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Securing the Sonobuoy Supply Chain: How Australia Can Help Underwrite Anti-Submarine Warfare Cooperation in the Indo-Pacific

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EXECUTIVE SUMMARY

This paper highlights the challenges afflicting the sonobuoy supply chain, a key item in the prosecution of anti-submarine warfare (ASW) operations by the United States and many of its key allies. It argues that Australia is well-placed to address these issues, and that doing so would better underwrite collective ASW operations in the Indo-Pacific.

After a brief post-Cold War hiatus, significant improvements in the submarine fleets of China and Russia have seen ASW revived as a core mission for the United States Navy. However, growing demand for ASW operations has exposed shortcomings in the maintenance, procurement and readiness of US maritime aircraft fleets essential to prosecuting those missions. This paper argues that, as a result, US allies and partners in the Indo-Pacific—many operating US-made maritime aircraft—will likely be required to step-up their own contributions to regional ASW operations. However, serious vulnerabilities in the sonobuoy supply chain accessed by all of these states threatened to undermine collective efforts, challenges which predate the global COVID-19 pandemic. A single US-based supplier presently provides sonobuoys to the US and many of its key partners, but its long-term capacity to meet soaring demands is in question. In its current form, any disruption to the sonobuoy supply chain would disproportionately impact allies and partners in the Indo-Pacific at the same time they are being asked to step-up their contributions to collective ASW. Securing the long-term future of the sonobuoy supply chain should therefore be an urgent priority.

This paper argues that Australia is well-positioned to address these challenges, given its history of innovation and manufacturing in advanced sonar technologies; recent investments in sovereign defense industry capabilities and military infrastructure; deep alliance relationship with the US; and growing network of ASW-oriented regional security partnerships. To this end, Australia should pursue several interrelated lines of effort: 1) increase interim sonobuoy stockpiles while rebuilding its independent manufacturing capacity; 2) deepen defense industry cooperation with the US and Five Eyes partners on defense industry and supply chain issues; 3) strengthen cooperation in the defense industry, especially research and development within key regional security partnerships already predisposed towards ASW, such as with South Korea. Addressing the vulnerabilities in the sonobuoy supply chain would not only improve Australia's independent ASW capacity, but would help underwrite collective ASW in the Indo-Pacific for years to come.

Acronyms

ADF - Australian Defence Force
ASW - Anti-submarine Warfare
AUD - Australian Dollars
AUSMIN - Australia-United States Ministerial Consultations
DAPA - Defense Acquisition Program Administration, Republic of Korea
DST - Defence Science and Technology Group, Australia
INDOPACOM - United States Indo-Pacific Command
ISR - Intelligence, Reconnaissance and Surveillance
MPA - Maritime Patrol Aircraft
MOU - Memorandum of Understanding
MPH - Maritime Patrol Helicopter
NATO - North Atlantic Treaty Organization
NDAA - National Defense Authorization Act
NTIB - National Technology and Industrial Base
PLAN - People's Liberation Army - Navy
R&D - Research and Development
RAN - Royal Australian Navy
RAAF - Royal Australian Air Force
ROK - Republic of Korea (South Korea)
SLOC - Sea Lines of Communication
US - United States
USN - United States Navy
USSI - Undersea Sensor Systems Inc., a subsidiary of Ultra Electronics
UUV - Unmanned Underwater Vehicle

1. INTRODUCTION

After a two-decade "holiday from history,"[1] anti-submarine warfare (ASW) has made a distinct return to the primary mission set of the United States Navy (USN). The number of sovereign states deploying their own submarine fleets globally continues to grow, yet improvements in the quality and size of the submarines fielded by China, Iran, North Korea, and Russia pose notable and evolving undersea challenges to the maritime security interests of the US and its partners around the world. The Indo-Pacific has seen a particularly steep rise in the quantity and quality of US adversaries' submarine capabilities. In February 2019, the head of US Indo-Pacific Command (INDOPACOM) Admiral Philip Davidson noted a three-fold increase in adversary submarine activity since 2008, a phenomenon requiring "at least a corresponding increase" in US asymmetric ASW capabilities including airborne platforms "to maintain superiority."[2] The primary object of Davidson's concerns (and those of his predecessor[3]) has been the growth and modernization of China's submarine fleet. Today, the People's Liberation Army-Navy (PLAN) fields roughly seven times as many modern (i.e., stealthier) attack submarines as it did in 2004.[4] The size of China's submarine fleet has consistently exceeded, or at the very least held steady, with the US submarine fleet over the same period, currently numbering in the mid-60s and expected to reach the mid-70s by 2030.[5] China is in the early stages of developing a new class of larger nuclear-powered attack submarines which will expand the PLAN's ability to operate further afield across the Indo-Pacific and for much longer than its current fleet of mostly diesel-electric submarines allows.[6]

A US Navy MH-60R *Seahawk*. Credit: US Pacific Fleet.

The Impetus for Networked Airborne Anti-Submarine Warfare

A more active PLAN submarine force will, in turn, place growing demands on the ASW capabilities of the US and its regional partners. However, improvements in China's undersea capabilities come at a time when the US ASW model applied so effectively during the Cold War

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[1] James R. Holmes, "Relearning Anti-Submarine Warfare," *The Diplomat*, October 30, 2014, https://thediplomat.com/2014/10/relearning-anti-submarine-warfare/.
[2] Philip S. Davidson, "Statement of Admiral Philip S. Davidson, U.S. Navy Commander, U.S. Indo-Pacific Command Before the Senate Armed Services Committee on U.S. Indo-Pacific Command Posture," *Senate Armed Services Committee*, February 12, 2019, https://www.armed-services.senate.gov/imo/media/doc/Davidson_02-12-19.pdf.
[3] Steven Stashwick, "US Pacific Command Needs More Submarines as Navy Struggles to Maintain Force," *The Diplomat*, May 12, 2017, https://thediplomat.com/2017/05/us-pacific-command-needs-more-submarines-as-navy-struggles-to-maintain-force/.
[4] Ashley Townshend, Brendan Thomas-Noone and Matilda Steward, "Averting Crisis: American Strategy, Military Spending and Collective Defence in the Indo-Pacific," *The United States Studies Centre*, August, 2019, 16, https://united-states-studies-centre.s3.amazonaws.com/uploads/616/baf/f9e/616baff9e819d2915ed672e3f2cd6559337cfc33/Averting-crisis-American-strategy-military-spending-and-collective-defence-in-the-Indo-Pacific.pdf.
[5] Ibid 52.
[6] Larger frames will also enable additional crew to embark, reducing the impact of crew fatigue on submarine operations. See: H.I. Sutton, "Chinese Navy Steps Closer to New Generation of Nuclear Submarines," *Forbes*, June 19, 2020, https://www.forbes.com/sites/hisutton/2020/06/19/chinese-navy-gets-closer-to-new-generation-of-nuclear-submarines/#539a14a229e5.

is under mounting pressure. Particularly concerning are the budgetary constraints, maintenance backlogs, readiness issues and "un-strategic" decision-making which have together resulted in declining numbers of operationally-ready ASW aircraft. To compound matters, competing demands for ASW aircraft from numerous US global commands threaten to drain resources from America's avowed strategic priorities in the Indo-Pacific.[7] Improvements in the stealth of Chinese submarines have reduced the effectiveness of surface ships and submarines in the detection stage of ASW operations, increasing their vulnerability to being outmaneuvered and attacked without air support from maritime patrol aircraft (MPA) and maritime patrol helicopters (MPH).[8] However, MPA and MPH are multi-mission platforms, and are often critical components of broader patrol and/or intelligence, surveillance and reconnaissance (ISR) operations outside of the ASW mission set,[9] heaping further pressure on top of an already strained fleet.

A US Navy P-8A *Poseidon*. Credit: *US Pacific Fleet*.

To address these challenges, a new premium has been placed on networked airborne ASW operations between America and its Indo-Pacific partners. Many of these states have been encouraged to procure advanced P-8A *Poseidon* MPA and MH-60R *Seahawk* MPH from the US to enable and enhance interoperability and joint operations in coalition settings. Indeed, ASW has become one of the foremost avenues for security cooperation between Indo-Pacific security partners, a trend illustrated by a surge in bilateral and multilateral ASW exercises between the US and several of its key regional allies, as well as between those partners themselves, throughout 2019. Many of these states either intend to or already operate the P-8 and MH-60, increasing opportunities to enhance networked operations through joint exercises and patrols and allowing these partners to assume greater responsibility for operations across shared geographical areas of interest.

However, while the quality, quantity, and similarity between the aircraft flown by different security partners will be a crucial consideration, higher operational tempos will also see corresponding increases in states' maintenance and readiness requirements, and the more rapid exhaustion of stockpiles of spare parts, munitions, and other critical items. In fact, states' capacity to respond to both sudden and/or sustained demands for ASW operations cannot be

[7] Loren Thompson, "U.S. Navy to Stop Buying P-8 Poseidon Sub Hunters Despite Growing Undersea Threat," *Forbes*, December 2, 2019, available at: *https://www.forbes.com/sites/lorenthompson/2019/12/02/us-navy-plans-to-stop-buying-p-8-poseidon-sub-hunters-despite-growing-undersea-threat/#6a87748759fe*; Bryan Clark, "US Navy Should Turn to Unmanned Systems to Track and Destroy Submarines," *Defense News*, April 13, 2020, available at: https://www.defensenews.com/opinion/commentary/2020/04/13/us-navy-should-turn-to-unmanned-systems-to-track-and-destroy-submarines/.

[8] Clark, "US Navy Should Turn to Unmanned Systems to Track and Destroy Submarines."

[9] Ibid

assured without adequate logistical and industrial ecosystems, including robust stockpiles and secure supply chains to replenish depleted inventories.

Sonobuoys: A Critical Enabler Under Stress

This paper focuses on one particularly critical item, the sonobuoy. Sonobuoys are tubular devices dropped from ASW aircraft into the ocean to locate and track submarines, either by passively "listening" for mechanical noise or actively searching for submarines by emitting sonic pulses and measuring the return signal. Though not the sole means of detecting submarine activity (sonobuoy signals are generally triangulated with helicopter dipping sonar or hull-mounted devices on surface ships), active and passive sonobuoys are nevertheless the most accurate and reliable means of doing so, particularly over large stretches of open ocean,[10] and will remain critical enablers of peacetime and wartime ASW operations alike as long as the US and its allies maintain sizable MPA and MPH fleets even as new ASW capabilities are brought online.[11] Even in the absence of outright conflict, "cat-and-mouse" encounters between adversaries' submarines and US and allied ASW assets are becoming more and more common, while large-scale submarine exercises and operations are taking place with increasing frequency.[12] As such, demand for ASW operations involving MPA and MPH is likely to remain high in both peace and wartime settings, meaning that sonobuoy expenditure rates will also remain high in both contexts.[13] It is therefore vital that states operating ASW aircraft have reliable access to a robust sonobuoy supply chain to underwrite independent and collective operations in both lethal and non-lethal settings.

However, even as demand increases, the long-term future of the only certified supplier of high-grade sonobuoys for US and other partners' modern ASW aircraft has been called into question. While Washington has taken some steps to address risks to short-term supply, longer-term challenges remain unresolved. The concentration of manufacturing entirely within the US, the domination of the market by a single supplier, and the barriers to closer cooperation on shared industry challenges posed by US defense technology restrictions means that partners in the Indo-Pacific remain disproportionately vulnerable to supply chain disruptions—even as they are increasingly vital to networked regional ASW operations. Even a partial decline in US-based sonobuoy production could see these states experience acute shortages in an item critical to contemporary ASW missions.

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[10] While the emphasis on sonobuoys over other sources is in part due to the P-8A operating at a significantly higher altitudes than the its predecessor, pilots have frequently attested to the superior effectiveness of the aircraft's sensor array and sonobuoy capabilities over other available platforms. For example, see: Roger A. Holler, "The Evolution of the Sonobuoy From World War II to the Cold War," *US Navy Journal of Underwater Acoustics* (January 2014): 342, https://apps.dtic.mil/dtic/tr/fulltext/u2/a597432.pdf; Mike Yeo, "Australia Bolsters Capabilities, Training Opportunities for its P-8A Aircraft," *Defense News*, February 27, 2019, https://www.defensenews.com/digital-show-dailies/avalon/2019/02/27/australia-bolsters-capabilities-training-opportunities-for-its-p-8a-aircraft/.

[11] Sebastian Brixey-Williams, "Prospects for Game-Changers in Submarine-Detection Technology," *The Strategist*, August 22, 2020, https://www.aspistrategist.org.au/prospects-for-game-changers-in-submarine-detection-technology/.

[12] Russia recently demonstrated this trend in the North Atlantic, deploying ten submarines in one of the largest underwater exercises since the Cold War. See: Thomas Grove and James Marson, "Russian Submarines Test NATO in Icy North Atlantic," *The Wall Street Journal*, July 2, 2020, https://www.wsj.com/articles/russian-submarines-test-nato-in-icy-north-atlantic-11593682201.

[13] For comparison, explosive ASW munitions such as torpedoes, while critical, will experience drastically different expenditure rates in peacetime versus wartime scenarios due to their lethal application.

A Role for Australia

Ensuring the long-term security of the sonobuoy supply chain should be an urgent priority. Though the US has supplied the majority of its partners' high-end sonobuoy requirements for the last decade, these same partners should now seek to assume a greater share of production burden to underwrite their own independent capabilities and enhance the resilience of networked ASW operations. Australia is particularly well-placed to lead these efforts. It has a history of innovation and manufacturing in sonobuoys and has recently committed to a series of targeted investments in sovereign defense industry capabilities and ASW military infrastructure that will improve its capacity to contribute to collective operations. The country is also in a position to push for enhanced industry cooperation with the US given its inclusion in the US National Technological and Industrial Base (NTIB)—a framework which could also be leveraged to facilitate expanded cooperation between the Five Eyes intelligence grouping to include shared defense industry challenges.[14] Finally, Australia also enjoys a range of other regional strategic partnerships distinctly oriented towards ASW in cooperation could be expanded to ASW-relevant industrial, logistical and research and development (R&D) challenges like the sonobuoy supply chain. Collectively, these factors suggest that Australia has the means to address its own independent requirements, make a valuable contribution to its alliance with the US, and facilitate enhanced regional cooperation to better underwrite collective ASW.

Summary of Recommendations

To address the long-term sonobuoy supply challenge, the Australian government should consider a range of interrelated actions which can be divided into three broad areas:

- Sovereign capabilities—Australia should increase its stockpiles of sonobuoys to account for projected and unforeseen surges in operational demands. In the longer-term, Australia should invest in reviving its sovereign sonobuoy manufacturing capabilities under the mandate of the *2020 Defence Strategic Update*.

- Alliance networks—Australia should leverage its alliance with the US to streamline defense industry cooperation through the NTIB framework. Australia should also elevate Five Eyes coordination on shared defense supply chain challenges through the newly-minted defense ministers' meetings.

- New partnerships—Australia should explore opportunities to collaborate with other regional partners on sonobuoy development and production, such as South Korea. Doing so would provide opportunities to consolidate and enhance critical in-region strategic partnerships, and provide alternative sources of innovation and supply for future sonobuoy requirements.

[14] The Five Eyes are: Australia, Canada, New Zealand, the United Kingdom (UK) and the United States.

US Navy P-3C *Orion* and P-8A *Poseidon* on the flight line at Naval Air Station Jacksonville, Florida. Credit: US Navy.

2. Sources of Pressure on US Anti-Submarine Warfare Capacity

Before addressing the sonobuoy supply chain issue, it is necessary to understand the wider array of challenges facing the United States' ASW capacity, for these will place growing demands on America's allies to contribute more to collective operations. However, it is also important to point out at the outset that the challenges discussed in this paper largely predated the onset of the global COVID-19 pandemic. Though temporary shutdowns to the Boeing P-8A production line in March demonstrated the real risks of short-term shocks to ASW supply chains,[15] it is difficult to speculate about the ultimate impacts that the pandemic could have on the availability of US and partners' ASW aircraft, including the manufacture and production of mission items. All the same, the risk remains that the pandemic could yet compound with preexisting challenges to the availability of USN MPA and MPH. Specifically, cuts to procurement targets, conflicting political and strategic priorities, and persistent maintenance and readiness issues threaten to constrain the availability of those aircraft in regions where adversaries' submarine fleets are growing in size and sophistication, including the Indo-Pacific. Such shortages would, in turn, place pressure on regional partners to step-up their own contributions to collective ASW operations.

[15] Valerie Insinna, "KC-46, P-8 Production to Stop as Boeing Temporarily Shuts Down Facilities," *Defense News*, March 23, 2020, https://www.defensenews.com/coronavirus/2020/03/23/kc-46-p-8-production-to-stop-as-boeing-temporarily-shuts-down-production-in-puget-sound-area/; Valerie Insinna, "Boeing to Reopen the KC-46 and P-8 Production Lines," *Defense News*, April 13, 2020, https://www.defensenews.com/industry/2020/04/13/boeing-to-reopen-the-kc-46-and-p-8-production-lines/.

Growing Demand, Shrinking Fleet

Even with demand for MPA and MPH increasing across multiple US global commands, in December 2019 the USN's FY21 budget request sought to cease P-8A procurement at 117 aircraft—21 short of the "validated war-fighting requirement" of 138 frames identified 12 months earlier.[16] The US Senate Armed Services Committee's mark-up for the National Defense Authorization Act (NDAA) for FY21 seemed to confirm the early closure of the P-8A production line, with $80 million earmarked for line closures and none for additional airframes.[17] By contrast, the House Armed Services Committee mark-up would strip money for line closure and instead provide funds for six additional P-8A.[18] These conflicting proscriptions have set up a Congressional showdown over procurement funding in the final NDAA document for the next financial year, meaning that the ultimate size of the P-8A fleet remains unclear.

A 15% reduction in the total US P-8A fleet would come at the same time as adversaries' submarines are growing in number, range, and sophistication.[19] An April 2020 report from the Congressional Research Service noted significant improvements in the stealthiness of the PLAN's attack submarine fleet, and that the expansion of China's submarine shipbuilding yards could allow it to accelerate what has otherwise been only modest growth in its fleet size.[20] The US government estimates that the PLAN will possess around 70 attack submarines by the end of 2020, and closer to 80 by 2030.[21] Growth in China's submarine fleet will likely increase demands for US P-8A operations in the Indo-Pacific, with a recent spike in Poseidon flights around Taiwan and the South China Sea demonstrating that demand is already on the rise.[22] However, recent incidents across Africa, Europe, the Mediterranean, and the Middle East have spotlighted the extent of demand for P-8 operations globally, including for missions beyond

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[16] Stephen Kuper, "Concerns as US Navy Scales Back Poseidon Purchase, Limiting Allied Anti-Sub Capability," *Defence Connect*, December 3, 2019, https://www.defenceconnect.com.au/maritime-antisub/5237-concerns-as-us-navy-scales-back-poseidon-purchase-limiting-allied-anti-sub-capability.

[17] Senate Armed Services Committee, "S.4049 - National Defense Authorization Act for Fiscal Year 2021," *US Congress*, June 23, 2020, 1095, https://www.congress.gov/116/bills/s4049/BILLS-116s4049rs.pdf.

[18] House Armed Services Committee, "H.R. 6395—FY21 National Defense Authorization Bill," *US Congress*, July 1, 2020, 7, https://docs.house.gov/meetings/AS/AS00/20200701/110784/BILLS-116HR6395ih.pdf.

[19] For example, see: Jack Kim, "Explainer: North Korea's suspected submarine missile 'pushes the envelope','' *Reuters*, October 2, 2019, https://www.reuters.com/article/us-northkorea-missiles-explainer/explainer-north-koreas-suspected-submarine-missile-pushes-the-envelope-idUSKBN1WH0XJ; Joseph Trevithick, "Admiral Warns America's East Coast Is No Longer A "Safe Haven" Thanks To Russian Subs," *The Drive*, February 4, 2020, https://www.thedrive.com/the-war-zone/32087/admiral-warns-americas-east-coast-is-no-longer-a-safe-haven-thanks-to-russian-subs; H.I. Sutton, "China's Submarine Lead In Asia Could Grow By 2030," *Forbes*, March 3, 2020, https://www.thedrive.com/the-war-zone/32087/admiral-warns-americas-east-coast-is-no-longer-a-safe-haven-thanks-to-russian-subs; H.I. Sutton, "Iranian Navy Building New Submarines And A 6,000-Ton Destroyer," *Forbes*, April 4, 2020, https://www.forbes.com/sites/hisutton/2020/04/04/iranian-navy-building-new-submarines-and-a-6000-ton-destroyer/#437fc3237e9f.

[20] Ronald O'Rourke, "China Naval Modernization: Implications for U.S. Navy Capabilities—Background and Issues for Congress," *Congressional Research Service*, April 24, 2020, 6-7, https://assets.documentcloud.org/documents/6879130/China-Naval-Modernization-Implications-for-U-S.pdf.

[21] Office of the Secretary of Defense, "Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2019," *US Department of Defense*, May, 2019, 35-36, available at: https://media.defense.gov/2019/May/02/2002127082/-1/-1/1/2019_CHINA_MILITARY_POWER_REPORT.pdf.

[22] Phillip Charlier, "US Military Aircraft Operating South of Taiwan Point to Possible Submarine Activity," *Taiwan English News*, June 25, 2020, https://taiwanenglishnews.com/us-military-aircraft-operating-south-of-taiwan-point-to-possible-submarine-activity/; Matt Yu and Emerson Lim, "U.S. Anti-Sub Aircraft Spotted Near Taiwan for Eighth Consecutive Day," *Focus Taiwan*, June 28, 2020, https://focustaiwan.tw/politics/202006280012.

ASW,[23] increasing the risk that "rising patrol requirements could consume a shrinking fleet."[24] Qualitative improvements in adversaries' submarine technology have reduced the effectiveness of US and allied surface ships and submarines in the detection stage of ASW operations, increasing their vulnerability to being outmaneuvered and attacked without air support from P-8A or MH-60R.[25] As such, while MPA and MPH are but one component of full spectrum ASW operations, they are increasingly crucial to protecting US and allied surface fleets from a mounting undersea threat.

Un-Strategic Decision-Making

The issues above are exacerbated by the deployment of high-end capabilities for low-end operations, rather than in support of the Trump Administration's avowed strategic priority theatre, the Indo-Pacific.[26] At the behest of the White House, in early April US Defense Secretary Mark Esper announced the movement of several P-8s and other high-end ASW assets to US Southern Command to support counter-narcotics operations across Central and Southern America.[27] These assets were reportedly drawn from INDOPACOM forces stationed on the US East Coast,[28] straining the Command's already insufficient resourcing and contradicting the Secretary's efforts to realign US global force posture with strategic priorities. While the P-8A and MH-60R are both multi-mission aircraft, the deteriorating strategic situation in the Indo-Pacific demands the smarter prioritization of the most highly capable platforms to the theaters where they can have the most impact.[29]

Maintenance and Readiness Issues

The Navy's airborne ASW fleets also face persistent maintenance and readiness issues. For instance, a Pentagon report issued in February 2019 highlighted "consistently negative trends

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[23] Franz-Stefan Gady, "US Navy: Chinese Destroyer Targeted P-8A Aircraft With Laser," *The Diplomat*, February 29, 2020, https://thediplomat.com/2020/02/us-navy-chinese-destroyer-targeted-p-8a-aircraft-with-laser/; Carl Prine, "US Navy and Special Operations Telegraph Message to Tehran," *Navy Times*, March 15, 2020, https://www.navytimes.com/news/your-navy/2020/03/15/us-navy-and-special-ops-telegraph-message-to-tehran/; John Vandiver, "Russian Fighter Buzzes US Aircraft for Second Time in Four Days," *Stars and Stripes*, April 20, 2020, https://www.stripes.com/news/europe/russian-fighter-buzzes-us-aircraft-for-second-time-in-four-days-1.626677; Geoff Ziezulewicz, "Watch Russian Jets Intercept Navy Plane," *Navy Times*, May 26, 2020, https://www.navytimes.com/news/your-navy/2020/05/26/watch-russian-jets-intercept-navy-plane/; David Cenciotti, 'A U.S. Navy P-8A Poseidon Has Carried Out An Unusual ISR Mission Off Libya Recently," *The Aviationist*, June 9, 2020, https://theaviationist.com/2020/06/09/a-u-s-navy-p-8a-poseidon-has-carried-out-an-unusual-isr-mission-off-libya-recently/.

[24] Schmitt and Donnelly, "The Navy's Decision to Stop Buying P-8 Poseidons is a Mistake," *The National Interest*, February 25, 2020, https://nationalinterest.org/blog/buzz/navy%E2%80%99s-decision-stop-buying-p-8-poseidons-mistake-126832.

[25] Clark, "US Navy Should Turn to Unmanned Systems to Track and Destroy Submarines."

[26] Defense Secretary Mark Esper has repeatedly framed the region as such since assuming office in July 2019, and particularly within the last six months. For example, see: Jim Garamone, "Esper's Indo-Pacific Trip Highlightd U.S. Emphasis on Alliances," *US Department of Defense*, November 12, 2019, https://www.defense.gov/Explore/News/Article/Article/2014257/espers-indo-pacific-trip-highlights-us-emphasis-on-alliances/; Jim Garamone, "Esper Discusses Importance of Indo-Pacific Strategy," *U.S. Department of Defense*, July 21, 2020, https://www.defense.gov/Explore/News/Article/Article/2280887/esper-discusses-importance-of-indo-pacific-strategy/.

[27] Paul McLeary, "Exclusive: Indo-Pacom Chief's Bold $20 Billion Plan For Pacific; What Will Hill Do?" *Breaking Defense*, April 2, 2020, https://breakingdefense.com/2020/04/exclusive-indo-pacom-chiefs-bold-20-billion-plan-for-pacific-what-will-hill-do/.

[28] Ibid

[29] See: Townshend et al., "Averting Crisis."

in fleet-wide [P-8A] aircraft operational availability" due to a spike in maintenance requirements and spares shortages, driven by forward-deployed units' "cannibalization" of aircraft at other operating locations and recurring sensor performance shortfalls.[30] While readiness challenges may be overcome in peacetime, the US Defence Logistics Agency's current approach to replacing consumables—requiring the near-depletion of stocks before ordering replacements—leaves little in the way of surge capacity.[31] An early end to the P-8 program could accelerate the shuttering of US-based manufacturing facilities which produce unique parts and critical spares, potentially undermining the long-term availability and effectiveness of US and partners' P-8A fleets alike. [32] Moreover, reports in July 2019 suggested that unforeseen spikes in demand for P-8A and MH-60R operations with the US 6th Fleet (Middle East) and 7th Fleet (Indo-Pacific) had produced a $100 million shortfall in funding within the naval aviation flight-hour budget, reducing the number of training hours available to non-deployed MPA and MPH aircrews.[33] These challenges are presenting themselves at the same time as the USN moves to place greater emphasis on maritime helicopter operations in its future fleet,[34] and when P-8A are in high demand across multiple theaters.

A US Navy sailor performs maintenance on the rotors of an MH-60R *Seahawk* while on deployment in the South China Sea. Credit: US Navy.

The range of challenges discussed above demonstrate that the availability of US airborne ASW fleets is under mounting strain, a trend which will place greater pressure on allies and partners around the world to step up the frequency of their own MPA and MPH to offset shortfall in US capacity, but particularly in the Indo-Pacific. Indeed, the US has routinely justified the provision of advanced ASW aircraft to these states on the grounds of enabling coalition ASW and maritime patrol operations, and sharing responsibility across geographic areas of common interest.[35] All the same, higher operational tempos will also increase pressure on partners' own maintenance and readiness rates, as well as accelerate the depletion of supplies of expendables,

[30] Christopher Woody, "The US Navy's Best Sub-Hunting Aircraft is Facing Some Nagging Problems," *Business Insider Australia*, February 2, 2019, https://www.businessinsider.com.au/the-us-navys-best-sub-hunting-aircraft-faces-some-nagging-problems-2019-2?r=US&IR=T.
[31] *Ibid*
[32] Thompson, "U.S. Navy Plans to Stop Buying P-8 Poseidon Sub Hunters Despite Growing Undersea Threat."
[33] Megan Eckstein, "Navy Reducing East Coast Flight Hours to Cover Costs of Overflying P-8s," *USNI News*, July 16, 2019, https://news.usni.org/2019/07/16/navy-reducing-east-coast-flight-hours-to-cover-costs-of-overflying-p-8s.
[34] Frank Wolfe, "355-Ship US Navy Will Put More Emphasis on Helicopter Fleet," *Rotor and Wing*, May 7, 2019, https://www.rotorandwing.com/2019/05/07/355-ship-us-navy-will-put-emphasis-helicopter-fleet/.
[35] See, for example: Defense Security Cooperation Agency, "Australia - MH-60R Multi-Mission Helicopters," *US Department of Defense*, July 9, 2010, https://www.dsca.mil/major-arms-sales/australia-mh-60r-multi-mission-helicopters; Defense Security Cooperation Agency, "Korea - P-8A Aircraft and Associated Support," *US Department of Defense*, September 13, 2018, https://www.dsca.mil/major-arms-sales/korea-p-8a-aircraft-and-associated-support; Defense Security Cooperation Agency, "India - MH-60R Multi-Mission Helicopters," *US Department of Defense*, April 2, 2019, https://www.dsca.mil/major-arms-sales/india-mh-60r-multi-mission-helicopters; Defense Security Cooperation Agency, "Republic of Korea: MH-60R Multi-Mission Helicopters with Support," *US Department of Defense*, August 7, 2019, https://www.dsca.mil/major-arms-sales/republic-korea-mh-60r-multi-mission-helicopters-support.

munitions and spare parts, many of which are solely manufactured in the United States. In fact, the supply chain for one particularly important item—the sonobuoy—is already under significant stress.

A US Navy crewman loads sonobuoys onto an MH-60R *Seahawk* aboard the guided missile destroyer *USS McCampbell*, operating in the Philippine Sea. Credit: *US Pacific Fleet*.

3. The Sonobuoy Supply Issue

Sonobuoys are critical items in the prosecution of airborne ASW operations. These devices are essentially deployable sensor arrays, expendable tubular sonar systems dropped from aircraft or helicopters into the ocean to locate and track submarine acoustic signatures underwater. Signals from sonobuoys are usually triangulated with those of dipping sonars used by MPH and/or towed sonar arrays employed by ASW surface vessels to pinpoint the location of an enemy submarine in a set area of ocean. Sonobuoys operate at various depths and frequencies, depending on their specifications and upon the mission they are deployed in support of, and have an average lifespan of around eight hours. Expenditure rates vary depending on the mission at hand: some estimates put the average P-8A sonobuoy "drop" at somewhere between 50 and 60,[36] but entire sonobuoy payloads can be expended when hunting submarines "blind"

[36] Sandra I. Irwin, "The Promise of Technology: Navy Could Save Billions of Dollars Sending Robots to Patrol the Oceans," *National Defense Magazine*, June 1, 2016, https://www.nationaldefensemagazine.org/Articles/2016/6/1/2016June%20The%20Promise%20of%20Technology%20Navy%20Could%20Save%20Billions%20of%20Dollars%20Sending%20Robots%20to%20Patrol%20the.

(i.e. when the general location of an enemy submarine is unknown).[37] Usage rates should be expected to remain high given the growth in global submarine numbers and activities, the associated increase in demand for advanced ASW capabilities, and the acceleration of the consumption of sonobuoys as operational and training tempos increase.

Sonobuoy Spending Over the Last Decade

In recent years, however, the capacity of the US-based P-8A and MH-60R sonobuoy supply chain to meet immediate and long-term demand has been called into question. Indeed, after two decades of flatlining demand for ASW operations globally, a sudden surge in demand in 2017 caught the USN off-guard. The Navy's assumed rates of sonobuoy expenditure and resupply were shown to be inadequate for a new era of Great Power rivalry by an "unexpected high anti-submarine warfare operational tempo," specifically to counter increased Russian submarine activity across the North Atlantic and Mediterranean oceans.[38] The abnormally "high expenditure rate" of sonobuoys required the reprogramming of some $20 million of defense spending to replenish dwindling supplies and avoid critical shortages.[39] Since that time, the Navy's demand for sonobuoys has remained high. In its FY19 budget submissions, the service justified a notable increase in its funding requests for sonobuoys on the basis of "an increase in actual expenditures, budget constraints and an increase in the Total Munitions Requirement" driven by the resurgence of submarine activity in a number of regional theaters, including the Indo-Pacific.[40] Critically, the Navy also noted that the then-assumed rates of expenditure were insufficient to sustain forward operations and meet readiness demands going forward.[41]

A look at Pentagon budget figures for sonobuoy procurement puts the Navy's growing demands in historical context. For example, the $313 million enacted for sonobuoy procurement in FY20 was over five times the $61.9 million spent in FY03,[42] and three and a half times the $89.6 million enacted in the Obama administration's first budget in FY10.[43] Figure 1A and 1B show that sonobuoy funding remained relatively consistent after a dramatic

[37] P-8A can carry 129 sonobuoys at a time, while MH-60R carry approximately one fifth of that number at 25.
[38] Paul McCleary, "Pentagon Sounds Alarm Over Sub-Hunting Tech Shortage, Hypersonic Funding," *Breaking Defense*, July 23, 2018, https://breakingdefense.com/2018/07/pentagon-sounds-alarm-over-sub-hunting-tech-shortage-hypersonic-funding/.
[39] Ibid
[40] "Department of Defense Fiscal Year (FY) 2019 Budget Estimates - Navy Justification Book Volume 3 of 5," *US Department of the Navy*, February, 2018, 81, https://www.secnav.navy.mil/fmc/fmb/Documents/19pres/OPN_BA3_BOOK.pdf.
[41] Ibid
[42] Office of the Under Secretary of Defense, "Procurement Programs—Department of Defense Budget Fiscal Years 2004/2005," *US Department of Defense*, February, 2003, N-27, https://comptroller.defense.gov/Portals/45/Documents/defbudget/Docs/fy2004_p1.pdf.
[43] Office of the Under Secretary of Defense, "Procurement Programs—Department of Defense Budget Fiscal Year 2011," *US Department of Defense*, February, 2010, N-26, https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2011/fy2011_p1.pdf.

spike in FY14,[44] but that spending in FY20 amounted to nearly double that of FY17.[45] The figures also demonstrate that in the last three years, Congress has repeatedly stepped in to fund sonobuoy procurement above the Pentagon's request. For example, both the House and Senate Armed Services Committees have marked $312.8 million for sonobuoy procurement in FY21, $49 million above request (a figure equal to the Navy's unfunded priorities listing).[46] The figures also suggest that reported shortages in sonobuoy inventories in the last three years are most likely a result of increased adversary activities and/or the Pentagon's underestimation of expenditure rates, rather than a Congressional failure to appropriate sufficient supplies. This also suggests that rates of procurement may not be as high as they need to be, particularly considering that the Navy has included sonobuoys amongst its unfunded priorities in order to backfill depleted inventories rather than to get ahead of anticipated requirements. Whether this is due to a lack of foresight by the Pentagon is an open question, but the figures nonetheless raise questions over the capacity of the Navy's chosen supplier to meet demand. Indeed, that the USN's FY21 unfunded priorities list included $49 million for over 6000 sonobuoys to backfill shortages created by "unplanned FY19 operational expenditures" demonstrated that rather than getting ahead of predicted operational demands, the Pentagon continues to play catch-up.[47]

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[44] This might be explained by a notable surge in Russian submarine construction and patrols, and revised assessments from US intelligence over the number of ballistic missile submarines China planned to construct. See: Christopher P. Cavas, "Will Russia's Sub-Building Boom Matter?" *Defense News*, January 24, 2015, https://www.defensenews.com/naval/2015/01/24/will-russia-s-sub-building-boom-matter/; Sam LaGrone, "Russian Navy Chief: Submarine Patrols Up 50% Over Last Year," *USNI News*, March 19, 2015, https://news.usni.org/2015/03/19/russian-navy-chief-submarine-patrols-up-50-percent-over-last-year; Hans M. Kristensen, "Is China Planning To Build More Missile Submarines?" *Federation of American Scientists*, April 23, 2015, https://fas.org/blogs/security/2015/04/china-subs/.

[45] Sources for Figure 1A and 1B: House Armed Services Committee, "H.R. 6395", 11, 20; Office of the Under Secretary of Defense, "Procurement Programs: Department of Defense Budget Fiscal Year 2012," February, 2011, N29-N29B, https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2012/fy2012_p1.pdf, Office of the Under Secretary of Defense, "Procurement Programs: Department of Defense Budget Fiscal Year 2013," February, 2012, N27-N27A, https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2013/fy2013_p1.pdf; Office of the Under Secretary of Defense, "Procurement Programs: Department of Defense Budget Budget Amendment to the Fiscal Year 2014 President's Budget Request for Overseas Contingency Operations (OCO)," May, 2013, N28-N28A, https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2014/amendment/fy2014_p1a.pdf; Office of the Under Secretary of Defense, "Procurement Programs: Department of Defense Budget Budget Amendment to the Fiscal Year 2015 President's Budget Request for Overseas Contingency Operations (OCO)," June, 2014, N27-N27A, https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2015/amendment/fy2015_p1a.pdf; Office of the Under Secretary of Defense, "Procurement Programs: Department of Defense Budget Fiscal Year 2016," February, 2015, N27-N27A, https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2016/fy2016_p1.pdf; Office of the Under Secretary of Defense, "Procurement Programs: Department of Defense Budget March Budget Amendment to the Fiscal Year 2017 President's Budget Request for BASE + Overseas Contingency Operations (OCO)," March, 2017, N27-N27C, https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2017/marchAmendment/fy2017_p1a.pdf; Office of the Under Secretary of Defense, "Procurement Programs: Department of Defense Budget Budget Amendment to the Fiscal Year 2018 President's Budget Request for BASE + Emergency + Overseas Contingency Operations (OCO)," November, 2017, N33-N33A, https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2018/November2017Amended/fy2018_p1a.pdf; Office of the Under Secretary of Defense, "Procurement Programs: Department of Defense Budget Fiscal Year 2019," February, 2018, N37-N37C, https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2019/fy2019_p1.pdf; Office of the Under Secretary of Defense, "Procurement Programs: Department of Defense Budget Fiscal Year 2020," March, 2019, N34-N34A, https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2020/fy2020_p1.pdf; Office of the Under Secretary of Defense, "Procurement Programs: Department of Defense Budget Fiscal Year 2021," February, 2020, N33-N33A, https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2021/fy2021_p1.pdf; Senate Armed Services Committee, "S. 4049," 1099, 1107.

[46] Senate Armed Services Committee, "S. 4049", 1099, 1107; House Armed Services Committee, "H.R. 6395", 11, 20.

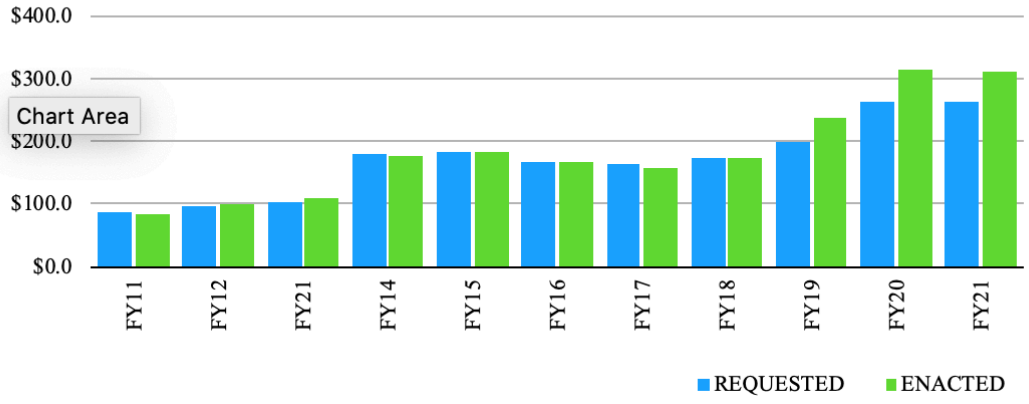
[47] M. M. Gillday, "Navy Fiscal Year 2021 Unfunded Priorities List Descriptions," *U.S. Department of Defense*, February, 2020, https://files.nc.gov/deftech/blog/files/FY2021-Navy-UPL-c2.pdf.

Figure 1A
US Sonobuoy Procurement Over the Last Decade

FINANCIAL YEAR	REQUEST	ENACTED	DIFFERENCE ON PREVIOUS FY
FY11	$87.8	$83.3	—
FY12	U$96.3	$100.4	$17.1
FY13	$104.6	$109.5	$9.1
FY14	$179.9	$177.3	$67.8
FY15	$182.9	$182.9	$5.6
FY16	$168.7	$168.7	- $4.2
FY17	$162.5	$158.5	- $10.2
FY18	$173.6	$173.6	$15.1
FY19	$199.0	$237.3	$63.7
FY20	$263.5	$313.5	$76.2
FY21*	$263.8	$312.8	- $0.7
TOTAL	**$1,882.6**	**$2,017.8**	

Source: Office of the Under Secretary of Defense (Comptroller). All figures in USD millions.
* FY21 estimates based on House and Senate Armed Service Committee NDAA FY21 mark-ups.

Figure 1B US Sonobuoy Procurement Over the Last Decade



Single Supplier Vulnerability

To complicate matters, the strain on the Navy's sonobuoy stockpiles has come at a time when the future of its sole supplier has come into question. That supplier is ERAPSCO,[48] a joint

[48] ERAPSCO has its own subsidiary which handles all of its overseas sales, named Sonobuoy TechSystems, which also deals with negotiating US defense export controls.

venture between US firm Sparton Corporation and an American-based subsidiary of British Ultra Electronics called Undersea Sensor Systems Inc. (USSI), which has since 2010 been the only entity certified to produce sonobuoys for use in Poseidon and Seahawk aircraft flown by the navies of the US and its partners.[49] However, doubts as to ERAPSCO's long-term viability began to surface in 2018. The US Department of Justice was initially forced to block a complete merger between Sparton (which was struggling financially) and USSI on the grounds of preventing market monopolization and the creation of a critical supply vulnerability (though the Navy's total reliance on ERAPSCO effectively created a monopoly anyway).[50] After successfully blocking the merger, the US government moved to bar ERAPSCO from bidding on the complete range of five sonobuoy types required by the USN in the interests of diversifying its range of suppliers, but these efforts were successfully challenged by Sparton through the Government Accountability Office on the basis of anti-competitive practices.[51]

A P-8A crewman inspects sonobuoys prior to take-off from Anderson Air Force Base, Guam, during *Exercise Sea Dragon* 2019. Credit: US Pacific Fleet.

Sonobuoys were not explicitly mentioned in a major government report on the poor state of the US Manufacturing and Defense Industrial Base released in October 2018,[52] yet in March 2019 US President Donald Trump invoked the Defense Production Act to designate five types of sonobuoys as "essential to the national defense." [53] An accompanying presidential memorandum warned that without such action, the US could not expect to produce sonobuoys in the numbers and within the timeframe required.[54] The Act authorized the Pentagon to provide funds for the sustainment and expansion of the sonobuoy supply base by assisting existing vendors as well as seeking new suppliers, though the Navy's ongoing search for alternative suppliers since 2014 had produced few leads up to this point.[55] Indeed, ERAPSCO's

[49] Doyle, Barlow & Mazard PLLC, "Trump's DOJ Blocks JV from Permanently Combining", *Antitrust Lawyer Blog*, March 9, 2018, https://www.antitrustlawyerblog.com/trumps-doj-blocks-jv-permanently-combining/.
[50] Richard Pettibone, "Sparton Finds a New Home," *Defense and Security Monitor*, November 25, 2019, https://dsm.forecastinternational.com/wordpress/2019/11/25/sparton-finds-a-new-home/.
[51] Joe Gould and Aaron Metha, "US Could Lose a Key Weapon for Tracking Chinese and Russian Subs," *Defense News*, May 1, 2019, https://www.defensenews.com/digital-show-dailies/navy-league/2019/05/01/us-could-lose-a-key-weapon-for-tracking-chinese-and-russian-subs/.
[52] "Assessing and Strengthening the Manufacturing and Defense Industrial Base and Supply Chain Resiliency of the United States," *US Department of Defense*, September, 2018, https://media.defense.gov/2018/Oct/05/2002048904/-1/-1/1/ASSESSING-AND-STRENGTHENING-THE-MANUFACTURING-AND%20DEFENSE-INDUSTRIAL-BASE-AND-SUPPLY-CHAIN-RESILIENCY.PDF.
[53] "Defense Production Act Title III Presidential Determination for Sonobuoys," *US Department of Defense*, March 12, 2019, https://www.businessdefense.gov/News/News-Display/Article/1783491/defense-production-act-title-iii-presidential-determination-for-sonobuoys/.
[54] Donald J. Trump, "Presidential Memorandum for the Secretary of Defense: Presidential Determination Pursuant to Section 303 of the Defense Production Act of 1950, as Amended," *The White House*, March 12, 2019, https://www.whitehouse.gov/presidential-actions/presidential-memorandum-secretary-defense-11/.
[55] Richard Pettibone, "Sparton Finds a New Home," *Defense and Security Monitor*, November 25, 2019, https://www.defense-aerospace.com/articles-view/release/3/207756/sonobuoy-maker-sparton-finds-a-new-home.html.

market dominance and high-quality products had meant that potential alternative producers were reportedly unable to offer competitive enough prices per unit to meet the USN's demands.[56] The USN has repeatedly stated its preference for Sparton and USSI to dissolve ERAPSCO by 2024 and improve their independent production capacities.[57] However, reports in May 2019 suggested that neither business partner expected that they would be "able to make the necessary investments to produce the capability [sonobuoys] independently" without government intervention.[58]

Sparton's immediate future was secured after defense firm Cerberus formally acquired it in November 2019,[59] while in February 2020 the Pentagon's FY21 defense budget request flagged $10.8 million to bolster domestic sonobuoy manufacturing as part of its industrial and supply base risk mitigation program (though funding was drawn from prior years' budgets).[60] Even so, these measures have not fundamentally resolved the supply security issue. Despite the Pentagon's misgivings about ERAPSCO, it has had no choice but to continue to source sonobuoys exclusively from the joint venture. This was clearly demonstrated in July 2019 when the USN awarded a five-year, $1 billion contract to ERAPSCO for the production of 932,000 sonobuoys through to 2024.[61] The signing of the agreement suggested that the cost and technical barriers for new market entrants remained just as high as those which had prevented other companies from bidding for previous sonobuoy contracts.[62] Though Ultra and Sparton may come to possess independent production capacity by the time their joint venture expires in 2024, whether they could each meet surging demand from the US as well as other foreign buyers over the longer term remains an open question.

The risks of depending on a single sonobuoy supplier were not unknown but had until this point been obscured by two decades of low demand for ASW operations and the prioritization of counter-terror operations in the Middle East. A Defense Department report to Congress on industrial capabilities in 2010 identified the limitations of the sonobuoy supply chain based around "a narrow market, required unique technical knowledge, and a small number of qualified manufacturers," though played down the risks of such a model given that the Defense Department's primary suppliers possessed the "requisite skills, facilities, processes and capacity" to meet present demands.[63] However, the rapid expansion of Chinese and Russian submarine operations, and the consequent spike in US ASW operations, have clearly demonstrated that the procurement practices, usage assumptions and overall supply model of the last decade are no longer sufficient to meet rapidly changing requirements.

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[56] Ibid
[57] Ibid
[58] Gould and Metha, "US Could Lose a Key Weapon for Tracking Chinese and Russian Subs."
[59] Ross Wilkers, "Sparton Finds a New Buyer in PE Firm Cerebus," *Washington Technology*, December 12, 2018, https://washingtontechnology.com/articles/2018/12/12/sparton-sale-cerberus.aspx.
[60] Office of the Secretary of Defense, "Department of Defense Fiscal Year (FY) 2021 Budget Estimates - Defense-Wide Justification Book Volume 1 of 2: Defense Production Act Purchases," *US Department of Defense*, February, 2020, 6-8, https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2021/budget_justification/pdfs/02_Procurement/DPAP_PB2021.pdf.
[61] "Contracts For July 18, 2019: Navy," *US Department of Defense*, July 18, 2019, https://www.defense.gov/Newsroom/Contracts/Contract/Article/1909668/.
[62] Doyle, Barlow & Mazard PLLC, "Trump's DOJ Blocks JV from Permanently Combining."
[63] Office of Under Secretary of Defense Acquisition, Technology & Logistics Industrial Policy, "Annual Industrial Capabilities Report To Congress," *US Department of Defense*, May, 2010, 25-26, https://www.hsdl.org/?view&did=810668.

The shortcomings of the present model would be clearly exposed in the event of a high-end conflict between the US and one or both of its Great Power rivals, contingencies in which subsurface and anti-subsurface operations would almost certainly figure prominently, and particularly in the Indo-Pacific. Indeed, experts have warned that "tens of billions of dollars" would be required to avoid short-falls in "military-unique manufacturing and industrial capabilities" in the event of a high-end conflict,[64] capabilities which would equally take time to produce and deploy. A report from the National Defense Industrial Association in February 2020 suggested that more than a quarter of critical US defense supplier industries would struggle to meet demand in a protracted conflict with one of America's Great Power rivals, given that the efficiency and output rates of many suppliers were based on peacetime assumptions, while many critical supply chains were afflicted by capacity limitations due to their domination by sole suppliers.[65] As far as sonobuoys are concerned, it is uncertain whether the current US sonobuoy inventory and supply chain are sufficient to meet steady or sudden wartime operational requirements.

Consequences for Allies and Partners

Most reporting on the sonobuoy supply issue has focused on the vulnerability posed to the US alone. However, considering the uptake of modern US-specification MPA and MPH by a growing number of other countries, there is good reason to believe that the challenges facing the sonobuoy supply chain for those platforms will disproportionately affect allies and partners. Many of America's Indo-Pacific partners either plan to or have already purchased P-8A *Poseidon* and/or MH-60R *Seahawk* from the US, as Figure 2 shows. [66] However, the clear risk of

Aviation mechanics service a sonobuoy launcher aboard an MH-60R *Seahawk*, on the flight deck of the aircraft carrier *USS George Washington*. Credit: US Pacific Fleet.

[64] William Greenwalt, "Leveraging the National Technology and Industrial Base to Address Great-Power Competition: the Imperative to Integrate Industrial Capabilities of Close Allies," *The Atlantic Council*, April, 2019, 24, https://www.atlanticcouncil.org/wp-content/uploads/2019/04/Leveraging_the_National_Technology_Industrial_Base_to_Address_Great-Power_Competition.pdf.

[65] Wesley Hallman, Chris Smith and Corbin Evans, "Vital Signs 2020: The Health and Readiness of the Defense Industrial Base," *National Defense Industrial Association*, January, 2020, 52, https://www.ndia.org/-/media/vital-signs/vital-signs_screen_v3.ashx?la=en.

[66] Figure 2A Sources: Defense Security Cooperation Agency, "Republic of Korea - MH-60R Multi-Mission Helicopters with Support," *U.S. Department of Defense*, August 7, 2019, https://www.dsca.mil/major-arms-sales/republic-korea-mh-60r-multi-mission-helicopters-support; "The Military Balance," *International Institute for Strategic Studies*, 120, No. 1 (February 2020), 51, 221, 225, 253, 273, 282, 289, 299; Manu Pubby, "India to Go Ahead with $3.1 Bn US Deal for Maritime Patrol Aircraft," *The Economic Times*, September 5, 2019, https://economictimes.indiatimes.com/news/defence/india-to-go-ahead-with-3-1-bn-us-deal-for-maritime-patrol-aircraft/articleshow/70986634.cms; Japan Ministry of Defense, "Medium Term Defense Program (FY 2019 - FY 2023)," *Government of Japan*, December, 2018, 36, https://www.mod.go.jp/j/approach/agenda/guideline/2019/pdf/chuki_seibi31-35_e.pdf; Royal Australian Air Force, "P-8A Poseidon," *Australian Department of Defence*, 2020, https://www.airforce.gov.au/technology/aircraft/intelligence-surveillance-and-reconnaissance/p-8a-poseidon; Royal Australian Navy, "Sikorsky MH-60R Helicopter," *Australian Department of Defence*, 2020, https://www.navy.gov.au/aircraft/sikorsky-mh-60r-seahawk; Sam LaGrone, "Indian Navy

disruption posed to the sonobuoy supply chain threatens to undermine the capacity of these states to sustain contributions to collective operations. In fact, the standardization of ERAPSCO sonobuoys even in export variants of the P-8A and MH-60R has seen many regional partners become reliant on the same single sonobuoy source as the USN. In 2017, Ultra Electronics noted that while growing demand for P-8A sales to Asia-Pacific partners would likely induce parallel increases in demand for sonobuoys, it stated that the aircraft was "only compatible with USN high altitude sonobuoys," of which itself and Sparton were the only certified producers.[67] Ultra also noted than despite the best efforts of other suppliers in a number of countries to provide local supply solutions for their P-8A and MH-60R, they were unable to meet the "economies of scale" to be financially viable, nor the technical qualifications to meet the standards of US-specification platforms.[68] These states have thus tended to source ERAPSCO sonobuoys regardless of their own sovereign production capabilities.[69]

Considering that exported P-8A and MH-60R are almost universally based on US specifications,[70] the loss of even a portion of US-based sonobuoy production could have particularly negative ramifications for America's global ASW systems customers.[71] The sheer distance between manufacturing hubs in the US and end-users in the Indo-Pacific would become a serious liability in the event of regional conflict were sea lines of communication (SLOCs) to be disrupted or severed by hostile forces. Given the growing demand for US MPA and MPH globally, sonobuoy shortages in the Indo-Pacific would in turn impact America's capacity to execute theatre-wide ASW operations, significantly reducing the force multiplication effect that allies' own MPA and MPH bring to bear. Analysts have argued that in light of America's declining strategic advantage in the Indo-Pacific, "capability aggregation" between allied militaries in areas including airborne ASW will be essential to uphold regional stability and deter (and if necessary defeat) Chinese aggression in a number of regional hotspots.[72] In that light, the graphs in Figure 2A demonstrate that based on current projections, US partners in the region will field approximately half of the modern MPA and 35% of modern MPH available for high-end, theatre-wide coalition ASW operations in the coming years. These figures are even more significant considering the near impossibility of the US deploying its entire MPA and MPH fleets to the Indo-Pacific, given the scale of its global commitments and the sheer logistical effort involved.

Expanding Anti-Submarine Warfare Stable with Initial $904M MH-60R Buy," *USNI News*, May 18, 2020, https://news.usni.org/2020/05/18/indian-navy-expanding-anti-submarine-warfare-stable-with-initial-904m-mh-60r-buy.

[67] "Proposed Acquisition of Sparton Corporation ("Sparton") And Placing of New Ordinary Shares to raise £133.7m (net)," *Ultra Electronics*, July 7, 2017, https://www.ultra-electronics.com/uploads/investors/final%20announcement%207%20july%202017.pdf.

[68] Ibid

[69] Ibid

[70] While structuring its acquisition programs in such a way as to "maintain some autonomy and customization" in how it uses its platforms, Australia nevertheless deliberately kept its MH-60R and P-8A procurement programs as close to US specification as possible to enhance interoperability. Even Indian Navy P-8I which are perhaps the most customized of all export platforms do not differ markedly from the USN's 'A' design when it comes to sonobuoy dispersal and information processing infrastructure. See: Mike Yeo, "Australian Navy gets More Out of the Seahawk Helicopter Than Originally Planned," *Defense News*, March 6, 2019, https://www.defensenews.com/digital-show-dailies/avalon/2019/03/06/australian-navy-gets-more-out-of-the-seahawk-helicopter-than-originally-planned/.

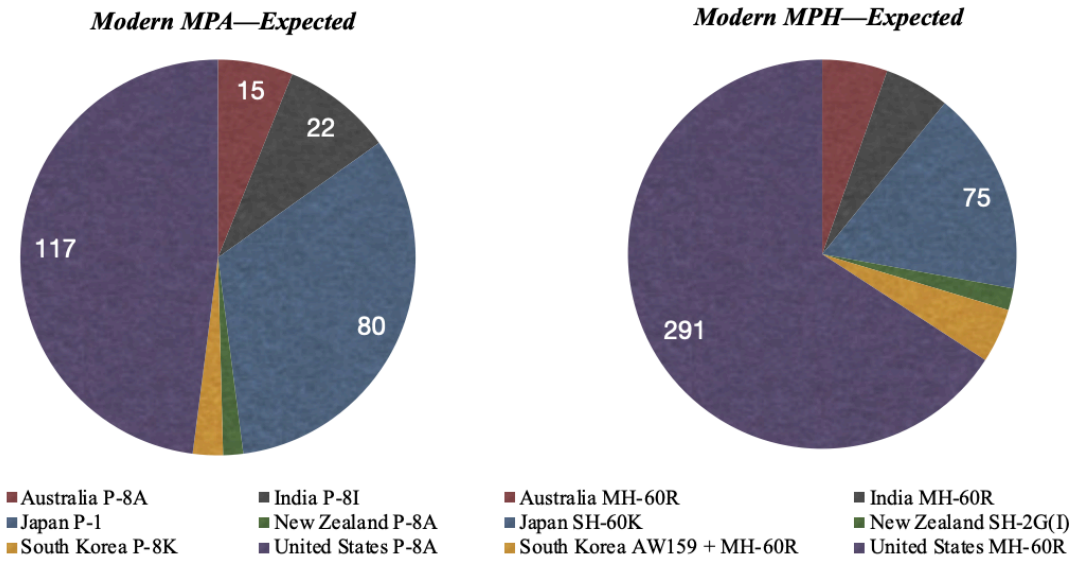
[71] Christopher Woody, "The US just Awarded a Billion-Dollar Contract for a Critical Anti-Submarine Tool That May Soon be in Short Supply," *Business Insider Australia*, July 25, 2019, available at: https://www.businessinsider.com.au/erapsco-awarded-104-billion-us-defense-contract-pentagon-2019-7?r=US&IR=T.

[72] See: Townshend et al., "Averting Crisis."

Figure 2 - Modern ASW Aircraft in the Indo-Pacific

COUNTRY	MODERN MPA CURRENT	MODERN MPA EXPECTED	MODERN MPH CURRENT	MODERN MPH EXPECTED
Australia	12	15	24	24
India	8	22	0	24
Japan	22	80	58	75
New Zealand	0	4	8	8
South Korea	0	6	8	20
United States	87	117	278	291
TOTAL	129	240	400	447

Source: Australian Department of Defence; *The Economic Times*; Government of Japan; International Institute for Strategic Studies; US Defense Security Cooperation Agency; USNI News.



Sonobuoy shortages could erode collective ASW capacity even before a conflict erupts. Indeed, shortfalls in stock levels following a drop-off in demand for ASW operations after the Cold War and increases in per-unit prices have negatively affected "both the training and proficiency of many NATO MPA and MPH aircrew" in the use of sonobuoys.[73] These shortages have engendered an "overly conservative" approach to sonobuoy deployment by aircrews sensitive to "national inventory limitations,"[74] reducing their experience and proficiency in working with the items and potentially compromising live operations (i.e., the loss of contact with a "hot" target).[75] Ensuring the availability of sufficient sonobuoy supplies to facilitate realistic training for P-8A and MH-60R crews in the Indo-Pacific is particularly important given that many of

[73] Perkins, "Alliance Airborne Anti-Submarine Warfare," 42.
[74] Ibid
[75] Ibid

these states are only beginning to bring their capabilities online. Failure to bolster stock levels in the near-term and secure supply options in the longer term would ultimately risk undermining states' operational effectiveness and readiness in ASW even before operational demands reach their peak.

The evident problems afflicting the sonobuoy supply chain and the mounting risk posed to collective ASW capacity strongly suggests that change is needed. While efforts are underway in the US to strengthen and expand the supply chain, allies fielding advanced ASW aircraft capabilities should consider a wider range of possible solutions beyond the current model. Taking steps to diversify the sonobuoy supply chain—geographically and/or commercially—would allow partners to better meet their own independent requirements and assist in relieving pressures on the US industrial base. Though Washington could regard attempts by allies to create their own sovereign sonobuoy manufacturing capabilities as a threat to its current commercial monopoly and as an inefficient use of collective industrial capabilities, doing so would in fact produce strategic dividends for the US in the longer-term. Beyond platform interoperability, crucial to the resilience of collective ASW operations will be for regional partners to strengthen their sovereign defense industrial capabilities,[76] enhancing their self-sufficiency and production of high-use mission items for in-region US forces.[77] Ultimately, allies more capable of sustaining independent operations *and* contributing to coalition maintenance and supply requirements "are ultimately more capable strategic partners."[78]

4. A Role for Australia: Challenges and Opportunities

While America's Indo-Pacific partners are presently ill-placed to meet projected and unexpected increases in sonobuoy demand, there are opportunities for these states to be part of a wider solution. Australia is among the most vulnerable to a potential disruption in sonobuoy supply: the Australian Defence Force's (ADF) sole supplier of sonobuoys is ERAPSCO,[79] and its entire MPA and MPH fleets already consist of P-8A and MH-60R. Yet Australia is for a number of reasons uniquely well-positioned to address the sonobuoy issue: it is already moving to address vulnerabilities to other critical mission items and it has a history of sonobuoy development and manufacturing. Reestablishing sonobuoy production capacity in Australia would also complement its strategic geography and fit with planned investments in other defense infrastructure and manufacturing.

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[76] Townshend et al., "Averting Crisis," 62-65.

[77] Michael Shoebridge, "Australia Needs to Ensure It Has the Advanced Missiles It Needs," *The Strategist*, June 30, 2020, https://www.aspistrategist.org.au/australia-needs-to-ensure-it-has-the-advanced-missiles-it-needs/.

[78] Brendan Thomas-Noone, "Ebbing Opportunity: Australia and the US National Technology and Industrial Base," *The United States Studies Centre*, November, 2019, 13, https://united-states-studies-centre.s3.amazonaws.com/uploads/fce/273/18d/fce27318d567698a625ef4d44293d6c6cffb878b/Ebbing-opportunity-Australia-and-the-US-National-Technology-and-Industrial-Base.pdf.

[79] See "Maritime & Underwater Warfare: Sonobouys & Recievers," *Ultra Electronics*, 2020, https://www.ultra-electronics.com.au/products-solutions/maritime-and-underwater-warfare/sonobouys-and-recievers. Ultra's claims are supported by recent Australian Department of Finance tender documents. See, for example: Australian Department of Finance, "Contract Notice View - CN3570400," *Aus Tender*, February 12, 2019, https://www.tenders.gov.au/Cn/Show/beea97eb-9fd3-2bb5-7573-db9fd3938f0c; Australian Department of Finance, "Contract Notice View - CN3588146," *Aus Tender*, May 1, 2019, https://www.tenders.gov.au/Cn/Show/69080324-9b56-ad63-12a3-b388cf72f48e; Australian Department of Finance, "Contract Notice View - CN3636585," *Aus Tender*, October 25, 2019, https://www.tenders.gov.au/Cn/Show/5c370a94-2582-4015-99d2-f9e36bf4a4f0.

Reclaiming Sovereignty: The French Example

There is precedent for US partners like Australia to look to alternative supply solutions. France has sought to "recover industrial and technological sovereignty in the field of sonobuoys," having judged that it was "no longer sustainable" to rely on ERAPSCO given its market monopoly, complications arising from US export controls, and the urgency created by increased Russian submarine activity in French waters.[80] The French Navy and French Defense Procurement Agency instructed Thales to upscale the local development and production of sonobuoys, leading to the unveiling of the SonoFlash in October 2018, a sonobuoy combining active and passive sonar to bypass the mission-specificity of older types of sonobuoys, effectively reducing procurement costs and overall inventory requirements. The SonoFlash is not expected to enter production until 2021,[81] but the French example nevertheless demonstrates that capable and willing US partners could move to assure their own long-term supply chain security by looking to alternative solutions.

Waking Up to Defense Supply Chain Vulnerabilities

Australian commentators have increasingly drawn attention to the vulnerabilities of the country's present defense stockpiling policies, supply chain arrangements and manufacturing capabilities. In consumables such as sonobuoys, the ADF's existing stockpiles and projected consumption rates have been premised on peacetime training requirements, operational tempos and uninterrupted access to far-flung supply chains.[82] However, there is a growing consensus that these premises would prove unfounded in the event of a high-intensity regional conflict, where Australia's trade routes and SLOCs with the US would almost certainly be contested, if not severed. Experts have raised additional concerns that access to US-based supply chains and stockpiles could not be guaranteed were America to experience similar spikes in demand,[83]

Royal Australian Navy MH-60R and a P-8A Poseidon (rear) fly in formation during Exercise Ocean Explorer 2019. Credit: Australian Department of Defence.

[80] "French Navy to use Thales's SonoFlash buoy for ASW missions," *Naval Technology*, October 25, 2018, https://www.naval-technology.com/news/french-navy-thales-sonoflash-sonobuoy/; "Thales Presents SonoFlash," *Armada International*, October 24, 2018, https://armadainternational.com/2018/10/thales-presents-sonoflash/.
[81] "Driving Outstanding Collaborative Naval Combat With SonoFlash," *Thales Group*, April 19, 2019, available at: https://www.thalesgroup.com/en/worldwide-defence/naval-forces/magazine/driving-outstanding-collaborative-naval-combat-sonoflash-0; "Ultra to Supply New Sonobuoys to French Navy," *Ultra Electronics*, February 7, 2019, https://www.ultra.group/media-centre/news/ultra-to-supply-new-sonobuoys-to-french-navy/.
[82] Stephan Frühling, "Sovereign Defence Industry Capabilities, Independent Operations and the Future of Australian Defence Strategy," *Australian National University Strategic and Defence Studies Centre*, October, 2017, http://bellschool.anu.edu.au/sites/default/files/uploads/2017-09/cog_36_web.pdf; Thomas-Noone, "Ebbing Opportunity," 14; Stephan Frühling, "Reassessing Australia's Defence Policy (Part 3)", *The Strategist*, February 6, 2020, https://www.aspistrategist.org.au/reassessing-australias-defence-policy-part-3-preparing-for-major-war-in-the-2020s/.
[83] Shoebridge, "Australia Needs to Ensure It Has the Advanced Missiles It Needs."

fearing that Washington would withhold supplies promised to Australia in order to sustain its own operations.[84]

These concerns have animated recent debates surrounding Australia's access to another critical strategic commodity: fuel.[85] In fact, a government review into the country's liquid fuel security in April 2019 found that Australia had only 18 days of petrol, 22 days of diesel, and 23 days of jet fuel in reserve, while noting that the country lacked a strategic government fuel reserve like that of the US.[86] Though the Australian government reached an agreement in March 2020 to lease storage space within the US Strategic Oil Reserve and to access US supplies in an emergency,[87] the decision was widely criticized for overlooking the serious obstacles to accessing the reserve in a regional conflict.[88] Maritime supply routes between Australia and the US Strategic Oil Reserve would be vulnerable to disruption given the vast distance expanses of blue water ocean separating the two continents, and supplies coming from Singapore (where most of Australia's jet fuel is processed) would be even more susceptible to disruption.[89] Disruptions would severely hamper ADF operations from Australian shores, likely limiting the range and number of missions that Australian combat aircraft could undertake.[90] The risks of low onshore supply levels have been highlighted before, such as when Australia's fuel supplies were drained to dangerously low levels by unplanned non-combat operations in support of the search for Malaysian Airlines flight MH-370 in 2014.[91]

Fortunately, the government has taken some steps towards addressing this vulnerability. Energy Minister Angus Taylor announced in April 2020 that Australia would take advantage of historically low oil prices to increase Australia's overall fuel reserves (again, to be stored in the US), but this time included a commitment to establish a sovereign fuel reserve and explore options to expand onshore fuel storage capacity.[92] More recently, the government's *Defence*

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[84] Greg Sheridan, "Coronavirus: Time for Urgent Reassessment of Vulnerability," *The Australian*, March 13, 2020, https://www.theaustralian.com.au/inquirer/coronavirus-time-for-urgent-reassessment-of-vulnerability/news-story/34e57abe9358a4aaf0908837ff909025.

[85] Keyurkumar Patel, "Australia's Petroleum Supply and Its Implications for the ADF," *Australian Defence Force Journal*, 204 (March 2018), 71-76; Amy Remeikis, "Labor to Establish National Fuel Reserve to Boost Emergency Stocks," *The Guardian*, February 28, 2019, https://www.theguardian.com/australia-news/2019/feb/28/labor-to-establish-national-fuel-reserve-to-boost-emergency-stocks; Georgia Hitch, "Federal Government to Spend $94 million Stockpiling Fuel in the US," *ABC News*, April 22, 2020, https://www.abc.net.au/news/2020-04-22/government-to-buy-fuel-secure-national-stockpile/12173276.

[86] "Liquid Fuel Security Review," *Australian Department of the Environment and Energy,* April, 2019, https://www.environment.gov.au/energy/liquid-fuel-security-review-consultation, 2, 28.

[87] "U.S. And Australia Strengthen Fuel Security With New SPR Arrangement", *U.S. Department of Energy*, March 10, 2020, https://www.energy.gov/articles/us-and-australia-strengthen-fuel-security-new-spr-arrangement.

[88] Justin Burke, "Australia Needs More Than an Accounting Trick to Secure its Fuel Reserve," *The Strategist*, April 3, 2020, https://www.aspistrategist.org.au/australia-needs-more-than-an-accounting-trick-to-secure-its-fuel-reserve/.

[89] Patel, "Australia's Petroleum Supply and Its Implications for the ADF," 72.

[90] John Coyne, "Tindal Air Base Investment Means Nothing Without Fuel Security," *The Strategist*, March 4, 2020, https://www.aspistrategist.org.au/tindal-air-base-investment-means-nothing-without-fuel-security/.

[91] John Coyne, Tony McCormack and Hal Crichton-Standish, "Running on Empty? A Case Study of Fuel Security for Civil and Military Air Operations at Darwin Airport," *Australian Strategic Policy Institute*, May, 2020, 4, https://s3-ap-southeast-2.amazonaws.com/ad-aspi/2020-05/SR%20154%20Running%20on%20empty.pdf?ihVLUkU0VDfSfyFGBLARhztemVUpoJO0.

[92] Angus Taylor, "Australia to Boost Fuel Security and Establish National Oil Reserve," *Australian Department of Industry, Science, and Resources*, April 22, 2020, https://www.minister.industry.gov.au/ministers/taylor/media-releases/australia-boost-fuel-security-and-establish-national-oil-reserve#:~:text=Australia%20has%20been%20negotiating%20access,the%20current%20low%20global%20prices.; "Help Increase Australia's Domestic Fuel Storage: Request for Information," *Australian Department of Industry,*

Strategic Update and *Force Structure Plan* released in July 2020 indicated that as much as A$1.5 billion would be provided "to enhance the capacity, survivability and redundancy of the integral fuel supply system" over the next two decades to ensure continuity of ADF operations even when global supply chains are disrupted.[93] The latest Australia-US Defense and Foreign Ministers meetings (AUSMIN) also included a commitment to establish a US-funded, commercially operated strategic fuel reserve on Australian shores.[94]

An aviation flight deck team on board HMAS *Newcastle* prepare a MH-60R *Seahawk* for take-off. Credit: Australian Department of Defence.

The fuel example contains lessons for Australia regarding other critical items, including sonobuoys. Without increasing stockpiles and improving onshore manufacturing capacity, Australia will not be able to maximize the returns on its investments in high-end ASW capabilities and supporting military infrastructure and will remain vulnerable to supply chain disruptions in both peacetime and wartime. Indeed, Australia's present stocks of sonobuoys are based on peacetime planning and usage assumptions, and that these levels are likely insufficient to cope with sudden, protracted surges in demand.[95] Nor could prompt resupply be guaranteed in a crisis given the tyranny of distance afflicting the supply chain, and the risk that US demands could be prioritized ahead of Australia's requirements in a pinch.[96] Analysts have pointed to similar vulnerabilities in Australia's munitions policies, arguing that the 200 long-range anti-ship missiles recently purchased from the US would be quickly exhausted within the first few days of a high-end conflict, adding that manufacturers would struggle to surge production for extended periods of time.[97] The evident problems with the sonobuoy supply chain notwithstanding, Australian policymakers should also consider options for increasing short-term stockpiles in anticipation of heightened operational demands, consistent with the *Defence Strategic Update*'s warning that the "strategic warning time" for major regional conflicts, or even attacks against Australia, has been drastically reduced.[98]

Science, Energy and Resources, June 15, 2020, https://www.industry.gov.au/news-media/help-increase-australias-domestic-fuel-storage-request-for-information.

[93] "2020 Force Structure Plan," *Australian Department of Defence*, July, 2020, 84-85, https://www.defence.gov.au/StrategicUpdate-2020/docs/2020_Force_Structure_Plan.pdf.

[94] Office of the Spokesperson of the US Department of State, "Joint Statement on Australia-U.S. Ministerial Consultations (AUSMIN) 2020," *U.S. Department of State*, July 28, 2020, https://www.state.gov/joint-statement-on-australia-u-s-ministerial-consultations-ausmin-2020/.

[95] Frühling, "Sovereign Defence Industry Capabilities," 7.

[96] Shoebridge, "Australia Needs to Ensure It Has the Advanced Missiles It Needs."

[97] Ibid

[98] "2020 Defence Strategic Update," *Australian Department of Defence*, July, 2020, 14, https://www.defence.gov.au/StrategicUpdate-2020/docs/2020_Defence_Strategic_Update.pdf.

Advantage One: A Favorable History

Fortunately, Australia already has a history of sonobuoy manufacture from which to draw lessons for the future. Australia's dependence on ERAPSCO has come despite its history as a global leader in the development and manufacture of advanced sonobuoy technologies.[99] In the 1960s and 1970s, the Australian Defence Science Agency (now the Defence Science and Technology Agency, or DST) together with several small local defense companies spearheaded the development of the Barra Sonobuoy.[100] Production of the Barra commenced in 1980 through Sonobuoys Australia, an Australian-based joint venture between AWA Defence Industries and GEC Marconi Systems.[101] The Barra was eventually supplied to the Australian and British navies, and employed extensively during the latter stages of the Cold War.[102] Critical to the Barra's success was not only the Australian government's willingness to provide financial support for the development of a sovereign sonobuoy capability and the sonar expertise within DST, but also that the Royal Australian Navy (RAN) "was orientated in large measure to anti-submarine warfare" during this period.[103] That acute operational focus drove considerable investments in other critical ASW items including the *Ikara* anti-submarine missile and advanced sonar arrays designed by GEC Marconi.[104]

However, the end of the Cold War saw ASW retreat from the forefront of ADF operations, and Australia's sonobuoy manufacturing capacity gradually eroded.[105] Barra sonobuoys were used by Australian MPA and MPH up until the procurement of the P-8A and MH-60R, with the last confirmed order and production of Barra sonobuoys in Australia for the ADF in 2006.[106, 107] DST and the ADF had entered into an alliance agreement with France's Thales Under Water Systems in 1997 to exchange and develop new sonar technology, seemingly

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[99] This may in large part be due to the ADF's preference for keeping the specifications of its Poseidon and Seahawk aircraft as close to those of the USN as possible, exception for a few additional load-out specifications for search and rescue missions. These limited efforts to tailor the platforms to Australia's independent requirements have not extended to the supply of critical items like sonobuoys. See: Yeo, "Australian Navy Gets More Out of the Romeo Helicopter Than Originally Planned."

[100] Defence Science and Technology Organisation, "Barra Sonobuoy," *Australian Department of Defence,* accessed May 14, 2020, https://www.dst.defence.gov.au/innovation/barra-sonobuoy.

[101] Peter Roberts, "Move to Regain Edge in Sonar Technology," *Australian Financial Review*, October 11, 1990, https://www.afr.com/companies/move-to-regain-edge-in-sonar-technology-19901011-k44i4; Ian Bedwell, "Australian Sonar Transducer Technology," *Australian Acoustical Society*, November, 2013, https://www.acoustics.asn.au/conference_proceedings/AAS2013/papers/p21.pdf.

[102] "Export Marketing Contract for Australian Anti-Submarine Weapon", *Australian Department of Defence*, June 8, 1979, https://parlinfo.aph.gov.au/parlInfo/download/media/pressrel/HPR10027577/upload_binary/HPR10027577.pdf;fileType=application%2Fpdf#search=%22media/pressrel/HPR10027577%22; Roberts, "Move to Regain Edge in Sonar Technology."

[103] Australian Naval Institute and the Naval Studies Group at the University of New South Wales, "Protecting Australian Maritime Trade," *Australian Naval Institute*, March, 2020, 14, https://navalinstitute.com.au/wp-content/uploads/Protecting-Australian-Maritime-Trade-Report-March-2020.pdf.

[104] Roberts, "Move to Regain Edge in Sonar Technology;" Australian Naval Institute et al., "Protecting Australian Maritime Trade," 14.

[105] Roberts, "Move to Regain Edge in Sonar Technology."

[106] "CTD 2006-6 Mono-Static RASSUPTIN Sonobuoy," *Australian Department of Finance*, October 25, 2006, https://www.tenders.gov.au/Search/KeywordSearch?keyword=Sonobuoy&page=7.

[107] Thales Australia were contracted in 2011 for a "Re-Life Study and Report" into the Barra, which may have referred to an analysis of the integrity of aging stock, or a study into the possibilities of reestablishing sovereign supply. However, nothing seems to have come of this effort. See: "Barra Sonobuoy - Re-Life Study and Reporting," Australian Department of Finance, December 6, 2011, https://www.tenders.gov.au/Cn/Show/1167a99b-a983-4610-8660-1e84f7aa5955.

leading to Thales' assumption of Barra manufacturing rights and the offshoring of the bulk of production to France.[108][109] While Thales Australia continues to offer the "Rassputin" mono-static sonobuoy (based on the Barra design) as a potential defense export item,[110] there do not appear to be any international buyers for the item at present and the model is not used by the ADF.

Even with the decline of domestic sonobuoy manufacturing, the Australian government remains committed to retaining a technological edge in sonar technologies, including sonobuoys. Canberra's *2018 Defence Industrial Capability Plan* directed Australian industry to "design, develop and use technology applications" to ensure that the ADF could maintain distinct advantages in advanced signals processing, including in the fields of "sonar and acoustic technologies."[111] Sonar technology and systems remain high on the research agenda of DST's Maritime Division,[112] largely because of the lack of a "widespread civilian industrial base" to drive the development of the advanced "undersea acoustic sensing knowledge and capabilities" needed to sustain the ADF's regional edge in ASW.[113] Indeed, Australian innovation continues to play an important role in the development of new sonobuoy technologies. For example, apart from being based on the original Barra design, Thales' SonoFlash includes advanced ceramic components developed at the company's Australian competence center (though the parts themselves are manufactured in Brest, France).[114]

Despite its latent advantages, recent Australian government documents relating to sovereign defense industry capabilities have not addressed the domestic manufacture of sonobuoys. Indeed, reclaiming sonobuoy sovereignty would be consistent with the thrust of the priorities outlined in the *Sovereign Industrial Capability Plan* of 2018, specifically with regards to the local production of "operationally critical" items including munitions and small arms,[115] though non-lethal items such as sonobuoys would seem to fall outside this bracket. More recently, the *2020 Defence Strategic Update* and *Force Structure Plan* contained commitments to pursue "more durable supply chain arrangements and strengthened sovereign industrial capabilities", specifically in the production of "key enablers … vital to the future operational capability" and self-reliance of Australian forces.[116] However, priority was again given to the manufacture of munitions and propellants rather than critical mission-enabling items like sonobuoys.

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[108] Australian Naval Institute et al., "Protecting Australian Maritime Trade," 14.
[109] GEC Marconi had become Thomson Marconi in 1995, a company known as Thales Underwater Systems from 2001. Thales was forced by partner shareholder BAE Systems to acquire the Marconi venture outright in 2001, likely sealing the offshoring of Barra production to France in the long-term given that Thales is part-owned by the French government.
[110] "Australian Defence Sales Catalogue," *Australian Defence Export Office*, Edition Four (2020), 53, https://www.defence.gov.au/export/australian-military-sales/documents/Australian-Defence-Sales-Catalogue-2020.pdf.
[111] "2018 Defence Industrial Capability Plan," *Australian Department of Defence*, April, 2018, 38, https://www.defence.gov.au/spi/industry/capabilityplan/Docs/DefenceIndustrialCapabilityPlan-web.pdf.
[112] Defence Science and Technology Organisation, "Maritime Division," *Australian Department of Defence*, accessed May 14, 2020, https://www.dst.defence.gov.au/research-division/maritime-division-naval-technology.
[113] Defence Science and Technology Organisation, "Sonar Technology and Systems," *Australian Department of Defence*, accessed May 14, 2020, available at: https://www.dst.defence.gov.au/capability/sonar-technologies.
[114] Naval Technology, "French Navy to use Thales's SonoFlash Buoy for ASW Missions;" Armada International, "Thales Presents SonoFlash."
[115] "Fact Sheet: Sovereign Industrial Capability Priorities," *Australian Department of Defence*, March, 2018, 1, https://www.defence.gov.au/spi/industry/capabilityplan/Docs/SICP-Factsheet1.pdf.
[116] Australian Department of Defence, "2020 Defence Strategic Update", 84.

Advantage Two: Established Industry Partnerships

Thales CEO Chris Jenkins and First Assistant Secretary - Joint Systems Ivan Zlabur sign the contract for Strategic Domestic Munitions Manufacturing in Canberra (June 2020). Credit: Australian Department of Defence.

At a time when Australia is reassessing its dependence on a range of global defense supply chains, greater attention ought to be paid to the country's ongoing access to a reliable source of sonobuoys. Unlike many other countries, however, Australia does not have the domestic defense industry prime companies that could efficiently create a local manufacturing capability, meaning that it is in large part reliant on the assistance of foreign defense industry companies. Even so, Australia has the required skillset and commercial connections to reestablish local sonobuoy manufacturing capabilities should it choose to do so, and enjoys strong relationships with a number of large defense firms dealing in cutting-edge underwater systems technologies. Analysts have already suggested that Australia should leverage its close relationships with the local subsidiaries of such prime companies to stand-up domestic production lines for explosive ordinance.[117] The same should be done with sonobuoys.

In this respect, Ultra and Thales are two of the most logical options. Ultra Electronics has operated an Australian branch since 2009, providing a range of capability elements to the RAN through a number of support facilities around the country,[118] and has recently expressed interest in expanding its footprint in Australia.[119] Whether as Ultra USSI or ERAPSCO/Sonobuoy TechSystems, Ultra's existing in-country infrastructure could potentially be leveraged to establish a local sonobuoy production line. Establishing a third global manufacturing location for ERAPSCO-standard sonobuoys in Australia—the first such facility in the Indo-Pacific—would increase Ultra's capacity to meet demand independent of its partnership with Sparton per the USN's stated preference, provide an in-region source of sonobuoys for Australia and other strategic partners, and create local manufacturing jobs for Australian industry without forcing a complete rethink of Australia's current supply arrangements and capability specifications.

Alternatively, Australia could leverage its enduring partnership with Thales to push for the reestablishment of a local Barra-derivative sonobuoy production line. Thales remains heavily involved with many Australian naval construction and technological development programs,

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[117] Marcus Hellyer, "Supply Chain Security: Lessons From Australia's Defence Industry," *The Strategist*, April 9, 2020, https://www.aspistrategist.org.au/supply-chain-security-lessons-from-australias-defence-industry/; Shoebridge, "Australia Needs to Ensure It Has the Advanced Missiles It Needs."

[118] "Ultra Electronic Australia," *Ultra Electronics*, accessed May 29 2020, https://www.ultra-electronics.com.au/about-us/ultra-electronics-australia.

[119] For example, see: Dylan Nicholson, "L3Harris Technologies, Ultra Electronics and Indianic Group Form Local Alliance for SEA 1350 Bid," *Defence Connect*, May 22, 2020, https://www.defenceconnect.com.au/maritime-antisub/6142-l3harris-technologies-ultra-electronics-and-indianic-group-form-local-alliance-for-sea-1350-bid.

particularly in sonar systems,[120] while the company's Australia-based competence center was responsible for the aforementioned development of key components in the new SonoFlash sonobuoy. Additionally, in June the Australian government and Thales signed an A$1 billion 10-year Strategic Domestic Munitions Manufacturing contract to sustain and enhance local munitions manufacturing, providing both for ADF consumption requirements as well as opening up export opportunities for overseas customers.[121] Given that Rassputin sonobuoys are offered as export items by the Australian Defence Export Office, it could be a relatively simple procedure to stand-up local Thales sonobuoy production lines. That Thales systems are already integrated with the MH-60Rs flown by the Australian Navy may also suggest that any technical challenges relating to the pairing of new sonobuoy types with transceivers aboard P-8A and MH-60R could be effectively managed and overcome. Regardless of the final manufacturer, on-shoring sonobuoy production will almost certainly require some degree of investment in local industry from the Australian government, as well as efforts to foster a willingness to accept higher costs for locally sourced items.[122]

The 12th of Australia's P-8A *Poseidon* arrives at RAAF Base Edinburgh, South Australia, in December 2019. Three more are expected to be procured in the coming years. Credit: Australian Department of Defence.

Advantage Three: Strategic Geography and Planned Investments

Reclaiming sovereignty in sonobuoys would complement Australia's favorable strategic geography and planned investments in ASW-relevant infrastructure, increasing its capacity to support both independent and coalition operations in the near region. Occupying what some have called the "Goldilocks zone," Australia is distant enough from the Chinese mainland to put it out of range of China's intermediate range ballistic missile arsenal but close enough to reliably support coalition operations in Southeast Asia and the South China Sea, while its coastlines provide open access for shipping and naval forces to the Indian, Pacific and Southern Oceans. Experts have argued before that Australia's location makes it an ideal "gateway" or staging ground for US and/or wider coalition operations in the Indo-Pacific, including in anti-submarine warfare.[123] Effectively supporting such operations would require Australia to increase its stockpiles not only of high-expenditure explosive munitions as these experts

[120] For example, see: Thales Group, "Thales Sonar Upgrades to Extend Australia's Collins Class Submarine Capability," June 14, 2018, https://www.thalesgroup.com/en/worldwide/defence/press-release/thales-sonar-upgrades-extend-australias-collins-class-submarine; Defence Connect, "SEA 5000 Set to Benefit from Thales' Sonar Expertise," September 20, 2018, https://www.defenceconnect.com.au/maritime-antisub/2896-sea-5000-set-to-benefit-from-thales-sonar-expertise.

[121] Thales, "Strategic Defence Partnership to Secure Hundreds of Australian Jobs," June 29, 2020, https://www.thalesgroup.com/en/group/journalist/press-release/strategic-defence-partnership-secure-hundreds-australian-jobs.

[122] Marcus Hellyer, "Supply Chain Security;" Shoebridge, "Australia Needs to Ensure It Has the Advanced Missiles It Needs."

[123] Jim Thomas, Zack Cooper and Iskander Rehman, "Gateway to the Indo-Pacific: Australian Defense Strategy and the Future of the Australia-U.S. Alliance", *Center for Strategic and Budgetary Assessments*, November, 2013, 20-21, 25-26, https://csbaonline.org/uploads/documents/Gateway_to_IndoPacific1.pdf.

suggest,[124] but also other critical enabling items such as aircraft fuel, spare parts and sonobuoys to prepare for scenarios where uninhibited access to production on the US mainland cannot be guaranteed.

In addition, reviving local sonobuoy production would be a logical extension of recent investments in Australia's military infrastructure. Several current projects are clearly intended to support both Australian and US ASW operations. In February 2020, the Australian government announced a AUD$53 million upgrade package for a new hangar and maintenance facilities at RAAF Base Darwin in the country's north, intended to better support P-8A maritime patrol missions across the Indian Ocean and Southeast Asia.[125] In the same month, the government also announced A$1.1 billion in upgrades to RAAF Tindal to extend the operational reach of both Australian and visiting US aircraft across the Indo-Pacific,[126] which included funding for runway and refueling infrastructure capable of supporting P-8A operations.[127] These projects follow on from similar investments made in other Australian facilities in recent years, including on the Cocos (Keeling) Islands in the eastern Indian Ocean and at Butterworth Airbase in Malaysia.[128, 129]

Considering these clear efforts to enhance the reach and tempo of Australian (and US) airborne ASW operations across the country's near region, parallel investments should also be made in sovereign manufacturing capabilities for high-use items central to the P-8A's core mission sets, like sonobuoys. These investments could be made under the mandate of the recently released *Defence Strategic Update* and *Force Structure Plan*. While the *Defence Strategic Update* flagged increases in weapons stockpiles to enhance the "resilience and self-reliance" of Australian forces, it also suggested that funding would be provided "for exploring and potentially implementing additional measures," specifically in the development of manufacturing capabilities in explosive

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[124] Ibid 19.

[125] Australian Department of Finance, "Invitation to Register Interest: Head Contract (Construct Only) - R7096 FOB Package 4 RAAF Darwin (NT)", *Aus Tender*, October 4, 2018, https://www.tenders.gov.au/atm/ShowClosed/2b556201-9c49-5a61-cb4a-921d770e5b87?PreviewMode=False; Mike Yeo, "RAAF Base Darwin to Get New P-8 Hangar and Facilities," *Asia Pacific Defence Reporter*, February 28, 2020, https://asiapacificdefencereporter.com/raaf-base-darwin-to-get-new-p-8-hangar-and-facilities/.

[126] Scott Morrison, "$1.6 Billion to Upgrade RAAF Base Tindal to Protect Australians and Create Jobs," *Office of the Prime Minister of Australia*, February 21, 2020, available at: https://www.pm.gov.au/media/16-billion-upgrade-raaf-base-tindal-protect-australians-and-create-jobs#:~:text=%241.6%20billion%20to%20upgrade%20RAAF%20Base%20Tindal%20to%20protect%20Australians%20and%20create%20jobs,-Media%20release&text=The%20Morrison%20Government%20is%20investing,capability%20from%20the%20Northern%20Territory.

[127] Chris McLennan, "Tindal's Mighty Upgrade - Some of the Finer Details," *Katherine Times*, February 24, 2020, https://www.katherinetimes.com.au/story/6645547/tindals-mighty-upgrade-some-of-the-finer-details/.

[128] "RAAF P-8A Completes First Overseas Deployment," *Australian Aviation*, June 7, 2017, https://australianaviation.com.au/2017/06/raaf-p-8a-completes-first-overseas-deployment/; "Contract Awarded for Cocos/Keeling Runway Upgrades," *Australian Defence Magazine*, February 4, 2020, https://www.australiandefence.com.au/defence/air/contract-awarded-for-cocos/keeling-runway-upgrades.

[129] RAAF Butterworth has historically supported Australian maritime patrol operations (including ASW) over the northern Indian Ocean and the South China Sea, while AP-3C *Orion* surveillance aircraft (the predecessor to the P-8A) have provided intelligence, reconnaissance and surveillance (ISR) support for coalition counter-insurgency missions in the Philippines in recent years. See: Caitlyn Gribbin, "Australian Spy Planes to Fly Over Southern Philippines in Islamic State Fight," *ABC News*, June 23, 2017, https://www.abc.net.au/news/2017-06-23/australian-spy-planes-to-fly-over-philippines-in-is-fight/8645086; Air Power Development Centre, "The P-3 Orion in RAAF Service - Flexible Air Power in Action," *Pathfinder*, 250 (August 2015), https://airpower.airforce.gov.au/APDC/media/PDF-Files/Pathfinder/PF250-The-P-3-Orion-in-RAAF-Service.pdf.

munitions and propellants.[130] The *Force Structure Plan* indicated that between A$0.8-$1.1 billion would be spent on such an initiative between 2022 and 2030[131] to "ensure weapons stock holdings are adequate to sustain combat operations if global supply chains are at risk or disrupted."[132] Consistent with its fresh commitment to "mitigate supply risks" for mission-critical items,[133] the Australian government should also explore opportunities to enhance sovereign sonobuoy production.

Last, investments in relevant defense industry capabilities would correspond with the clear reorientation of the Australian Navy toward ASW operations. The *Defence White Paper* of 2016 outlined a military modernization program and force structure clearly geared towards ASW operations, with 25% of total capital investments in capabilities out to FY25-26 going to future submarines, frigates equipped with towed sonar arrays, and expanded Poseidon and Seahawk fleets.[134] These investments were sustained by the recent *Defence Strategic Update* and *Force Structure Plan*, which doubled down on major naval shipbuilding projects and flagged additional investments in additional ASW capabilities and infrastructure, including advanced anti-submarine torpedoes, "an integrated undersea surveillance system," semi-autonomous or fully autonomous surface and underwater vehicles, and over A$10 billion worth of undersea warfare support facilities and infrastructure.[135] Importantly, the *Force Structure Plan* emphasized that many of these investments would be made to "build collaborative anti-submarine capability among Australia's partners,"[136] confirming that Australia envisages a critical role for itself in regional collective ASW operations. That imperative is only likely to grow given the clear shift in Australia's strategic priorities away from the Middle East and back to its near region—specifically the Indian Ocean, the Pacific Islands, and Southeast Asia—presented by the *Defence Strategic Update*.[137] Reorienting ADF operations away from counter-insurgency campaigns and back to maritime missions across the vast oceans of the Indo-Pacific will increase the demands on Australia's maritime domain awareness and ASW capabilities, but will also require Canberra to double down on critical regional maritime security partnerships in order to expand the reach and effectiveness of independent and collective ASW operations alike.

5. Leveraging Partnerships: Options for Enhancing Collective Capacity

Adding a domestic sonobuoy manufacturing capability to the list of investments detailed above would round-out Australia's independent capacity to support ASW operations in multiple regional oceans. However, there is no reason for Australia to pursue this capability alone: indeed, Canberra could look to its existing alliances or even new partnerships for support in its efforts to reclaim sonobuoy sovereignty. In fact, doing so is arguably critical to improving the resilience of collective ASW capacity in the Indo-Pacific. Collaborating on sonobuoy development and manufacturing with established key security partners such the United States and other Five Eyes countries (Canada, New Zealand, and the United Kingdom) would be the

[130] Australian Department of Defence, "2020 Defence Strategic Update," 40.
[131] Ibid 85.
[132] Ibid 82, 84.
[133] Ibid 82.
[134] Brendan Thomas-Noone, "Anti-Submarine Warfare Biggest Winner in Defence White Paper," *The Interpreter*, March 1, 2016, https://www.lowyinstitute.org/the-interpreter/anti-submarine-warfare-biggest-winner-defence-white-paper.
[135] Australian Department of Defence, "2020 Force Structure Plan," 36-37, 39.
[136] Ibid 37.
[137] Australian Department of Defence, "2020 Defence Strategic Update," 21.

most logical step in this regard. However, there is arguably merit in exploring opportunities for collaboration with other major regional security partners such as South Korea, both for the sake of providing alternatives to the dominant supply chain model and in order to boost Australia's strategic relationships with key regional players.

The US-Australia Alliance and the NTIB

Australian Minister for Defence Linda Reynolds (left) and United States Defense Secretary Mark T. Esper during AUSMIN 2020 in Washington. Credit: Australian Department of Defence.

Notwithstanding the problems afflicting the current sonobuoy supply chain model, Australia may yet be able to solve its problems through existing means. Specifically, Australia could seek to leverage its membership of the US National Technological and Industrial Base (NTIB) to secure a licensing agreement to produce US-standard sonobuoys onshore. The NTIB is an initiative intended to expand "the number of actors, resources and competitiveness of the US defense industrial base" by combining it with the industrial capabilities of close allies, including Australia, Canada and the United Kingdom, and effectively creating a defense free-trade area.[138] Thorough implementation of the NTIB would offer the US an opportunity to "immediately add [40%] in capacity" to its industrial base and help address critical shortages by leveraging the "defense-unique specialties" of member states like Australia, including in fields such as sonar and sonobuoys.[139]

However, the division of responsibilities for the administration of US defense export controls across multiple government agencies has created substantial bureaucratic barriers to enhanced cooperation between the US and its NTIB partners, including the slow issuing of license exemptions for critical capabilities. These have constrained efforts on the part of the US and its allies to address common gaps in critical industrial and manufacturing capabilities, including munitions.[140] Under current arrangements, for Australia to produce expendable, US-origin defense items locally would require enhanced access to technical data and intellectual property, access hereto limited by the extraterritoriality of US defense export controls. In fact, restrictions on the sharing of US-owned defense technical data and intellectual property have already disrupted Australia's access to critical supplies in the past, in one instance forcing the hurried creation of a local plastic explosives manufacturing capability to fill a crucial supply gap, exposed by a surge in ADF operations in the Middle East.[141] Notwithstanding Australia's development of a solution in this instance, it would be far more difficult to generate stop-gap solutions for complex items like sonobuoys in the context of a high-end conflict in Australia's local region.[142]

[138] Thomas-Noone, "Ebbing Opportunity," 5.
[139] Greenwalt, "Leveraging the National Technology and Industrial Base to Address Great-Power Competition," 21.
[140] Ibid 16; Thomas-Noone, "Ebbing Opportunity," 4.
[141] Thomas-Noone, "Ebbing Opportunity," 13-14.
[142] Ibid

Streamlining cooperation through the NTIB would allow Australia to contribute more effectively to underwriting collective ASW capacity in the Indo-Pacific. Canberra has recently signaled its interest in pursuing closer integration with US defense supply chains. Indeed, while the *Defence Strategic Update* placed significant emphasis on improving Australia's self-reliance, it also identified a need to "selectively [increase] interdependence" with the US and other partners to create "more responsive and assured global supply chains."[143] The Joint Statement from the recent AUSMIN meetings demonstrated that the feeling is mutual, containing commitments to "reduce barriers to industrial base integration," enhance Australia's participation in US supply chains, and identify and resolve "defense trade issues of mutual concern" through the Australia-US Defense Trade Working Group.[144] These measures would, according to the Australian Defense Minister Linda Reynolds, "strengthen [alliance] interoperability and … shared resilience."[145]

Based on the nature of these commitments, the sonobuoy supply chain should be included among the alliance's top NTIB priorities, potentially as part of a broader package of munitions manufacturing agreements between the two sides. A revised NTIB could see an ERAPSCO or Ultra USSI sonobuoy production facility established via Ultra's Australian arm, with the Australian and/or US governments providing financial support to facilitate the process. Local sonobuoy manufacturing capabilities would complement other efforts to enhance the availability of critical non-lethal defense commodities for US forces in Australia's northern territory also flagged in the AUSMIN statement, such as the plan to establish a "US-funded, commercially operated strategic military fuel reserve" in Darwin.[146] Investing in the local manufacture of non-lethal commodities like fuel and sonobuoys will bolster the deterrence value of Australian and US forces operating out of northern Australian just as much as it would underwrite wartime operations, providing what might be framed as a pre-positioned manufacturing capability. In any case, standing up production lines for staple mission-critical items like sonobuoys used extensively by Australian and US forces is would "improve supply-chain resilience and ensure Australia remains an effective strategic partner in the Indo-Pacific."[147] Getting the NTIB right could well be crucial.

Expanding Five Eyes Cooperation

Australia could also push for greater coordination between Five Eyes members on the sonobuoy issue. Much like in the case outlined above, the sonobuoy supply issue could provide a good test case for expanded cooperation amongst the grouping to cover a wider suite of defense challenges beyond intelligence, including shared defense industry challenges. Cooperation between the Five Eyes partners has recently moved beyond the grouping's traditional preoccupation with intelligence sharing to encompass other critical areas of strategic cooperation. In June, for example, the Five Eyes defense ministers held their first official ministerial meetings and issued a Joint Statement committing to "advance defence and security

[143] Australian Department of Defence, "2020 Defence Strategic Update," 29.
[144] Office of the Spokesperson of the US Department of State, "Joint Statement on Australia-U.S. Ministerial Consultations (AUSMIN) 2020."
[145] US Department of State, "Secretary Michael R. Pompeo At a Press Availability with Secretary of Defense Mark Esper, Australian Foreign Minister Marise Payne, and Australian Defence Minister Linda Reynolds," July 28, 2020, https://www.state.gov/secretary-michael-r-pompeo-at-a-press-availability-with-secretary-of-defense-mark-esper-australian-foreign-minister-marise-payne-and-australian-defence-minister-linda-reynolds/.
[146] Ibid
[147] Thomas-Noone, "Ebbing Opportunity," 14.

cooperation on matters of common interest", including through exploring "new opportunities" to "build resilience" and "advance cooperation across key lines of effort."[148] Australian Foreign Minister Marise Payne recently noted that Five Eyes discussions had broadened to encompass a range of new issues, including the security of shared supply chains.[149]

These discussions have likely already touched on certain common defense industry challenges, but Australia should seek to ensure that coordination on defense supply chain issues—including sonobuoys—remains a priority. In fact, there are several factors already in favor of such an approach. Four of the five members (except New Zealand) are considered part of the NTIB, though these states have faced many of the same problems that Australia has faced pursuing closer defense industry integration with the US, as explored above. Nevertheless, Australia could use the newly minted Five Eyes defense ministers' meetings to coordinate a wider push amongst the other Five Eyes members aimed at accelerating US internal reforms to NTIB processes, pitching the sonobuoy issue as a relatively low-hanging fruit for trialing enhanced cooperation and coordination. Indeed, the Five Eyes already share a trusted supplier for high-end intelligence-gathering and other maritime equipment in Ultra Electronics. The company already has subsidiaries in Australia, Canada, the UK, and the US, though only its USSI branch manufactures the A-size sonobuoys used in P-8A and MH-60R.[150] There is also sufficient commonality of MPA platforms across the grouping to increase the appeal of greater coordination, with four of the Five Eyes planning to or already flying the P-8A.[151]

Considering the relatively "niche" yet critical nature of the problem at hand—a specific item for a specific set of capabilities—the sonobuoy supply chain problem would appear to be a good test case for enhanced cooperation on critical supply issues. Pushing for the establishment of an Indo-Pacific sonobuoy manufacturing location would strengthen a key shared supply chain by distributing sonobuoy manufacturing across a wider range of facilities and geographic locations and provide ready in-region support for other the forces of Five Eyes countries in the event of sudden contingencies. These facilities would provide more secure access to sonobuoy production both for the ADF as well as other Five Eyes/NTIB regional partners like New Zealand or visiting forces from the UK or US.[152] In the interim, the grouping could also move

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[148] Minister of Defence, "Joint Statement - Five Eyes Defence Ministers' Meeting," *Australian Department of Defence*, June 23, 2020, https://www.minister.defence.gov.au/minister/lreynolds/statements/joint-statement-five-eyes-defence-ministers-meeting#:~:text=The%20defence%20ministers%20from%20the,videoconference%20on%2022%2D23%20June.

[149] Greg Sheridan, "Five Eyes to the Fore: Australia Takes a Seat at the Global Big Table," *The Australian*, July 17, 2020, https://www.theaustralian.com.au/nation/politics/five-eyes-to-the-fore-australia-takes-a-seat-at-global-big-table/news-story/fac2a774d28eacd1d4e2da9962557b69.

[150] For a complete list of Ultra's sonobuoy offerings by type and manufacturer, see: "Type and Performance Information," *Ultra Command and Sonar Systems*, accessed May 29, 2020, https://www.ultra-css.com/uploads/css/sonobuoys%20type%20and%20performance%20specifications/ultra%202018%20sonobuoys%20ref%20card-issue03_v4%20type%20and%20performance%20specification%20ultra%20electronics.pdf.

[151] Only Canada has yet to decide upon its new MPA platform, though the P-8A is well and truly under consideration.

[152] While not generally considered a heavyweight player in prospective conventional conflicts, New Zealand's decision to procure four P-8A shows that Wellington recognizes "its potential coalition requirements as well as its own need to maintain surveillance of the country's huge areas of maritime strategic interest", interests which happen to be shared with Australia. In addition, the UK has in recent years touted intentions to deploy the Royal Navy to the Indo-Pacific, including a carrier group accompanied by ASW assets. See: Severin Carrell, "South China Sea: UK Could Send Aircraft Carrier to Back Australian Vessels," *The Guardian*, July 21, 2018, https://www.theguardian.com/world/2018/jul/21/south-china-sea-uk-could-send-aircraft-carrier-to-back-australian-vessels; James Goldrick, "Maritime and Naval Power in the Indo-Pacific" in *The Future of the Undersea Deterrent: A Global Survey*, ed. Rory Medcalf, Katherine Manstead, Stephan Frühling and James Goldrick (National Security College, Australian National University, February 2020), 6,

to include sonobuoys in a pool of strategic resources to be shared between members as it seeks to enhance collective resilience against Chinese coercion.[153]

Strengthening Regional Partnerships: Australia-South Korea Cooperation

Aside from building independent capacity and collaborating with existing allies, Australia should also explore opportunities for deepening defense industry cooperation with other close regional partners. The *Defence Strategic Update* identified a need to "selectively [increase] interdependence" with the US and a range of other partners to create "more responsive and assured global supply chains."[154] Leading experts have pointed out that Australia is in fact already engaged in "a web of new strategic diplomacy" with partners other than the US, including on supply chain issues.[155] In this case, Australia should look to deepen cooperation with regional partners, particularly those relationships already predisposed towards ASW and/or with an interest in defense industry cooperation.

Royal Australian Navy submarine HMAS *Farncomb* and Republic of Korea Navy destroyer ROKS *Wang Geon* are overflown by a US Navy MH-60R *Seahawk* helicopter during *Exercise Pacific Vanguard*, May 2019. Credit: Australian Department of Defence.

The Republic of Korea (ROK, or South Korea) is one potential candidate for cooperation on the sonobuoy supply issue. While countries like Japan and India might be more obvious choices as partners on shared defense supply chain issues (particularly considering recent reports of a Supply Chain Resilience Initiative between the three countries),[156] South Korea also holds natural appeal as a fellow US ally,[157] status as a "2+2"-level partner, and as an emerging manufacturing and technological powerhouse in its own right.[158] Despite these qualities, however, Seoul has traditionally received far less attention in Australian strategic thinking. Cooperation on the sonobuoy issue would therefore be a good opportunity for Canberra and Seoul to kickstart defense cooperation. With growing mutual concerns over supply chain vulnerabilities, both countries are increasingly

https://nsc.crawford.anu.edu.au/sites/default/files/publication/nsc_crawford_anu_edu_au/2020-02/the_future_of_the_undersea_deterrent.pdf.

[153] Patrick Wintour, "Five Eyes Alliance Could Expand in Scope to Counteract China", *The Guardian*, 29 July 2020, available at: https://www.theguardian.com/uk-news/2020/jul/29/five-eyes-alliance-could-expand-in-scope-to-counteract-china?CMP=share_btn_tw.

[154] Australian Department of Defence, "2020 Defence Strategic Update", 29.

[155] Rory Medcalf, "Defence Plan Makes it Clear We Must Prepare for Risk of Armed Conflict," *The Sydney Morning Herald*, July 2, 2020, https://www.smh.com.au/politics/federal/defence-plan-makes-it-clear-we-must-prepare-for-risk-of-armed-conflict-20200701-p5584a.html.

[156] See: Pranab Dhal Samanta, "India-Japan-Australia Supply Chain in the Works to Counter China," *The Economic Times*, August 19, 2020, https://economictimes.indiatimes.com/news/economy/foreign-trade/india-japan-australia-supply-chain-in-the-works-to-counter-china/articleshow/77624852.cms?from=mdr.

[157] While the true importance of a common ally in the scheme of the Australia-South Korea relationship is debatable, that fact would nevertheless make the partnership more appealing to the United States, potentially lessening concerns about the sharing of sensitive data outside of the 'hub and spokes' alliance system.

[158] Tom Corben, "Australia's Four 'First Order' Relationships," *Young Australians in International Affairs*, June 20, 2019, https://www.youngausint.org.au/post/2019/06/20/australias-four-first-order-relationships

interested in decentralizing manufacturing and diversifying their range of defense suppliers,[159] suggesting that focused defense industry cooperation on an issue like sonobuoys could be exactly the sort of project needed to inject new momentum into bilateral relations. Doing so would be in keeping with pledges made by President Moon Jae-in and Prime Minister Scott Morrison to do so earlier this year,[160] while successful cooperation on the sonobuoy issue could in turn facilitate expanded strategic cooperation on a wider range of shared concerns.[161] As such, while not the most obvious of partners, it is nevertheless worthwhile considering the advantages of working with Seoul to address the sonobuoy challenge.

Practically, the Australia-ROK bilateral military relationship already centers around ASW cooperation. Aside from the biennial ASW Exercise *Haedoli-Wallaby*,[162] Australia and South Korea have recently expanded their engagements in multilateral ASW settings alongside the United States. Both countries participated in the 2019 editions of the US-led multilateral ASW Exercise *Pacific Vanguard* off Guam,[163] while South Korea participated in Exercise *Sea Dragon* alongside Australia, Japan, New Zealand, and the US for the first time in January 2020.[164] Australian and South Korean MPA have regularly cooperated in practical mission settings, too. Since 2018, for example, under the banner of Operation Argos, Australian P-8A have conducted maritime surveillance missions around the Korean Peninsula to enforce United Nations sanctions against North Korean illicit shipping practices,[165] an initiative supported by regular ROK aerial and surface patrols.[166] ROK P-3C *Orion* also operated out of Australian air bases during the search for Malaysian Airlines Flight MH-370 in 2014.[167] South Korea's decision to procure the P-8A was based in large part on the need to "share a common

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[159] Bill Paterson, "Australia and South Korea Can and Should have Closer Defence Ties," *The Strategist*, August 19, 2020, https://www.aspistrategist.org.au/australia-and-south-korea-can-and-should-have-closer-defence-tiesoul/.
[160] Tom Corben, "Course Correction: Promising Signs for Australia-South Korea Relations," *The Diplomat*, October 12, 2019, https://thediplomat.com/2019/10/course-correction-promising-signs-for-australia-south-korea-relations/.
[161] Paterson, "Australia and South Korea Can and Should have Closer Defence Ties."
[162] For example, see: Naval Today, "Australia, Korea Join in Ex Haedoli Wallaby," October 30, 2015, https://www.navaltoday.com/2015/10/30/australia-korea-join-in-ex-haedoli-wallaby/; Australian Department of Defence, "Exercise Haedoli Wallaby," *Navy Daily*, November 5, 2017, https://news.navy.gov.au/en/Nov2017/Fleet/4196/Exercise-HAEDOLI-WALLABY.htm#.Xw5YlZMzbOQ.
[163] Other participant countries have included Canada and Japan. See: "Inaugural Maritime Exercise Pacific Vanguard Concludes Off the Coast of Guam," Australian Department of Defence, May 31, 2019, https://news.defence.gov.au/media/media-releases/inaugural-maritime-exercise-pacific-vanguard-concludes-coast-guam; Commander 7th Fleet Public Affairs Office, "U.S., Allied Forces Conduct Exercise Pacific Vanguard," *U.S. Indo-Pacific Command*, November 20, 2019, https://www.pacom.mil/Media/News/News-Article-View/Article/2022009/us-allied-forces-conduct-exercise-pacific-vanguard/.
[164] Oh Seok-min, "S. Korea Takes Part in U.S.-Led Multilateral Anti-Submarine Exercise," *Yonhap News Agency*, January 21, 2020, https://en.yna.co.kr/view/AEN20200121006400325.
[165] Marise Payne, "Stronger Enforcement of UNSC Resolution on North Korea," *Australian Department of Defence*, April 28, 2018, https://www.minister.defence.gov.au/minister/marise-payne/media-releases/stronger-enforcement-unsc-resolution-north-korea; Christopher Pyne, "Australia P-8A Poseidon Maritime Patrol Aircraft to Enforce Sanctions on North Korea," *Australian Department of Defence*, November 30, 2018, https://www.minister.defence.gov.au/minister/cpyne/media-releases/australia-p-8a-poseidon-maritime-patrol-aircraft-enforce-sanctions; Linda Reynolds, "Australia Conducts Deployments to Enforce Sanctions on North Korea," *Australian Department of Defence*, September 1, 2019, https://www.minister.defence.gov.au/minister/lreynolds/media-releases/australia-conducts-deployments-enforce-sanctions-north-korea; Linda Reynolds, "Defence's First Commitment to Operation Argos for 2020," *Australian Department of Defence*, February 19, 2020, https://www.minister.defence.gov.au/minister/lreynolds/media-releases/defences-first-commitment-operation-argos-2020.
[166] Author interviews.
[167] See: "RAAF Base Pearce", Australian Department of Defence, accessed May 29, 2020, https://www.defence.gov.au/aircraftnoise/PearceGinGin/Default.asp.

operational perspective" and consolidate "tactical commonalities" with the MPA of critical partners like Australia, including in ASW and maritime patrol missions.[168]

Australian Minister for Defence Linda Reynolds (R) talks with Republic of Korea Minister for National Defense Joeng Kyeong-doo during the Australia-ROK 2+2 Meeting in Sydney, Australia (December 2019). Credit: Australian Department of Defence.

ASW cooperation between Australia and South Korea is clearly deepening, but both countries stand to suffer from sonobuoy supply chain disruptions. Historically, the ROK's ASW capabilities have suffered from qualitative and quantitative limitations stemming from funding and procurement shortfalls, including in the supply of sonobuoys, with adverse impacts on the readiness and skill levels of Korean MPA crews.[169] Though some domestic players have attempted to enter the sonobuoy market, there are currently no viable domestic options for South Korea to provide high-level sonobuoys at scale.[170] South Korea has largely relied on Thales to supply sonobuoys for its P-3C fleet, but a switch to the P-8A could foreseeably entail a switch in sonobuoy suppliers to ERAPSCO and expose the ROK to the same supply chain vulnerabilities as Australia. Like Australia, the government in South Korea is also seeking to improve the country's defense self-reliance by enhancing sovereign defense industry capabilities under the banner of the Defense Reform 2.0 agenda. Under that mandate, the ROK's Defense Acquisition Program Administration recently initiated a five-year program to enhance the capacity of local firms to produce essential items currently produced overseas.[171] The Ministry of National Defense is also seeking to expand an existing strategy to form additional defense industry innovation clusters on top of the first established in April 2020. That policy would see more government funding channeled to South Korean industry and research entities to better "support regional collaboration in defense-related research and development as well as manufacturing."[172]

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[168] For more on the strategic drivers of the ROK's P-8A procurement, see: Yoon Suk-joon, "Expanding the ROKN's Capabilities to Deal with the SLBM Threat from North Korea," *Naval War College Review*, 70 No. 2, (Article 4, Spring 2017), 49-74, https://digital-commons.usnwc.edu/cgi/viewcontent.cgi?article=1015&context=nwc-review; Yoon Suk-joon, "South Korea's P-8A Decision," *The Diplomat*, August 3, 2018, https://thediplomat.com/2018/08/south-koreas-p-8a-decision/; Yoon Suk-joon, "Make Way for South Korea's Underwater Drones," *The Diplomat*, February 19, 2020, https://thediplomat.com/2020/02/make-way-for-south-koreas-underwater-drones/.

[169] Bruce Klinger, "Measures to Enhance Combined South Korean-US Naval Capabilities," *The Journal of East Asian Affairs*, 27 No. 1 (Spring 2013), 12-13, 18, https://www.jstor.org/stable/23595527?seq=1.

[170] For example, Meta Networks has gradually developed the capacity to design and develop certain types of sonobuoys for the ROK Navy's P-3C *Orion* fleet, though not the complete range of A-sizes used in US-built MPA and MPH. See: "History: 2010 ~ Today," Meta Networks, accessed April 16, 2020, http://www.metanetworks.co.kr/eng/01_com/com_05.html.

[171] Oh Seok-min, "S. Korea to Extend Support for Developing Homegrown Parts for Key Weapons," *Yonhap News Agency*, April 16, 2020, https://en.yna.co.kr/view/AEN20200416001900325#:~:text=SEOUL%2C%20April%2016%20(Yonhap),arms%20procurement%20agency%20said%20Thursday.

[172] Mike Yeo, "Reform Efforts in South Korea Create Ecosystem for Defense Industry Growth," *Defense News*, August 17, 2020, available at: https://www.defensenews.com/top-100/2020/08/17/reform-efforts-in-south-korea-create-ecosystem-for-defense-industry-growth/.

It would seem, therefore, that targeted defense industry cooperation between Australia and South Korea in ASW-relevant areas such as sonobuoy production would be mutually beneficial, and would be in keeping with both states' prioritization of sovereign manufacturing capabilities. Indeed, such collaboration would capitalize on recent commitments expressed by senior officials from both countries. The Joint Statement from the latest Australia-ROK Defence and Foreign Ministers "2+2" Meeting in December 2019 emphasized "the importance of a strong domestic [defense] industrial base" and flagged the revival of the dormant Joint Defence Industry Cooperation Committee to address "mutual policy challenges to our [defense] industries."[173] Such cooperation is already technically possible under the 2001 MoU on Defence Industry Cooperation, and several mechanisms are available for policymakers to jumpstart coordination including the annual Ammunition Working Group and Mutual Logistics Cooperation meetings.[174] In fact, Australian and South Korean companies have explored opportunities for local ammunition production and other larger defense projects in the past,[175] though these efforts were let down by poor communication from the Australian government, Korean perceptions of the "sovereign risk" inherent in Australia's defense industry policy settings, and Australia's sudden cancellation of other major defense contracts contested by Korean defense companies.[176] Rather than pursuing commercial models of cooperation through a standard buyer–seller business dynamic, Australian and South Korean entities should prioritize exploring options to co-develop and co-produce capabilities and/or items of mutual need. Doing so would more equitably distribute the financial costs and risks of cooperation, and would likely secure more reliable, long-term buy-in from both parties than simple arms sales dynamics.

As it happens, there is at present a significant opportunity for Australia and South Korea to realize enhanced cooperation in this area. Hanhwa Defense Systems is presently seeking to establish itself as a regular force in the Australian market,[177] and is actively contesting contracts for Australia's self-propelled howitzer and infantry fighting vehicle requirements. Although the focus of its present ventures in Australia relates to land combat systems,[178] Hanhwa also has a demonstrable interest in advanced underwater systems including sonobuoys, and is presently developing a dual active-passive sonobuoy system which it intends to offer on the commercial

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[173] "Joint Statement: Australia-Republic of Korea Foreign and Defence Ministers' 22 Meeting 2019," Australian Department of Foreign Affairs and Trade, December, 2019, https://www.dfat.gov.au/geo/republic-of-korea/Pages/joint-statement-republic-of-korea-australia-foreign-and-defence-ministers-2-2-meeting-2019.

[174] "Blueprint for Defence and Security Cooperation between Australia and the Republic of Korea 2015," Australian Department of Foreign Affairs and Trade, September, 2015, https://www.dfat.gov.au/geo/republic-of-korea/Pages/blueprint-for-defence-and-security-cooperation-between-australia-and-the-republic-of-korea.

[175] John Kerin, "S Korean Weapons Maker Ditches Tender Fight," *Australian Financial Review*, January 30, 2013, https://www.afr.com/policy/foreign-affairs/s-korean-weapons-maker-ditches-tender-fight-20130129-jibnm.

[176] See: Peter Jennings, "Defence Industry Cooperation in Asia: Bad and Good News," *The* Strategist, February 7, 2013, https://www.aspistrategist.org.au/defence-industry-cooperation-in-asia-bad-and-good-news/; Chris Johnson, "South Korea 'Very Much Disappointed' with Australia over Defence Contracts," *The Sydney Morning Herald*, March 16, 2016, https://www.smh.com.au/politics/federal/south-korea-very-much-disappointed-with-australia-over-defence-contracts-20160316-gnksmb.html.

[177] "Hanhwa Defense Australia (HDA) Was Formally Launched in Victoria by the CEO of Hanhwa Defense Mr Sungsoo Lee," *Asia Pacific Defence Reporter*, May 28, 2019, https://asiapacificdefencereporter.com/hanwha-defense-australia-hda-was-formally-launched-in-victoria-by-the-ceo-of-hanwha-defense-mr-sungsoo-lee/.

[178] Stephen Kuper, "Hanhwa Welcomes SPH Announcement with Eyes on the Future," *Defence Connect*, May 20, 2019, https://www.defenceconnect.com.au/land-amphibious/4068-hanwha-welcomes-sph-announcement-with-eyes-on-the-future; Choi Soo-hyang, "Hanhwa Defense to Send Prototypes of New Armored Vehicle to Australia," *Yonhap News Agency*, July 26, 2020, https://en.yna.co.kr/view/AEN20200724007600325?section=national/defense.

market.[179] The company has also committed to building both of its present offerings in Australia, and plans to establish manufacturing facilities in Victoria should it secure the contracts in question. It is not difficult to foresee defense industry cooperation between Australia and South Korea expanding to ASW-relevant projects such as sonobuoy R&D and manufacture materializing should Hanhwa secure one or both of the aforementioned land capability contracts.

Aside from manufacturing the items required now, the two countries could also pursue the development of new signal processing technologies including in "sensor resolution, processing power and machine autonomy" to meet evolving operational demands,[180] such as improving persistence through leveraging new battery life solutions or developing responses to new types of ASW countermeasures such as those being developed by the Russian Navy designed to jam sonobuoy signals processors.[181] Successful collaboration on a low-key yet not insignificant initial project like sonobuoy development could overlap with other more advanced ASW projects of mutual interest, including underwater acoustic sensor systems such as that being developed by South Korea's Defense Acquisition Program Administration and/or large unmanned underwater vehicles being developed for ASW missions by Hanhwa, both capabilities of interest to Australia.[182]

6. RECOMMENDATIONS

There are a range of means and motivations for Australia to pursue greater security of supply in high-end sonobuoys. Achieving this goal will depended not only on Australia's independent industrial capacity, but almost certainly on its ability to leverage relationships with its allies and partners. As such, a series of recommendations detailing a range of possible options open to the Australian government follows.

1) Immediately increase sonobuoy stockpiles in anticipation of higher operational tempos. Pending the establishment of a reliable domestic source, it will be necessary for Australia to continue purchasing sonobuoys through ERAPSCO in the short-term. As such, Australia should seek to drastically increase its current stockpile of sonobuoys—based as it is on peacetime expenditure rates—in anticipation of higher operational tempos and to guard against potential supply chain disruptions. The challenge here will be optimizing sonobuoy procurement in line with Australia's expected expenditure rates while also taking into account the average shelf life of current sonobuoy models (around five years without a battery change). Without increasing sonobuoy stockpiles, it will be difficult to maximize the returns on investments in major infrastructure upgrades in the country's north, the RAN's fleet of 24 MH-60R, and the expected expansion of the P-8A fleet from 12 to 15 aircraft. The bottom line is

[179] "Naval Systems," Hanhwa Systems, accessed April 20, 2020, https://www.hanwhasystems.com/m/en/business/defense/4/2/view.do.
[180] Brixey-Williams, "Prospects for Game-Changers in Submarine-Detection Technology."
[181] Joseph Trevithick, "Russian Submarines Getting Countermeasures That Jam Sonobuoys Dropped By Enemy Aircraft," *The Drive*, March 13, 2020, https://www.thedrive.com/the-war-zone/32584/russian-submarines-getting-electronic-warfare-buoys-that-jam-sonobuoys-dropped-by-enemy-aircraft.
[182] H.I. Sutton, "New Submarine Killing Autonomous Underwater Drone," *Forbes*, October 27, 2019, https://www.forbes.com/sites/hisutton/2019/10/27/worlds-first-submarine-killing-autonomous-underwater-robot/#56b903dd1aea; Oh Seok-min, "S. Korea Develops Indigenous Port Surveillance System," *Yonhap News Agency*, April 1, 2020, https://en.yna.co.kr/view/AEN20200401004500325; Australian Department of Defence, "2020 Defence Strategic Update," 39.

that any increase in sonobuoy stockpiles should be sufficient to enable extended periods of high-tempo operations without resupply.

2) Devote funding to local sonobuoy manufacturing under the mandate of the Defence Strategic Update. The A$1 billion in funding committed to improving Australia's munitions manufacturing capabilities contained within the *Defence Strategic Update* should be explicitly expanded to include the production of non-lethal mission-critical expendables like sonobuoys. At present, the *Update* does not make clear the breadth or scope of the government's planned investments in non-lethal defense items, though some experts expect the contours of these policies to become clearer during the FY2021-2022 budget cycle.[183] Explicitly allocating funds for sovereign sonobuoy production under the mandate established by the *Update* would allow Australia to leverage its niche manufacturing and technological expertise, offering both strategic and financial gains with regards to Australia's post-COVID economic restructure.[184]

Ultra Electronics and Thales Australia are the most logical industry partners with which the Australian government should explore cooperation. On the one hand, Australia could seek to leverage Ultra's existing presence in the country to establish a local sonobuoy supply solution, an approach which would likely play to US preferences and would not require any major technical modifications on board Australian aircraft to accommodate new sonobuoy designs. Alternatively, Australia should leave open the possibility of seeking alternative suppliers if the business case for an ERAPSCO production line is deemed unviable and/or if navigating US defense technology restrictions proves too difficult. In this instance, Canberra could engage Thales over the possibility of establishing a local SonoFlash production line in the country once the capability is ready in 2022, leveraging Australia's historical role in the development of the Barra and the ongoing contributions made by Australian defense industry entities to Thales' advanced sonar capabilities. The production of sonobuoys could conceivably be included under the Strategic Domestic Munitions Manufacturing agreement reached this year, while a two-year lead time before the SonoFlash is ready for deployment leaves a substantial period for negotiations over financing and logistics to reach a conclusion.

3) Address sonobuoy production through the NTIB. The sonobuoy supply challenge would be a good test case for enhanced Australia-US defense industry cooperation through the NTIB. Streamlining the transfer of relevant data and IP between the US and close allies like Australia to enable the local maintenance and production of common mission items will require the lowering of bureaucratic barriers in order to make business models viable for local Australian suppliers seeking to produce US-specification items,[185] including for sonobuoys. The recent AUSMIN meetings demonstrated that both allies are committed to reducing barriers to defense industry cooperation, though much work remains to be done to realize that positive intent.[186] Australian officials should continue to agitate for the necessary NTIB reforms

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[183] Michael Shoebridge, "Defence Strategic Update Promises Real Change but More is Needed," *The Strategist*, July 1, 2020, https://www.aspistrategist.org.au/defence-strategic-update-promises-real-change-but-more-is-needed/.

[184] Shoebridge, "Australia Needs to Ensure It Has the Advanced Missiles It Needs."

[185] See: Thomas-Noone, "Ebbing Opportunity."

[186] Ashley Townshend and Brendan Thomas-Noone, "Allies Have Your Back as China Seeks Greater Influence," *The Australian*, July 30, 2020, available at:

required to facilitate closer alliance collaboration on pressing defense supply chain issues, using sonobuoys as a clear example of an area where Australia—and for that matter, the US—stands to incur strategic costs if the issue is not resolved in a timely fashion.[187] Ultimately, local sonobuoy production facilities could be included as part of a broader package of munitions manufacturing capability agreements reached between the allies.

4) Use the sonobuoy case as a test case to explore enhancing Five Eyes defense industry cooperation. As an extension of bilateral cooperation with the US through the NTIB, Australia should also push for greater coordination between Five Eyes members on shared defense industry challenges, including sonobuoy manufacturing, R&D and stockpiling. Doing so would complement recent efforts to expand the group's discussions to a wider range of mutually important issues beyond intelligence sharing, including supply chain security and the pooling of mutually critical strategic resources.[188] These discussions have likely already touched on certain common defense industry challenges, but Australia should nevertheless seek to ensure that emerging coordination on defense and supply chain issues remains a priority for Five Eyes ministers' discussions, perhaps by establishing a dedicated coordinating mechanism tasked with identifying common defense supply chain challenges and coordinating efforts across the commercial, defense and foreign affairs authorities of each participant country. Such a mechanism could serve as an additional means for pushing the US to accelerate NTIB reform to facilitate easier defense industrial integration with and between trusted allies, not just Australia. The grouping should also consider including sonobuoys on an initial list of mutually critical strategic resources to be shared between members.[189]

5) Explore opportunities for sonobuoy development and manufacture with South Korea. There is presently a window of opportunity for Australia and South Korea to explore closer cooperation on mutual defense industry challenges, and the sonobuoy supply chain issue would be a good small-scale project to start with. Officials should jump-start conversations on this issue through the Joint Defence Industry Cooperation Committee, and recently concluded MoU on defense science and technology cooperation by flagging joint R&D and manufacturing of ASW-relevant expendables and items as a priority and exploring options to diversify the sonobuoy supply chain. As part of this process, the Australian government should also engage Hanhwa with a proposal to explore opportunities for establishing local manufacturing facilities capable of producing advanced ASW capabilities including sonobuoys, with the intention of expanding that capacity to produce potential future jointly developed capabilities such as UUVs.

7. CONCLUSION

Though the challenges afflicting the sonobuoy supply chain are real and serious, Australia has at its disposal the means not only to respond to the short-term challenges of increasing demand and dwindling stocks, but improve the long-term certainty and resilience of the supply chain

https://www.theaustralian.com.au/commentary/allies-have-your-back-as-china-seeks-greater-influence/news-story/2c22a08e4e78f6aad6312bda03ded5ac.

[187] See: Thomas-Noone, "Ebbing Opportunity."

[188] Wintour, "Five Eyes Alliance Could Expand in Scope to Counteract China."

[189] *Ibid*

for itself and its allies—including the United States—to meet the enduring challenges presented by a more popular undersea environment in the Indo-Pacific. A history of innovation in sonar technologies, recent investments in defense infrastructure and manufacturing, expanding role in the US alliance and growing web of regional security partnerships are amongst the most compelling reasons for Australia to assume a leading role in responding to defense industry challenges. Taking steps to address this critical vulnerability would bolster Australia's capacity for independent operations, support the country's alliance with the US, and potentially provide opportunities to enhance other critical regional strategic relationships—ultimately improving the resilience of collective ASW in the Indo-Pacific, and

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