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ADF capability review: Royal Australian Navy

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23

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This ASPI *Policy Analysis* is the first of a series intended to provide a snapshot of ADF capability to inform the Defence White Paper debate. Other papers in the series will consider Army, RAAF and C^{4}ISR capabilities.

Overview

The Royal Australian Navy (RAN) operates a fleet comprised of surface combatants, submarines, amphibious assault vessels, patrol boats and support vessels as well as a range of helicopters. In size it is a little larger than the navies of countries like Singapore and Thailand, but is much smaller than those of China, India and Japan.

We can be quite confident about the planned future force structure of the RAN. Most of the decisions that will shape the Navy for the decades ahead have already been made (see Table 1). The Navy will look much as it does today until the middle of the next decade, when the air warfare destroyers and amphibious ships are delivered. Over the past decade, new-build additions to the fleet included the *Collins* class submarines, *Armidale* class patrol boats, the *Huon* class mine hunters and two *Leeuwin* class hydrographic survey vessels. The replenishment ship HMAS *Sirius* joined the fleet in 2006.

In terms of capability, the RAN is currently a middle power force, with no fixed wing air power and with frigates forming the core surface combatant capability. The absence of an aircraft carrier (and the other elements of a carrier battle group required for escort) in the fleet circumscribes the range of operations the ADF can undertake. The principal operator of carriers, the United States Navy, can project air power and provide air cover for naval and land based operations in hotly disputed areas, capabilities denied other nations. The only other carrier operators in the Asia–Pacific are the aspiring major powers Russia and India. The former operates a single carrier, providing limited naval air power. India operates an ex-RN carrier and is in the (tortured) process of acquiring another from Russia, as well as beginning to build its own indigenous design. China is undoubtedly interested in aircraft carriers, though opinion is divided as to the priority assigned to acquisition. However, aircraft carriers are extremely expensive to acquire and operate, and there is little prospect of Australia deciding to once again field a carrier.

Table 1: Major naval vessels		
Role	Description	Current vessel type(s)
Surface combatants	Long range platforms that can sustain independent operations in remote areas for extended periods, including the escort of shipping and command and control of task groups. Ability to perform anti-air, anti-surface and anti-submarine tasks. Ability to embark helicopters that extend the reach and tactical abilities of the ships.	FFG: *Adelaide* class guided missile frigates (4) FFH: *Anzac* class frigates (8) 'Air Warfare Destroyers' – *Hobart* class AF-100 frigates (3 firm +1 option, for delivery from 2014)
Submarines	Maritime strike and interdiction, intelligence gathering, deploying mines, clandestine deployment of special forces.	SSG: *Collins* class guided missile capable submarines (6)
Embarked helicopters	Maritime surveillance and reconnaissance, anti-surface and anti-submarine operations, search and rescue.	Sikorsky *Seahawk* (16) Westland *Sea King* (6)
Amphibious lift	Troop and vehicle lift, helicopter transport and operations, deployment of landing craft, transport of materiel and medical evacuation.	LPA: *Kanimbla*-class amphibious landing ship (2) LSH: HMAS *Tobruk* heavy landing ship LHD: Two 27,000 tonne amphibious vessels from 2013
Patrol boats	Patrol, surveillance and response capability. Contributes to the civil surveillance program under tasking from Border Protection Command.	*Armidale* class patrol boats (14)
Afloat support	Refuelling and resupply for naval vessels and embarked helicopters while at sea and provides logistics support to land operations.	AO: HMAS *Sirius*, 46,000 tonne Auxilliary Tanker AOR: HMAS *Success*, 17,900 tonne Replenishment Tanker
Minehunters	Detection and neutralisation of sea mines.	Six *Huon* class coastal minehunters Two clearance diving teams
Hydrographic survey vessels	Charting the sea floor to enable safe navigation and operations in shallow waters.	Two *Leeuwin* class Hydrographic survey vessels One civilian-registered Fokker F.27 airborne laser depth sounding aircraft

Of the other navies, Japan and South Korea currently operate what we would term air warfare destroyers (AWDs)[1], a capability that the RAN will only take delivery of in the middle of the next decade. The amphibious ship acquisition announced at the same time as the AWD decision will put the RAN in the first rank of regional amphibious capability. Around the region, many nations are acquiring submarines[2], and Australia's naval forces will be operating in an environment where sophisticated diesel-electric and nuclear submarines are increasingly the norm.

While this paper focuses on the Navy, it is important to note that, in many instances, naval elements combine with other services to provide a joint ADF capability. For example, the RAAF contributes to anti-submarine warfare (ASW) through its P-3 Orion patrol aircraft and to fleet air defence through its air combat capability. And the amphibious ships will enable joint operations with the Army (and probably RAAF).

Current capability shortfalls include the ability to conduct ASW operations due especially to deficiencies in ship-borne and airborne sensors, fleet air defence and the availability and capability of embarked helicopters.

Major considerations over the next few years will include:

- planning for the next generation of submarines and surface combatant
- what happens post-Seasprite and the future of RAN embarked helicopters
- implementation of the ASW roadmap developed to address ASW shortfalls
- with Army, development of the concepts and expertise required for amphibious operations
- manning of fleet elements, especially submarines.

Capability summary

Surface combatants

Surface combatants represent Navy's largest investment. They fulfil a wide variety of roles, including high-end warfighting, protection of sea lanes, and escort of shipping and interdiction tasks such as the Proliferation Security Initiative. Surface combatants can operate far from base and maintain a persistent presence. Australian surface combatants have operated in the Persian Gulf area, on an almost continuous basis since 1990 through both Gulf Wars, a task that continues today.

To carry out the full range of envisaged tasks, surface combatants need to be able to defeat threats in the air, surface and subsurface domains. They can also be used to engage targets on land with gunfire and provide support to land operations.

The Navy's surface combatant force is in transition. The fleet suffered a significant reduction in its area air defence capability early this decade with the retirement of the guided missile destroyers (DDGs). The surface combatant fleet comprises two classes of frigates. As such, it is ill-equipped for high-level operations. A plan to upgrade the *Anzac* class frigates into a capable air defence platform was abandoned, although an air-surface missile defence upgrade will provide a self- and point-defence capability. An upgrade to the guided missile frigates (FFGs) under Project SEA 1390 has been seriously delayed. Neither approach would have delivered a capability at the level of a dedicated AWD.

The surface fleet will receive a major capability boost—and will be substantially better than it was in the DDG days—when three or four larger air warfare destroyers (actually large multi-role frigates) are delivered. They will provide additional area air defence and situational awareness capability, and will greatly enhance the operating envelope of the Airborne Early Warning and Control (AEW&C) and Maritime Patrol Aircraft (see the forthcoming *Air Force Capability Summary* in this series) as they can be protected by the AWD without the need for dedicated fighter escort. They are scheduled to be delivered from 2014, though full in-service capability will be some time later. Any slippage in this delivery date will continue to leave the fleet short of organic medium to long range air defence.

The AWDs have the potential to allow the RAN to operate in hotly contested environments, including the presence of sophisticated air threats. For example, Navy is watching the US development of the Standard Missile 6 (SM 6) for its Aegis fleet as a possible growth path for the AWD. This missile has the potential to fundamentally change the dynamics of sea-based area air warfare with its range of over 350km and over the horizon engagement capability when operating with an AEW&C aircraft. It will give sea-based forces the ability to engage threats before they can engage or effectively target a task group, even when operating beyond the range of the RAAF's land based fighters.

A continuing major capability shortfall is in anti-submarine warfare. The *Collins* class submarine is a capable ASW platform but because it is limited by its diesel-electric propulsion, it is most effective in littoral areas and bottlenecks where geography constrains the movements of adversary forces. In the open ocean, the fleet's organic ASW capability must be provided by surface vessels and their embarked helicopters, both of which fall short of what is required to operate against modern submarines. Current surface combatant system shortfalls include the absence of low-medium frequency hull-mounted sonars and the lack of a variable depth sonar capability. Defence has recognised this shortfall and has produced an ASW roadmap, but the capability will take time to rebuild and the plan is contingent upon receiving funding for its various components through the Defence Capability Plan (DCP) process. The ASW fit on the air warfare destroyers—to be selected in the near future—is crucial for improvement however true rectification of this capability gap is most likely the target for a future project, the Navy's Next Generation Combatant (SEA 5000) which will replace the *Anzac* frigates.

The low capability and availability of embarked helicopters also adversely affects the capability of the surface fleet to locate and strike ships or other surface targets (antisurface warfare – AsuW) or to locate and engage submerged submarines (anti-submarine warfare – ASW) tasks (see the entry for naval aviation below).

Submarines

Ten years ago the RAN's *Oberon* class submarines were approaching the end of their service lives. (In fact, two of them were taken beyond their planned retirement dates because of slippages in the *Collins* project.) The 'O-boats' were very capable submarines in their day, but the *Collins* are much larger (by almost 1,000 tonnes) and were designed from the start for a more wide-ranging role, being able to remain at sea for longer periods.

Despite much negative publicity (some of it fair, some not), the *Collins* submarine project has been a success story of Australian indigenous defence projects. Now that they have been fitted with fully-functional combat systems, the *Collins* class boats are capable conventional submarines that are highly thought of by allied nations, who have experienced great difficulty when faced with a *Collins* class boat in exercises. Their submerged dash speed and endurance is superior to the *Oberon*. The *Collins* can stay at sea for longer with greater ability to remain submerged than comparable diesel submarines, although the lack of an air independent propulsion (AIP) system means that some modern submarines can maintain longer submerged times, albeit at very low speeds. The *Collins* boats are now credible ASuW platforms, armed with wire-guided torpedoes and Sub Harpoon anti-ship missiles.

Being a conventional diesel powered submarine, the *Collins* fleet cannot match the speed of surface vessels during a transit, and so cannot provide ASW escort for a transiting task group. Instead, submarines would be dispatched to take up patrol in the forward area where amphibious lodgements would be conducted in advance of a task group sailing.

The capacity of the *Collins* fleet for concurrent tasking is limited by its size. And given that perhaps three or four boats will be available for operations at any given time, sustained simultaneous deployments, especially for contingencies that occur far afield, would leave little in reserve for other tasking. High-level requirements for the *Collins* class included the ability to keep two boats on patrol at 2,500 nautical miles from base and for individual boats to be able to remain at sea for sixty days. This means that *Collins* submarines can maintain standing patrols or collect intelligence well into the Indian Ocean or into North Asia. Potential adversaries cannot assume that their home ports and coastal waters are safe refuges.

Other capacity issues concern the availability of the boats. At the time of writing, there were boats alongside due to crewing shortfalls and maintenance requirements. (Although it is not clear if the high rate of maintenance work reported recently is due to reliability issues with the boats themselves, or if the crewing shortfall created an opportunity to batch routine maintenance activities.)

Over the lifetime of the current DCP, the *Collins* are planned to receive progressive upgrades to their sensors and other systems to keep them at the forefront of conventional submarine capability. However, developments by other submarine manufacturers will erode the qualitative advantage of the *Collins* boats over time, which will be most significant in submarine versus submarine operations. Features such as air independent propulsion and remotely controlled submersibles will become increasingly important for submarine operations.

By around 2025, the *Collins* will reach their life of type and newer boats will be required. Given the timeframe required, Australia must begin soon if it chooses to design and build another submarine. ASPI has examined the high-level drivers of Australia's future submarine capability in a separate publication, *Keeping our heads below water: Australia's future submarine*, but for now simply note that it may be a matter of balancing the size (and hence endurance and range) and capability of each platform with the affordable size of the fleet.

Naval aviation

Embarked helicopters are important components of the systems of naval surface units. In warfighting roles, they greatly extend the reach of the ships weapons and sensors, enabling 'over the horizon' search and strike missions. They can conduct anti-surface and anti-submarine warfare missions with missiles and torpedoes, as well as search and rescue activities. Current embarkable helicopters are sixteen Sikorsky S-70B-2 Seahawks and six Westland SK-50 A/B Sea Kings.

Naval aviation is a problematic area of Navy capability. The current fleet of helicopters suitable for embarked operations is limited in numbers, availability and capability. The Navy does not have the capability to prosecute the full range of helicopter anti-surface warfare (ASuW) and anti-submarine warfare (ASW) tasks. Notable shortcomings are ASW dipping sonar and anti-shipping missiles, although the current helicopters can provide third-party targeting for Harpoon anti-ship missiles fired from other platforms.

With the recent cancellation of the *Seasprites* and the limited warfighting capability of the *Sea Kings*, the only helicopter suitable for embarked war-like operations at the moment is the *Seahawk.* A multi-role helicopter, they have surface search radar and the ability to perform ASW operations with sonobuoys and an ASW torpedo. The Seahawks are scheduled for a mid-life upgrade and life extension program at a budgeted cost of up to $450 million for completion around 2012. According to the DCP, this will 'include a range of initial scoping studies to determine capability shortfalls and to identify potential technical upgrade options' and mentions integration of the MU-90 lightweight ASW torpedo as a likely component of the upgrade. Neither dipping sonar nor ASuW missiles will be fitted under this program.

Replacement of the Sea Kings by *MRH90* is planned for 2010. The *MRH90* delivered to Navy will lack some of the features required for efficient embarked operations. For example, they do not have the level of corrosion protection normally built into marinised aircraft, and folding of their rotor blades for hangar stowage is a manual process, which could prove problematic in operational circumstances. (Defence is considering the provision of automatic blade fold.)

While justifiable in some circumstances, operating a mixed-type fleet results in the duplication of fixed costs. Recognising that, Project AIR 9000 Phase 8 is intended to provide new multi-role naval helicopters that are capable of performing the ASW and ASuW roles. The project is budgeted between $2.5–3 billion, with an expected in-service date of 2017–2019. However, now that the Seasprites will never enter service, there seems little doubt that a major rethink of the way ahead will occur. The press release announcing the cancellation of the Seasprites said that the 'Government will investigate the planned replacement of the Seahawk during its White paper deliberations'. ASPI will discuss the range of broad options in a forthcoming paper.

Sea lift and amphibious ships

For any meaningfully-sized operation overseas, the bulk of ADF personnel and materiel would necessarily be moved by sea. Air lift remains the fastest way to move small numbers of troops or small volumes of equipment, but only sea lift allows for large quantities to be moved efficiently. It is not surprising that one of the first questions asked by participants in war games and crisis exercises over the years has invariably been about the location and availability of sea lift.

Sea lift is improved primarily through additional capacity. (Although their contribution to command and control and other operational tasks is certainly welcome.) As such, the ADF capability has improved markedly over the last decade, and will improve further over the next.

A decade ago, the 5,800 tonne HMAS *Tobruk* was the primary sealift asset of the RAN. Since then it has been augmented by two 8,500 tonne LPAs (Landing Platform Amphibious), HMA Ships *Kanimbla* and *Manoora*. These ships were acquired from the United States Navy and modified as helicopter-capable amphibious transports for the RAN. Each of these vessels can transport 350–520 troops and supporting vehicles, helicopters and landing craft, as well as carrying medical facilities with forty beds.

In the future, the RAN's sealift capability will receive a substantial boost when two amphibious *Canberra* class Landing Helicopter Dock (LHDs) of over 27,000 tonnes are delivered. Each will be able to embark 1,100 personnel with vehicles and landing craft.[3] Like the LPAs, the amphibious ships will be able to carry command and control elements, and in terms of embarked aviation are a quantum change in capability as each LHD will be able to support up to twenty-two embarked helicopters operating from six deck spots. The helicopters will primarily serve embarked land forces, but some of these could be replaced by helicopters with task force ASW or search and rescue roles.

As the RAN has retained the ski-ramp configuration the Spanish Navy requires for use with its current short take-off vertical landing (STOVL) Harriers and, in the future, Joint Strike Fighter (JSF) aircraft, these ships offer considerable versatility to the ADF. This may include the launching of larger fixed wing unmanned aerial vehicles. (Acquiring the JSF for use from these ships has been suggested by some commentators, but the mix of fixed and rotary wing assets on a relatively small deck would be extremely difficult, and the STOVL JSF will be a more expensive and complex variant than the version under consideration for the RAAF.) The other aspect that comes with ships the size and capability of the LHDs, is that the ADF can now consider the operational concept of seabasing of headquarters staff, logistics and support elements thereby reducing the footprint and protection requirement of forces deployed ashore.

The current fleet of three vessels offers more options in terms of simultaneous deployments in different locations, or larger deployments to a single location than was possible in the past. A question that is sometimes asked is whether a focus on a smaller number of large ships instead of a larger number of smaller ones is correct. A larger fleet would provide better concurrency for simultaneous deployments to different locations (for example, Timor, Solomon Islands and Fiji), but would also bring with it greater fixed costs in terms of crew numbers and possibly running costs. And large deployments to one location would require the movement of multiple vessels. There is no single answer—it is always dependent upon specific operational circumstances.

Afloat support

Afloat support vessels are not glamorous, but are an essential part of maintaining the fleet for extended deployments by providing fuel, food, stores and ammunition. Afloat support is provided by two vessels–HMA Ships *Sirius* and *Success*. Both ships are capable of underway replenishment of

other ships, including transfer of fuel, ammunition, water and stores during day or night. The result of a very successful project, *Sirius* is a converted commercial tanker which replaced the HMAS *Westralia* in 2006. The afloat support capability of the RAN is now sufficient for a wide range of deployments, though two hulls provide limited ability for concurrency and sustainability over prolonged periods.

Mine warfare

Mine detection and clearance is a vital function. Mines placed in shipping routes or near ports have the potential to completely disrupt Australia's sea trade. Navy has six *Huon* class minehunters, designed in Italy but built locally in a very successful project. The first of class was commissioned in 1999. These vessels have low magnetic signatures and are designed to have a high level of shock resistance. Navy also has two highly capable clearance diving teams.

Patrol boats

In recent years, fourteen new-build *Armidale* class patrol boats have replaced the older *Fremantle* class. Despite some teething problems with the fuel system, these boats make a significant contribution to the civil surveillance program under the tasking of Border Protection Command. They also have a role for lower level regional operations and in the protection of our offshore oil and gas platforms against non-state based threats, the reason given by the previous government for ordering two additional boats.

Hydrographic ships

For operations in coastal waters, knowledge of the topography of the sea floor is a critical information requirement. The depth and texture of the bottom has a marked effect on sonar effectiveness, in turn affecting ASW or mine detection operations. The areas of Australia's responsibility are huge—almost one-eighth of the Earth's surface. Consequently, there are large areas where detailed and accurate information is not available. Navy operates two *Leeuwin* class hydrographic survey vessels and four smaller survey motor launches (for operations in very shallow or constrained waters).

Endnotes

[1] The Japanese and South Koreans refer to 'AEGIS-equipped guided missile destroyers'.
[2] ASPI has detailed regional submarine plans in the *Special Report* 'The enemy below: Anti-submarine warfare in the ADF', available from www.aspi.org.au
[3] According to Army, each ship will carry 1,100 personnel. Of those approximately 500-700 will be combat troops out of a hardened and networked Army Battle Group (HNA BG), which will consist of 2,200 people. If both ships were available for an operation (a questionable assumption), they could embark only two thirds of a HNA BG. This argument is likely to be used to advocate the building of a third ship.

About the Author

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