine Socioecology Interdisciplinary School, and enhance communication and leadership skills (e.g. ABC media program).
- **Training for non-marine science participants**, such as policymakers, industry professionals, coastal communities, aimed at improving ocean literacy across sectors and supporting science-informed management needs (e.g. in context of the blue economy). Initiatives including citizen science (e.g. *Eye on the Reef's* reef health impact surveys), *Ocean Decade Australia* workshops, and University of Tasmania's free online climate course, *The Climate Shift,* help bridge knowledge gaps and empower communities to make informed, science-based decisions and management needs. Decision-support tools like *CoastAdapt* also play a crucial role by providing training videos, case studies, guiding documents, and a community network for coastal adaptation planning and action.
- **Collaborative learning across sectors**, where mutual learning opportunities such as partnerships between marine scientists and other sectors (e.g. industry, community, tourism, policy makers) demonstrate the value of cross-sector knowledge exchange,

as demonstrated, for example, through the range of applied and co-developed projects delivered by the *NESP Marine and Coastal Hub*.

Each level of training plays a vital role in Australia's broader marine science ecosystem. While postgraduate training typically focuses on developing high-level research and analytical capabilities, the ongoing professional development landscape provides opportunities to respond to emerging challenges, such as climate adaptation, risk communication, and the use of GenAI in environmental modelling.

4. The role of marine science in advancing ocean literacy: infrastructure and capability needs

Marine science can play a central role in shaping ocean sustainability in Australia by supporting national-scale ocean literacy. A necessary step, however, is to provide opportunities for the education and training needed to equip marine researchers with skills and capacity to contribute to improving societal ocean literacy. We propose three enablers through which marine science can strengthen cross-sector capabilities and contribute to accelerating national progress on ocean literacy, articulated as:

(1) enhanced and inclusive ocean literacy for all Australians;
(2) credible marine science (actionable and co-produced where relevant); and
(3) future-ready marine science education and training.

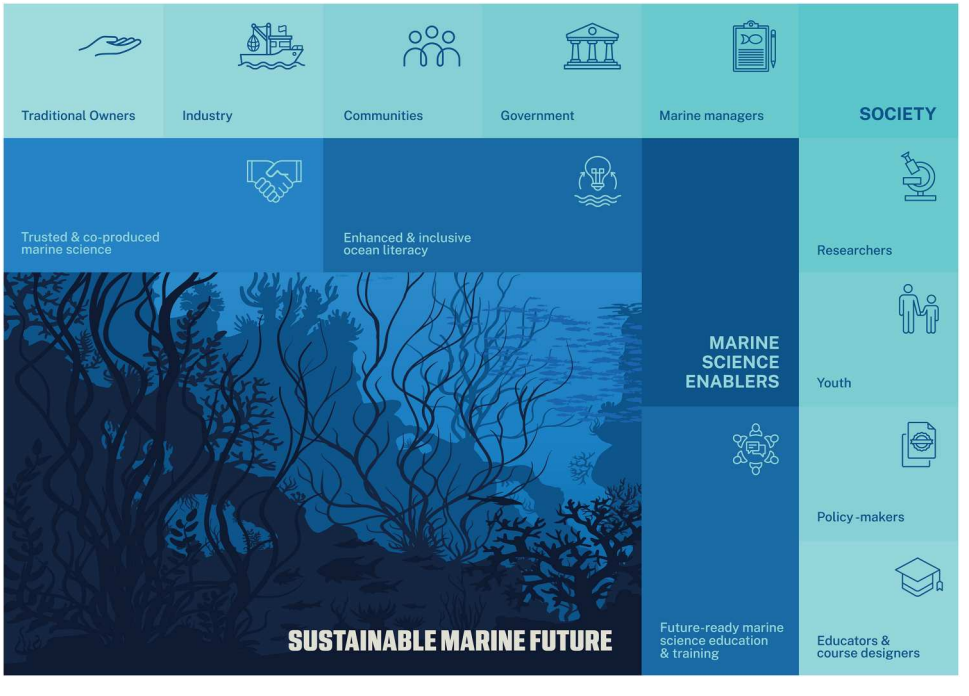

Figure 3. The marine science community can foster collaboration across sectors and strengthen Australia's capacity to transition towards and achieve a sustainable, equitable, and resilient ocean future.

We suggest that these enablers provide a foundation upon which marine science can contribute to transforming how Australians use, value, and protect the marine environment (Figure 2; Figure 3). Below, for each enabler, we identify current needs related to infrastructure, workforce development, expertise, and system coordination, as well as barriers that may constrain action and progress. Barriers include limited funding, fragmented or short-term efforts, skill shortages, and institutional inertia. Taking needs and barriers together, we highlight opportunities for targeted investment, collaboration, and strategic planning that can support long-term success in advancing ocean literacy at a national scale.

4.1 Enabler #1: enhanced and inclusive ocean literacy for all Australians

Progress on ocean literacy in Australia is underdeveloped, underfunded, and inconsistently integrated across sectors. While some programs are emerging, they are largely uncoordinated. There is need for a national strategy to lead coordination, dedicated funding to support and expand programs, and guidelines on achieving inclusive engagement across Australia's diverse population (Kelly et al. 2025).

Efforts to truly advance national ocean literacy will need to engage Australians who do not have access to or do not currently feel connected to the ocean, particularly inland communities, people from culturally and linguistically diverse backgrounds, and those in lower socioeconomic or digitally disconnected settings. Marine science can support targeted, place-based and culturally relevant approaches that go beyond conventional engagement and education methods. For example, engaging community leaders in co-designed programs, collaborating with other sectors to embed ocean themes in existing local or cultural narratives (e.g. water, food, climate), and informing and testing the design of immersive learning experiences (e.g. travelling exhibitions, virtual reality, citizen science).

Table 1 outlines the key capabilities, actions, and system changes required to build a more inclusive and coordinated approach to achieving ocean literacy in Australia and highlights potential role of marine researchers in contributing to this goal. It highlights the foundational investments, such as coordination, targeted research, robust monitoring, and inclusive education, all of which are essential for long-term impact. These priorities lay the groundwork for a **National Ocean Literacy Strategy** that ensures coordination and enables shared learning across sectors and jurisdictions.

Table 1. Visions for enhancing and reaching an inclusive ocean literacy society in Australia.

Vision	Potential barriers	Priority
Develop a National Ocean Literacy Coalition	Time and capacity to coordinate and maintain momentum; sustained leadership needed; requires cross-sector buy-in	High
Develop a National Ocean Literacy Strategy	Complexity of navigating educational systems, policy integration, and jurisdictional differences; slow implementation pathways	High
Support and build ocean literacy research and researchers in Australia	Limited funding for social science; low number of researchers with ocean literacy expertise; lack of academic career pathways in this area	High
Establish a national ocean literacy baseline data and longitudinal dataset	Baseline survey currently underway at Deakin University; sustained funding needed to maintain longitudinal data collection over time	High

(*Continued*)

Table 1. Continued.

Vision	Potential barriers	Priority
Increase representation and co-leadership of Traditional Owners and underrepresented communities in ocean literacy design and delivery (e.g. collaborating with Sea Country Ranger programs to design ocean literacy materials)	Limited structural support for co-design; underfunded Indigenous-led initiatives; lack of equitable collaboration frameworks; and chronic under-resourcing of Sea Country programs, including insufficient funding, staffing, and institutional support, limit the ability to scale and integrate across broader marine management frameworks	High
Deliver immersive, in-person marine science experiences that inspire curiosity, strengthen public trust in science, and empower communities to actively participate in the stewardship of Australia's marine environment	Understanding and meeting stakeholder/community needs; communicating complex science in meaningful and tangible ways	High
Develop accessible digital platforms and open educational resources (e.g. UTAS *The Climate Shift* online course)	Requires sustained funding, technical support, and long-term maintenance; however, accessibility and inclusivity across languages and communities may be overlooked; it also requires institutional buy-in	Medium
Implement robust monitoring and evaluation mechanisms to track the effectiveness of ocean literacy program(s) through time	Limited funding and incentives for institutions to adopt long-term tracking; lack of standardised metrics or shared evaluation frameworks	Medium
Alignment with international benchmarks and coordinated efforts with global ocean literacy programs (e.g. *UNESCO Ocean Literacy Framework*)	Geopolitical shifts, reduced international cooperation, and the slowing momentum of some global initiatives may hinder sustained alignment; limited awareness or engagement with global frameworks among Australian stakeholders	Medium
Develop targeted training that links ocean literacy to governance and decision-making, especially for industries (fisheries, tourism, infrastructure, conservation)	Siloed land-sea governance; lack of cross-sector training pathways; disconnect between science and operational decision-making in some industries; limited time and resources for professional development	Medium
Develop professional training pathways to build knowledge broker capacity that facilitates ocean literacy and science-policy engagement across sectors	Limited recognition of knowledge brokering as a formal professional role within marine science and policy sectors, alongside a lack of dedicated funding and institutional support for training and career development in this space	Medium
Compile ocean literacy initiatives into a database and analyse how they are funded	Fragmented information; limited capacity to collect, analyse, and maintain up-to-date records; and risk of duplication without coordinated leadership	Medium
Compile a database of potential funding options and stakeholder engagement opportunities (e.g. going beyond just government/ARC funding, including philanthropy)	Time and resource constraints; lack of a central coordinating body to oversee database maintenance and dissemination; limited awareness of alternative funding pathways	Medium

4.2. Enabler #2: credible and co-produced marine science

Marine science will continue to support ocean literacy by delivering outputs that are relevant, credible, and accessible. The Australian community must move beyond traditional researcher-led models of scientific delivery (i.e. deficit model, Reincke, Bredenoord, and van Mil 2020), to more collaborative, user-inspired approaches that include engagement with communities, industry, policymakers and Indigenous knowledge holders from the outset (i.e. dialogue model, Reincke, Bredenoord, and van Mil 2020). Table 2 outlines the capability requirements to build a trusted and co-produced marine science system in Australia. It identifies specific actions, barriers, and priorities to ensure marine science is responsive to the needs of Australian society.

Today's marine science system sits within a broader and more complex society, in which persistent demographic, geographic, and socioeconomic barriers limit potential

Table 2. Visions for establishing a trusted and co-produced marine science in Australia.

Vision	Potential barriers	Priority
Improve public understanding of climate change impacts on marine and coastal environments (e.g. to support risk awareness and informed adaptation in coastal communities)	Low baseline ocean and climate literacy in communities, combined with limited access to clear, locally relevant, information and lack of interest by mainstream media; and culturally appropriate communication tools	High
Strengthen interdisciplinary research capacity and collaboration across natural and social sciences (e.g. equip researchers with key skills)	Academic and institutional silos; limited incentives or career pathways for interdisciplinary work	High
Embed co-design approaches into marine research processes involving end-users from the outset. (e.g. collaboration with Traditional Owners, communities, industries, policymakers)	Limited institutional frameworks or funding mechanisms to support long-term co-design; lack of training in participatory research methods	High
Increase investment in science communication and translation to ensure relevance and access (e.g. multilingual resources, infographics, and visual storytelling)	Science communication is often underfunded or undervalued; lack of tailored resources for diverse audiences	High
Build science credibility through transparent, two-way communication and long-term engagement with stakeholders	Short-term project cycles; lack of institutional support for relationship-building activities	High
Ensure culturally sensitive, co-produced research with Traditional Owners and Indigenous organisations	Lack of long-term, secure funding for partnerships; limited training for non-Indigenous researchers in culturally safe practices; few mechanisms for equitable co-leadership and governance in research design and implementation; limited infrastructure for Indigenous-led research and science	High

participation, uptake, and trust in science. For example, many individuals in communities across Australia do not engage with science beyond secondary school, and many migrants and underrepresented groups face additional language and cultural barriers to access. These social factors and others contribute to a widespread perception gap between what some individuals perceive or believe is happening in the marine environment and observations made based on the best available science. Narrowing this gap will be key to securing societal interest and trust in science and in setting the national foundation for ocean knowledge and active stewardship. Science engagement should prioritise relationship-building and effective knowledge exchange to understand end-user needs and inform (co-)designed research efforts that can address those needs.

4.3. Enabler #3: future-ready marine science education and training

Adaptive, creative, interdisciplinary approaches to education and training (Table 3) are essential to developing a national workforce equipped to address complex evolving challenges facing ocean sustainability into the future; including marine scientists, cross-sector government and industry leaders making decisions about marine use and management. This education will begin in schools, which will continue to support foundational marine science knowledge, and foster student attitudes and stewardship of the marine environment (i.e. ocean literacy) and interest in marine science. However, more consistent approaches to integrating marine science content across current curricula are needed to improve student access and engagement with ocean learning and motivate interest in marine science post-school. Marine science can support curriculum development by providing evidence-based content, contemporary research findings, and real-world case studies that can be adapted into age-appropriate materials to enhance ocean literacy across all education levels.

Table 3. Visions for improving cross-sector, interdisciplinary education and training.

Vision	Potential barriers	Priority
School education sector (K-12 levels)		
Updated K-10 continuum of ocean literacy mapped across subjects and years, providing a coordinated approach to integrating marine science and ocean literacy within the current National Curriculum framework.	May not be prioritised by ACARA amidst competing curriculum reviews and changes; limited recognition if developed externally to ACARA processes; potential variability in uptake and implementation across states and territories; insufficient funding to support development of aligned teaching resources.	High
Improved visibility, subject rigour, and perceived value of marine science in secondary education, including clear pathways for students into tertiary studies and marine careers.	Long lead time for curriculum change; requires ACARA and state education buy-in; perceived as a niche subject and low awareness of career pathways; limited teaching resources and support.	High
Greater promotion of marine science careers through a career prospectus driven by NMSC and AMSA.	Funding to develop resource; limited expert capacity to drive initiative and ensure prospectus remains relevant and updated.	High
Ensuring adequate, relevant and updated marine science and ocean literacy resources are available for school education through (i) review and consolidation of existing resources in an online portal; (ii) development of new resources with educators.	Funding for review and development; ensuring state-based curriculum authorities and teacher associations promote resources for widespread use; lack of capacity for regular resource updates.	High
Developing free, online modules for upskilling teachers in marine science and ocean literacy.	Funding and time constraints for development; difficulty reaching all teachers across the nation; ensuring alignment with curricula and teacher accreditation.	High
Development of guides to support work experience related to marine science in schools, including tips for finding placements, suggested activities, and insurance and risk assessment considerations.	Funding for development; tailoring required across states and territories and education systems; ensuring WHS and legal compliance; competing placement demands across education sector.	High
Improved funding for informal marine education programs.	Lack of recurrent funding; programs not always aligned with curriculum outcomes; capacity gaps in institutions for engagement.	High
Connect marine science experts with schools in a coordinated approach (e.g., through a mentoring or CSIRO STEM-style program).	Lack of national coordination; limited funding; competing demands on experts' time; inconsistent engagement across schools and regions.	Medium
Stronger connections between schools, professional associations, marine research institutions and businesses.	Limited coordination of efforts.	Medium
Development of school-to-work pathways for marine science including university or vocational training options; and improved funding and regulation of VET programs.	Complex coordination between curriculum authorities, VET providers, tertiary institutions, and industry; funding gaps for VET delivery; lack of transparency in quality for registered training organisations.	Medium
Promotion of marine science degrees to high school graduate students with strong mathematical skills.	Marine science often not positioned as a viable career pathway for high-achieving students (typically encouraged to pursue higher ATAR degrees); perceived lower earning potential and stability compared to other industries.	Medium
Tertiary education sector		
Increase diversity of students in marine science, including more Indigenous, low-SES, and underrepresented groups; increase diversity of teaching staff through dedicated programs that attract and retain them.	Barriers to access (e.g., academic preparation, financial costs, cultural safety); lack of targeted programs for recruitment and retention; limited financial support (e.g., childcare, fieldwork costs); few pathways into academia for Indigenous and low-SES students.	High
A national program (championed by the NMSC) designed to support undergraduate students in navigating complex marine career pathways by providing clear, accessible information, mentoring	Fragmented support and lack of national coordination; barriers to access for regional and underrepresented students; lack of dedicated funding/resources.	High

(*Continued*)

Table 3. Continued.

Vision	Potential barriers	Priority
opportunities, and practical guidance on building skills and experience for marine science careers.		
Undergraduate programs to develop a broad suite of employability skills, (e.g. flexibility, adaptability, collaboration, stakeholder engagement, cultural competency, field trip planning, risk assessments, permits) and technical skills (e.g., social science, quantitative fisheries science, water quality, agronomy, engineering and mathematics, IT, data analytics, statistics, modelling, artificial intelligence, machine learning, law, genetics, engineering).	Difficulty integrating new content into already content-heavy and technically focused marine science programs; institutional and accreditation constraints; academic culture prioritising disciplinary depth over interdisciplinarity; lack of staff time and resourcing.	Medium
Ensure all Australian marine science undergraduate programs embed WIL as a core, assessed component of the degree.	Limited capacity and resources in the marine sector to host placements; need for dedicated university coordination and quality control and support; inconsistent adoption across universities.	Medium
A central body to coordinate marine and coastal science education and avoid duplication of effort.	University business models prioritising competition over collaboration; lack of funding for national coordination; siloed institutional structures.	Medium
Cross-institutional programs that promote collaborative and multi-disciplinary approaches to applied research (e.g., SIMS cross-institutional masters program).	Competitive funding models that limit collaboration between institutions; institutional structures and policies that prevent co-development and shared delivery of programs challenging; resource allocation models that disincentivise sharing students and facilities.	Medium
Repeat the *Midway Report* for both undergraduate and postgraduate marine science training.	Resource and funding constraints; requires coordination across universities and stakeholders.	Medium
Embed training for practical skills in (e.g. diving and vessel qualifications) into standard education pathways.	Legislative and regulatory challenges; cost barriers for students and institutions; lack of consistent pathways across programs.	Medium

4.4. Realising enablers to achieve ocean literacy through sustained investment

The three enablers outlined above are interconnected and mutually reinforcing. However, their successful implementation hinges on a common requirement: long-term, coordinated, and equitable funding. While each enabler identifies specific needs and barriers, all three articulate the absence of sustainable financial mechanisms to support delivery and scaling of impactful initiatives. For this reason, funding is addressed as a standalone section to underscore the need for sustained support for key marine science contributions to national-scale ocean literacy and sustainable development by 2036.

Ocean literacy efforts have been underfunded in Australia and often viewed as a 'milestone' within a greater project rather than as a standalone strategic objective or process. This framing and understanding have limited the ability of ocean literacy practitioners and experts (including marine scientists) to design, deliver, and evaluate meaningful, long-term initiatives. Moving forward, ocean literacy should be positioned as a national priority requiring targeted investment across government, philanthropic, research, and industry sectors. Reflecting other national-scale efforts and calls to advance ocean literacy (e.g. Kelly et al. 2025), we emphasise the need for a central coordinating coalition (i.e. a marine research development fund) to provide oversight and ensure strategic distribution and evaluation of funds across disciplines and sectors, following nationally determined objectives and agendas. This would ensure alignment with reduced potential duplication or fragmentation of efforts across jurisdictions/disciplines.

To be effective, funding mechanisms will need to support national-scale coordination and localised delivery, including resources for curriculum development, educator training, informal learning, public engagement, and digital infrastructure. Equally important is ensuring equity of access by directing funding to underrepresented groups, including First Nations, regional/remote, and culturally/linguistically diverse communities. Crucially, funding should be made available over multi-year timeframes to provide certainty and security for the sector.

5. A national framework for ocean literacy progress

A unified National Ocean Literacy Strategy will be essential to guide and achieve progress moving forward. This strategy should build upon existing policy foundations, particularly the 2024 draft Sustainable Ocean Plan, which underscores the importance of building ocean literacy through education and career pathways, and emphasises participation of women and First Nations communities. The strategy should also establish clear governance structures, define cross-sector roles, and articulate coordination mechanisms between government, industry, education, and research organisations and communities.

Australia can strengthen contributions to international sustainability goals by aligning its strategy and other efforts with global ocean literacy initiatives. Frameworks and initiatives that have been applied and tested elsewhere provide learnings and benchmarks for Australia's effort to improve ocean literacy. For example, the Global Ocean and Society Survey, deployed in 22 countries and currently being adapted for Australia through Deakin University, offers a model for establishing baseline measurements of public ocean perceptions (McRuer et al. 2025). Further, the *United Nations Ocean Decade White Papers* (published 2024) outline internationally defined drivers for advancing ocean literacy across society (e.g. Glithero et al. 2024) and a shared agenda that Australia can align with while also addressing national and local priorities. The development of National Ocean Literacy Coalitions (e.g. Canada, Wales) and National Ocean Literacy Strategies (e.g. *Ocean Literacy Strategy for Wales 2025*) (*Y Môr a Ni*) elsewhere provide models of successful approaches that can be adapted here. A dedicated Australian Ocean Literacy Hub (e.g. a centralised digital platform) will be required to track progress on national-scale ocean literacy and facilitate knowledge exchange between marine science and other sectors. The hub would serve as a repository for marine research outputs, national ocean literacy survey data and case-studies, and provide real-time tracking and communication on ocean literacy initiatives Beyond data management, the hub could function as a comprehensive education and training resource centre, hosting training modules, teaching resources, and other development opportunities. By doing so, the platform would reduce duplication to enable more strategic resource allocation that ensures consistent and quality delivery.

6. Priorities for achieving a sustainable 2036

Australia's growing recognition of ocean literacy as a strategic enabler for ocean sustainability must now be matched by coordinated action. This white paper has outlined how marine science can shape ocean sustainability by supporting and delivering:

(1) enhanced and inclusive ocean literacy for all Australians;
(2) credible marine science (actionable and co-produced where relevant); and
(3) future-ready marine science education and training.

Actualising the potential of these enablers requires identifying and addressing key dependencies that could accelerate or hinder progress (e.g. across education, training, decision-making). Rather than starting from scratch, we have a window of opportunity to scale what already works and build on recent progress advancing ocean literacy in Australia – to bridge existing gaps, and position Australia's marine science community centrally in shaping the necessary systems to support implementation at pace. A **National Ocean Literacy Strategy remains the most critical dependency**. Without a unifying framework, progress risks being fragmented and inconsistent with progress across sectors, limited by funding, and ineffective in the absence of a shared vision to work towards.

6.1. Immediate priorities (Next 5 years)

The rate of change in today's marine environment is unprecedented and accelerating. The future of our oceans will be shaped by the decisions society makes now and over the coming decade. People across all levels of ocean literacy (including seafood producers, consumers, communities, policymakers, and blue economy professionals) will be called on to make informed choices about how Australia uses and manages its marine resources. Strategies for connecting these disparate groups to credible and accessible marine science and advancing ocean literacy are urgently needed. We recommend the following priorities in the next five years:

- **National strategy and coordination:** Establishing a National Ocean Literacy Coalition and developing the accompanying strategy must be prioritised within the first two years.
- **Ocean literacy baseline:** Data collection across Australia should commence as soon as is feasibly possible, to establish current understanding levels and identify priority regions and demographics for targeted intervention. A project led by Deakin University is already underway to begin addressing this need, contributing to the development of Australia's ocean literacy research capacity and enabling evidence-based approaches to evaluate program effectiveness.
- **Education system integration:**

  ○ In the school sector, immediate priorities include developing an updated K-10 continuum of ocean literacy mapped across existing subjects and year levels, creating free online modules for teacher upskilling, and establishing clearer pathways between marine science learning opportunities and tertiary studies.

  ○ For tertiary education, encouraging all Australian marine science undergraduate programs embed WIL as a core component is critical for producing industry-ready graduates. This requires building capacity within the marine sector to host placements and establishing dedicated coordination mechanisms within universities.

6.2. Medium term goals (5-10 years)

- **Cross-sector training and professional development:** As the blue economy expands, there is increasing demand for professionals who can work at the interface of science, policy, and community engagement. Developing comprehensive

professional development pathways, including knowledge brokering capacity and interdisciplinary collaboration skills, will be essential for meeting this demand. This period should also see the establishment of robust professional training programs linking ocean literacy to governance and decision-making, particularly for industry.

- **Inclusive access and representation:** Medium term priorities must address the significant inequities in access to marine science education and ocean literacy programs. This includes targeted initiatives to increase participation from Indigenous communities, culturally and linguistically diverse populations, and students from low socioeconomic backgrounds. Success requires not just removing barriers but actively creating pathways and support systems.
- **Technology and innovative integration:** The integration of emerging technologies, including responsible use of GenAI in marine science education, represents both an opportunity and a challenge. Training programs must evolve to ensure students and professionals can effectively leverage these tools while maintaining critical thinking and academic integrity. Digital platforms and open educational resources, such as the Ocean Literacy Portal, need to be scaled nationally with sustained funding and technical support to ensure long-term accessibility and maintenance.
- **International alignment:** Australia must strengthen its connections to global ocean literacy frameworks and initiatives, including UNESCO's Ocean Literacy Framework and international best-practices. This alignment will enhance Australia's contributions to global sustainability goals while ensuring local approaches benefit from international innovation and collaboration.

6.3. Long term vision (beyond 2036)

- **Systemic integration and cultural change:** The long-term goal is creating an ocean-literate society where marine science is embedded across all sectors of Australian society. This requires fundamental shifts in how we approach education, from early childhood through professional development, ensuring ocean literacy becomes a core competency rather than a specialist area. Long-term success depends on establishing marine science as an integral part of Australia's knowledge economy, with clear career pathways, competitive salaries, and recognition of its strategic importance to national prosperity and environmental sustainability.
- **Transformative innovations:** Looking beyond 2036, transformative innovations in education delivery, citizen science technologies, and immersive learning experiences will reshape how Australians connect with and understand the marine environment. Virtual reality, mobile laboratories, and AI-powered personalised learning systems may revolutionise access to marine science education, particularly for inland and remote communities.

6.4. Critical dependencies and investment requirements

The absence of sustained, multi-year funding is the single greatest barrier to progressing ocean literacy in Australia. Real progress cannot rely predominantly on competitive grants, which often perpetuate inequities and prevent long-term planning. Multi-year funding commitments are essential for building partnerships, developing curricula,

training educators, and establishing the infrastructure needed for national-scale impact. The interconnected nature of these priorities means progress in one area often depends on advancement in others. For example, developing effective school curricula requires trained teachers, appropriate resources, and supportive institutional frameworks. Similarly, building public trust in marine science depends on both high-quality research and effective communication strategies.

Scaling ocean literacy initiatives in Australia requires a skilled workforce of educators, communicators, knowledge brokers, and program coordinators. Investment in professional development, career pathways, and institutional capacity building is essential for sustainable growth. Successful cross-sector collaboration depends on (to date) unprecedented cooperation between education systems, research institutions, government agencies, industry, and community organisations. This requires new governance structures, accountability mechanisms, and incentives that reward collaboration over competition. Australia has the foundation to become a global leader in ocean literacy. Realising this potential requires coordinated investments, sustained commitment, and the courage to think and act at the scale the challenge demands. The marine science community stands equipped to contribute, but success will depend on national recognition that ocean literacy is not just an educational goal, but a strategic imperative for Australia's sustainable future.

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Annexe 1.

Examples of Australian tertiary institutions that incorporate Indigenous Knowledges into marine science undergraduate degrees.

University	Program	Details
Edith Cowan University	Bachelor of Science (Marine and Freshwater Biology)	Course learning outcomes state students will "incorporate diverse perspectives into scientific practice, applying a global outlook and including Aboriginal and Torres Strait Islander cultural perspectives."
Curtin University	Bachelor of Science (Coastal and Marine Science major)	Learning outcomes emphasise understanding and appreciation of cultural diversity and its impact on scientific practice (does not explicitly reference Indigenous knowledge directly)
University of Western Australia	Bachelor of Marine Science	Course is delivered in the context of "recognising the role, relevance and ethical implications of marine science in society and apply[ing] cultural, economic and social awareness, including those of Indigenous people."
Deakin University	Indigenous Studies Minor in the Bachelor of Marine Science	This study program supports marine science students to engage with First Nations knowledge more comprehensively.
University of Queensland	Bachelor of Science (Majors: Coast and Ocean Sciences; Marine Biology)	Indigenous knowledge integrated in the field trips to Minjerribah (North Stradbroke Island) with local Quandamooka Traditional Owners providing cultural knowledge on marine ecosystems and totems.
University of Sydney	Bachelor of Science (Marine Science Major) Postgraduate Program Marine Science and Management	Indigenous knowledge integrated across different units of study from 1st to 3rd year. For example, there is an optional unit of study that includes an immersion with Aboriginal communities. The core units of study also include modules (compulsory) and a fieldtrip (optional) to study Indigenous Coastal Management. A large part of one of the core units involves working on Aboriginal Coastal Management with the Gamay Rangers both at University and at Gamay. There is also an optional fieldtrip to Worimi Country (Port Stephens) that includes a module on Indigenous Coastal Management.
Southern Cross University (SCU)	Bachelor of Science (Marine Specialisation)	Core third year unit on “Caring for Country” delivered by SCU Gnibi College. In 2026 this will change to an elective and students will be required to take a core first year unit on “Indigenous Knowledge”.
University of New South Wales, Sydney	Bachelor of Science, Bachelor of Advanced Science, Bachelor of Environmental Science Postgraduate program: Masters of Marine science & Management	Incorporates Traditional Knowledge and Indigenous perspectives, particularly through courses that focus on ethical, equitable integration of Indigenous knowledge with Western science for conservation. The curriculum explores using Indigenous knowledge to manage marine environments and understand the historical context of scientific practices. Marine teaching and research draws on expertise with the local Gamay Ranger program, and affiliated programs at the Sydney Institute of Marine Science.