

Protecting Australia's Underwater Cultural Heritage White Paper

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Introduction

Australia's marine jurisdiction is the third largest on Earth. From the saltwater of the sea to the freshwater lakes and rivers, Australia is an island nation defined by its relationship with water across time. Australia's underwater cultural heritage (UCH) embodies this connection, offering insights into the complex and overlapping influences that have shaped our national identity.

In Australia, the definition of UCH is taken from the UNESCO 2001 Convention on the Protection of the Underwater Cultural Heritage (hereafter, UNESCO 2001 Convention) as, *all traces of human existence of a cultural, historical or archaeological character which, have been partially or totally underwater, periodically or continuously, for at least 100 years* (UNESCO Convention, 2001, Article 1.1 (a)). Australia's UCH includes shipwrecks and associated artefacts, aircraft, vehicles, and submerged or partially submerged infrastructure, as well as tangible First Nations Underwater Cultural Heritage (FNUCH). This paper also includes consideration of First Nations intangible cultural heritage, such as cultural practices, rituals, performances, storytelling and knowledge systems, which are covered by the UNESCO 2003 Convention for the Safeguarding of the Intangible Cultural Heritage. However, it should be noted that Australia has not signed or ratified either of these Conventions.

This white paper outlines the value of Australian UCH research, detailing its current and future contributions to national identity, community resilience, scientific research, climate change adaptation, and international leadership. It discusses the state of the discipline and provides a strategic case for investment, policy alignment, and collaborative stewardship. It recommends an integrated approach that elevates UCH as a priority within the National Marine Science Plan.

Australia's peak body for UCH, the Australasian Institute for Maritime Archaeology (AIMA), conducted a 'state of the science' membership survey in May 2025. The results of this survey are incorporated within this white paper and included as Appendix A.

Societal Benefits

Cultural heritage is a shared global asset that can also be deeply tied to national and local identity. Community engagement is therefore a central element of UCH research and

management. Aboriginal and Torres Strait Islanders retain a deep connection to Sea Country, with complex cultural traditions and practices that extend far beyond the coast, and systems of stewardship of the marine environment. Communities in coastal or riverine environments, particularly those communities with historic links to maritime industries, or descendants/survivors of shipwrecks, often have an intrinsic appreciation for local maritime histories and engage in the promotion and preservation of heritage sites.

Future Research Foci

Underwater cultural heritage can, and should, be used as a gateway for learning about topics as diverse as knowledge systems and cultural practices, the movement of people and ideas across the ocean, and the sustainable management of marine resources to support livelihoods and industries. UCH may also be used to engage more deeply with climate change and environmental issues. Research confirms that UCH supports marine biodiversity, with shipwrecks often functioning as artificial reefs and providing valuable habitat for fish and benthic invertebrates. Australia's submerged cultural landscapes testify to the impact of past sea-level rise, benefiting climate change research and adaptation policies.

Tourism

Wreck diving and maritime heritage trails drive tourism and boost local economies while preserving the cultural memory of Australia's maritime past. In Queensland, the wreck of SS *Yongala* offers a popular diving experience on the Great Barrier Reef (QLD Department of Environment and Heritage Protection, n.d.). Along South Australia's coast and the River Murray, maritime heritage trails use place-based interpretive signage to support visitors' exploration of histories of trade, industry, and leisure (SA Department of Environment and Water, n.d.). Victoria's Shipwreck Coast on the Great Ocean Road is a major tourist draw, with The Historic Shipwreck Trail marked out on road signs, maps and plaques for explorers travelling by car or by foot (Heritage Victoria 1993).

International Leadership

Through shared histories of seafaring, trade, migration, conflict and cooperation, UCH connects Australia to a global community. Shared heritage offers unique opportunities for international engagement and collaboration, e.g., management of Australian shipwrecks located overseas, as well as solidifying Australia's position as a leader in global UCH interpretation and protection. As one of the first nations to establish a legislative framework to regulate historic shipwrecks (the Western Australian *Maritime Archaeology Act 1973*, still in force, and the Commonwealth *Historic Shipwrecks Act 1976*, now repealed and replaced by the *Underwater Cultural Heritage Act 2018*), Australia has been a trailblazer in implementing laws and policies to protect and preserve UCH. Australia has also led in academic areas, with pioneering work on the VOC Dutch East India shipwrecks and significant developments in materials conservation by the Western Australian Museum, both in stabilising *in-situ* shipwrecks and in conserving excavated material. Contributions to the International Council on Monuments and Sites (ICOMOS) International Committee on Underwater Cultural Heritage have further consolidated Australia's position as a global leader on maritime heritage, with scope to consolidate this leadership role within our region as Australia moves towards ratification of the UNESCO 2001 Convention.

Education

The nation's UCH is an invaluable yet limited resource offering significant benefits spanning economy, education and the environment. Major cultural institutions – such as the Australian National Maritime Museum, the WA Maritime Museum, the WA Shipwrecks Museum, the Museum of Tropical Queensland, and the Museum and Gallery of the Northern Territory – collect, interpret, display, and conserve the maritime past. Across the continent, local museums engage with their communities through objects and stories to share their fishing, seafaring, and other maritime heritage. At present, the Australian Curriculum does not incorporate elements of UCH within learning streams, and UCH is overlooked as an essential element of ocean literacy.

First Nations UCH

One of the most compelling societal benefits of UCH research is its ability to provide deeper knowledge of Indigenous Sea Country, oral traditions and songlines. Research by Nunn and Reid (2016) identified 21 locations where Dreaming stories align with geological records of sea-level change (see figure 1). In fact, there are an increasing number of scientific insights that align with beliefs and traditions preserved by Aboriginal and Torres Strait Islander communities for millennia.



Figure 1: Map of Australia showing 21 coastal locations with surviving Aboriginal stories about coastal inundation 7000 years ago. The light orange area shows the extent of the exposed continental shelf at the height of the last glacial maximum (~20,000 years ago) (Nunn & Reid 2016).

This convergence highlights the need for inclusive heritage management practices that elevate FNUCH. Doing so also aligns with international and national policy instruments, including the UNESCO 2003 Convention for the Safeguarding of the Intangible Cultural Heritage, 2021 National Research Infrastructure Roadmap supporting Indigenous heritage data infrastructure, the 2024 National Science and Research Priorities emphasising Indigenous knowledge

systems, and the 2020 National Agreement on Closing the Gap which targets strengthened Indigenous Sea Country management and governance.

Current State of the Science

UCH research, conservation and management in Australia is currently undertaken by six broad groups: academics, museums and cultural institutions, government agencies, consultants, avocational groups and Traditional Owners. The sector is under stress to deliver legislated, research or cultural responsibilities while Australia's heritage legislation is currently convoluted and often outdated. The sector advocates for ratification of the *UNESCO 2001 Convention on the Protection of the Underwater Cultural Heritage*.

Government

The Australian Underwater Cultural Heritage Program (est. 1983) is the intergovernmental funded program for UCH in Australian waters and administers the *Underwater Cultural Heritage Act 2018* (hereafter UCH Act). The program collaborates with the State and Northern Territory governments and cooperates with international partners, particularly in the Asia-Pacific Region.

This Program implements the 2010 Underwater Cultural Heritage Intergovernmental Agreement with State and Territory heritage agencies. The Agreement provides approximately \$600,000 of total annual funding for the agencies to fulfill their delegated responsibilities for UCH off their respective State/Territory boundary to the edge of Commonwealth waters (up to 200 nm offshore). The role of the State/Territory agency UCH practitioner, being the senior maritime archaeologist of the agency, is to administer Commonwealth UCH legislation and processes to identify, protect, manage, conserve and interpret UCH. In some cases, their roles are funded by the Program.

The Australian Underwater Cultural Heritage Program also manages the Australasian Underwater Cultural Heritage Database (AUCHD), which serves as Australia's statutory register of underwater cultural heritage and provides a portal for the public to interact with government in matters related to UCH (submit notifications of discovery, permit applications and compliance action). UCH sites may also be registered on individual State/Territory databases.

Not all UCH sites can be quantified, however; as of publication, it is estimated that between 10-20% of historic UCH sites in Australian waters have been located (Figure 2).

Jurisdiction	Historic UCH (Shipwrecks, aircraft and other UCH)	Located / Inspected / Surveyed / Excavated (Data only provided for shipwrecks)
NSW	2388	292
QLD	1410	127
VIC	996	233
SA	817	206
WA	4557	Data not provided
TAS	1101	104
NT	408	48
Cwth	44	5
	11,721	1015

Figure 2. Data on located sites in Australian waters as per the AUCHD, May 2025. Courtesy Commonwealth DCCEEW.

Academia

Four universities offer core UCH coursework (University of New England, University of Western Australia, James Cook University and Flinders University). Only one, Flinders University, has a dedicated Maritime Archaeology Program that conducts yearly field schools to provide practical experience. Researchers focused on UCH are also based at the University of Adelaide, James Cook University, Deakin University, University of Western Australia, University of Sydney, University of Queensland and University of New England. Internationally based researchers and academics from complementary disciplines also regularly support Australian-based projects. The University of Melbourne is the only institution in Australia that can provide training in UCH materials conservation. Opportunities for UCH conservators are even more limited; as of publication, there are fewer than 10 individuals with this expertise nationwide.

Museums

Museums have long played a central role in Australian maritime archaeology. The Australian National Maritime Museum was founded in 1991 with a national scope and dedicated maritime archaeology research program. The Western Australian Museum, now encompassing the WA Maritime Museum and the WA Shipwrecks Museum, has been involved in the discipline since the 1970s and includes the largest number of staff maritime archaeologists nationally. The

Western Australian Maritime Museum also undertakes conservation of recovered UCH materials. Other major museums with a maritime focus include the Queensland Museum of Tropics, the Maritime Museum of Tasmania and the Museum and Gallery of the Northern Territory. More broadly, a network of over 200 regional and remote museums and cultural institutions across the continent engage with local maritime heritage.

Avocational Archaeology

Avocational groups include, but are not limited to, the Maritime Archaeology Association of Victoria, the Maritime Archaeology Association of Western Australia, Southern Ocean Exploration and WreckSploration. Active members undertake research including alongside State/Territory agencies. Citizen science programs such as Gathering Information via Recreational and Technical (GIRT) Scientific Divers, NSW Wreckspotters Program, and the joint Australasian Institute for Maritime Archaeology (AIMA) and Nautical Archaeological Society (NAS) AIMA/NAS training program offer UCH training for interested members of the public.

Consultancy

For decades Australia has only had one dedicated maritime archaeology consultancy, Cosmos Archaeology, which has been active in the field since 1997. However, recently other smaller consultancies with maritime archaeology expertise have been establishing in Australia. Several larger heritage consultancies also maintain a small capacity in this area. Historically, this capacity has been sufficient to meet demand, with many maritime archaeological consultants also taking on terrestrial archaeological work. However, demand from the offshore renewable industry has recently caused an increase in demand and overseas UCH consultancies are now beginning to have a presence in Australia.

Australasian Institute of Maritime Archaeology (AIMA)

The Australasian Institute for Maritime Archaeology (AIMA) is the peak body for maritime archaeology in Australasia and is an incorporated, not-for-profit organisation, dedicated to the preservation of UCH. AIMA advocates for the protection of UCH across Australia, New Zealand, the Pacific and southeast Asia. Members of AIMA include professional maritime and historical archaeologists, Government officials, subject matter experts, students, academics, conservation scientists and interested members of the public. AIMA's objectives include to

support and undertake research within the field of maritime archaeology and to publish the results of this work.

AIMA has an active publications programme including a quarterly newsletter and an annual volume, the *Australasian Journal of Maritime Archaeology*, as well as special publication reports. AIMA also organises an annual conference and offers yearly scholarship opportunities for student and avocational research.

Traditional Owners

Traditional Owner groups have managed Sea Country sustainably for tens of thousands of years and maintain strong connections to tangible and intangible marine heritage values. They play a leading role in stewardship of that heritage through Aboriginal Corporations or similar bodies and are deeply involved in initiatives to map Sea Country across Australia. For example, the Murujuga Aboriginal Corporation collaborated with maritime archaeologists on discovery of the first mapped FNUCH in Western Australia and are involved in Flinders University programs to train young Indigenous Rangers to dive and record UCH. However, despite notable examples like this in a few locations, capacity and training within Traditional Owner groups across Australia remains extremely limited, restricting the availability of informed consent for offshore development.

Resource Decline

Overall, Australia is poorly resourced across all sectors of UCH research and management. As of 2025, fewer than 30 maritime archaeologists are employed in an ongoing professional capacity nationwide. There is a disturbing decline in dedicated professional roles within key governmental agencies, including the Great Barrier Reef Marine Park Authority (GBRMPA), the Department of Environment and Science (DES) in Queensland, Heritage NSW, and Heritage Victoria. This also extends to Tasmania and the Northern Territory who currently do not employ suitably qualified maritime archaeology practitioners. There has also been a steady decline in support for field work, an increased emphasis on meeting minimum regulation requirements rather than conducting sustained research, an incomplete national database, and a lack of specialist training opportunities. These sustained declines have left Australia's UCH sector unable to meet growing demands for expertise and information and limited ability to regulate and enforce legislation.

This shortfall is particularly evident in areas such as offshore windfarm development, where the lack of local capacity has necessitated bringing in specialists from overseas. With the recent announcement of 13 feasibility licences off the coast of Victoria, along with several declared areas off New South Wales, Tasmania, and Western Australia, the demand for experienced maritime archaeological consultants—particularly those with expertise in submerged landscape research—has surged dramatically. Currently, there are simply not enough qualified professionals within Australia to meet this growing demand, let alone projected future needs.

Compounding the issue is a significant shortfall in the specialised equipment required for researchers, such as universities or practitioners, to effectively access, survey and investigate offshore areas, to locate and record archaeological sites for research and public benefit, outside of development interests. Although investigation of the seabed by developers is thorough and of high quality, it is often not publicly available for external use by researchers.

Legislation

State and Territory legislation protects UCH located up to three nautical miles from the lowest astronomical tide. Beyond three nautical miles, and up to 200 nautical miles to the edge of the Exclusive Economic Zone (EEZ), UCH is protected by the UCH Act. However, for shipwrecks and shipwreck artefacts only, the UCH Act overlaps with State/Territory legislation in coastal waters, zero to three nautical miles from the lowest astronomical tide. In this jurisdictional overlap, there is layered protection of both State/Territory and Commonwealth Acts (see Figure 3).

However, legislative protection for UCH is inconsistent across Australia's State and Territory jurisdictions, for example varying in:

- the use of terms (such as shipwreck or vessel),
- scope of what is protected (such as only shipwrecks or all UCH),
- date of protection (either a 75-year rolling date or prior to 1900),
- requiring a level of significance for protection, and,
- in providing automatic or declared protection for site categories.

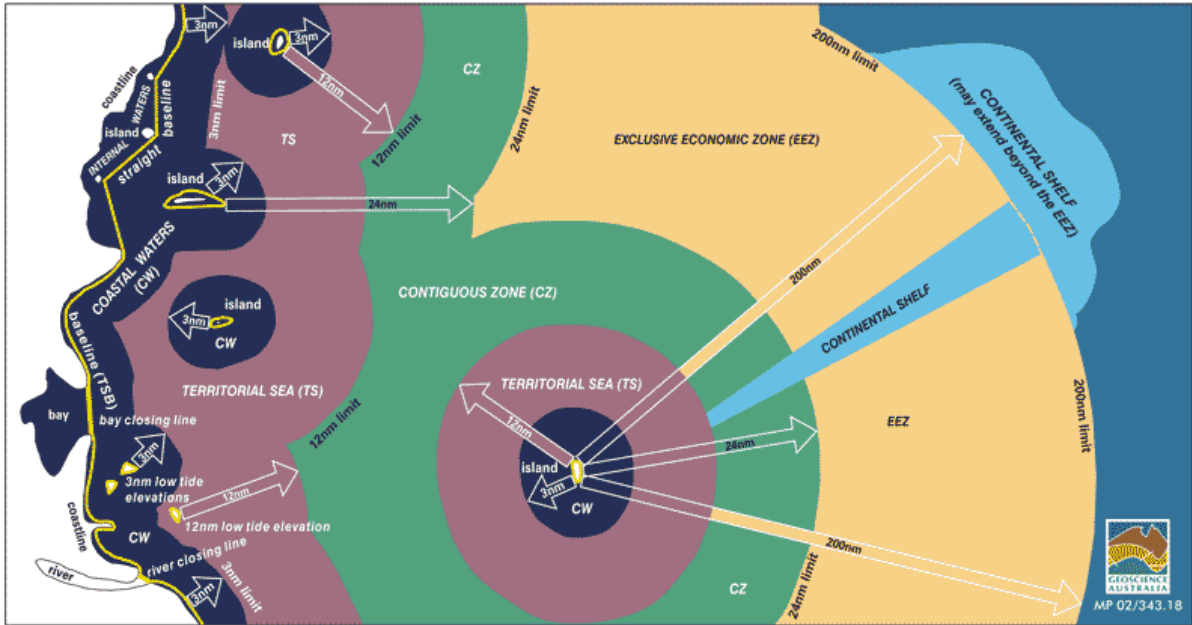


Figure 3: Australia’s maritime zones used to define the jurisdiction of State/Territory heritage Acts and the Commonwealth Underwater Cultural Heritage Act 2018 (Geoscience Australia, MP 02/343.18).

Some UCH legislative instruments have not substantially changed since the 1970s (such as the Western Australian *Maritime Archaeology Act 1973* or the New South Wales *Heritage Act 1977*), while others have been superseded or substantially updated (such as the Victorian *Heritage Act 2017* and the UCH Act). There are also different relationships with land-based heritage protection—some States/Territories combine some or all heritage protection into one Act and some have separate Acts for historic and First Nations heritage, which presents some challenges to the protection and regulation of UCH and FNUCH.

FNUCH is included within the UCH Act under the definition of UCH as *all traces of human existence*. However, the current scope of the UCH Act provisions is limited to tangible heritage as defined in the UNESCO 2001 Convention, i.e. physical archaeological material. Most State Acts also focus only on physical archaeological remains while others also consider intangible values, including oral histories and ethnographic evidence (such as the Victorian *Aboriginal Heritage Act 2016*).

In broad terms, historic heritage is well-protected across Australia for shipwrecks and aircraft that have been on the seabed for 75 years or more. The protection of other forms of UCH, such as maritime infrastructure (including jetties, piers and navigation markers etc.) and submerged archaeological sites (such as quarantine grounds), varies across the country. However,

effective and comprehensive protection of significant FNUCH is still in its infancy. Ratification of the UNESCO 2001 Convention is recommended to provide more consistency between Commonwealth and State/Territory legislation. In the meantime, the UNESCO 2001 Convention is the foundation of the UCH Act and all State/Territory agencies agreed to adopt the principles of the Annex to the Convention. Some states, such as South Australia and Western Australia, are currently using the 2001 UNESCO Convention as a guideline to update their heritage legislation (Lowther et al. 2025).

Ratification of the UNESCO 2001 and 2003 Conventions is recommended to provide more consistency between Commonwealth and State/Territory legislation and to safeguard intangible cultural heritage. The UNESCO 2001 Convention is the foundation of the UCH Act and there has been significant work towards ratifying the 2001 Convention with all State/Territory agencies agreeing to adopt the principles of the Annex to the Convention. Some states, such as South Australia and Western Australia, are currently using the 2001 UNESCO Convention as a guideline to update their heritage legislation (Lowther et al. 2025). However, no effort has yet been made towards ratifying the 2003 Convention and there is currently no Commonwealth legislative protection that explicitly includes intangible cultural heritage.

Knowledge and Disciplinary Requirements

Traditionally, UCH research in Australia has focused on shipwrecks, aircraft and submerged or partially submerged coastal infrastructure. While the potential for collaboration to locate and investigate these types of sites remains high, for the purposes of this section, we will focus on new areas of research that align with marine science priorities both in Australia and overseas.

Submerged Landscape Research

Research into Australia's submerged cultural landscapes is rapidly evolving, driven by new discoveries, expanding regional focus, and increasing interdisciplinary collaboration. Initial efforts have largely concentrated on the west coast of Australia, particularly in the Pilbara region. This area, protected by the Dampier Archipelago and characterised by an arid seabed and highly visible archaeological record, has yielded the first confirmed subtidal Indigenous archaeological sites, due to minimal post-inundation sediment coverage and reduced erosion.

These favourable conditions have made it a natural epicentre for foundational research. However, coastal geomorphology varies significantly across Australia, and other areas likely preserve archaeological materials beneath marine sediments. Recent efforts have broadened geographically, with maritime archaeologists from universities and industry conducting sub-regional submerged landscape assessments and applying a diverse array of AI, predictive modelling and survey techniques adapted to local environmental conditions.

Currently, the research capacity is anchored by institutions such as Flinders University, the University of Western Australia, and James Cook University. These universities are not only deepening investigations at known sites like Murujuga (which was inscribed as a World Heritage Site in July 2025) but are also extending inquiry into new regions across the continent. Current examples of practical approaches to connecting Indigenous Knowledge with maritime science and archaeology include Sea Country planning and co-management of submerged cultural landscapes in Murujuga, as well as Yolngu (Morphy 1991) and Lardil (Roughsey 1970) sea-level narratives, whose oral histories provide valuable evidence of climate and sea-level change.

Despite this growing momentum, there is clear consensus across the sector that future progress depends on greater inclusion of Indigenous knowledge systems and leadership. Respondents to the recent AIMA survey, for instance, overwhelmingly emphasised the need for research led by First Nations peoples and that includes both tangible and intangible heritage values. In addition, Indigenous representation in academic and heritage management roles remains disproportionately low, pointing to structural barriers such as access to training and education that urgently need to be addressed to ensure equitable leadership in this field.

A further research value of submerged First Nations heritage lies not only in its archaeological significance but also in its relevance to contemporary climate science. These landscapes preserve a record of past sea-level fluctuations tied to Milankovitch cycles and glacial-interglacial transitions, and oral traditions in many Indigenous communities preserve detailed accounts of coastal change, marine ecology and land submergence. Continued research in this area provides critical baselines for understanding long-term climate variability and human adaptation, enriching climate resilience strategies and contributing to national and international scientific agendas. This space is further enriched by the cultural significance it holds for Traditional Owners of Sea Country, reflecting our national recognition of their enduring history and deep connection to the marine environment.

Climate Change Research

One of the greatest threats facing UCH is anthropogenic climate change. Sites located in coastal, intertidal and marine environments are increasingly subject to a complex set of degradation processes—physical, chemical, and biological—that are exacerbated by anthropogenic environmental change. Rising sea levels, higher ocean temperatures, increased frequency and intensity of extreme weather events, and ocean acidification all contribute to the deterioration of underwater sites. In many cases, these pressures interact with existing vulnerabilities caused by sediment erosion, shifting currents, or biological colonisation (Gregory et al. 2022).

Unfortunately, the field still lacks a comprehensive and interdisciplinary framework for responding to these imminent threats. A cohesive agenda that brings together marine scientists, cultural heritage practitioners/maritime archaeologists, policymakers and local stakeholders remains elusive, yet crucial. This absence is not a reflection of scientific inadequacy but a legacy of compartmentalised policy development and limited cross-sectoral collaboration. As a result, UCH management remains disconnected from broader environmental and marine policy agendas, which constrains the potential for integrated and sustainable heritage protection strategies (Gregory et al. 2022).

This gap is particularly notable when compared to the natural resource sector, where marine spatial planning and ecosystem-based management have advanced considerably. To bridge this divide, UCH must be embedded more fully into environmental policy frameworks, marine science priorities, and climate adaptation planning. Doing so will require capacity-building at multiple levels, including skills training for heritage professionals, students and the development of decision-making tools grounded in environmental science.

Shipwreck Ecology

Shipwreck ecology explores the ecological roles of shipwrecks as artificial reefs and biodiversity hotspots within marine environments. With thousands of known wrecks scattered across its extensive coastline, Australia provides a unique opportunity to study the synergies that arise where UCH and marine biodiversity occur (Pearson and Thompson, 2023). These synergies can contribute to better outcomes for wrecks and fish alike, but such remain poorly understood. While limited past UCH research projects have included marine ecological

research as a component, future UCH research could benefit from stronger collaborations between archaeologists, marine ecologists, and conservation scientists, to better understand how biological communities colonise, transform, and are shaped by shipwrecks over time.

These sites not only support rich assemblages of marine life but also offer valuable insights into broader ecological processes such as succession, habitat connectivity, and resilience to environmental change (see figure 3). Shipwrecks are increasingly recognised not just as historical artefacts, but as integral components of marine ecological networks — particularly in the context of marine protected areas, fisheries management, and climate adaptation strategies. Shipwrecks further act as artificial reefs which may aid in biodiversity and prevent illegal trawler fishing. As interest in blue heritage and ocean sustainability grows, shipwreck ecology in Australia holds significant potential for advancing both heritage protection and ecological research through integrated, cross-disciplinary approaches (Paxton et al. 2024; Meyer-Kaiser & Mires 2022; Pearson & Thomson 2023).

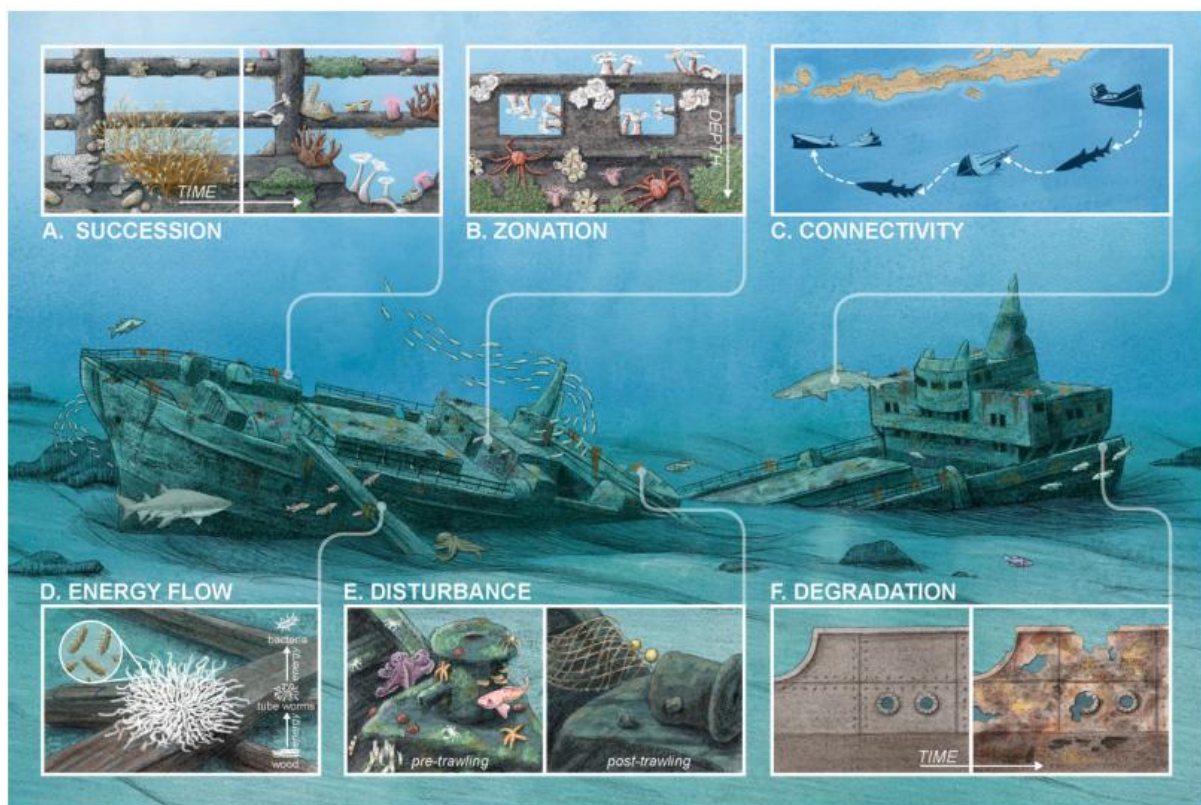


Figure 4. Fundamental ecological functions and processes occur on shipwrecks, including (A) succession, (B) zonation, (C) connectivity, (D) energy flow, (E) disturbance, and (F) habitat degradation. Each inset panel of the conceptual diagram depicts an example of one of the core ecological processes and functions that has been previously documented to occur on metal

shipwrecks in particular ocean depths and geographic regions. (A) Succession where primary biofilm colonizers and other initial colonizers prepare shipwreck structure for secondary colonizers. (B) Zonation where large invertebrate suspension feeders are on upper (shallower) parts of shipwrecks with mobile and smaller encrusting invertebrates closer to the seabed. (C) Connectivity where shipwrecks act as stepping stones facilitating movement of fauna, such as sharks. (D) Energy flow where chemosynthetic bacteria support tubeworms growing on organic matter. (E) Disturbance where anthropogenic pressures, such as trawling, can alter shipwreck morphology and relief likely influencing habitat use. (F) Degradation of shipwreck structure over time via abiotic and microbially influenced corrosion. (Paxton et al. 2024) Illustration by Alex Boersma (www.alexboersma.com).

Meyer-Kaiser & Mires (2022) argue that it is inappropriate to view anthropogenic structures (like shipwrecks) as separate from naturally occurring ecosystems and vice versa; yet, this is the common view among many audience and stakeholder groups. In fact, UCH is not just irreplaceable historical resources but also valuable biological habitats that constitute the long-term remains of anthropogenic activities in the ocean (Meyer-Kaiser & Mires 2022). Despite this dual value, these interactions remain poorly under-researched across Australia.

When vessels sink, they become artificial structures that interact with diverse seafloor environments—ranging from coral reefs and seamounts to soft sediments in ocean basins. These structures, varying in size and complexity, can enhance local habitat heterogeneity, especially in areas with low topographic complexity. Shipwrecks introduce hard substrates that are rapidly colonised by microorganisms, sessile invertebrates (e.g., sponges, tunicates, bryozoans), algae, and mobile invertebrates like crustaceans and echinoderms. They also attract a variety of fish species, from reef dwellers to pelagic predators, and marine mammals (Paxton et al. 2024).

Some shipwrecks, such as the SS *Yongala*, have become thriving biodiversity hotspots. As part of a citizen science project led by Reef Ecologic in August 2023 and July 2024, over 1,499 observations were recorded, identifying 212 distinct species (figure 4). Other shipwrecks, such as the *Wollongbar II*—which sank off Crescent Head, NSW in 1943—now serve as critical habitats, including nurseries for species like the endangered Grey Nurse Shark (Duncan pers. comm. 14 May 2025).

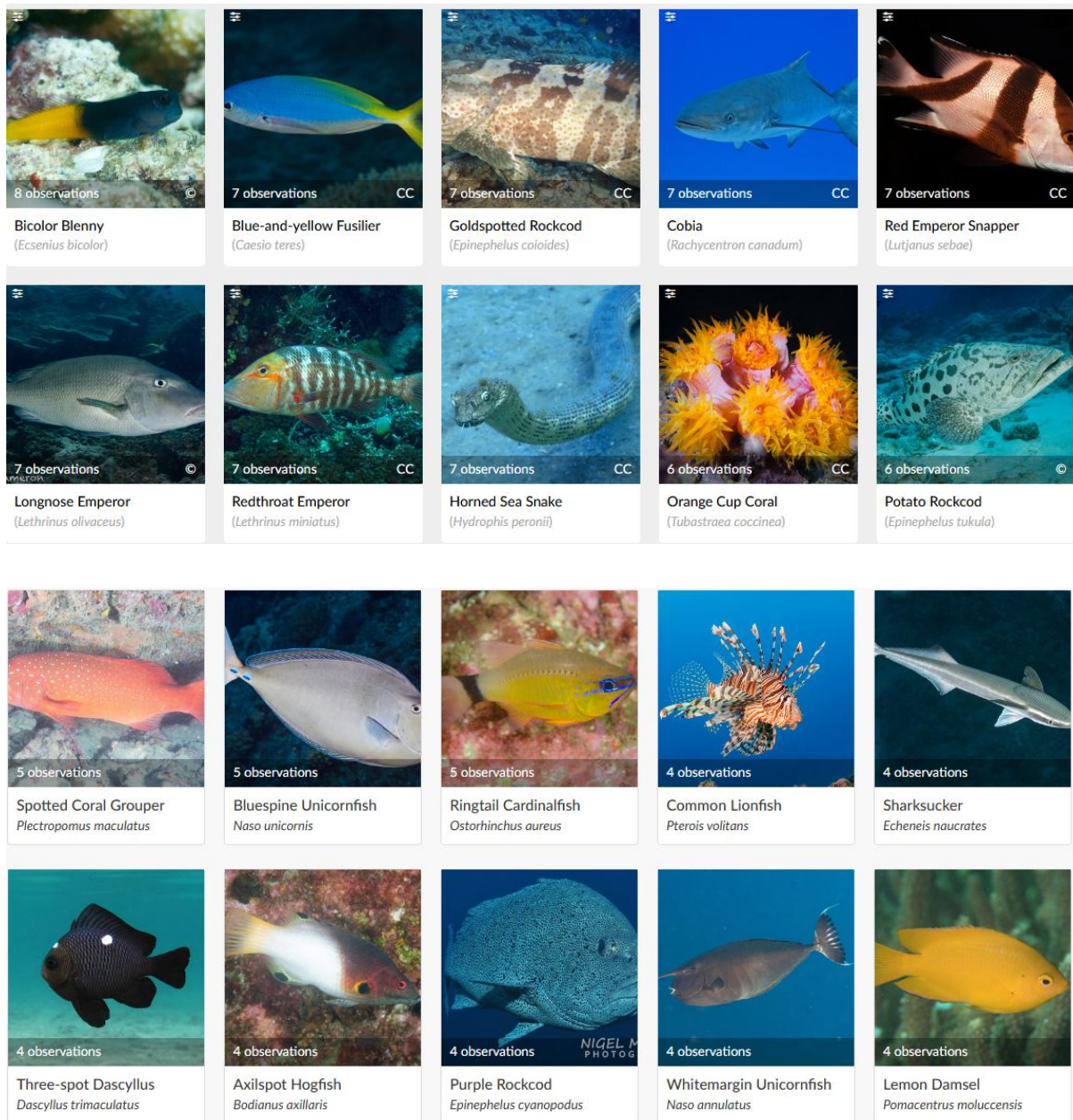


Figure 5: Example of iNaturalist observations on the SS Yongala shipwreck (Smith et al. 2024).

However, shipwrecks can also pose ecological risks. Their impact on natural habitats can be destructive, particularly when pollutants, such as oil or heavy metals, are present. These pollutants can potentially alter surrounding biological communities. National and international projects into the impact of Potentially Polluting Wrecks (PPW) are underway to assess and mitigate the impact of shipwreck-based pollution on the marine environment (Lloyd’s Register Foundation, 2025). WWI-era shipwrecks in Brazil have also been found to act as stepping stones for invasive marine species (Paxton et al, 2024).

Blue Economy

Maritime archaeology supports the blue economy by enhancing sustainability through understanding past practices, driving economic growth via heritage tourism and education, and informing marine spatial planning and resource management. It creates new economic opportunities in heritage-related services, contributes to climate adaptation by sharing traditional knowledge, and fosters public awareness and community engagement with marine cultural heritage, ultimately promoting a more resilient and integrated blue economy. Particularly, UCH helps researchers understand historical patterns of human use of the ocean, including shipping, port development, and resource exploitation.

Underwater cultural heritage represents an overlooked but scientifically valuable component of this system. Submerged archaeological sites, shipwrecks, ports, and cultural seascapes provide not only historical records but also living laboratories that link human activity with marine ecosystems. UCH also offers insights into long-term ocean–climate interactions. Sediment layers around submerged sites preserve paleoenvironmental data, from storm records to sea-level change, providing baselines for understanding how past societies adapted to shifting marine conditions.

The scientific potential of UCH aligns closely with the UN Decade of Ocean Science for Sustainable Development (2021–2030). UCH research requires multidisciplinary approaches, drawing together archaeology, marine ecology, oceanography, geoscience, and Indigenous knowledge systems. Such collaboration fosters “ocean literacy in practice” by revealing the human dimensions of seascapes, UCH makes marine processes visible and relatable to diverse communities, strengthening the uptake of science in decision-making.

Anchoring UCH in blue economy strategies ensures that ocean-based development is informed by both cultural and ecological science. For example:

- Marine spatial planning benefits from mapping UCH as coupled cultural–ecological systems, helping to balance conservation with economic use.

- Biodiversity and fisheries research can use wrecks and submerged landscapes as sentinel sites for monitoring species diversity, invasive species spread, and reef connectivity.
- Climate science gains archives of paleoenvironmental data that extend beyond modern monitoring records.
- Regenerative tourism grounded in marine science can use heritage sites as platforms for public engagement in reef ecology, ocean literacy, and restoration initiatives.

Additionally, the planned construction of offshore wind farms in Australian waters has led to an increase in pressure on coastal and underwater cultural heritage of all types. Practical techniques for investigation including geophysical and geotechnical surveying, commercial diving capabilities and the use of remotely operated technologies, technologies and skills not currently directly available to most UCH researchers. The Australian Government's 35-year, \$3.4 billion investment in the Resourcing Australia's Prosperity initiative, led by Geoscience Australia, aims to accelerate the discovery of critical minerals and other resources to boost Australia's net zero transition and enable responsible management of all resources, which could place further strain on resources in a sector with dedicated funding and resource concerns. Current Commonwealth legislation is strong enough to require the appropriate management of sites in areas proposed for seabed disturbance (new pipelines, windfarms, etc.), however, the enforcement of that legislation has been historically under resourced.

Rather than being seen only as relics, UCH sites function as integrative scientific observatories where ecology, culture, and climate knowledge converge. Repositioning UCH as both a cultural and scientific asset allows the blue economy to advance beyond extractive models toward regenerative pathways that restore ecosystems while sustaining communities.

Infrastructure and Capability Needs

This section explores key infrastructure and capability needs for the sector to effectively protect and manage Australia's UCH. It underlines the need for a renewed focus on raising sector expertise and training opportunities, access to vessels and equipment, major excavations and continued exploration of offshore deepwater sites to expand knowledge of Australia's UCH.

Methodological Gaps

While remote technologies are becoming more sophisticated there is still a critical need for SCUBA investigation of UCH sites. Since the 1960s, changing SCUBA diving safety regulations have created hurdles for professionals and members of the public to participate in UCH research and activities for all scientific diving, particularly with regards to excavation. The Australian occupational diving standards (AS/NZS 2299.1:2015 and AS/NZS 2299.2:2002) require divers to be commercially trained for any work-related UCH research. However, these requirements preclude most community or student engagement and participation in UCH activities. National conversations are underway to address scientific diving standards that are safe yet can more easily involve students and the public.

Major Excavations

Maritime archaeology in Australia was born in the 1960s and 1970s with a number of large excavation projects, including major investigations of famous sites such as the Dutch VOC shipwrecks (1600s to 1700s) in Western Australia, HMS *Sirius* (1790) off Norfolk Island, and HMS *Pandora* (1779) in Queensland. Major excavation projects not only provided a wealth of artefacts for research and display for decades, but they also excited public support for maritime archaeology, sourced significant funding and provided practical experience in the excavation, management and conservation of UCH. However, the most recent major national excavation was *Clarence* (1850) in 2012. A recommendation of this paper is greater political and financial support for a major research-driven national excavation project.

Deepwater Archaeology

There has been little research undertaken on deepwater sites (greater than 40m) conducted in Australia to date. This is a reflection of the difficulty and expense of such work, as well as regular access to technologies or vessels with the capability to identify and document sites located at depth. Major deepwater UCH research projects include the privately led investigation of AHS *Centaur* in 2009 at 2,059m, and in 2008, the Western Australian Museum-led project to document HMAS *Sydney* and HSK *Kormoran* at 2000+m. In recent years, limited research at sites >500m has been conducted in collaboration with the CSIRO Marine National Facility RV *Investigator* using onboard multibeam and drop camera systems. Further integration with the national marine science program is recommended to provide access to, and greater

opportunity for, identification and protection of UCH in deep Australian waters. Continued collaboration with the CSIRO Marine National Facility includes development of a cultural heritage Standard Operating Procedure (SOP) and invites UCH practitioners to apply for sea time on RV *Investigator*, with two projects currently under consideration. A dedicated UCH voyage proposed for November 2025 will include opportunities for UCH practitioners to be upskilled on deepwater procedures and technologies.

Emerging Technologies

While remote-sensing tools—such as satellite imagery, satellite-derived bathymetry, drone-based photogrammetry, bathymetric lidar, multibeam sonar and high-resolution marine geophysics—have been utilised in UCH research for decades, they are increasingly accessible and capable of generating precise, large-scale data on underwater sites and their environmental contexts. The availability of advanced underwater survey tools—such as medium-depth Remotely Operated Vehicles (ROVs), Autonomous Underwater Vehicles (AUVs), geotechnical coring equipment, and high resolution multibeam and sub-bottom profilers—is critical for high-resolution documentation of submerged sites. When combined with open-source environmental datasets such as those available from the Integrated Marine Observing System (IMOS), these tools enable real-time monitoring and risk assessment.

However, access to such technology remains uneven across the heritage sector, with many practitioners and agencies lacking access or expertise, which further highlights the need and opportunity for cross sector partnerships. Strategic investment in nationally coordinated opportunities for use of technical infrastructure and capacity development would enable science-based decision-making, guiding more effective conservation prioritisation and *in situ* site preservation in line with international best practices.

Digital Infrastructure

The development of robust digital infrastructure, including an upgraded future facing UCH database, GIS systems, and collaborative platforms, is essential to manage and share the growing volume of data. The expansion of access to such technologies will optimise national resources and facilitate more efficient, consistent, and impactful research outcomes. To address this gap, the development of specialised training programs and certifications is essential. Collaboration across relevant stakeholder databases, including CSIRO, the

Australian Hydrographic Office, and Geoscience Australia, is crucial for ensuring that future professionals are equipped to manage the complex, interdisciplinary nature of UCH and submerged cultural landscape research.

Collaboration with Traditional Owners of Sea Country

It is recommended to develop a framework for FNUCH research from the perspective of First Nations of Australia. This framework should provide opportunities for Traditional Owners to set the priorities for research and protection and be collaboratively developed with Traditional Owners, maritime archaeologists, Indigenous Rangers, scientists and government. These partnerships are essential to shifting the UCH narrative to one that recognises the inherent rights, responsibilities, and enduring spiritual and cultural connections of Traditional Owners over Sea Country. Existing collaborative two-way knowledge programs within marine science, e.g., those developed through the Australian Institute of Marine Science (AIMS) or GBRMPA, could assist to inform this recommendation.

To create sustainable growth, AIMA survey respondents advocated for two-way knowledge capacity-building initiatives that train and empower both Indigenous peoples in maritime archaeological principles and practice and non-Indigenous maritime archaeologists in cultural awareness and understanding of Sea Country values and knowledge systems. Several respondents highlighted the importance of Indigenous co-design at every stage of research and the necessity for instituting the CARE Principles for Indigenous Data Governance.

Progress and Impact Measurement

UCH research is broadly communicated to the public through media, published resources and personal communications. However, there has been limited inclusion of UCH within existing marine science frameworks in recent years, with corresponding limited positive progress.

Alignment with Existing National Science Frameworks

Priorities for UCH in Australia align closely with existing national marine science frameworks, including the Australian Academy of Science's 2015–2025 National Marine Science Plan, the 2021 National Research Infrastructure Roadmap, and the 2024 National Science and Research Priorities—all of which emphasise climate change adaptation, ecology, sustainability, and the

elevation of Indigenous knowledge as key pillars of Australia's scientific future. As UCH research engages with these themes, it offers a platform for interdisciplinary innovation and societal benefit.

UCH research has been excluded from many marine science frameworks to date. The 2024 draft Sustainable Ocean Plan (SOP) offers one of the only direct mentions of UCH within marine science frameworks, stating that *further work is needed to improve our understanding of ocean ecosystems, the seabed and **underwater cultural heritage**, including submerged seascapes and wrecks* (SOP 2024, p.37). This acknowledges a greater awareness and need for increased collaboration within the marine sciences in relation to the practicalities of locating and managing Australia's UCH. For example, the AUCHD can be applied as a [protected] data layer in the internal CSIRO Marine National Facility database, to alert staff to the possible presence of significant UCH, providing for opportunistic surveys. Allocation of time and resources to these endeavours would be enhanced through greater signalling of the national importance of this space.

The SOP further notes that establishing national marine baseline, mapping and long-term research programs are required in order to effectively identify, manage and monitor cultural heritage in marine parks and Commonwealth waters (SOP 2024). Underwater cultural heritage research in Australia would significantly benefit from these initiatives as there is a dearth of long-term research programs proposed, an absence of a coordinated mapping agenda and no extant national marine baseline for the field.

This document is an excellent first step towards greater inclusion of UCH research in marine science policy and planning. It is recommended to continue this relationship with the National Marine Science Committee through inclusion of representation, development of Standard Operating Procedures for UCH, and utilising this relationship as a jumping off point for broader understanding of UCH across marine science.

Public Awareness

The location and investigation of UCH has high public value, particularly given the significant national and international coverage that shipwreck surveys and discoveries generate in local and national media. For example, the recent discovery of the *Koning Willem de Tweede* (1857) shipwreck in South Australia generated over 30 discrete national and international media stories. The discovery of SS *Nemesis* off Port Kembla, after it vanished in 1904 with 32 lives, led

to 23 relatives of those lost attending a memorial event on the 120th anniversary of its disappearance with considerable media. The media coverage of the location of SS *Iron Crown* (1942) by RV *Investigator* in 2019 resulted in the orphaned descendant of a crew member being reconnected with his long-long sister.

Community Engagement

Results from previous investigations have shown that not only is there tremendous public interest in UCH research, but also high levels of community support for and engagement with bringing valuable aspects of our national history to light. Investigations of sites associated with maritime tragedy or military operations are particularly poignant reminders of our national heritage and are often supported by descendants, families and local communities. Most UCH practitioners communicate directly with communities impacted by located sites, which is a time intensive but immensely valuable process.

Collection Access

Artefacts recovered from UCH sites are held in museums and state agencies across Australia, with some also legally held in private collections. National, State and local maritime museums communicate our past as well as stories of human feats, survival and tragedy across maritime history using UCH material and the results of maritime archaeological research. Museums also conserve and maintain collections of artefacts, often in temperature and humidity controlled conditions, that can be accessed digitally or directly by researchers. Museums and other agencies also maintain physical and digital resources of research on UCH sites, including published material and grey literature.

Seafloor Mapping

By preserving complex, often remote, sites, 3D imaging helps safeguard human history for future generations. Ongoing funding for high-resolution comprehensive geophysical survey of Australian waters will ensure we have mapped submerged landscapes and pinpointed the location of UCH sites to support effective future marine spatial planning. Conducted in advance of any proposed activities in a particular area of interest, these activities will save both time and money and ensure social license for proposed works. High resolution 3D scanning of

selected sites, such as submerged port infrastructure or shipwreck graveyards, is particularly useful for activities with proposed higher levels of disturbance.

National Profile

There has been little political interest in maritime archaeology in the last decade. More significant and frequent works delivered in collaboration with marine science on national priority areas (climate change, Sea Country) would assist to realign UCH research within the political eye. Additionally, the expansion of UCH research activities and increased funding opportunities for major excavation projects would uplift the public profile of the sector.

AIMA survey respondents also suggested that Australia's extensive sovereign-owned UCH throughout approximately 40 coastal states worldwide represent a little-tapped resource for 'cultural diplomacy' that could strengthen international relationships, raise Australia's international profile and advance research. A recent example is the collaborative work between Australia and Indonesia on the World War II shipwreck HMAS *Perth* (I) (Hosty et al. 2018 & Pearson 2023). For further information, see: *The protection and management of Australian Defence underwater cultural heritage outside Australian waters*, Commonwealth of Australia, 2025. Ultimately, meaningful progress will require both increased funding and a more coordinated, inclusive approach that recognises UCH's scientific, cultural, and diplomatic significance.

Conclusion

The future of Australia's underwater cultural heritage depends on a unified, well-resourced, and strategically prioritised approach. By investing in research infrastructure, developing specialised training programs, strengthening legal protections, and fostering interdisciplinary and international partnerships, Australia can ensure the preservation of its UCH for generations to come. This coordinated effort will not only enrich scientific understanding of the value of these sites but also contribute to national identity, public engagement, and the sustainable management of our irreplaceable underwater cultural heritage.

Recommendations

Key Recommendations

1. Include UCH within national marine science planning, by:

- i. UCH representation in the National Marine Science Committee Membership.
- ii. Embedding UCH in national science, climate, and marine planning frameworks.
- iii. Advocate for inclusion of UCH professionals within all national marine science agencies.
- iv. Promote interdisciplinary collaboration through fostering partnerships across sectors, particularly with marine scientists, ecologists, and technology specialists, to enhance research outcomes.
- v. Developing a general UCH Unexpected Finds Protocol and/or SOP for use by members of the National Marine Science Committee.

This will enable us to:

- Ensure that UCH protocols and procedures are understood by the marine science community.
- Advocate with other committee members for inclusion of UCH professionals within national marine science bodies and frameworks.
- Advocate internally and externally for representation of UCH practitioners at key stakeholder events to facilitate collaboration opportunities.

2. Deeper (and better) Collaboration with First Nations Communities on FNUCH, by:

- i. Developing a framework for FNUCH research from the perspective of First Nations of Australia to guide and set national research priorities.
- ii. Along the same principles, develop a national submerged cultural landscape research strategy.
- iii. Scope capacity building initiatives.

This is progressed in collaboration with NATSIMSI, to lead development of:

- A National Framework for FNUCH
- A national strategy for submerged cultural landscapes research
- Opportunities to develop two-way knowledge capacity-building initiatives that train and empower both Indigenous peoples in maritime archaeological principles and practice

and western maritime archaeologists in cultural awareness and understanding of Sea Country values and knowledge systems.

To convene through AIMA:

- A national implementation strategy to analyse data collected by Geoscience Australia for evidence of FNUCH.
 - Upskilling historic maritime archaeologists in investigation and management of submerged cultural landscapes.
3. Expand national access to specialised survey equipment to increase the availability of advanced tools—such as ROVs, AUVs, geotechnical coring equipment and high-resolution multibeam and sub-bottom profilers—to improve the quality and consistency of surveys and applicability of the data for UCH research, including for submerged cultural landscape research.

Marine Science Collaborative Research Priorities

To embed UCH as a scientific anchor in the blue economy, the following research priorities are critical:

1. Ecological Monitoring and Biodiversity Studies
 - i. Conduct long-term studies on species colonization, succession, and habitat formation on UCH sites.
 - ii. Use wrecks and submerged landscapes as sentinel stations for monitoring reef connectivity, invasive species, and ecosystem health.
2. Climate and Sea-Level Change Archives
 - i. Investigate sediments and stratigraphy around UCH for paleoenvironmental records of storms, sea-level rise, and coastal change.
 - ii. Integrate archaeological data with Indigenous oral histories and geoscience to improve climate adaptation models.
3. Coupled Human–Ocean Systems Research
 - i. Examine how UCH contributes to ecosystem services such as habitat complexity, biodiversity support, and potential blue carbon storage.
 - ii. Assess socio-ecological interactions at heritage sites to better understand resilience and sustainability in marine systems.
4. Technological Innovation and Observatories

- i. Deploy autonomous monitoring systems (ROVs, AUVs, acoustic arrays, environmental sensors) on heritage sites for continuous ecological and oceanographic data collection.
 - ii. Establish UCH sites as “living laboratories” and field schools where archaeologists, marine scientists, and Indigenous knowledge holders collaborate.
5. Citizen and Community Science
 - i. Engage divers, coastal communities, and Indigenous groups in ecological monitoring of UCH sites through structured citizen science programs.
 - ii. Develop participatory tools and open-access data platforms that allow communities to contribute to and benefit from marine science.
6. Science Communication and Ocean Literacy
 - i. Use UCH as an entry point to communicate marine science concepts—reef ecology, ocean circulation, climate change—through education, tourism, and outreach to bring attention to UCH and engage public interest.
 - ii. Highlight UCH in Ocean Decade programs that emphasize “An Inspiring and Engaging Ocean” and “A Healthy and Resilient Ocean.”

Further Recommendations

1. Ratify the UNESCO 2001 and the 2003 Conventions to formalise international leadership, safeguard intangible heritage, provide a standardisation for Australia-wide UCH legislation, and ensure all UCH work in Australia meets an international standard.
2. Support large excavation projects that provide training to maritime archaeologists and conservators, excite public support for UCH, and provide research opportunities.
3. Update the current national database (AUCHD) and integrate it with survey data.
4. Explore mechanisms to increase Government funding for UCH and submerged cultural landscape research and management nationally, including for UCH regulatory bodies at State and Commonwealth levels.

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