

Australia's Submarine Capability: Enduring Characteristics, Emerging Features*

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The September 2021 announcement that Australia would acquire at least eight nuclear-powered submarines through an enhanced trilateral security partnership – the Australia-United Kingdom-United States (AUKUS) partnership – was the death-knell for collaboration on the *Attack*-class with the French. It was also the most significant reversal in government direction on submarine capability in the history of the Submarine Arm.¹ For the first time since 1960 – when USS *Triton* demonstrated the speed, range and endurance of nuclear-powered submarines by completing a dived circumnavigation of the globe – Australia's directed submarine capability matched the real demands of its geographic and geostrategic circumstances.

This article provides an overview of Australia's past, current and evolving submarine capability, including the transformative impacts of a nuclear-powered submarine capability for the Royal Australian Navy (RAN) and the country. A brief examination of the historical features of that capability is intended to illuminate not only its enduring characteristics and inherent value, but also those elements of capability which Australia has failed to assure adequately. There are crucial lessons on offer here for the successful transition to a multi-class, multi-type and multi-squadron fleet of submarines and for the timely transformation of the RAN, already underway, to enable safe and effective stewardship and operation of nuclear-powered submarines as the capital ships of the fleet.

Australia's Submarines Across a Century

Prior to the 20th century, mankind existed on the land or on the sea. The waging of war was confined to ranging across the surface of one or the other, because life in the through-air and undersea domains was simply unviable. Indeed, the entire undersea domain was largely unexplored and unknown. The potential of the undersea domain was almost totally unrealised.

The invention and militarisation of both aircraft and submarines changed this dynamic rapidly, globally and irrevocably. From the moment of their invention and weaponisation, submarines became immediately significant to the sovereignty, security and prosperity of Australia, whether we knew it or not. A first, and fleeting, glimpse of that significance would be caught at the outbreak of the First World War, when AE1 and AE2 were immediately deployed into action with the fleet, securing Australian and regional waters, escorting troops overseas and, for



Australian Deputy Prime Minister and Minister of Defence Richard Marles MP is greeted by the ship's company of US Navy Submarine USS *Asheville* during a visit to HMAS *Stirling*, Western Australia, 16 March 2023.

AE2, conducting combat operations during the Dardanelles campaign.

It is difficult to mount a convincing argument toward the true value of a capability that is weak, fragile, unproven, or sporadic. Regrettably, for much of Australia's early naval history, one or more of these characteristics applied to its submarine forces. Notwithstanding the proud service and achievements of both AE1 and AE2, with a force structure of only two boats, Australia's first 'submarine capability' was totally lost – irretrievably sunk – within eight months of the declaration of a war which would last four years.

Of course, even less significant than a weak force, is a non-existent force. Notwithstanding a number of attempts at establishing a submarine capability over the course of the 20th century, and acknowledging the presence of a small flotilla of British submarines in Sydney between 1949 and 1969, the RAN was typically without an organic Submarine Arm in any given year from the 1920s to the 1960s.

There was, however, a period within those decades when submarine capability was prominently and extremely significant for Australia. That period was, of course, the Second World War. Whilst submarines were absent from the RAN order of battle, the submarine forces of both Japan and Germany menaced and sank Australia's shipping and raided its ports. Those submarines, whilst small



Submarine HMAS *Farncomb* sails with navy ships from around the Indo-Pacific region during the Japan Maritime Self-Defense Force's International Fleet Review 2022 off Yokosuka, Japan.

in number in Australian waters, constituted a threat that went almost completely unanswered as Australia had no direct or effective response to them.

Highly significant also were the Allied submarines that waged the war against the Japanese on Australia's behalf, including the more than 160 American, British and Dutch boats that pushed into theatre from the massive submarine bases in Brisbane and Perth. Operating over vast distances, they took the war to the enemy in a way that Australia itself could not and inflicted crippling losses that enabled eventual victory in the Pacific.

Enduring Characteristics of Australian Submarines

It is no mere coincidence that the most successful submarines of the war in the Pacific were the fleet submarines of the US Navy. Long-range, ocean-going submarines, they were capable of operating forward, thus optimising their ability to threaten and interdict merchant and naval shipping.

Whilst technologies have advanced, the geography and oceanography of the Indo-Pacific region remain fundamentally unchanged from those years and still demand that Australian fleet units, both submarines and surface ships, have extended range and endurance. These traits have been particular strengths of both the *Oberon* and the *Collins* submarines. Having the range to patrol well beyond Australia's shores, and the endurance to deliver poise and presence on station, means that submarines can operate, and survive, wherever their strategic, operational and tactical advantages are optimised.

Modern warships are typically designed to operate within a task group or a task force construct, each performing

specific roles such as logistic re-supply, air defence or anti-submarine warfare, and each contributing – through weapons, sensors, or other capability – to the performance of the whole. Unlike other major fleet units, total independence allows submarines to conduct surveillance and intelligence collection in times of tension or offensive operations against an enemy without any reliance on direct support from other units. At the same time, interoperability facilitates the sequencing of missions with allies, such as the United States, to magnify the operational effect across a theatre.

In an operational sense, the ability of RAN submarines to deploy at range and exercise freedom of manoeuvre, whilst avoiding counter-detection, is predicated on the preservation of stealth – the ultimate tenet of submarine operations. Stealth underpins submarine safety, survivability and effectiveness. Preservation of stealth is what allows operations in otherwise non-permissive or hostile environments and enables them to accrue a tactical advantage, regardless of the mission. One of the gifts of stealth is the ability to adopt a clandestine posture, which makes submarines uniquely suited to intelligence, surveillance and reconnaissance missions, including during phase zero operations short of conflict. With the combined history of the *Oberon*-class and *Collins*-class, the RAN has now been capable of conducting long-range, high-endurance, independent submarine operations for more than half a century.

It is, of course, in the realm of combat operations that submarines are most feared. First and foremost, submarines are offensive weapons systems, designed to sink ships and other submarines. From their inception, the ability of submarines to deliver decisive combat power has been phenomenal and the firepower of Australian submarines has developed impressively throughout the century. The highly advanced and powerfully destructive Mark 48 torpedoes, continually and jointly developed with the USN to take advantage of new technologies and meet new threats, are carried in substantial quantities onboard a *Collins*.

The offensive capability of the RAN and, in particular, its submarines, has been critical in shaping Australia's strategic environment. Because of the environment in which they operate, submarines are inherently difficult to detect. The sustained defence of a force against a capable submarine, operating over an expansive maritime domain, is invariably a complex, resource-intensive and costly endeavour. It is their raw destructive power, combined with their ability to operate with stealth over vast ranges, for sustained periods at sea, that lends them credibility as a deterrent, a combatant, or both.

Creating doubt in the minds of others, submarines at sea shape the geostrategic environment of the region. They

shift the calculus of naval commanders and political masters, and thus deter coercion and aggression. This is where the real value of submarines lies and what defines them as Australia's pre-eminent naval weapon system.

Where Australia has Faltered

A significant aspect of the introduction of the *Collins*-class was that the RAN achieved operation of consecutive classes of submarine for the first time, transitioning the capability from one class to another, rather than suffering the total loss of capability and then re-introducing it again, as had been the previous experience. That said, between the mid-1990s and the mid-2000s the Submarine Arm was impossibly stretched across the simultaneous demands of sustaining and operating the *Oberons*, designing and building the *Collins*, and introducing the *Collins* into operational service whilst shouldering parent navy responsibilities for the class. It would be delusional to say that there was no shortfall in capability – at one stage *Otama* was the sole operational submarine – but a degree of force continuity was maintained.

Force continuity is critical to avoid exposure to the strategic risk of declining capability with a subsequent erosion of deterrent effect which might be exploited, either politically or militarily, by an adversary. While there has been no shortage of government announcements regarding submarines over recent decades, action to match the rhetoric and generate new capability has been less evident. This collective failure to assure the ongoing potency of Australia's submarine force has sent a strategic message to the region, whether intended or not, and emboldened potential adversaries.

For a variety of reasons, the RAN has a decades-long history of failing to provide the right number of quality people, at the right time, to generate sufficient uniformed workforce strength and assure the total submarine capability.

Whenever this predisposition has been co-incident with a lack of available, reliable and capable submarines – as has frequently been the case – the result has been disastrous.

In the face of an expansion of submarine capability, 'where will you find the crews?' is an inevitable question from pundits and nay-sayers. The difficulty in responding to that question is that submariners are not to be 'found' anywhere. They are not a naturally occurring species, just as a Submarine Arm is not a naturally occurring organism, even within a first-rate navy. They need to be created, fostered, nurtured and championed, particularly when they comprise the most specialised workforce in the Australian Defence Forces (ADF), but represent a fraction of the total RAN strength. This principle relates equally to the non-submarine-qualified and other non-uniformed elements of the submarine enterprise across defence, government, industry and academia that enable a submarine capability. A more pertinent question is 'what is our strategy to create the workforce and assure the requisite expertise and experience to deliver the capability?'

However challenging, the workforce dimension is not an unsolvable problem. In my view, it is a matter of strategic clarity, prioritisation and determination. It is also my view that the requisite clarity on requirements is available in the 'optimal pathway' which articulates the phased and progressive evolution and expansion of Australian submarine capability across the next three decades. Decisions on prioritisation of resource across the various demands of the navy and wider defence will be supported by the growing realisation of the value and effectiveness of submarine capability writ large and governed by the primacy of the requirement to steward the nuclear-powered submarine capability safely and effectively. I anticipate that the determination to succeed will continue to be driven by Australia's strategic circumstances and collective desire to protect interests, defend sovereignty and assure prosperity.

Emerging Features of Australian Submarines

There are features that will distinguish the Australian nuclear-powered submarine capability from its conventionally-powered predecessors. Speed might present as a tactical enabler, but it is also one which affords operational and strategic advantage in where, how and when submarines might be deployed and tasked.

While the *Collins* boats as a force are entirely responsive to government direction, they are far from a reactive capability. Optimising their employment at sea requires exceptionally long-term planning and scheduling to ensure they are deployed into the most strategically significant waters in any given period of time. Nuclear-powered submarines, with their sustained speed and associated range, offer a substantially more reactive platform, presenting



US Navy submarine USS *Santa Fe* transits in formation with RAN *Collins*-class submarines HMAS *Collins*, HMAS *Farncomb*, HMAS *Dechaineux* and HMAS *Sheean* in the West Australian Exercise Area, February 2019.



Petty Officer Maritime Logistics - Supply Chain Submariner Steven New on-board HMAS Sheean during a logistics visit at Hobart, Tasmania, April 2021.

government with much greater flexibility in their operational tasking. This is a defining advantage, particularly in an ever-more dynamic region. That advantage will, from the 2030s, be accentuated by increasing strength in numbers, which has a value all its own.

Equally, while both types (conventional and nuclear-powered) are inherently capable of fighting their way out of most battle situations, a clear distinction is the reduced vulnerability – and enhanced survivability – afforded a nuclear-powered submarine by virtue of the speed advantage it can generate over threatening forces. Once again, this is likely to result in a broader set of operational scenarios into which nuclear-powered submarines might reasonably be deployed.

For much of Australia’s history, the RAN has only operated a single ‘class’ of submarine, currently the *Collins*-class, at any one time. To date – and putting to one side the Deep Submergence Rescue Vehicle (DSRV) capability – Australia has also only operated a single ‘type’ of submarine; conventional-powered attack submarines (SSKs). Within a decade, the RAN will be operating at least two types of submarine – SSKs and nuclear-powered attack submarines (SSNs). They will be drawn from two classes, the *Collins*-class and *Virginia*-class. A decade later, this will extend to a second class of nuclear-powered attack submarine, currently known as the AUKUS-SSN.

Importantly, within the next five years Australia will be supporting and participating in the operation of two types of submarine (SSKs and SSNs) across three classes (*Collins*, *Virginia* and *Astute*) as the USN and Royal Navy (RN) commence operations through the Rotational Force-West out of Perth. Further, it is within this timeframe that uncrewed submarines, such as the *Ghostshark* – an autonomous underwater vehicle (AUV) currently in development and an additional type of submarine – will enter service.

Given the above, it is important to understand that the RAN is not facing a simple binary transition from *Collins* to *Virginia* or from *Virginia* to the AUKUS-SSN. Even to label the dynamic as a ‘transition to nuclear-powered submarines’ is to understate significantly the impact and import. This is a transformation to an enduring multi-class, multi-type, multi-squadron submarine capability for Australia.

Lethality and Potency – Platform-based Capability

There is a distinction to be drawn between the lethality of the weapons a submarine might carry, and the potency of a submarine force. In the right hands and the right place, a single Mark 48 torpedo can be a lethal weapon in that it can cause the death of an enemy. For a submarine force to be potent – that is, capable of exercising great power, influence or persuasion – much more is required.

There are inherent and obvious advantages in the opportunity for the RAN to acquire and operate *Virginia*-class submarines, including those associated with a nuclear-propulsion system, shared combat system and torpedo, and sea/land-attack-capable cruise missiles; all of which will substantively increase the potency of the force. There are further advantages in the fact that the *Virginias* will be sustained as force elements within a much wider class base, taking Australia beyond the ‘critical mass’ issues of the past.

Further down track, the acquisition of the AUKUS-SSN, which will benefit from an evolution of the *Astute*-class, USN and RAN design support and inclusion of a jointly developed USN combat system and weapons, will further add to the potency of the force. Just as the size of the *Virginia*-class base is an advantage, so too will there be



A photo of HMAS Anzac’s embarked MH-60R Seahawk helicopter taken through the periscope from HMAS Rankin during anti-submarine warfare training conducted as part of Exercise Zeehond in the Western Australian Exercise Area, November 2021.

benefits of scale and continuous production for both the RN and the RAN in designing, building and operating a common platform, thereby keeping both submarine fleets above a critical overall mass.

Equally relevant to potency is the ability of a navy or state to generate force, recover from attrition, or respond to strategic shifts; such as the Japanese Maritime Self-Defence Force has done so admirably with its submarine force over recent years. This requires more than exceptionally capable platforms. It requires a robust industrial base with the capacity and resources to design, build, sustain and, importantly now, dispose of submarines. It also requires a maritime industry which is structured to support the navy – an industry which understands and is motivated by the fact that it is in the business of generating sea power to ensure the security of the country. Investment by all three AUKUS partners in their industrial infrastructure, and the creation of a nuclear-powered submarine sustainment yard and other facilities in Western Australia, a nuclear-powered submarine build yard in South Australia and an east coast operating base in New South Wales will amount to a substantial net increase in the Australian, and therefore allied, submarine industrial and operational capacity, benefiting all three navies.

Domestic rhetoric and commentary tends to focus on what each state gets from ‘the deal.’ It is as important to consider the contribution that each state is making to the alliance. Additional infrastructure and industrial capacity, adding to the overall allied submarine complex, is one key contribution within the gift of Australia. Proximity to the Indo-Pacific region, adding to the overall force posture options of allies and partners, is another.

Conclusion

The routine deployment of RAN submarines into the Indo-Pacific region over the years stands as a clear demonstration of Australia’s determination and capacity to employ the submarine force throughout the maritime commons. That force exists, first and foremost, to deter aggression and coercion, and to defeat attacks against Australia. The relative strength and potency of the submarine force correlate directly to the combat effect that it can achieve when called upon and have qualified the credibility of the deterrent over time.

The pathway to develop and expand the submarine capability of the RAN, announced in early 2023, constitutes a powerful, contemporary statement of Australia’s intent and what it is willing to invest in order to uphold its sovereignty, protect its interests and assure future prosperity. With the advent of nuclear-powered submarines, Australia’s stated ambition matches the strategic demand with the necessary urgency, makes ground immediately and progressively, and carries extra weight as a trilateral effort.



The LR5 submersible is launched from MV *Stoker* during diving operations on HMAS *Rankin* off the coast of Rottnest Island in Western Australia as part of Exercise *Black Carillon* 21, November 2021.

Domestically, achieving a multi-class, multi-type, multi-squadron submarine capability is a challenge that will require, to coin a phrase, a ‘most-of-navy’ and ‘much-of-government’ effort. The challenges abound, particularly with regard to generating the requisite workforce and ensuring continuity of the force. However, with the concerted effort of the governments, industrial bases and navies of all three states, those challenges can be met. Success will result in the consistent attainment of credible presence in strategically significant waters, creating doubt and shaping the calculus of regional naval commanders and political leaders. Although conventionally armed, the submarine force of the RAN will, for Australia, continue to present as the country’s principal strategic deterrent long into the future. 🇦🇺

Notes

- * The paper draws on several earlier writings by the author, including “Same, Same but Different. A Personal Perspective on the Requirements for a Future Submarine,” *Australian Naval Review* (2010); and “The Significance of Australia’s Submarines in the 20th and 21st Century,” presented to an Australian Naval Institute Conference (2014).
- 1. For clarification, the terms used here refer to the following. Submarine Force = all at sea. Submarines and submariners assigned to the Fleet Commander. Submarine Arm = all aboard. Submarine qualified uniformed personnel in the RAN. Submarine Enterprise = everybody. All those who contribute to the submarine capability. Submarine Capability = everything. Platforms, weapons, headquarters, dockyards, and everybody who brings it together.

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