Please note: the substantive content of the 2026 NRI Roadmap Survey begins at Question 20 (with prior questions dealing with administrative and other information).

As such all submissions that are published include the responses submitted from Question 20 onwards only.

Q20.

Part 2: Research themes

2.1 NRI comprises the assets, facilities and associated expertise to support leading-edge research and innovation in Australia and is accessible to publicly and privately funded users across Australia and internationally. We are seeking your input on possible directions for future national-level investment - i.e., where the requirements are of such scale and importance that national-level collaboration and coordination are essential.

The 2021 Roadmap used a challenge framework to support NRI planning and investment. With this in mind, consider likely future research trends in the next 5 - 10 years, and with respect to one or more of the 8 challenge areas identified in the 2021 Roadmap as listed below:

- describe emerging research directions and the associated critical research infrastructure requirements that are either not currently available at all, or not at sufficient scale and
- describe current national infrastructure requirements that you anticipate will no longer fit the definition of NRI in 5-10 years.

Do not limit your commentary to NCRIS funded capabilities.

Q21.

Resources Technology and Critical Minerals Processing

Australia is entering a critical phase of offshore energy transition, requiring informed decisions on decommissioning aging oil and gas infrastructure and developing offshore renewable energy projects. Advanced research infrastructure is essential for assessing environmental impacts, ensuring regulatory compliance, and optimising sustainable outcomes. Oil and gas titleholders will spend an estimated $60 billion to decommission offshore infrastructure over the next 30–50 years. Research infrastructure enables environmental risk assessment through controlled studies in experimental aquarium facilities, such as the National Sea Simulator, which can evaluate how residual contaminants, biofouling, and artificial reef effects influence marine ecosystems. Decision-making for structure removal versus repurposing is supported by research into "rigs-to-reefs" programs, helping to determine whether leaving infrastructure in place benefits biodiversity. Sediment and water quality studies use monitoring tools to assess the impacts of infrastructure removal on seafloor habitats, water chemistry, and carbon storage. Australia's push for offshore wind and wave energy requires research to ensure environmentally and economically viable development. Key areas include turbine and structure impact studies, where experimental aquarium trials model how noise, vibrations, and electromagnetic fields from offshore wind farms affect marine life. Hydrodynamic and structural testing facilities with wave tanks and flume systems evaluate the efficiency and resilience of offshore energy devices under extreme ocean conditions. Ecosystem monitoring and data integration involve advanced vessels and remote monitoring stations tracking changes in biodiversity, fish migration, and seabed integrity. Investing in cutting-edge research infrastructure, such as new research vessels, experimental facility, monitoring and data systems, ensures evidence-based decision-making, balancing energy security, economic viability, and marine ecosystem protection.

Q22.
Food and Beverage

Aquaculture has emerged as a pivotal sector in Australia's quest for sustainable food production and economic growth. Recognising its potential, both federal and state governments have outlined strategic plans to bolster the industry's development. The Australian Government's National Aquaculture Strategy (2017–2027) aims to double the industry's value to $2 billion annually by 2027. Advanced research infrastructures are crucial for addressing the challenges and opportunities within Australia's aquaculture sector. They enable the development of sustainable practices, enhance biosecurity measures, support species diversification, drive technological innovation, and improve climate resilience. Continued investment in and expansion of such facilities are vital to maintain Australia's position as a leader in sustainable aquaculture. Recent statistics indicate that the nominal value of Australian fisheries and aquaculture production is forecast to rise to $3.56 billion in 2023–24. This growth is driven by increased production volumes across all major species, despite lower prices for some key species. The overall production volume is expected to reach 296,000 tonnes by 2024–25, an increase from 2022–23. Additionally, aquaculture's contribution to seafood production is projected to increase from 60% of production value in 2023–24 to 64% by 2028–29, with the overall real value of aquaculture reaching $2.21 billion by 2028–29. This remarkable growth underscores the importance of sustainable practices and technological innovation in driving the industry's expansion. The Australian Fisheries and Aquaculture Statistics report provides comprehensive information on commercial fishing and aquaculture in Australia, covering fisheries production, trade data, consumption, and employment statistics. The report highlights the significant role of aquaculture in meeting the rising global demand for aquatic foods and emphasizes the need for continued investment in research and development to maintain Australia's competitive edge in the global market. Advanced research infrastructure capable of developing new and technologically advanced aquaculture systems are essential in developing improved food security for Australia.

Q23.
Medical Products

Q24.
Defence

Q25.
Recycling and Clean Energy

Q26.

Space

Q27.

Environment and Climate

Australia's marine environments, including the internationally significant Great Barrier Reef, Ningaloo Reef, and Southern Ocean, face increasing pressures from climate change, pollution, and human activities. Rising ocean temperatures, acidification, and extreme weather events threaten biodiversity, fisheries, and coastal communities. Research into these impacts is critical for developing conservation strategies, managing fisheries sustainably, and mitigating climate risks. Recent large-scale coral bleaching events, marine heatwaves, and flooding highlight the need for targeted research to understand resilience mechanisms in marine systems. Studying ocean currents, nutrient cycles, and species adaptation helps predict future ecosystem responses and informs policy decisions. Experimental aquarium facilities like the National Sea Simulator (SeaSim) allow scientists to simulate future ocean conditions, test species' responses to stressors, and develop resilience strategies. Such facilities support long-term, multi-stressor experiments that are impossible in natural settings. Advanced research vessels enable in-situ monitoring of deep-sea and coastal ecosystems. Equipped with remote sensing, autonomous vehicles, and sampling tools, they facilitate real-time data collection on ocean chemistry, marine biodiversity, and climate impacts. Integrated data platforms, including remote sensing, underwater observatories, and bioinformatics tools, are essential for tracking environmental changes. Long-term datasets improve climate modelling and enable early warnings for ecosystem shifts. Investment in these research capabilities strengthens Australia's leadership in marine science, ensuring the sustainable management of its unique and globally significant marine ecosystems.

Q28.

Frontier Technologies and Modern Manufacturing

Q29.

2.2 The 2024 statement of National Science and Research Priorities (NSRPs) includes outcomes linked to each priority to assist in identifying critical research needed in the next 5 to 10 years.
Consider the priority statements and, with respect to one or more of the 5 priority areas as listed below:

- describe emerging research directions and the associated critical research infrastructure requirements that are either not currently available at all, or
- not at sufficient scale and describe current national infrastructure requirements that you anticipate will no longer fit the definition of NRI in 5-10 years.

Do not limit your commentary to NCRIS funded capabilities, and where relevant, refer to the underpinning outcomes and research identified in the NSRPs document.

Q30.

Transitioning to a net zero future

Q31.

Supporting healthy and thriving communities

Australia's identity, economy, and culture are deeply connected to its vast coastline, which stretches over 35,000 km and is home to diverse ecosystems, from coral reefs to temperate ecosystems. Nearly 90% of Australians live within 50 km of the coast, shaping their lifestyles, recreation, and livelihoods. The coast holds deep significance for Indigenous Australians, whose knowledge and stewardship of marine environments span thousands of years. Their practices, such as sustainable fishing and reef management, continue to influence modern conservation efforts. Coastal cities, surf culture, and marine tourism are central to Australian life, with millions engaging in fishing, swimming, and diving each year. Australia's coastal environment underpins key industries, including tourism, fisheries, aquaculture, and offshore energy. The Great Barrier Reef alone contributes billions to the economy, while ports and shipping sustain global trade. With rising sea levels, coastal erosion, and climate change impacting marine ecosystems, there is an urgent need for robust research infrastructure to support and protect these vital environments. Advanced facilities, such as experimental aquariums, ocean observation networks, and research vessels, provide the necessary tools to monitor environmental changes, assess human impacts, and develop innovative conservation strategies. High-resolution data from remote sensing and long-term ecological studies inform policies that balance economic growth with ecosystem health. Investing in cutting-edge marine science ensures that Australia can mitigate climate risks, safeguard biodiversity, and sustain the coastal industries that define its national identity and prosperity.

Q32.

Elevating Aboriginal and Torres Strait Islanders knowledge systems

Q33.

Protecting and restoring Australia's environment

Australia's marine environments are increasingly vulnerable to a range of pressures, many of which are exacerbated by climate change. Rising ocean temperatures are driving marine heatwaves and widespread coral bleaching, significantly impacting ecosystems such as the Great Barrier Reef and Ningaloo Reef. Ocean acidification, caused by increased CO_2 absorption, is altering seawater chemistry, weakening coral skeletons, and disrupting marine food chains. Coastal erosion and rising sea levels pose additional threats, endangering habitats, infrastructure, and communities. Biodiversity loss and habitat degradation, driven by overfishing, pollution, and invasive species, are further reducing ecosystem resilience. The transition away from fossil fuels presents new challenges, requiring research to assess the environmental impacts of decommissioning oil and gas infrastructure while ensuring best practices for the development of offshore renewable energy projects. To effectively address these challenges, Australia's marine research infrastructure requires significant investment. Expanding advanced experimental facilities, such as the National Sea Simulator, would enable multi-stressor experiments that combine factors like heat, acidification, and pollution to better understand ecosystem responses. Comprehensive ocean observation systems are needed to improve real-time monitoring of marine heatwaves, ocean currents, and biogeochemical changes, providing early warning systems for environmental shifts. Strengthening integrated data and modelling platforms would enhance coordination across institutions, improving predictive models and informing policy responses. Greater investment in specialised research vessels and autonomous monitoring technologies, including underwater vehicles and remote sensing, would enhance deep-sea and offshore research capabilities, ensuring more effective ecosystem assessments. Closing these research gaps is essential for protecting Australia's marine environment, supporting sustainable industries, and ensuring resilience in the face of accelerating climate impacts.

Q34.

Building a secure and resilient nation

Q35.

2.3 The case for a new NRI capability, or enhancements to existing capabilities, typically emerges through advocacy from research communities clustering around rigorously identified needs and goals. Such a concept could respond to a requirement for novel or expanded capacity within a domain, or across domains, and must be such that it could only be made available with national-level investment.

If you have identified such a requirement, briefly describe the need, the proposed infrastructure capability, the medium-term goals, impacted research communities, and the timeframe over which you advocate its establishment. Your response can include links to relevant existing reports.

Q36.

Part 3: Industry perspectives

This section is seeking input specifically from industry-based respondents. Other respondents can skip this section.

Recommendation 6 of the 2021 Roadmap related to improvements in industry engagement with NRI. To complement work on this topic that has occurred since then, we are seeking additional advice on NRI requirements as perceived by current or potential industry-based users.

Q37.

3.1 Have you (or your organisation) interreacted with or used Australia's NRI?

- (●) Yes
- ( ) No

Q38.

3.2 If so, please briefly outline the NRI capabilities you (or your organisation) have interacted with or used. Do not limit your response to NCRIS capabilities.

Q39.

3.3 Please indicate your (one or more) primary reasons for interacting with NRI:

- [ ] For expertise or advice
- [ ] Access to research resources or products
- [ ] Access to equipment for research
- [ ] Access to equipment for operational reasons
- [ ] Help in translating research
- [ ] Access to data
- [ ] Support for clinical trials
- [ ] Other (please specify)

Q40.

3.4 If you answered no, please indicate your (one or more) primary reasons:

This question was not displayed to the respondent.

Q41.

Part 4: Other comments

4.1 Please elaborate on any of your above responses or add any other comments relevant to the development of the 2026 Roadmap. Your response can include reference or links to existing reports that you recommend be considered during the 2026 Roadmap development process.

Q49.

4.2 Optional Document Attachment.
Note: Our strong preference is that answers are provided against the relevant questions in the survey. However, this file upload option is available for submissions in file format, where needed. Please ensure the document includes your name or organisation.