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NAVIGATING SECURITY DILEMMAS IN INDO-PACIFIC WATERS

Undersea Capabilities and Armament Dynamics

TYTTI ERÄSTÖ, FEI SU AND WILFRED WAN

STOCKHOLM INTERNATIONAL PEACE RESEARCH INSTITUTE

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Executive summary

Reflecting the geopolitical realities in the Indo-Pacific, a number of actors in the region—most notably China and the United States—are engaging in military build-up. A prominent trend is the increasing investments in the naval domain, particularly undersea assets—that is, submarines and anti-submarine warfare (ASW) capabilities. In addition to the more established naval powers, such as Japan, several South East Asian states have invested in submarines in recent years.

The emphasis on undersea capabilities stems from regional security concerns related to the defence of national sovereignty and territorial integrity, and the perceived need to protect sea lines of communication (SLOC). In this context, smaller states view submarines as a source of asymmetric advantage against military superior adversaries. For this purpose, they have acquired, or are in the process of acquiring, tactical submarines. While these are primarily conventionally armed diesel–electric submarines (SSKs), Australia is notably pursuing the acquisition of conventionally armed nuclear-powered submarines (SSNs) as part of the trilateral Australia–United Kingdom–United States (AUKUS) security agreement.

Tactical submarines serve as a means of sea denial that could be employed to deny use of specific areas of sea to an adversary, with the aim of defending territorial integrity against that adversary's naval forces—including other submarines. At the same time, tactical submarines function as tools of power projection that can facilitate military operations far from their homeland. In addition to protecting SLOC in high seas, they could be used to conduct offensive military operations such as the enforcement of maritime blockades. Especially when armed with high-precision land-attack weapons, tactical submarines could also hold under threat high-value assets in the territories of other states—which in turn highlights the need for ASW capabilities by those states that are concerned about falling victim to such offensive operations.

At the same time, undersea dynamics in the Indo-Pacific have a strategic dimension, particularly concerning the role of nuclear-powered ballistic missile submarines (SSBNs) in deterrence relationships among nuclear-armed states. Several nuclear-armed states have long deployed nuclear weapons on submarines to ensure their survivability against counterforce attacks. While China, too, has deployed more advanced SSBNs since 2013, these are still exposed to the ASW capabilities of the USA and its allies, especially when passing through the narrow straits that encircle its coastal waters. One way for China to address this problem is for its SSBNs to be escorted by tactical submarines, which can provide protection against adversaries' ASW capabilities. Apart from their potential defensive and offensive roles in regional conflicts, tactical submarines can thus also play a strategic function. Blurring the line between tactical and strategic submarines, North Korea claims to have armed some of its SSKs with nuclear weapons with the aim of making its nuclear second-strike forces more survivable against potential counterforce strikes by the USA and South Korea.

This report examines the drivers and implications of naval build-ups in the Indo-Pacific, considering key actors' security objectives, threat perceptions and paying attention to the interplay of regional dynamics and strategic relations between nuclear-armed states. Underlying the analysis is the assumption that armament in undersea capabilities in the Indo-Pacific is largely driven by security dilemma dynamics; this means that capabilities intended as defensive by one side tend to be viewed as offensive and requiring a response by the other, leading to more armament and tensions. These dynamics gravitate especially around Chinese–US rivalry but are also endemic across the region—including on the Korean Peninsula, where they have deep historical roots. They have implications for escalation risks, including both horizontal escalation—that

is, involving a wider geographical region and a wider group of countries—and vertical escalation—that is, growing in scale from minor to major. Nuclear–conventional entanglement related to the counterforce potential of ASW capabilities requires particular attention since it seems to have driven past incidents and could potentially drive future escalation. Moreover, submarine-to-submarine incidents—while still rare—as well as incidents between submarines and surface ships are becoming more likely as the number of vessels and submarine operators grows, particularly in the East and South China seas.

In addition to raising awareness of these complex dynamics, the report also proposes some initial steps to mitigate the risks related to the increased undersea activities in the Indo-Pacific. These include reducing the threat of miscalculation and misperception through strengthening and expanding naval hotlines and notification mechanisms; institutionalizing reporting on military exercises; information exchange; and promoting a strategic culture based on restraint and understanding of the other sides' motivations and objectives.

Abbreviations

ASW	Anti-submarine warfare
AUKUS	Australia–United Kingdom–United States (security partnership)
ASEAN	Association of Southeast Asian Nations
CCP	Chinese Communist Party
CUES	Code for Unplanned Encounters at Sea
EEZ	Exclusive economic zone
FONOP	Freedom of navigation operation
ISR	Intelligence, surveillance and reconnaissance
PLAN	People's Liberation Army Navy (China)
SLOC	Sea lines of communication
SLBM	Submarine-launched ballistic missile
SLCM	Sea-launched cruise missile
SSB	Ballistic missile submarine
SSBN	Nuclear-powered ballistic missile submarine
SSK	Diesel–electric submarine
SSN	Nuclear-powered submarine
UNCLOS	United Nations Convention on the Law of the Sea

1. Introduction

The rivalry between China and the United States has increasingly played out in Indo-Pacific waters, becoming intertwined with regional security dynamics there. While China has demonstrated its assertiveness, particularly in connection with its territorial claims in the East and South China Seas, the USA has enhanced its military collaboration with allies. The USA has also challenged what it views as China's excessive maritime claims by conducting so-called freedom of navigation operations (FONOPs), based on the stated aim of reinforcing 'internationally-recognized rights and freedoms'.[1] At the same time, the international normative framework for these rights and freedoms remains contested, with the ambiguity of key provisions in the 1992 United Nations Convention on the Law of the Sea (UNCLOS) leading to different interpretations.[2] In recent years, the major power competition in the region has contributed to an increasing number of incidents, more aggressive maritime operations, and the growing frequency and scale of military exercises.[3]

Reflecting these trends, actors in the Indo-Pacific have heavily invested in military build-ups, with a focus on the naval domain. While the naval balance might previously have appeared 'to be shifting inexorably in China's favour', according to some observers that balance 'may be starting to swing back towards the United States and its allies and partners' following a redoubling of their investments in naval capabilities as well as their greater interoperability.[4] These build-ups have contributed to security dilemma dynamics. Typical of the action–reaction logic that characterizes arms races more generally, military build-up by one side, while intended as defensive, tends to be viewed as offensive and requiring a response by the other.

This report examines the drivers and risks of naval build-ups in the Indo-Pacific (see figure 1.1). It considers the security objectives of key actors, paying attention to the interplay of regional dynamics and strategic relations between nuclear-armed states. In particular, it parses the character of armaments as it pertains to submarines and anti-submarine warfare (ASW) capabilities, which constitute a significant focus of military investments in the region. It then considers the implications of these developments for escalation risks, including those related to nuclear–conventional entanglement and to grey zone activities—that is, hostile actions that fall below the threshold of armed conflict.[5] The objective is to raise awareness of these complex dynamics and to thereby contribute to 'security dilemma sensibility', defined as 'capacity to perceive the motives behind, and to show responsiveness towards, the potential complexity of the military intentions of others' and, in particular, 'to understand the role that fear might play in their attitudes and behaviour'.[6]

[1] Freund, E., *Freedom of Navigation in the South China Sea: A Practical Guide* (Harvard University, Kennedy School, Belfer Center for Science and International Affairs: Cambridge, MA, June 2017), p. 19.

[2] United Nations Convention on the Law of the Sea, opened for signature 10 Dec. 1982, entered into force 16 Nov. 1994, *United Nations Treaty Series*, vols 1833–35 (1994), Article 87; and Yanai. S., International Tribunal for the Law of the Sea, 'The rule of law in the seas of Asia: Navigational chart for the peace and stability', Keynote speech, International Symposium on the Law of the Sea, 12–13 Feb. 2015.

[3] Anthony, I., Su, F. and Saalman, L., 'Naval incident management in Europe, East Asia and South East Asia', SIPRI Insights on Peace and Security no. 2023/03, Mar. 2023.

[4] Childs, N., 'Asia-Pacific naval and maritime capabilities: The new operational dynamics', eds T. Huxley and L. Kuok, *Asia-Pacific Regional Security Assessment 2023: Key Developments and Trends* (International Institute for Strategic Studies: London, 2023), p. 64.

[5] Robertson, A., 'What is grey zone confrontation and why is it important?', The Cove, Australian Army, 18 July 2022.

[6] Booth, K. and Wheeler, N., 'Rethinking the security dilemma', ed. P. D. Williams, *Security Studies: An Introduction* (Routledge: London, 2008).

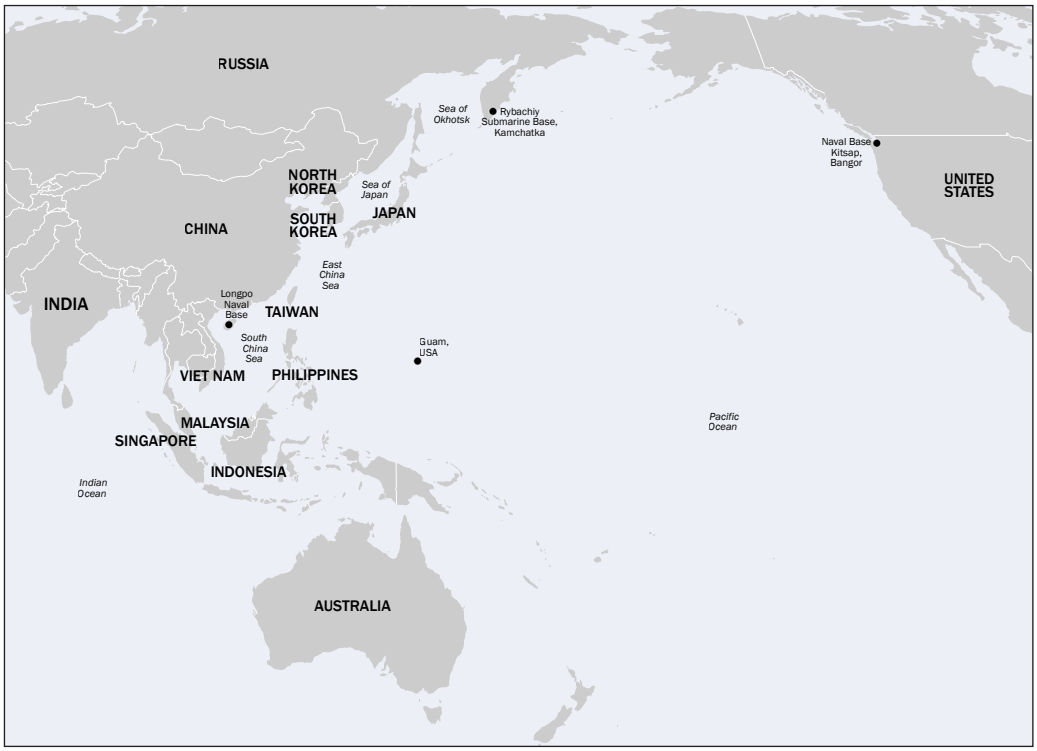

Figure 1.1. Map of the Indo-Pacific region

This report continues in chapter 2 with an examination of the security interests and threat perceptions of selected Indo-Pacific actors based on their respective doctrines and postures. Chapter 3 then presents trends and developments in the submarine and ASW build-up in the Indo-Pacific, followed in chapter 4 with an assessment of the implications of these dynamics for regional and strategic stability, including potential escalation risks involving nuclear weapons. Chapter 5 concludes the report with some initial recommendations aimed at mitigating these risks.

2. National security priorities and threat perceptions

Nearly half of global trade pass through Indo-Pacific waters, which also facilitate access to states that generate almost 60 per cent of global gross domestic product (GDP) and two-thirds of global growth.[7] They house vast natural resources: for instance, they provide more than 70 per cent of the global fish catch, while the South China Sea contains an estimated 3.6 billion barrels of untapped crude oil and 1.1 trillion cubic metres of natural gas.[8] These considerations are intertwined with the military and geostrategic significance of the region.

Yet, there is no definitive conceptualization of the Indo-Pacific or its geographic boundaries. Rather, the Indo-Pacific framework reflects material realities in which 'accelerating economic and security connections between the Western Pacific and the Indian Ocean regions' have contributed to the establishment of a 'single strategic system . . . an Asian maritime super-region'.[9] Canada, France, Japan, the Republic of Korea (South Korea), the United States and the European Union (EU), among others, have produced Indo-Pacific strategies, while the Association of Southeast Asian Nations (ASEAN) adopted its first 'outlook' on the region in 2019.[10] However, China does not use the term 'Indo-Pacific' (印太), instead preferring 'Asia-Pacific' (亚太).[11] Nonetheless, the notion of maritime connectivity—including between the Pacific and Indian Oceans—features prominently in China's concept of the Maritime Silk Road.[12]

Against this backdrop, this chapter looks at the national security priorities and threat perceptions of key actors in the Indo-Pacific in order to better understand the rationales that drive armament dynamics—in particular, those undersea. Starting from the premise that one key driver for armament is the rivalry between China and the USA, the chapter profiles these two countries first and describes their relationship, around which much of the region pivots. It then focuses on those regional actors—Australia, Japan, Taiwan and selected South East Asian states—whose threat perceptions revolve around China. While some actors seek to address related concerns through security cooperation with the USA, others maintain a traditional hedging posture—that is, a policy between engagement and balancing.[13] The Democratic People's Republic of Korea (DPRK, or North Korea) and South Korea, whose threat perceptions are closely intertwined, are discussed last.

Although the Indo-Pacific extends further west, the maritime dimension does not feature significantly in contemporary relations between India and Pakistan, which

[7] German Federal Foreign Office, 'The Indo-Pacific region', 22 Sep. 2023; Ghost, A. K., Sarkar, D. and Chaudhury, A. B. R., *Security, Economy, and Ecology: Setting Priorities for Cooperation in the Indo-Pacific*, Special Report no. 184 (Observer Research Foundation: New Delhi, Feb. 2022); and Baruah, D. M., Labh, N. and Greely, J., *Mapping the Indian Ocean Region* (Carnegie Endowment for International Peace: Washington, DC, June 2023).

[8] Grare, F., 'Fish and ships: Chinese fishing and Europe's Indo-Pacific strategy', European Council on Foreign Relations, Aug. 2021, p. 2; and US Energy Information Administration, 'South China Sea', Regional analysis brief, 21 Mar. 2024, pp. 2–3.

[9] Medcalf, R., 'The Indo-Pacific: What's in a name?', *American Interest*, vol. 9, no. 2 (2013). See also Medcalf, R., 'An Australian vision of the Indo-Pacific and what it means for Southeast Asia', eds D. Singh and M. Cook, *Southeast Asian Affairs 2019* (ISEAS–Yusof Ishak Institute: Singapore, 2019).

[10] E.g. European Commission, 'Questions and answers: EU Strategy for Cooperation in the Indo-Pacific', 16 Sep. 2021; and Association of Southeast Asian Nations (ASEAN), 'ASEAN outlook on the Indo-Pacific', 34th ASEAN Summit, 23 June 2019.

[11] Chinese State Council, 新时代的中国国防 [China's national defence in the new era] (State Council Information Office: Beijing, July 2019), chapter 1. English translation: Chinese State Council, *China's National Defence in the New Era* (State Council Information Office: Beijing, 24 July 2019).

[12] Chinese State Council, *The Belt and Road Initiative: A Key Pillar of the Global Community of Shared Future* (State Council Information Office: Beijing, 10 Oct. 2023).

[13] E.g. Kuik, C., 'Binary trap threatens ASEAN's hedging role', East Asia Forum, 1 Aug. 2023.

are characterized by the former's long-standing naval advantage.[14] These nuclear-armed neighbours have an unresolved maritime border dispute over the Sir Creek region, but this is characterized by experts as a 'lower priority dispute'.[15] Accordingly, these two South Asian states are excluded from the analysis. Nonetheless, China's investment in the Indian Ocean region (including its expansion of Pakistan's Gwadar Port), the conduct of joint Chinese–Pakistani naval exercises and its 2016 agreement to export eight diesel–electric submarines (SSKs) to Pakistan may have impacts on the strategic relations of all three nuclear-armed states.[16] Meanwhile, the Russian Federation—despite its naval presence in the Indo-Pacific and strategic partnership with China—is also not considered in this analysis, largely because its security interests and threat perceptions are primarily focused on Europe.[17] Overall, the actors selected for discussion illustrate the tendency for the threat perceptions of rivals or adversaries to mirror each other, as is characteristic of security dilemma dynamics.

China

In November 2012, at the 18th National Congress of the Chinese Communist Party (CCP), President Hu Jintao articulated China's ambition to emerge as a strong maritime power.[18] This commitment was also clearly reflected in China's subsequent Defence White Papers.[19] With rapid economic development over the past decade, China has been increasingly able to direct attention and resources towards its naval forces. In the process, its navy—the People's Liberation Army Navy (PLAN)—has shifted its focus from 'near seas defence' to 'far seas protection', including extension of its training 'to the far seas'.[20] This underscores a long-term ambition for the PLAN to transform into a blue water navy—that is, one capable of projecting power in distant waters. The PLAN has rapidly expanded its capabilities to develop and deploy expeditionary forces, aligning with its new mission of far seas protection.[21] For example, in 2022 China unveiled its third aircraft carrier, the *Fujian* (Type 003), demonstrating its commitment to enhancing both its expeditionary and its ASW capabilities.[22]

The stated security objectives behind China's naval build-up include upholding state sovereignty and territorial integrity—especially related to China's claims in the East and South China seas and to Taiwan—and securing sea lines of communication (SLOC).[23] The so-called nine-dash line—which represents China's extensive territorial

[14] Saif-Ul-Haq, 'Indian naval modernization and its implications for Pakistan', *IPRI Journal*, vol. 21, no. 2 (Dec. 2021), p. 89.

[15] Banerji, A., 'Contested waters: The maritime dimension of India–Pakistan relations', South Asian Voices, Stimson Center, 8 Mar. 2022.

[16] Ali, G., 'China–Pakistan maritime cooperation in the Indian Ocean', *Issues & Studies*, vol. 55, no. 3 (Sep. 2019); and Abbas, B. A., 'Submarines are key to India's evolving force posture in the Indian Ocean', South Asian Voices, 10 May 2024.

[17] Melvin, N., *Russia and the Indo-Pacific Security Concept* (Royal United Services Institute (RUSI): London, 2021).

[18] '中共十八大代表强烈支持中国建设海洋强国' [Delegates to the 18th National Congress of the Chinese Communist Party strongly support China's decision to become a strong maritime power], Xinhua, 10 Nov. 2012.

[19] Chinese State Council, *The Diversified Employment of China's Armed Forces* (State Council Information Office: Beijing, Apr. 2013); and Chinese State Council, *China's Military Strategy* (State Council Information Office: Beijing, 27 May 2015).

[20] Chinese State Council (note 11), chapter 4.

[21] Chinese State Council (note 11), chapter 4.

[22] ChinaPower, 'How advanced is China's third aircraft carrier?', Center for Strategic and International Studies (CSIS), 17 May 2023.

[23] Grandview Institution, '中美海上利益对比及分歧管控' [Comparison of maritime interests between China and the United States and management of differences], Oct. 2022.

and maritime claims in the South China Sea—is a matter of international controversy.[24] In addition to its disputes 'over the territorial sovereignty of some islands and reefs, as well as maritime demarcation', China's more immediate security interests include defending its extensive continental coastline.[25] China's maritime ambitions also relate to the expanding presence overseas of its interests, citizens and assets, notably those related to the Belt and Road Initiative, which could be endangered by regional turmoil, terrorism and piracy.[26]

China views the moves made by the USA to strengthen alliances and reinforce deployments in the region as contributing to the 'daunting task' of China safeguarding its 'territorial sovereignty, maritime rights and interests'.[27] It is particularly wary of possible US intervention, with allied support, in a potential Taiwan crisis. The US focus on interoperability with allies—which even extends to commercial ships (e.g. merchant marine and offshore support vessels)—adds a new dimension to these concerns. Indeed, China views the integrated maritime activities of the USA and its allies as increasingly offensive, as seen for example in its reaction to the USA's use of uncrewed surface vessels (USVs) in a naval exercise with Japan in September 2023.[28] The trilateral security partnership between Australia, the United Kingdom and the USA (AUKUS) is similarly viewed by China as an effort to strengthen the combat readiness of the allies. China already perceives a greater frequency of what it deems 'provocative activities' by the USA that include 'illegal entry into China's territorial waters and maritime and air spaces near relevant islands and reefs'.[29] China is reportedly also concerned about the possibility that the USA could use its low-yield nuclear weapons to control escalation during a potential crisis in Taiwan.[30]

Moreover, there is a strategic dimension to China's naval build-up related to its development of nuclear-powered ballistic missile submarines (SSBNs)—which can also partly be seen to explain its large fleet of tactical submarines (see chapter 3). Specifically, in times of conflict the PLAN would seek to secure access to strategic sea lanes and enhance its 'capabilities for strategic deterrence and counterattack'.[31] China has long aspired for its SSBNs to freely pass into the Western Pacific past the first island chain—referring to the chain of islands that extends from northern Japan through Taiwan and the Philippines to Indonesia and Malaysia—thereby accessing deeper waters where it can conduct training activities and gain better launching positions for the SSBNs' nuclear weapons (see figure 2.1).[32] However, the ASW capabilities of the USA and its allies along the first island chain undermine this objective. Arguably related to this, China has expressed concern about the increased intelligence, surveillance and

[24] Caruana, A., 'Nine-dash line', *Institute for China America Studies (ICAS) Maritime Affairs Handbill*, vol. 2, no. 7 (25 July 2023).

[25] Chinese State Council (note 11), chapter 1.

[26] Chinese State Council (note 11), chapter 1. On the Belt and Road Initiative see also e.g. Anthony, I. et al., *China–EU Connectivity in an Era of Geopolitical Competition*, SIPRI Policy Paper no. 59 (SIPRI: Stockholm, Mar. 2021); and Chinese State Council (note 12).

[27] Chinese State Council (note 11), chapter 3.

[28] Zhu, J. (朱俊玮), Grandview Think Tank, '美军加强在我周边部署水下侦察系统' [The US military strengthens the deployment of underwater reconnaissance systems in our neighbourhood], Kunlunce.com, 3 Oct. 2023; and US 7th Fleet Commander, 'Unmanned Surface Vessel Division One makes its first port visit in Yokosuka, Japan', 21 Sep. 2023.

[29] Chinese State Council (note 11), chapter 6.

[30] Santoro, D. and Gromoll, R., 'On the value of nuclear dialogue with China: A review and assessment of the track 1.5 "China–US Strategic Nuclear Dynamics Dialogue"', Issues & Insights vol. 20, Special Report no. 1 (Pacific Forum: Honolulu, HI, Nov. 2020), p. 10.

[31] Chinese State Council (note 11), chapter 4.

[32] Qi, H. (祁怀高), '中美在西太平洋的海权博弈及影响' [Chinese–US maritime competition in the Western Pacific and its influence], 武汉大学学报（哲学社会科学版） [*Wuhan University Journal (Philosophy & Social Science)*], vol. 72, no. 3 (May 2019); and Erickson, A. S. (安德鲁・S.埃里克森) et al., 中国核潜艇部队的未来 [China's future nuclear submarine force] (Ocean Press: Beijing, 2015).

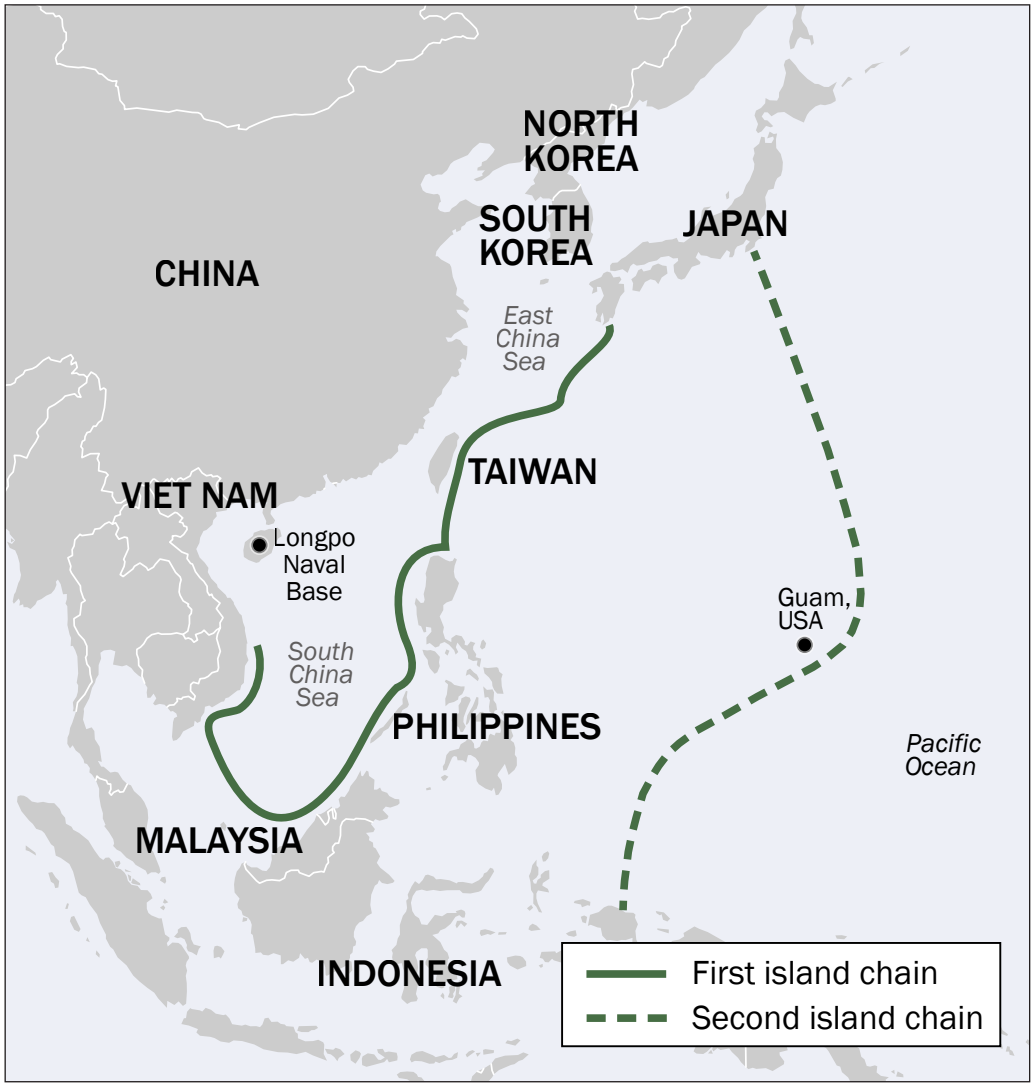

Figure 2.1. The first and second island chains

Source: Marcus, J., 'Is the US still Asia's only military superpower?', BBC, 24 Aug. 2019.

reconnaissance (ISR) activities of US allies near Chinese waters—including their joint underwater awareness operations.[33] China's long-term objective to overcome these obstacles is underscored by its anticipated introduction of the Type 096 SSBN (explored further in chapter 3), which will allow it to conduct patrols in the high seas. China's enhanced surface combat capability may also partly facilitate submarine deployment beyond coastal waters.[34] Indeed, it is conducting military exercises incorporating submarines and ASW operations in the high seas with increasing frequency.[35]

[33] Chen, Y. (陈永), '美国在印太建设冷战式水下态势感知能力' [The USA is building cold war-style underwater situational awareness capabilities in the Indo-Pacific], South China Sea Strategic Situation Probing Initiative (SCSPI), 11 Nov. 2023.

[34] Fang, X. (方晓志), '加强中国远洋海军建设的必要性与可行性探析' [An analysis of the necessity and feasibility of strengthening the construction of an ocean-going navy], *Journal of China and International Relations*, vol. 2 no. 2 (Oct. 2014).

[35] '南海舰队潜艇部队远海训练常态化 安全风险前所未有' [South Sea Fleet submarine force regularises far-sea training with unprecedented security risks], *People's Daily*, 14 July 2014; and 'Russia and China hold drills in Sea of Japan', Euronews, 20 July 2023.

The United States

The 2022 US National Security Strategy cites as a key objective keeping the Indo-Pacific open and accessible, including through FONOPs, and specifically identifies a desire to build support for open access to the South China Sea.[36] Much of the US interest in the region is related to 'unrestricted seaborne trade' and 'unimpeded access to markets', as well as reliance on undersea fibre-optic cables.[37] The significance of the Indo-Pacific for the USA also centres on its security commitments to its allies—Australia, Japan and South Korea, to which the USA provides extended nuclear deterrence; and the Philippines and Thailand, with which it has mutual defence pacts—and a number of regional partners, including Taiwan. In line with the growing importance of the Indo-Pacific, Guam—a US territory in Micronesia—has come to play a central role as 'key theater operations and logistical support to all US forces in the region'.[38]

The USA views China's increased assertiveness in the Indo-Pacific as challenging its regional dominance and the security of its allies. In particular, it is concerned about Chinese preparations 'for a contingency to unify Taiwan with [China] by force . . . , while simultaneously deterring, delaying, or denying any third-party intervention, such as the United States and/or other like-minded partners, on Taiwan's behalf'.[39] Despite China's long-standing expressed policy of no first use of nuclear weapons, the USA deems that China 'probably would . . . consider nuclear use to restore deterrence if a conventional military defeat in Taiwan gravely threatened CCP regime survival'.[40]

Moreover, while noting that China has long 'routinely intercepted foreign air and maritime assets operating in the Indo-Pacific', since 2021 the USA has perceived a more 'centralized, concerted campaign' of 'coercive and risky behaviors'—which in many cases have targeted the ASW aircraft of the USA and its allies (see chapter 4).[41] The USA is also concerned that China continues to 'signal its willingness to use military force against Taiwan'.[42] It views any conflict in the region as having a substantial impact on US economic and security interests, not least through invoking US security commitments.[43] Indeed, the USA has observed that the Indo-Pacific is the locale where relations with its 'most consequential geopolitical challenge'—China—'will be most acutely shaped'.[44]

The nuclear dimension of Chinese–US rivalry is also partly tied to naval dynamics. While in the past there was a tendency in the USA not to acknowledge the mutual nature of its deterrence relationship with China, this is changing, particularly with the latter's development of SSBNs.[45] In addition to highlighting its role as a nuclear peer, China's enhanced sea-based deterrent is narrowing 'damage limitation' options for the USA—that is, it is diminishing the USA's confidence in its ability to wage nuclear war

[36] The White House, *National Security Strategy* (White House: Washington, DC, Oct. 2022), p. 37.

[37] US Chief of Naval Operations, *Navigation Plan 2022* (US Navy: Washington, DC, 2022), p. 2.

[38] Underwood, K., 'The growing importance of Guam', *Signal*, Feb. 2021.

[39] US Department of Defense (DOD), *Military and Security Developments Involving the People's Republic of China 2023* (DOD: Washington, DC, Oct. 2022), p. 136.

[40] US Department of Defense (note 39), p. 106.

[41] US Department of Defense (note 39), pp. x, 139.

[42] US Department of Defense (note 39), pp. 140.

[43] O'Rourke, R., *US–China Strategic Competition in South and East China Seas: Background and Issues for Congress*, Congressional Research Service (CRS) Report for Congress R42784 (US Congress, CRS: Washington, DC, 15 Nov. 2023).

[44] The White House (note 36), p. 11.

[45] Santoro, D., 'Introduction: The mutual vulnerability question in US–China strategic nuclear relations', p. 3, and Lyon, R., 'Actors, orders, and outcomes: Distilling an Australian perspective on a US–China acknowledgement of mutual vulnerability', p. 57, ed. D. Santoro, *US–China Mutual Vulnerability: Perspectives on the Debate*, Issues & Insights vol. 22, Special Report no. 2 (Pacific Forum: Honolulu, HI, May 2022).

against China.[46] In US and allied perceptions, Chinese interests in Taiwan have also been linked to undersea dynamics, as China's potential occupation of the island would facilitate the movement of its SSBNs.[47]

The USA identifies integrated deterrence as the cornerstone of its approach to security in the Indo-Pacific, meaning a tight integration across warfighting domains—land, sea, air, space and cyberspace.[48] At the same time, it views its network of alliances and partnerships as 'force multipliers' that facilitate the projection of power overseas.[49] For example, the US Pacific Deterrence Initiative, which aims to meet the 'pacing challenge' presented by China, includes major investments to enhance the capabilities of allies and partners, including in areas such as maritime security and maritime domain awareness.[50] Further, the USA seeks to increase the 'scope and complexity' of joint exercises and operations with its allies and to develop joint force posture initiatives.[51] It has also expressed a desire for opportunities to link industrial bases, integrate supply chains and co-produce key technologies.[52]

Australia

In Australia's 2024 National Defence Strategy, the 'increasing strategic competition between the United States . . . and China' is recognized as the 'primary feature of [Australia's] security environment', with an acknowledgment that related build-up is 'increasing the risk of military escalation or miscalculation that could lead to a major conflict'.[53] Specifically, Australia cites China's 'coercive tactics . . . including forceful handling of territorial disputes and unsafe intercepts of vessels and aircraft'.[54] The 2023 Defence Strategic Review, the recommendations of which the government accepted, observes that China's 'assertion of sovereignty over the South China Sea' has led to a 'new strategic reality' and calls for substantial changes in Australia's defence forces.[55] A critical component of Australian national security strategy involves securing SLOC.[56]

In 2021 Australia articulated a need for AUKUS by highlighting the constraints of its SSKs, particularly in terms of weapon storage, speed and endurance.[57] These constrains are seen as hindering its ability to effectively address the escalating security challenges in the Indo-Pacific region. In 2023 Scott Morrison, who had overseen the agreement when he was Australian prime minister, explicitly identified China as the primary threat that necessitated a 'credible deterrent' in the Indo-Pacific; he also observed the concerns raised regarding the effectiveness of Australia's SSKs compared to China's rapid military advancements.[58]

[46] US Department of Defense (note 39); Cunningham, F. S., 'The unknowns about China's nuclear modernization program', *Arms Control Today*, vol. 53, no. 5 (June 2023); and Tellis, A. J., *Striking Asymmetries: Nuclear Transitions in Southern Asia* (Carnegie Endowment for International Peace: Washington, DC, 2022).

[47] deLisle, J., 'US–Japan–Taiwan dialogue: Deterrence, defense, and trilateral cooperation', US Defense Threats Reduction Agency (DTRA), Oct. 2022.

[48] The White House, *Indo-Pacific Strategy of the United States* (White House: Washington, DC, Feb. 2022), p. 12.

[49] The White House (note 36), p. 20.

[50] Department of Defense (DOD), 'Pacific Deterrence Initiative', Fiscal year 2024 budget, Mar. 2023, p. 4.

[51] The White House (note 48), p. 12.

[52] The White House (note 48), p. 13. See also Béraud-Sudreau, L. et al., *Arms-production Capabilities in the Indo-Pacific Region: Measuring Self-reliance* (SIPRI: Stockholm, Oct. 2022).

[53] Australian Department of Defence, *National Defence Strategy* (Australian Government: Canberra, 2024), pp. 6, 11.

[54] Australian Department of Defence (note 53), p. 12.

[55] Australian Government, *National Defence: Defence Strategic Review* (Australian Government: Canberra, 2023), pp. 23–24.

[56] Australian Government (note 55), p. 56.

[57] Australian government, 'Australia to pursue nuclear-powered submarines through new trilateral enhanced security partnership', Media statement, 16 Sep. 2021.

[58] Hudson Institute, 'Partnership of freedom: AUKUS viewed by its architects', 31 May 2023.

The AUKUS agreement includes the delivery to Australia of conventionally armed nuclear-powered submarines (SSNs) that are expected to serve as 'key assets' for executing a 'strategy of denial'—which Australia defines as 'a defensive approach designed to stop an adversary from succeeding in its goal to coerce states through force, or the threatened use of force, to achieve dominance'.[59] At the heart of this strategy is the ability to conduct strikes deep in the territory of adversaries; Australia is pursuing this objective though the AUKUS agreement and the related acquisition of Tomahawk sea-launched cruise missiles (SLCMs) from the USA (see chapter 3).

Japan

Japan's 2022 National Security Strategy argues that 'China's current external stance, military activities, and other activities have become a matter of serious concern' and that they present 'the greatest strategic challenge in ensuring the peace and security of Japan'.[60] The strategy notes China's increasing military spending as well as enhancements in its nuclear and missile capabilities and—apparently also related to the threat from China—'mounting pressures by unilaterally changing the status quo by force' and 'grey zone situations over territories'.[61] In particular, it notes that China's military presence in the East and South China seas as well as intrusions into the territorial waters and airspace surrounding the Senkaku/Diaoyu Islands—which are administered by Japan but claimed by China—have 'expanded and intensified'.[62] Furthermore, Japan has argued that China's 2021 Coast Guard Law is problematic in the context of international law, including in its authorization for use of weapons and the applicable sea area specified.[63] China's heightened pressure on Taiwan further exacerbates these concerns, as did underwater incursions by Chinese submarines into Japan's contiguous zone in 2018, 2020 and 2021, and China's launch of ballistic missiles into the waters of Japan's exclusive economic zone (EEZ) in 2022 as part of military exercises.[64]

Separately, Japan perceives the threat from North Korea as evolving; it is now seen as an 'even more grave and imminent threat to Japan's national security than ever before'.[65] Of particular concern are North Korea's nuclear and missile programmes, given Japan's proximity to missile launch sites and the frequency with which missile tests have flown over Japanese territory. Moreover, North Korea's development of ballistic missile submarines (SSBs) armed with nuclear weapons is closely monitored by Japan, requiring Japan's ASW assets to be vigilant.[66]

In recent years, Japanese threat perceptions have also increasingly focused on Russia. It views China's strategic coordination with Russia, alongside increased Russian military presence in the region, as being 'of strong security concern'.[67] The latter includes Russia's 'military activities in the vicinity of Japan' and 'strengthening its armaments' in the Kuril Islands (the southern part of which Japan claims as its Northern Territories).[68]

[59] Australian Government (note 55), pp. 49, 56. See also Johns, J. (ed.), *Australian Maritime Strategic Thought 2013–2023* (Australian Navy, Sea Power Centre–Australia: Canberra, 2023).

[60] Japanese Cabinet Secretariat, 'National security strategy of Japan', Provisional translation, Dec. 2022, p. 9.

[61] Japanese Cabinet Secretariat (note 60), pp. 2, 8.

[62] Japanese Cabinet Secretariat (note 60), p. 8.

[63] Japanese Ministry of Foreign Affairs, 'Trends in China Coast Guard and other vessels in the waters surrounding the Senkaku Islands, and Japan's response', 1 Apr. 2024; and Coast Guard Law of the People's Republic of China, adopted 22 Jan. 2021, entered into force 1 Feb. 2021 (in Chinese).

[64] Japanese Ministry of Defense, 'China's activities in East China Sea, Pacific Ocean, and Sea of Japan', Aug. 2023; and 'Chinese missiles suspected of landing in Japan's economic zone', Al Jazeera, 4 Aug. 2022.

[65] Japanese Ministry of Defense (MOD), *Defense of Japan 2023* (MOD: Tokyo, Mar. 2023), pp. 1, 103.

[66] Van Diepen, V. H., 'The sleeper has awakened: Six key takeaways from the rollout of North Korea's "tactical nuclear attack submarine"', 38North, 11 Sep. 2023.

[67] Japanese Cabinet Secretariat (note 60), p. 10.

[68] Japanese Cabinet Secretariat (note 60), p. 10.

Japanese concerns have been further fuelled by joint Chinese–Russian naval exercises, which include ASW missions, conducted in the Sea of Japan.[69]

Like Australia, Japan is pursuing conventional deep-strike capabilities based on naval platforms to enhance deterrence. In response to evolving security dynamics in its vicinity, in December 2022 Japan revised its National Security Strategy to include the acquisition of 'counterstrike capabilities' that could leverage its stand-off defence capability.[70] Japan's plan to deploy precision-guided Tomahawk SLCMs on its SSKs is in line with this objective (see chapter 3).[71] This advancement will enable Japan to 'respond to invading forces from outside the sphere of threats'—meaning that such a counterstrike would be directed 'against the opponent's territory'.[72] The need for this capability is justified in terms of the increasing difficulty 'to fully address missile threats with the existing missile defense network alone'.[73] Reflecting those perceived missile threats, Japan operates the sea-based Aegis ballistic missile defence system, provided by the USA.[74]

Taiwan

The primary maritime interests of Taiwan are twofold: to effectively address any military challenges that may arise within its surrounding waters; and to safeguard SLOC.

The threat of China using force to achieve reunification is acute and is specifically elaborated in Taiwan's defence documents. Such concerns have intensified over China's ongoing military build-up and its increasing assertiveness in the Taiwan Strait, including through frequent aerial and maritime patrols and drills in close proximity to Taiwan.[75] Taiwan is also concerned by China's grey zone activities, including the possibility of the future use of the PLAN, the China Coast Guard, the Maritime Militia and fishing vessels 'to approach the median line of the strait and even intrude into the eastern region of the Taiwan Strait'.[76] In addition to the difficulty of countering such activities, experts have suggested that a response by Taiwanese naval forces could drive escalation and allow China opportunities to create 'a pretext for conflict'.[77] There is also the particular worry that China could impose blockades on Taiwan's ports and SLOC as a means to cut off the maritime routes necessary for the island's defence.[78]

After procuring its first submarines from Western suppliers in the 1970s and 1980s, Taiwan's efforts to further build up its submarine force faced obstacles stemming from a desire from foreign governments and companies to maintain positive relations with China.[79] The launch of Taiwan's first indigenous submarine in February 2024 arguably

[69] Japanese Cabinet Secretariat (note 60), p. 10; and 'Joint Russian–Chinese naval drill "North/Interaction-2023" kicks off in Sea of Japan', TASS, 20 July 2023.

[70] Japanese Cabinet Secretariat (note 60), p. 19

[71] Takahashi, K., 'Japan Commissions third Taigei-class submarine', Naval News, 8 Mar. 2024; and Honrada, G., 'Japan's new VLS sub designed to hem in China', Asia Times, 22 Dec. 2023.

[72] Japanese Cabinet Secretariat (note 60), pp. 18, 19.

[73] Japanese Cabinet Secretariat (note 60), p. 19.

[74] Honrada, G., 'Japan pouring billions into sea-based missile defense', Asia Times, 25 Dec. 2023.

[75] Taiwanese Ministry of National Defense (MND), 中華民國110年國防報告書 [Republic of China 2021 national defence report] (MND: Taipei, Oct. 2021), pp. 26–27.

[76] Pang, K. (彭群堂) and Li, H. (李凱翎), '中國大陸「灰色地帶」衝突戰略運用對我國防衛作戰之影響與因應' [The impact of China's 'grey zone' conflict strategy on our defence operations and responses], 空軍學術雙月刊 [*Air Force Bimonthly Journal*], no. 682 (June 2021), p. 21 (author translation).

[77] Pang and Li (note 76), p. 21 (author translation).

[78] Taiwanese Ministry of National Defense (MND), 中華民國112年國防報告書 [Republic of China 2023 national defence report] (MND: Taipei, Sep. 2023), p. 39.

[79] Taiwanese Office of the President, '總統接受美國《紐約時報》專訪' [The president interviewed by *The New York Times*], 31 Oct. 2014; and Hioe, B., 'Taiwan's homegrown submarine at the center of political firestorm', The Diplomat, 14 Oct. 2023.

reflects a shift in Taiwanese thinking towards 'a self-reliant defence'.[80] This development has been recognized as key 'for the Taiwanese Navy in developing "asymmetric warfare" capabilities'.[81] In particular, in response to China's grey zone activities, Taiwan is expected to bolster counter-blockade operations.[82] Taiwan also plans to build more ASW frigates to counter China's growing tactical submarine force.[83] Through these coordinated efforts, Taiwan seeks to more effectively deter the increasingly frequent military exercises and patrols conducted by the PLAN.[84]

South East Asian states

While the emphasis may vary, one security objective shared by all South East Asian states is securing SLOC to foster economic growth. Indeed, safeguarding SLOC is viewed as a shared regional interest, given the critical role that these routes play in economic development. Singaporean submarine forces, for instance, play a crucial role in this regard, conducting patrols in the Strait of Malacca.[85] Moreover, the growing concern over China's military rise and its assertiveness in the disputed water of the South China Sea is a major driving force behind the recent military activities by individual South East Asian states. Rising tensions with China—centred on contested maritime claims involving Brunei Darussalam, Indonesia, Malaysia, the Philippines and Viet Nam—coupled with increasing grey zone activities by China as well as tensions over energy exploration, constitute key security considerations for several states. Reported coercive operations by China in the South China Sea since the 1990s have included, for instance, expelling and blocking Philippine and Vietnamese vessels.[86]

Disputes between China and its neighbours over islands and reefs in the South China Sea have intensified over the years. Underlying these are disagreements over the nine-dash line. After the Philippines brought this dispute to the Permanent Court of Arbitration in 2013, the verdict was that China's claims had no legal basis.[87] Viet Nam's maritime security concerns relate to its dispute with China over the Paracel Islands and the Spratly Islands. In the 2010s, Viet Nam procured and deployed submarines to more effectively patrol its territorial waters and EEZ, which has significantly improved its underwater domain awareness.[88] The Spratly Islands are also claimed by Malaysia and the Philippines. Notably, in January 2024 the Philippines signed agreements with Viet Nam to enhance bilateral cooperation between their coastguards to counter China's increasing use of grey zone tactics in the South China Sea.[89] Scarborough Shoal—also disputed between China and the Philippines—is another area where coastguards from

[80] Taiwanese Ministry of National Defense (note 78), p. 61 (author translation). See also Lee, C., 'Taiwan launches its first indigenous submarine', Naval News, 27 Feb. 2024.

[81] Taiwanese Office of the President, '總統主持「潛艦國造原型艦命名暨下水典禮」' [The President presided over the 'naming and unveiling ceremony of the national submarine prototype'], 28 Sep. 2023 (author translation).

[82] Shen, M., 'The development of Taiwan's asymmetric combat capabilities: A case study of the IDS and military interactions between the US and Taiwan', *Multidimensional Analysis of Taiwan's Security Landscape*, Taiwan Strategist no. 20 (Prospect Foundation: Taipei, Dec. 2023).

[83] Arthur, G., 'Taiwan begins building anti-submarine frigate', *Defense News*, 23 Jan. 2024.

[84] Taiwanese Ministry of National Defense (note 75), pp. 54, 62.

[85] Singaporean government, Nexus, 'Building a strong defence', SG101, 2024.

[86] Zhang, K., 'Cautious bully: Reputation, resolve, and Beijing's use of coercion in the South China Sea', *International Security*, vol. 44, no. 1 (summer 2019).

[87] Macias, A., 'The Hague just threw out Beijing's "9-dash line" in the South China Sea ruling', Business Insider, 12 July 2016; and Permanent Court of Arbitration (PCA), 'In the matter of the South China Sea arbitration', PCA Case no. 2013-19, Award, 2 July 2016.

[88] Tran, B., 'Vietnam's quest for enhanced maritime domain awareness', Perspective no. 96, ISEAS–Yusof Ishak Institute, 7 Dec. 2023.

[89] AP, 'Philippines and Vietnam agree to expand cooperation in South China Sea, which Beijing also claims', Indo-Pacific Defense Forum, 30 Jan. 2024.

both sides are increasingly active. In February 2024 the Philippines announced its first submarine procurement plan, citing energy security is a key driver, as the Philippines views submarines as a means for 'the unimpeded and peaceful exploration and exploitation of all natural resources' in its EEZ.[90] Policymakers in Malaysia similarly see its submarine programme as a means to 'ensuring the readiness of the country's strategic assets in protecting the nation's maritime borders'.[91] While Indonesia is not a claimant in the South China Sea, its EEZ in the North Natuna Sea falls within China's nine-dash line. Indonesia is also concerned about the activities of the China Coast Guard in this area and has deployed a warship to monitor those activities.[92]

In addition to China's coercive tactics, these states are concerned about US FONOPs—they fear that either could trigger inadvertent escalation and drive destabilization in a manner that impedes national development.[93] The great power competition driving these concerns has led to a delicate balance of policies: ASEAN held its first-ever joint military drills in September 2023, but five members states also took part in a land and sea exercise hosted by China in November 2023. ASEAN also agreed with China in July 2023 to complete negotiations by 2026 on a code of conduct in the South China Sea that could prevent conflict.[94] While there is plenty of scepticism as to whether the parties can follow through, the process further illustrates the complex relationship that South East Asian states have with China, and the interplay between economic and security considerations.[95] The diversity among South East Asian states is also demonstrated by their reactions to AUKUS. For example, Singapore, the Philippines and Viet Nam have been generally supportive of the agreement, while Malaysia and Indonesia have expressed concern that it could fuel arms races and undermine peace in the region by contributing to Chinese threat perceptions.[96]

South East Asian states' decade-long pursuit of military modernization has been marked by a notable shift in focus from land-based to maritime capabilities.[97] The recent efforts of Indonesia, Malaysia, Myanmar, Singapore, Viet Nam and now the Philippines to expand or initiate submarine programmes are, to some extent, integral to this shift (see chapter 3). Despite encountering financial constraints that have hindered progress, there is growing anticipation that the collective naval capabilities of South East Asian countries could compel China to exercise greater caution, particularly in its grey zone activities in the South China Sea.[98] Submarines are viewed as key to this effort, given their potential to provide asymmetric advantage through sea denial—meaning efforts 'to deny in part or full an adversary's use of the sea for military and commercial purposes'.[99]

[90] Maitem, J., 'Philippines confirm that it will acquire submarines', Naval News, 6 Feb. 2024. See also Royandoyan, R., 'Philippines "breaking from its shell" with submarine purchase', Nikkei Asia, 2 Feb. 2024.

[91] Syailendra, E. A., 'Why don't Malaysian policymakers view China as a threat?', The Diplomat, 24 Feb. 2023; and Koh, C., 'Royal Malaysian Navy looking at two more submarines by 2040', Navy Recognition, Apr. 2018.

[92] 'Indonesia deploys warship to monitor China Coast Guard vessel', Al Jazeera, 14 Jan. 2023.

[93] Yaacob, R., 'Not only the dragon: Understanding Southeast Asia's complex security landscape', The Interpreter, Lowy Institute, 26 Oct. 2023.

[94] Karmini, N. and Gomez, J., 'China and ASEAN agree to try to conclude nonaggression pact on sea feud in 3 years', AP, 13 July 2023.

[95] Lean, C. K., 'Muscle and mediation set to continue in the South China Sea', East Asia Forum, 18 Jan. 2024.

[96] Storey, I. and Choong. W., 'The AUKUS announcement and Southeast Asia: An assessment of regional responses and concerns', Perspective no. 23, ISEAS–Yusof Ishak Institute, 29 Mar. 2023.

[97] Wezeman, S. T., *Arms Flow to South East Asia* (SIPRI: Stockholm, Dec. 2019); and Koh, S. C., 'Rethinking the consequences of naval modernization in Southeast Asia: A heuristic approach', Doctoral thesis, Nanyang Technological University, 2015.

[98] Espeña, J. B., 'The Philippines wants to acquire submarines. What should they be used for?', The Diplomat, 11 Apr. 2022; and Siow, M., 'How many submarines does the Philippines need to deter Beijing amid South China Sea row?', *South China Morning Post*, 19 Feb. 2024.

[99] Vego, M., 'Getting sea control right', *Proceedings* (US Naval Institute), vol. 139, no. 11 (Nov. 2013).

North Korea

North Korea views the United States as the primary threat to its national security, along with South Korea. This perception derives from the 1950–53 Korean War: given the lack of a peace treaty, the countries technically remain in a state of war. Viewing Japan as an extension of this threat, North Korea considers the Japan–South Korea–USA alliance as 'an Asian version of the North Atlantic Treaty Organization (NATO), the root cause of war and aggression'.[100] Activities by the three allies—including naval exercises involving aircraft carriers and strategic bombers—are seen by North Korea as a source of instability and a 'serious threat'.[101] Although North Korea's rhetoric often highlights the nuclear dimension of such activities—for example, by describing the deployment of 'nuclear [aircraft] carriers, nuclear submarines and nuclear strategic bombers to South Korea' as a form of 'nuclear threat and blackmail'—the main threat arguably relates to its adversaries' overwhelming conventional strength.[102] Indeed, reflecting its conventional inferiority in relation to South Korea and its allies, North Korea itself heavily relies on nuclear weapons as a source of asymmetric advantage.

North Korea's concerns focus in particular on what it views as the 'deep-rooted plan for a pre-emptive nuclear strike' by the USA and South Korea.[103] Consequently, ensuring a nuclear second-strike capability through enhancing the survivability of its relatively small nuclear arsenal constitutes a critical security objective for North Korea. Notably, the related modernization efforts include the development of a sea-based nuclear deterrent—or what North Korea calls the 'nuclearization of [its] navy'.[104] In addition to SSBs and submarine-launched ballistic missiles (SLBMs), they also include development of a new 'tactical nuclear submarine' (see chapter 3). North Korea has characterized the new submarine as a means to enhance its deterrence against the USA and to enable the launch of pre-emptive or retaliatory strikes against hostile states in any waters.[105] This reinforces the law on North Korea's nuclear weapon policy, updated in 2022, which points to the possibility of nuclear first use.[106] The test of the Haeil-5-23 nuclear uncrewed underwater vehicle (UUV) in January 2024—which North Korea argued further demonstrated its 'underwater nuclear response posture'—also aligns with efforts to enhance the survivability of the country's nuclear arsenal.[107]

Many of the past military confrontations between North Korea and South Korea have occurred along the Northern Limit Line—a de facto maritime boundary recognized by the latter but not by the former.[108] North Korean Supreme Leader Kim Jong Un has claimed that the Northern Limit Line is 'illegitimate and lawless' and has further stated

[100] Korean Central News Agency (KCNA), '경애하는 김정은동지께서 조선민주주의인민공화국 최고인민회의 제14기 제9차회의에서 뜻깊은 연설을 하시였다' [Dear Leader Kim Jong Un makes significant speech at 9th session of 14th North Korean Supreme People's Assembly], 28 Sep. 2023 (author translation).

[101] North Korean Ministry of Foreign Affairs, '조선민주주의인민공화국 외무성 미국연구소 20세기 조선침략전쟁의 도발자 미국은 오늘도 조선반도의 평화와 안정을 파괴하는 원흉으로 남아있다고 강조' [The US Institute of the North Korean Ministry of Foreign Affairs emphasizes that the USA—the provocateur of wars of aggression against North Korea in the 20th century—remains the destroyer of peace and stability of the Korean Peninsula], 26 June 2023 (author translation).

[102] Korean Central News Agency (KCNA), 'US denounced as destroyer of peace and stability of Korean Peninsula', 6 June 2023.

[103] North Korean Ministry of Foreign Affairs (note 101) (author translation).

[104] '경애하는 김정은 동지께서 새로 건조한 잠수함 진수식에서 하신 축하연설' [Dear Leader Kim Jong Un's congratulatory speech at the launching ceremony of a newly built submarine], *Rodong Sinmun*, 8 Sep. 2023 (author translation).

[105] Korean Central News Agency (note 100); and *Rodong Sinmun* (note 104).

[106] 최고인민회의 법령 조선민주주의인민공화국 핵무력정책에 대하여 [Law on the Nuclear Weapons Policy of the Democratic People's Republic of Korea], adopted by the Supreme People's Assembly 8 Sep. 2022. See also Jun, B., 'Comparing North Korea's nuclear forces policy laws', Asia-Pacific Leadership Network, 21 Nov. 2022.

[107] Korean Central News Agency, '조선민주주의인민공화국 국방성 대변인 담화발표' [Statement by the spokesman for the North Korean Ministry of Defence], 19 Jan. 2024 (author translation).

[108] Van Dyke, J., 'The maritime boundary between North & South Korea in the Yellow (West) Sea', 38 North, 29 July 2010.

that, 'if South Korea encroaches on our territory, airspace or territorial waters, by even 0.001 millimetre, it will be considered a provocation of war'.[109]

South Korea

South Korea perceives North Korea—in particular, its nuclear and ballistic missile programmes—as the most prominent threat to its national security. Its threat perceptions mostly relate to North Korea's land-based forces.[110] In addition to relying heavily on security cooperation with the United States, including extended nuclear deterrence, South Korea is seeking to counter this threat by means of a pre-emptive strategy based on conventional deep-strike weapons.

South Korea's new SSKs—which are equipped with SLBMs and other missile types—reportedly play a key part in its pre-emptive strategy.[111] Although the 2023 National Security Strategy does not have a particular focus on maritime security issues, South Korea has increasingly voiced concerns about North Korea's efforts to build a sea-based nuclear deterrent.[112] These concerns are related to the potential for North Korea's SSBs to contribute to mutual deterrence between North Korea and the USA—which from South Korea's perspective could undermine the credibility of its extended nuclear deterrence. As for North Korea's 'tactical nuclear submarine', while there is widespread scepticism about its operational capability, such a development could substantially enhance North Korea's ability to launch SLBMs, thereby posing a significant challenge to South Korea's defence.[113] In November 2023 South Korea and the USA conducted joint naval exercises that assumed 'scenarios involving threats from enemy submarines', and which were characterized by an expert as defending against 'maritime infiltration by North Korea'.[114]

While the maritime dimension of the North Korean threat—especially along the Northern Limit Line—has historical precedence, a more recent sign of the potential for conflict in the maritime domain was North Korea's live-fire artillery drills near the line in January 2024. These appeared to be a response to South Korea's decision in November 2023 to partially suspend the 2018 Panmunjom Declaration.[115] Under the agreement, the two sides had agreed to turn 'the area around the Northern Limit Line in the West Sea into a maritime peace zone'. Such limited confrontations are likely to persist.[116]

[109] '경애하는 김정은동지께서 조선민주주의인민공화국 최고인민회의 제14기 제10차회의에서 강령적인 시정연설을 하시였다' [Dear Leader Kim Jong Un makes commanding and instructive speech at 10th session of 14th North Korean Supreme People's Assembly], *Rodong Sinmun*, 15 Jan. 2024 (author translation).

[110] Panda, A., *Indo-Pacific Missile Arsenals: Avoiding Spirals and Mitigating Escalation Risks* (Carnegie Endowment for International Peace: Washington, DC, 2023).

[111] Ng, J., 'South Korean Navy takes delivery of second KSS-III SSK', *Asian Military Review*, 28 Apr. 2023.

[112] Cheng, H. (정현욱) et al., 국가 해양전략 기본구상 연구 [A study on the basic conception of the national ocean strategy] (Korea Maritime Institute: Busan, 2022); and South Korean Office of National Security (ONS), *The Yoon Suk Yeol Administration's National Security Strategy: Global Pivotal State for Freedom, Peace, and Prosperity* (ONS: Seoul, June 2023).

[113] Choi, W. (최원기), '북한 핵공격잠수함: "조잡하나 무시할 수 없어"' [North Korea's nuclear attack submarine: 'Crude, but impossible to ignore'], Voice of America, 13 Oct. 2023; and Bermudez, J. S., Cha, V. and Jun, J., 'North Korea launches new ballistic missile submarine', Beyond Parallel, Center for Strategic and International Studies (CSIS), 11 Sep. 2023.

[114] Park, J., 'US, ROK hold joint naval drill on defending against North Korean submarines', NK News, 14 Nov. 2023.

[115] Bremer, I., Kim, J. and Park, J., 'North Korea fires more than 60 rounds of artillery near Northern Limit Line: JCS', NK News, 6 Jan. 2024; and Lee, H., 'South Korea fires 400 artillery shells in response to North's provocation', *Korea JoongAng Daily*, 5 Jan. 2024.

[116] Panmunjom Declaration on Peace, Prosperity and Reunification of the Korean Peninsula, signed 27 Apr. 2018; and Agreement on the Implementation of the Historic Panmunjom Declaration in the Military Domain, signed 19 Sep. 2018.

Beyond deterring North Korea, the other main mission of South Korea's submarines is to safeguard SLOC against broader regional and global challenges. This also aligns with South Korea's long-standing aspiration to establish a blue water navy that is 'capable of extended operations within East Asia and short-term operations in more distant theatres such as the Indian Ocean and the Strait of Hormuz', as was first elaborated in 1995 by President Kim Dae-jung.[117] This strategic ambition has been realized to some extent, with the South Korean Navy actively engaging in anti-piracy operations off the coast of Somalia and patrolling the Gulf of Oman in recent years.[118] Nevertheless, despite the South Korean Navy's advanced capabilities, it appears that there is a lack of political commitment to fully exploit its potential for a blue water role.

[117] Hyun, M., 'South Korea's blue-water ambitions', The Diplomat, 18 Nov. 2010.

[118] Johnson, J., 'In similar move to Japan, South Korea to deploy anti-piracy unit to Middle East amid US pressure', *Japan Times*, 21 Jan. 2020.

3. Submarine and anti-submarine warfare capabilities in the Indo-Pacific

This chapter provides an overview of the submarine and ASW capabilities of key actors in the Indo-Pacific. The focus on these particular components of naval forces is due to their strategic significance, especially since SSBNs play a pivotal role in the deterrence relationships between nuclear-armed states and, in the eyes of some experts, form the 'basis of current strategic stability'.[119] Several non-nuclear-armed states also regard submarines as 'fundamentally important' for their defence.[120] Small states with extensive coastal areas view tactical submarines as providing an asymmetric advantage over the large navies of more powerful adversaries. This rationale can be seen to largely explain recent investments in tactical submarines by several South East Asian countries.[121] For major powers, tactical submarines also serve as a tool for power projection, especially when armed with conventional precision-strike weapons. The fact that ASW capabilities can hold under threat both tactical submarines and strategic SSBNs suggests possible scenarios in which conventional conflict can drive nuclear escalation (explored further in chapter 4).

Highlighting the extent of military build-up involving undersea capabilities provides a sense of submarine traffic in the Indo-Pacific. It also helps to understand the extent to which ASW capabilities are contributing to more 'transparent oceans'—meaning that they are making it increasingly hard for submarines to hide underwater without being detected. In addition, this overview serves to describe the military balance related to undersea capabilities, shedding more light on the priorities and threat perceptions discussed in chapter 2. Notably, most of the building programmes involving submarine and ASW capabilities take the form of qualitative improvements, as several states focus primarily on replacing old vessels, rather than increasing their fleets—although the two objectives sometimes overlap.

Strategic submarines

Several nuclear-armed states have long deployed nuclear weapons on submarines to ensure their survivability against counterforce attacks.

The United States, which views the sea-based nuclear deterrent as the 'most survivable leg of the nuclear triad', currently deploys 70 per cent of its operational US nuclear warheads attributed to strategic launchers in the 14 Ohio-class SSBNs that are in service.[122] The Ohio class will be retired beginning in 2029, to be replaced by a fleet of 12 Columbia-class SSBNs that are currently being built.[123] The Columbia class has been described as 'the world's stealthiest and most potent class of submarines'.[124] All of the US SSBNs have unrestricted access to the high seas; eight are home-ported at Bangor,

[119] Friedman, N., *Strategic Submarines and Strategic Stability: Looking Towards the 2030s* (Australian National University, National Security College: Canberra, Sep. 2019), p. 6. See also e.g. Stanhope, M., 'Lessons on strategic stability and SSBNs from the cold war', The Interpreter, Lowy Institute, 12 Dec. 2014.

[120] Reynolds, L., Australian minister for defence, quoted in Jennings, P. and Hellyer, M. (eds), *Submarines: Your Questions Answered* (Australian Strategic Policy Institute: Barton, Nov. 2020), p. 4. See also Friedman (note 119).

[121] Beng, A., 'Submarine procurement in Southeast Asia: Potential for conflict and prospects for cooperation', *Pointer: Journal of the Singapore Armed Forces*, vol. 40, no. 1 (2014).

[122] Kristensen, H. M. et al., 'United States nuclear weapons, 2024', *Bulletin of the Atomic Scientists*, vol. 80, no. 3 (May 2024).

[123] Submarine Industrial Base Council, 'Columbia class SSBN', 2024.

[124] Larson, C., 'A class of its own: New US Navy submarine will be the world's stealthiest', *National Interest*, 6 June 2022.

in Washington state on the Pacific coast of the USA, with the other six on the Atlantic coast (see table 3.1).

China's nuclear weapons were for a long time assigned mainly to land-based delivery systems and, in contrast to the vast Russian and US arsenals, have historically been relatively low in number. However, as part of its recent nuclear modernization and build-up, China has developed its sea-based deterrent. By 2013 China had deployed the nuclear-armed Type 094 (Jin-class) SSBN, which was regarded by the USA as China's 'first credible at-sea second-strike nuclear capability' given the greater stealth compared to its predecessors.[125] China currently has six Type 094 SSBNs in service.[126] However, even these modern Chinese SSBNs are noisy compared to corresponding Russian and US vessels.[127] This is why China is developing the quieter Type 096 SSBN.[128] In addition to noise, the survivability of China's sea-based deterrent is affected by geography; Chinese SSBNs, which are based at Longpo on Hainan Island, need to pass through the first island chain to access the Pacific, thus exposing them to adversary ASW. While the country's new SLBM, the Julang-3 (JL-3), could reach the Western parts of the US mainland even while operating from China's northern coastal waters, in order to get there from Hainan the SSBNs would need to pass through narrow straits close to the territory of US allies.[129] In addition to the JL-3, the Chinese SSBNs carry JL-2 SLBMs, which would have to be launched in the mid-Pacific Ocean in order to target western continental USA, or from east of Hawaii to threaten targets on the US east coast.[130]

The SSBNs of other nuclear-armed states also operate in Indo-Pacific waters. For example, Russia has five SSBNs assigned to its Pacific Fleet, home-ported at Rybachiy submarine base on the Kamchatka Peninsula.[131] The British, French and Indian SSBNs also have access to the Indo-Pacific.

Tactical submarines

Tactical submarines—or attack submarines, which they are often called—include SSKs and SSNs, with the latter having greater underwater endurance and speed. These vessels perform various military roles. Typically armed with torpedoes, anti-ship missiles and ASW capabilities, they provide a stealthy option for attacking surface ships and other submarines, serving the purpose of sea denial. Some also have a land-attack role, especially when armed with precision-guided missiles (i.e. cruise or ballistic missiles). Moreover, nuclear-armed states use tactical submarines to protect SSBNs against adversary ASW capabilities. Countries such as China, whose SSBNs face technological or geographical limitations that reduce their survivability, probably rely more on this function of SSKs and SSNs.[132]

China's fleet of 69 tactical submarines is the world's largest (see table 3.1). It consists mostly of SSKs but also includes some SSNs as well as one SSB that can also carry nuclear

[125] US Office of Naval Intelligence (ONI), *The PLA Navy: New Capabilities and Missions for the 21st Century* (ONI: Washington, DC, 2015), p. 16.

[126] Kristensen, H. M. and Korda, M., 'Chinese nuclear forces', *SIPRI Yearbook 2024: Armaments, Disarmament and International Security* (Oxford University Press: Oxford, 2024), pp. 321–22.

[127] Zhao, T., *Tides of Change: China's Nuclear Ballistic Missile Submarines and Strategic Stability* (Carnegie Endowment for International Peace: Washington, DC, 2018), p. 26.

[128] Kristensen and Korda (note 126), p. 322.

[129] Kristensen, H. M., Korda, M. and Reynolds, E., 'Chinese nuclear weapons, 2023', Bulletin of the Atomic Scientists, vol. 79, no. 2 (Mar. 2023).

[130] Kristensen and Korda (note 126), pp. 322–33.

[131] International Institute for Strategic Studies (IISS), *The Military Balance 2024* (Routledge: London, 2024), pp. 202, 205; and Daly, J. C. K., 'Russia's Pacific Fleet upgrades Kamchatka submarine base', *Eurasia Daily Monitor*, 5 Dec. 2021.

[132] On the different historical roles of Soviet and US SSKs and SSNs see Peppe, P. K., 'SSNs: Mounting an offensive defense', *Proceedings* (US Naval Institute), vol. 115, no. 9 (Sep. 1989).

Table 3.1. Selected submarine capabilities in the Indo-Pacific, 2024

	SSKs	Including SSKs with AIP or LIB	SSNs	SSBs	SSBNs
Australia	6	–	[6–8]	–	–
China	59	20	9 [2]	1	6 [(?)]
Indonesia	4 [5]	[2]	–	–	–
Japan	25 [5]	14 [5]	–	–	–
Korea, North	20	–	–	[2]	–
Korea, South	20 [7]	11 [7]	–	–	–
Malaysia	2	–	–	–	–
Philippines	[2–3]	–	–	–	–
Singapore	6 [2]	4 [2]	–	–	–
Taiwan	2[a] [8]	[8]	–	–	–
Thailand	[3]	[3]	–	–	–
United States[b]	–	–	38	–	8[c]
Viet Nam	6	–	–	–	–

[ ] = Planned or in development; AIP = Air-independent propulsion; LIB = Lithium-ion batteries; SSB = Ballistic missile submarine; SSBN = Nuclear-powered ballistic missile submarine; SSK = Diesel–electric attack submarine; SSN = Nuclear-powered attack submarine.

Note: Midget submarines are not included in this table.

[a] This figure excludes Taiwan's 2 outdated Hai Shih class (Tench) submarines dating from World War II, which are used for training.

[b] Projected US capabilities are not included. US numbers represent estimates of its deployments in the Indo-Pacific (constituting 75% of its global forces). E.g. the USA has a total of 50 SSNs in service.

[c] The USA has 14 Ohio-class SSBNs in service, 8 of which are in the Pacific.

Sources: SIPRI Arms Transfers Database, Mar. 2024; Pape, A., *Jane's Fighting Ships 2019–2020* (IHS Markit: Coulsdon, 2019); and International Institute for Strategic Studies (IISS), *The Military Balance 2024* (Routledge: London, 2024).

weapons.[133] Similar to the Soviet bastion strategy during the cold war, one major task for China's tactical submarines is presumably to provide protection to its SSBNs while they are moving between their base and their patrol area, especially when passing the first island chain. As experts have reported, Australia, Japan, the United Kingdom and the United States are 'attempting to track the movements of China's missile submarines', while observing that 'China's SSBNs typically appear to be accompanied by a protection detail, including surface warships and aircraft (and possibly attack submarines) capable of tracking adversarial submarines'.[134] Some of China's tactical submarines are also reported to have a stand-off capability, providing conventional deep-strike options that could be used in a land-attack role.[135]

The US fleet of tactical submarines consists solely of SSNs. As described by the US Navy, these vessels 'are designed to seek and destroy enemy submarines and surface ships; project power ashore with Tomahawk cruise missiles and Special Operation Forces (SOF); carry out [ISR] missions; support battle group operations; and engage in mine warfare'.[136] In contrast to China, the USA arguably has less need to use tactical submarines to support strategic nuclear missions given that its SSBNs have easier access to the high seas.

[133] Roblin, S., 'Meet the Qing-class: China's homegrown nuclear missile submarine', *National Interest*, 3 Nov. 2019.

[134] Torode, G. and Lague, D., 'Special report: China's furtive underwater nukes test the Pentagon', Reuters, 2 May 2019; and Kristensen et al. (note 129), p. 126.

[135] Torode, G., 'China chases US and Russia guided-missile submarine capabilities with new vessels', Reuters, 25 Oct. 2023.

[136] US Navy, 'Attack submarines—SSN', America's Navy, 15 Mar. 2024.

Japan operates the second largest fleet of SSKs in the region, after China, followed by South Korea and North Korea. While the number of North Korea's SSKs is roughly equal to that of South Korea and not far behind Japan, they are based on a design dating from the late 1950s and so their quality is not comparable; for example, none of the North Korean vessels include air-independent propulsion or lithium-ion batteries, which are increasingly used by more modern navies to enhance the underwater endurance of SSKs. Japan's SSKs—similar to those of Indonesia, Malaysia, Singapore, Taiwan and Viet Nam—serve the national defence role of safeguarding sovereignty and territorial integrity in contested waters, apparently reflecting the perceived need for asymmetric advantage against China's naval power.[137] The delivery of six SSKs from Russia in 2013–17 also marked the establishment of Viet Nam's submarine force, substantially bolstering the Vietnamese Navy's ability to patrol the South China Sea.[138] Meanwhile, in addition to national defence, Singapore has referred to the protection of SLOC as a rationale for its SSK procurement.[139]

Australia's plan to replace its ageing Collins-class SSKs with SSNs as part of the AUKUS agreement represents a significant increase in terms of the endurance, speed and sensor technology of its tactical submarine fleet.[140] Although Australia plans to fill in the gap between the retirement of the current submarines and the expected delivery of the SSNs in the 2040s with the procurement of Virginia-class SSNs from the USA, experts have raised questions about the USA's ability to provide those vessels.[141] According to Australian experts, the SSNs will enable the country 'to project and sustain credible, deterrent force at greater distance from Australia'; 'provide the nation with greater strategic weight both alone and with our partners and allies', and also equip it with 'a more future-proof capability, retaining its effectiveness in the face of developing antisubmarine threats for longer than conventional submarines will'.[142] Australia's objective of achieving deterrence at greater distance is further highlighted by its acquisition of Tomahawk SLCMs, which can be deployed on both surface ships and submarines.[143]

Indeed, the land-attack role of tactical submarines has been highlighted by the frequent use of Tomahawk SLCMs by the USA and, more recently, Kalibr cruise missiles by Russia in conflicts in the Middle East.[144] In addition to Australia, several actors in the Indo-Pacific are currently pursuing a similar deep-strike capability based on tactical submarines. For instance, one class of South Korean SSKs, the KSS-III, already has a vertical launch system (VLS) for land-attack missiles.[145] In addition to SLCMs, these would include the SLBMs that South Korea is developing—the only non-nuclear-armed state to do so.[146] Japan is also planning to deploy Tomahawk SLCMs on its SSKs.[147]

[137] Japanese Ministry of Defense, 'National defense strategy', Provisional translation, Dec. 2022, p. 12.

[138] Ng, J., 'Vietnam's catch up challenge', *Asian Military Review*, 27 June 2019; and Pape, A., *Jane's Fighting Ships 2019–2020* (IHS Markit: Coulsdon, 2019), p. 1007.

[139] Beng (note 121).

[140] Tarapore, A., 'AUKUS is deeper than just submarines', Stanford University, Freeman Spogli Institute for International Studies, 29 Sep. 2021.

[141] E.g. Turnbull, M., 'Australia chose Aukus and now it faces the prospect of having no submarine capability for at least a decade', *The Guardian*, 25 Mar. 2024.

[142] Nicholls, A., Dowie, J. and Hellyer, M., *Implementing Australia's Nuclear Submarine Program* (Australian Strategic Policy Institute: Barton, Dec. 2021), p. 17.

[143] Whiteman, H. and Watson, A., 'US agrees to sell 220 Tomahawk missiles to Australia', CNN, 17 Mar. 2023; and Burgess, R. R., 'AUKUS agreement will provide Tomahawk missiles to Australian Navy', SeaPower, 1 Nov. 2021.

[144] 'Where are the shooters? A history of the Tomahawk in combat', The Sextant, 7 Apr. 2017; and 'Russia hits targets in Syria from Mediterranean submarine', BBC, 8 Dec. 2015.

[145] Bergmann, K., 'South Korean submarine launch milestone', *Asia-Pacific Defence Reporter*, 4 Apr. 2024.

[146] Cohen, M., 'South Korea's new SLBMs are a signal to North Korea and the US', NK News, 21 Sep. 2021.

[147] Takahashi (note 71).

Table 3.2. Selected anti-submarine warfare capabilities in the Indo-Pacific, 2024

	Aircraft	Helicopters	Major surface ships	Minor surface ships	SSKs	SSNs
Australia	12 [15]	23 [36]	11 [13–17]	–	6	[6–8]
China	29	60	88 [3]	50	59	9 [2]
Indonesia	–	5	18 [10]	14	4 [5]	–
Japan	75 [44]	92	52 [8]	–	25 [5]	–
Korea, North	–	4	2	3 [2]	20	–
Korea, South	17 [5]	30 [12]	27 [12–15]	5	20 [7]	–
Malaysia	–	6	4 [6]	–	2	–
Philippines	–	2	5 [2]	1 [1]	[2–3]	–
Singapore	5	8	6	–	6 [2]	–
Taiwan	12	25–26	24	13	2 [8]	–
Thailand	2	2	9 [1]	8	[3]	–
United States[a]	108	203	92	–	–	38
Viet Nam	–	6	4	7	6	–

[ ] = Planned or in development; SSK = Diesel–electric attack submarine; SSN = Nuclear-powered attack submarine.

Note: Patrol craft are not included in this table.

[a] Projected US capabilities are not included. US numbers represent estimates of its deployments in the Indo-Pacific (constituting 75% of its global forces). E.g. the USA has a total of 145 ASW aircraft in service.

Sources: Tables A.1–A.5 in appendix A.

Anti-submarine warfare capabilities

ASW capabilities include both sensors to locate, identify and track submarines and weapons that can be used to attack them. These can be integrated into several kinds of military platform, such as other submarines (as discussed above), surface ships, maritime patrol aircraft and maritime helicopters. While submarines and surface ships are by nature multipurpose—meaning that ASW is just one of many military functions they can perform—ASW aircraft and helicopters are typically dedicated mainly to this particular purpose. The increase in all of these platforms in the Indo-Pacific since 2010 indicates that, alongside submarines, actors in the region are heavily investing in ASW or capabilities with an ASW function.

The United States Navy is the most powerful ASW force globally, although only a proportion of its assets are stationed in the Indo-Pacific (see table 3.2 and appendix A). US ASW capabilities include, among other things, a large number of P-8 Poseidon aircraft—considered the world's most capable ASW aircraft.

China's ASW force is comparable to that of the USA in terms of the number of assets deployed in the region, although not in terms of quality. The large number of Chinese ASW assets is the result of a significant expansion of its naval capabilities in the past two decades. This has also included enhancement in the quality of ASW sensors and weapons, seemingly a focus area for China's major surface ships.[148]

Among US allies in the region, Japan leads both in the quantity and quality of ASW assets. In addition to modern submarines and surface ships equipped with advanced ASW sensors and weaponry, Japan operates the largest ASW aircraft fleet of any Asian country, while most of its major warships have ASW as their primary role.[149] All Japanese ships and a significant of part of their ASW equipment are indigenous designs.

South Korea also has an advanced ASW capability, which is focused on North Korea's submarines. In addition to SSKs and aircraft, it includes major surface ships. While

[148] Wong, K., 'Undersea dragon: Chinese ASW capabilities advance', *Jane's International Defence Review*, 2017.
[149] Pape (note 138), pp. 443–46.

most of South Korea's major surface ships do not have a primary ASW role, they are well equipped for it. In addition to the procurements of new, more advanced ASW platforms, South Korea's older SSKs and major surface ships will be modernized with improved sonars.[150]

All of Taiwan's naval capabilities, including ASW, serve to defend against a Chinese amphibious attack as well as to defend the country's SLOC in its southern littoral waters. However, Taiwan's ships are ageing—a shortcoming that the development of its new SSK partly seeks to address.[151]

While Australia's surface ships are dedicated to roles other than ASW, they also have significant ASW capabilities. However, these have been somewhat reduced with the replacement of Adelaide-class frigates by Hobart-class destroyers, which carry only one helicopter.[152]

In South East Asia, Indonesia possesses the most substantial ASW capability, which is also ageing. Like Indonesia, Malaysia must secure vast maritime territory, yet its ASW assets are limited.[153] Singapore's ASW fleet is relatively modern, while Viet Nam's ASW capability was enhanced significantly with the delivery of six SSKs.[154] The Philippines has also recently invested in two ASW helicopters and ASW equipment upgrades to its frigates in response to escalating tensions with China.[155]

North Korea's ASW capabilities are limited. For example, the sensors of its submarines and surface ships only include outdated hull-mounted sonars. North Korea has reportedly procured ASW helicopters from Cuba, and it has deployed helicopter-carrying frigates, partly to protect the strategically important naval base at Wonsan on its east coast.[156]

[150] E.g. Cha, E., 'South Korea to upgrade KSS-II Son Won-Il class submarines', Naval News, 22 Aug. 2023; and Lee, D., 'Second KDX-I destroyer delivered to ROK Navy following PIP', Naval News, 2 Nov. 2021.

[151] E.g Saunders, S., *Jane's Fighting Ships 2016–2017* (IHS Janes: Coulsdon, 2016), pp. 820–22; and SIPRI Arms Transfers Database, Mar. 2024.

[152] Saunders (note 151), p. 28.

[153] Pape (note 138), p. 30.

[154] Ng (note 138); Pape (note 138), p. 995; and Saunders (note 154), pp. 662, 760, 762, 764.

[155] Mangosing, F., 'Navy deploys anti-submarine warfare assets to WPS', *Philippine Daily Inquirer*, 28 June 2023; and Quismorio, E., 'PH's plan to acquire submarine warship justified; Solon explains why', *Manila Bulletin*, 4 Feb. 2024.

[156] Oliemans, J. and Mitzer, S., 'In aid of Juche: How Cuban anti-submarine helicopters ended up in North Korea', NK News, 13 May 2020; and Keck, Z., 'North Korea fields new helicopter-carrying frigates', The Diplomat, 16 May 2024.

4. How security dilemmas affect regional and strategic stability

The states of the Indo-Pacific have sought to hedge against aggressive behaviour of their rivals and adversaries through military build-up and posturing, especially in the naval domain. At the same time, they have shown a tendency to discount any defensive intent that might be motivating the other side, and to view them purely as power-seeking. As highlighted in chapter 2, such security dilemma dynamics in the context of the Chinese–United States rivalry reverberate across the region, with several states perceiving risks related to China's increasing power and assertiveness or a potential regional conflict involving China and the USA, or both. The conflict dynamics in the Korean Peninsula also affect the region more broadly, especially through North Korea's long-range missile tests. Combined with frequent demonstrations of force—such as military exercises and coercive operations—any of these dynamics could spiral out of control, leading to regional crises and, in certain circumstances, they even risk the use of nuclear weapons.

This chapter discusses the escalation risks that security dilemma dynamics in the Indo-Pacific pose to regional and strategic stability, highlighting the role of undersea capabilities. It describes how they can expand the risk of escalation both horizontally—to involve a wider geographical region and wider group of countries—and vertically—to grow in scale from minor to major. It also observes how the paucity of regulatory mechanisms applicable to undersea capabilities can compound these effects.

Undersea dynamics and the increased frequency of dangerous incidents

The large scale of maritime traffic, the increased number of military exercises and the use of grey zone tactics in the Indo-Pacific creates the potential for more frequent incidents. Indeed, a high number have already taken place: a report on incidents in 2010–22 identifies 21 military-to-military incidents—that is, 'an accidental or deliberate encounter between naval vessels or military aircraft or any occurrence that is associated with the operation of a ship and/or aircraft which affects or could affect the safety of operation'—and 59 incidents involving non-military (e.g. coastguard or fishing) vessels;[157] there were at least a further 7 military-to-military incidents in the region in 2023 and early 2024.[158]

Most of the reported incidents took place in the maritime domain, with several military-to-military incidents involving Chinese and US or allied aircraft over the sea. Of the 28 military-to-military incidents between 2010 and 2024, one-quarter involved ASW aircraft or helicopters, including 4 incidents with US or Australian P-8 Poseidon aircraft—which, as noted above, is considered the world's most advanced ASW aircraft.[159] China also frequently reacts to the presence over the South China Sea and

[157] Strating, R., *Assessing Military and Non-military Incidents at Sea in the Asia-Pacific* (VERTIC/Asia-Pacific Leadership Network: Seoul, July 2023), pp. 6, 21–22.

[158] Graham, E., 'China's latest unsafe interception at sea was no accident', The Strategist, Australian Strategic Policy Institute, 8 May 2024; Reuters and Karp, P., 'Australian warship HMAS Toowoomba sailed through sensitive Taiwan Strait close to China', *The Guardian*, 24 Nov. 2023; Gray, M., 'Chinese warship nearly hits US destroyer in Taiwan Strait during joint Canada–US mission', Global News, 3 June 2023; Lieberman, O. and Britzky, H., 'US says Chinese jet conducted "unnecessarily aggressive maneuver" intercepting US spy plane over South China Sea', CNN, 31 May 2023; AP, 'China threatens consequences over US warship's actions in South China Sea', NBC News, 24 Mar. 2023; Watson, I., Jozuka, E. and Campisi, D., 'Chinese fighter jet confronts US Navy plane with CNN crew aboard as tensions simmer in the South China Sea', CNN, 24 Feb. 2023; and Lendon, B., 'Videos show both sides of US–China aerial encounter—And highlight the risks involved', CNN, 4 Jan. 2023.

[159] Watson et al. (note 158); Graham (note 158); and Strating (note 157), pp. 21–22.

the Taiwan Strait of a P-8 in the form of rhetorical objections or by sending its combat aircraft to shadow it.[160]

Given the predominant ASW role of the P-8, the incidents involving this aircraft type can be seen to be driven by undersea dynamics; as noted by one observer, China is particularly concerned about the ability of the P-8's sonar systems 'to collect intelligence about its submarines and their movements'.[161] While similar concerns about the nuclear counterforce potential of ASW capabilities might to some extent also lie behind other incidents—such as the five encounters between Chinese and US or Australian surface ships with advanced ASW capability that took place between 2010 and 2024—this would be harder to demonstrate given the multipurpose role of these platforms.[162]

While concerns about the impact on Chinese submarines of the ASW capabilities of the USA and its allies thus seem to drive at least some incidents above the surface, reported submarine incidents remain rare. Yet, the risk of submarine-to-submarine collision will increase as the submarine fleets that operate in the region—particularly in the shallow waters of the East and South China seas—grow and as more states acquire them.[163] The stealth of the most advanced vessels could in principle prevent submarines from detecting one another, adding to the risk of collision. This seems to have been the case with the collision of British and French SSBNs in the Atlantic in 2009.[164]

Close proximity between submarines might also lead to incidents if the intentions of adversaries are mistakenly viewed as aggressive. This could happen while the vessels pass or trail one another.[165] Related to this, accidental damage to either a submarine or a surface ship could be misinterpreted as a malicious act and attributed to an adversary's submarine. In addition to stealth, the general lack of transparency in the undersea environment can also make attribution difficult in such cases. This problem is illustrated by the 2010 sinking of the South Korean Navy corvette *Cheonan*, which killed 46 crew members; while unconfirmed evidence pointed to the possibility of a torpedo attack by a North Korean submarine, the real cause of the incident remains contested.[166]

The mere presence of a foreign submarine in waters claimed by a state to be its territorial waters could, if detected, be considered a threat necessitating a response.[167] For example, in 2021 a US SSN collided with an unidentified object while submerged in the South China Sea, injuring 11 sailors.[168] The incident sparked a strong response from China, with a state-owned television network characterizing the US operation as an effort to 'secretly infringe on China's maritime territory in the [South China Sea]', which 'runs the risk of triggering a war between these two major powers by miscalculation'.[169]

[160] E.g. Czachor, E. M., 'China says its warplanes shadowed "trespassing" US Navy spy plane over Taiwan Strait', CBS News, 7 Dec. 2023; and Mongilio, H., 'US Navy P-8 flies over Taiwan Strait, causing China to scramble', US Naval Institute News, 28 Apr. 2023.

[161] Strating (note 157), p. 10.

[162] Reuters and Karp (note 158); Gray (note 158); and Strating (note 157), pp. 22–23.

[163] Robson, S., 'More undersea activity in South China Sea increases risks, experts say after submarine crash', *Stars and Stripes*, 8 Oct. 2021.

[164] Norton-Taylor, R., 'Two subs, dozens of nuclear warheads, one huge ocean—And a stroke of bad luck', *The Guardian*, 17 Feb. 2009.

[165] Miasnikov, E., 'Preventing submarine collisions: Answers to the questions of US nationwide policy debaters', Moscow Institute of Physics and Technology, Center for Arms Control, Energy and Environmental Studies, 21 Aug. 2003.

[166] Strating (note 157), p. 8.

[167] Stricker, B., 'Rules of engagement and undersea incursions: Reacting to foreign submarines in territorial waters', Center for International Maritime Security (CIMSEC), 6 Feb. 2023.

[168] 'South China Sea: US submarine collides with unknown object', BBC, 8 Oct. 2021.

[169] Korybko, A., 'The US' nuclear sub accident in the South China Sea is significant', China Global Television Network, 9 Oct. 2021.

Expanded scope of incidents: Horizontal escalation

The greater number of undersea capabilities and the growing number of states operating them can also expand the geographical scope of incidents and potential conflicts related to them. This could mean that an incident might spill over to several countries and across subregional theatres. The risk of such horizontal escalation is highlighted by the tangled web of alliances and partnerships in the Indo-Pacific. Adding to the risk is the versatile nature of contemporary submarine and ASW capabilities. Insofar as these capabilities have implications for both regional security and strategic relations between nuclear-armed states, China might target US allies based on concerns primarily related to its strategic relationship with the USA.

Again, incidents with P-8 aircraft can illustrate this point. In 2015 China accused the USA of 'regional militarization' when it deployed a P-8 to Singapore.[170] Yet, as noted above, P-8s are not only operated by the USA but also by several of its allies in the region, which have also reported incidents with China. For instance, in May 2022 China intercepted an Australian P-8 over the South China Sea, releasing chaff that was ingested by the aircraft engine, which Australia termed a 'dangerous manoeuvre which posed a safety threat'.[171] China justified its reaction by referring to the 'dangerous and provocative acts' of the Australian P-8.[172]

These examples underscore Chinese threat perceptions about technological exchange and procurement among the USA and its allies. Similar dynamics can also be seen to be at play regarding tactical submarines and surface ships, given their multipurpose nature that allows for considerable ASW potential. Perhaps the most telling example of this is China's objections to Australia's planned procurement of SSNs under the AUKUS agreement. While China has been rather reticent about the exact nature of its concerns, a 2024 report by a Russian research institute indicates the strategic rationale that arguably underlies both Chinese and Russian concerns. According to the report, 'From the late 2030s onwards, the [Australian Navy's] SSN capability will be at a level posing a persistent risk to the survivability of the Russian Pacific Fleet's strategic deterrent.'[173] In particular, the risk is associated with the SSN's ability to penetrate Russia's SSBN bastion in the Sea of Okhotsk and to target SSBNs leaving their base at Rybachiy submarine base with long-range precision-strike weapons such as Tomahawk SLCMs.[174] Similar considerations arguably lie behind China's objections to AUKUS as its SSBNs are even more vulnerable to adversary ASW than Russia's.

The risk of horizontal escalation can also take the form of a potential dual-crisis situation: the notion that an escalation in one subregion might instigate escalation in another. Such a concern has been raised by Japanese, South Korean and US expert and policy communities in relation to the Taiwan Strait and the Korean Peninsula.[175] For

[170] Tiezzi, S., 'China decries US P-8 deployment in Singapore as "regional militarization"', The Diplomat, 9 Dec. 2015.

[171] Australian Department of Defence, 'Chinese interception of P-8A Poseidon on 26 May 2022', 5 June 2022; and Yeo, M., 'Details surface on China's "dangerous" interception of RAAF P-8A', *Australian Defence Magazine*, 6 June 2022.

[172] Lendon, B., 'Chinese fighter jet "chaffs" Australian plane near South China Sea, Canberra alleges', CNN, 7 June 2022.

[173] Ladanov, V., *Dealing with the Royal Australian Navy's SSN Capability: Risk Reduction Options* (PIR Center: Moscow, 2024), p. 5.

[174] Ladanov (note 173), p. 16.

[175] Kim, J., 'Strategic stability on the Korean Peninsula: Dual crisis and risk reduction measures', European Leadership Network and Asia-Pacific Leadership Network, Feb. 2024, pp. 10–11; and Michishita, N., 'Japan's new National Security Strategy: Getting committed to the defense of Taiwan', Center for Strategic and International Studies (CSIS), June 2023, p. 7.

example, it is assumed that, if a conflict over Taiwan were to spread to the East China Sea, then North Korea might become directly involved.[176]

The interplay of strategic and regional security dynamics and the related risk of horizontal escalation can also function in reverse direction; in other words, capabilities that have relevance for nuclear operations may have an impact on regional dynamics revolving around concerns about conventional aggression. For instance, while one key task for China's SSKs and SSNs is the protection of its SSBNs, these submarines are also potent tools of conventional war. Their presence in or near contested regions could therefore trigger reactions from other regional actors, reflecting concerns that China might be preparing to use these vessels in conventional military operations—for example, to impose a blockade or anti-access/area denial (A2/AD) 'bubble' around Taiwan or to defend its territorial claims in the South China Sea.

Expanded scale of incidents: Vertical escalation

Accompanying the expansion in the scope of incidents is the issue of scale, meaning the potential for an incident to escalate to a major regional conflict. Security dilemmas and the related worst-case scenario planning create conditions for high-level escalation through efforts to prepare for and ensure the ability to prevail in a major war. Often these efforts also involve drills and exercises which, in addition to their training and rehearsal function, serve to show off military capabilities with the intention of creating a deterrent effect. However, if—as is likely—worst-case projections are mutual, the other side is predisposed to view such efforts as a sign of readiness or even of preparation for aggression. This could lead to inadvertent escalation through misperception, miscalculation or misunderstanding.

In the Indo-Pacific, such dynamics are prominent especially in the Taiwan Strait and on the Korean Peninsula. In the case of Taiwan, despite the November 2023 meeting between Chinese President Xi Jinping and US President Joe Biden that aimed to stabilize their bilateral relationship, experts warn about continuing trends that might contribute to confrontation.[177] In addition to worst-case projections about each other's intentions, these trends include domestic pressure for the leadership of both countries to demonstrate resolve and assertiveness on the Taiwan issue, and the erosion of previous Chinese–US understanding over the island's status.[178] Although the threshold for nuclear weapon use arguably remains high for both China and the USA, a potential confrontation between these two nuclear-armed states inevitably includes the risk of nuclear escalation. As noted above, this worst-case scenario is also part of these two countries' mutual threat perceptions, with each assuming a readiness by the other side to seek to control escalation by using nuclear weapons first.

As for the Korean Peninsula, the high degree of tension and mistrust that has characterized the relations between North Korea and South Korea for decades could quickly escalate to a high-level conflict. The mutual hostility is fuelled by aggressive rhetoric and posturing—including frequent missile tests and nuclear threats by North Korea, as well as regular military exercises by South Korea and the USA. For example, after calling the South Korean–US military exercises in early 2024 'frantic, reckless', North Korea warned that 'a nuclear war may be ignited even with a spark'.[179] The risk

[176] Kim (note 175); and Michishita (note 175).

[177] Wang, C., 'China military exercising restrain lately Taiwan officials say', Bloomberg, 18 Mar. 2024; and Swaine, M. D., 'Stabilizing the growing Taiwan crisis: New messaging and understandings are urgently needed', Quincy Brief no. 53, Quincy Institute for Responsible Statecraft, Mar. 2024.

[178] Swaine (note 177).

[179] Shin, H., 'North Korea denounces South Korea–US military drills, warns of consequences', Reuters, 5 Mar. 2024.

of a conventional conflict turning into a nuclear war is highlighted not only by North Korea's heavy reliance on nuclear weapons, but also by the pre-emptive doctrines of both sides, which could trigger an inadvertent nuclear war.[180] Further adding to the latter risk is North Korea's concerns about the vulnerability of its second-strike nuclear forces. These might lower North Korea's threshold for nuclear weapon use in case it perceived the threat of an imminent disarming strike by South Korea and the USA.[181]

To be sure, incidents related to undersea capabilities alone may not necessarily trigger a major regional war—even though the 2010 *Cheonan* incident does point to the existence of this possibility. However, if such a war were to occur, submarines and ASW can be expected to play a prominent role, alongside other military capabilities. For instance, in a potential conflict over Taiwan, China could use its tactical submarines to cut supply routes to the island, to which the USA and allies could respond by employing their ASW capabilities. Similarly, the USA and its allies could launch SLCMs against Chinese forces from submarines, to which China could respond with its own ASW capabilities. In this context of undersea warfare—which might be accompanied by heightened readiness of both Chinese and US nuclear forces—China could also react more strongly to any perceived efforts by the USA or its allies to target its SSBNs with ASW. The nuclear–conventional entanglement in undersea capabilities can thus be seen to add to escalation risks, meaning that employment of ASW by the USA or its allies could be mistakenly viewed by China as an effort to undermine its nuclear second-strike capability in preparation for a nuclear strike. Moreover, were the USA to resort to nuclear weapon use—whether in the form of a nuclear first strike or a second strike in response to first use by China—it could choose to do this by using either its SSBN-launched W76-2 low-yield warhead or other limited nuclear weapon options delivered from the air.[182]

As for nuclear escalation risks related to a conventional conflict in the Korean Peninsula, one scenario is that North Korea might seek to avoid defeat by resorting to limited nuclear strikes—possibly launched from its tactical nuclear submarine—in an effort to control escalation. In effect, one key priority for South Korea and the USA would be to limit the damage from North Korea's nuclear forces. In case they perceived an imminent nuclear threat from North Korea, they could attempt to limit the damage though massive counterforce strikes. These would be likely to involve conventional deep-strike weapons, such as SLCMs or SLBMs, launched from tactical submarines. The task of destroying hardened targets, such as missile silos, would also suggest the need for limited nuclear strikes by the USA—which could be carried out with the SSBN-launched W76-2 warhead. Perceiving the threat of such a disarming strike, North Korea might resort to massive nuclear weapon use in line with the 'use or lose' logic. While the sea-based platforms seem to be key to North Korea's effort to deter such a disarming strike, the USA and its allies would probably be able to detect and target them using ASW.

The paucity of regulatory mechanisms for undersea capabilities

Cooperative mechanisms and normative frameworks can regulate behaviour and reduce mistrust, thereby potentially decreasing the frequency of incidents and mitigating their consequences, including by preventing horizontal and vertical escalation. There are

[180] Panda, A., 'South Korea's "decapitation" strategy against North Korea has more risks than benefits', Carnegie Endowment for International Peace, Commentary, 15 Aug. 2022.

[181] Panda (note 180).

[182] Kristensen, H. M. and Korda, M., 'United States nuclear forces', *SIPRI Yearbook 2024* (note 126), pp. 280, 282.

already valuable cooperative mechanisms in the Indo-Pacific that have contributed to building confidence and to normative frameworks in the naval domain, and military-to-military communication already takes place among several Indo-Pacific actors.[183] However, the existing mechanisms have clearly not been sufficient to prevent incidents. In the case of undersea capabilities, there is the additional challenge of secrecy, given the centrality of stealth to submarine operations.

Some of the most significant existing regulatory mechanisms are hotlines that have been established between China and Japan and between China and ASEAN member states.[184] Notably, there is none between China and the USA. However, in 2014 their defence ministries agreed memoranda of understanding on notification of military activities and on rules of behaviour.[185] Moreover, at the time of writing, the two countries are reportedly seeking to establish high-level communication channels, notably between US Indo-Pacific Command and China's Eastern Theatre Command.[186]

One important forum for regional military dialogue on naval issues is the biennial Western Pacific Naval Symposium (WPNS), which includes naval leaders from several Indo-Pacific states.[187] In 2014 the discussions at the symposium produced the Code for Unplanned Encounters at Sea (CUES), a voluntary and non-binding agreement that seeks to reduce the risk of naval incidents as well as their escalation.[188] The 21 countries that are part of the agreement include Australia, China, Indonesia, Japan, South Korea, Malaysia, the Philippines, Russia, Singapore, Thailand, the USA and Viet Nam. Taiwan also reportedly implements the agreement.[189]

CUES includes safety procedures related to exercises with submarines, but the related provision is short: 'When conducting exercises with submarines, surface naval ships should consider the display of the appropriate signals from the International Code of Signals to indicate the presence of submarine(s) in the area.'[190] While CUES contains more extensive safety measures related to the avoidance of collisions at sea, these are focused on surface ships.[191] As argued by an expert, the signalling and communications procedures outlined in connection with the provision on submarines are infeasible.[192] To fill this apparent gap in practical measures for safe conduct of submarine operations, the chief of the Singaporean Navy has proposed an undersea version of CUES.[193] There are also differing interpretations of the geographic scope of CUES.[194]

Navigational rights in international straits as set forth in UNCLOS apply to ships in their 'normal modes of continuous and expeditious transit', including submerged

[183] Anthony et al. (note 3).

[184] Anthony et al. (note 3), p. 16; and Bosack, M. M., 'The significance of the new Japan–China defense hotline', *Japan Times*, 19 May 2023.

[185] Memorandum of Understanding between the US Department of Defense and the Chinese Ministry of National Defense on Notification of Major Military Activities Confidence-building Measures Mechanism, signed 31 Oct. and 4 Nov. 2014; and Memorandum of Understanding between the US Department of Defense and the Chinese Ministry of National Defense regarding the Rules of Behavior for Safety of Air and Maritime Encounters, signed 9–10 Nov. 2014.

[186] Crabtree, J., 'Can a US–China military hotline stop the downward spiral?', *Foreign Policy*, 27 May 2024.

[187] Gou, Y., 'China to host 19th Western Pacific Naval Symposium for the first time in 10 years', *Global Times*, 20 Apr. 2024.

[188] Code for Unplanned Encounters at Sea, version 1.0, Western Pacific Naval Symposium, 22 Apr. 2014.

[189] DeAeth, D., 'Taiwan and Philippine navies have unexpected encounter at sea', *Taiwan News*, 27 Apr. 2019.

[190] Code for Unplanned Encounters at Sea (note 188), para. 2.7.1.

[191] Code for Unplanned Encounters at Sea (note 188), section 2.

[192] Ton, A. D., 'Code for Unplanned Encounters at Sea and its practical limitations in the East and South China Seas', *Australian Journal of Maritime & Ocean Affairs*, vol. 9, no. 4 (2017).

[193] Zhai, K. and Tweed, D., 'Singapore Navy chief calls for Asian submarines to join conduct code', Bloomberg, 16 May 2017.

[194] Ton (note 192).

transit in the case of submarines.[195] But increased traffic in the Indo-Pacific can complicate these transit operations. The undersea dimension remains largely overlooked in other risk-management frameworks, and the ongoing negotiations between China and ASEAN members on a code of conduct in the South China Sea reportedly does not focus on this aspect; indeed, dating back to the 2002 declaration between the parties, submerged operations have never been part of the conversation on a code.[196]

[195] United Nations Convention on the Law of the Sea (note 2), Article 39.

[196] 'China, ASEAN unlikely to achieve Code of Conduct in 2024: experts', Radio Free Asia, 7 Feb. 2024; and ASEAN–China Declaration on the Conduct of Parties in the South China Sea, 4 Nov. 2002.

5. Conclusions: Ways to reduce risks related to undersea capabilities

The Indo-Pacific is characterized by a complex interplay of geopolitical, economic and security dynamics, reflected in the ongoing contestation over the region's conceptualization and boundaries. The emergence of the Indo-Pacific framework underscores the growing importance of maritime connections in the region. Economic imperatives and strategic considerations also help to explain the undersea armament of key actors in the region, with objectives that include safeguarding territorial integrity, sovereignty, sea lines of communication, energy security and fisheries. As this report demonstrates, the trends are not limited to great power competition but are instead endemic across the region, involving numerous actors. Such armament dynamics are significant and are likely to continue, especially in relation to submarine and ASW capabilities. At the same time, the risks related to these capabilities are increasing; incidents involving submarines could have the most severe consequences, and some of the incidents that have already taken place above the water involve ASW capabilities.

There is thus a need to address the lacuna and to mitigate risks related to such undersea capabilities. The existing naval hotlines, which can be used to clarify intentions during incidents and to prevent worst-case scenarios, could be strengthened and new hotlines established, notably between China and the United States in line with their current efforts. These military-to-military channels could also be used in connection with incidents involving undersea capabilities. Ensuring routine use of existing hotlines in peacetime, including through designated points of contacts, and even potential public reporting on successful cases of using hotlines could serve as transparency measures to ensure the functionality of such communication during times of tension. While some scepticism persists regarding the efficacy of hotlines during emergencies, particularly if one party chooses not to respond, keeping open the option of directly talking to the other side can have a crucial effect on how events unfold.

Meanwhile, national notification mechanisms, for example on military exercises, could be expanded to become bilateral or multilateral mechanism. With standardization of data and format, they would provide a means for naval and non-naval actors, as well as different naval forces, to enhance situational awareness and maintain safe distances. A regional information hub that facilitates reporting on military exercises, including those that involve submarine and ASW capabilities, could be helpful in this regard, drawing on the model of the Vienna Document 2011 on Confidence- and Security-building Measures of the Organization for Security and Co-operation in Europe (OSCE).[197] Instead of leaving the analysis of past incidents to the media, states could also do more to exchange information on incidents they perceive as dangerous in a confidential context, as private discussion might allow for more constructive engagement and greater understanding of what constitutes concerning behaviours for each side.

While rivals and adversaries may find it hard to agree any regulation or confidence- and security-building measure on submarines, there might be scope for such measures in relation to ASW capabilities. For example, China might be less prone to react to reconnaissance flights above the coastal waters where its SSBNs operate if they were to be conducted by less capable aircraft than P-8s. Establishing rules of behaviour for such air and maritime encounters, including by updating the 2014 Chinese–US memoranda of understanding or extending them to US allies, could help prevent such incidents in

[197] Vienna Document 2011 on Confidence- and Security-Building Measures, adopted by the participating states of the Organization for Security and Co-operation in Europe 30 Nov. 2011, entered into force 1 Dec. 2011.

the future from escalating. Separately, a non-binding agreement in the vein of CUES could be reached to establish rules of the road for undersea operations as previously proposed by the chief of the Singaporean Navy. This could be piloted between trusted partners, such as the USA and its allies. At a minimum, such a code could mean avoidance of collision between the submarines of allies, but it could also contain measures to reassure adversaries on ASW capabilities, notably by minimizing the impact of reconnaissance flights on strategic threat perceptions related to SSBN survivability.

While the above suggestions assume that risk reduction involving undersea capabilities is possible, there are obvious limitations to tangible regulatory mechanisms on undersea capabilities. From this perspective, it is imperative to address the psychological factors that ultimately drive decision-making. At the national level, there is a need for training that ensures that the mindset of front-line commanders is oriented towards de-escalation. This includes recentring on assumptions of accidents and misunderstandings, rather than malintent, during close encounters, with a high burden of proof and consultation of superior officers required before the alternative can be considered. For nuclear-armed states, bilateral or multilateral strategic dialogues present a path for engagement that can provide a way to better understand the other side's stakes, motivations and objectives, including in relation to their strategic submarines and related underwater capabilities. Insofar as such dialogues generate greater strategic empathy, they could prevent decision-making based on worst-case assumptions.

The consequences of naval build-up can be severe, with potential for escalation and long-term destabilization, in the seas and beyond. While risk management alone may not fully resolve conflicting interests, it will be crucial to explore potential pathways for de-escalation to prevent inadvertent escalation in the region. This can restore a level of trust and confidence among key actors and facilitate deeper engagement among the states of the region on how to strike a balance between advancing national or collective security goals while maintaining sensitivity to regional and strategic stability.

Appendix A. Compendium of selected anti-submarine warfare capabilities in the Indo-Pacific

Table A.1. Anti-submarine warfare aircraft in the Indo-Pacific, 2024

	No. of aircraft	Types of aircraft and onboard equipment		
Australia	12 [15]	*Type* *Sensors* *ASW weapons*	12 [15] P-8A Sonobuoys Mk-54 Mod-1 torpedo	
China	29	*Type* *Sensors* *ASW weapons*	5 SH-5 Sonobuoys; MAD Yu-2 torpedo; depth charges	24 Y-8Q Sonobuoys; MAD Yu-6 or Yu-11 torpedo; depth charges
Indonesia	–	. .		
Japan	75 [44]	*Type* *Sensors* *ASW weapons*	36 [44] P-1 Sonobuoys; MAD Mk-46 Mod-5 torpedo	39 P-3C Update-3 Sonobuoys; MAD Mk-46 Mod-5 torpedo
Korea, North	–	. .		
Korea, South	17 [5]	*Type* *Sensors* *ASW weapons*	16 P-3C Update-3/P-3CK Sonobuoys; MAD Mk-46 Mod-5 torpedo	1 [5] P-8A Sonobuoys Mk-54 Mod-1 torpedo
Malaysia	–	. .		
Philippines	–	. .		
Singapore	5	*Type* *Sensors* *ASW weapons*	5 F-50 Enforcer Mk-2S Sonobuoys; MAD –	
Taiwan	12	*Type* *Sensors* *ASW weapons*	12 P-3CUP Sonobuoys; MAD Mk-46 Mod-5 torpedo	
Thailand	2	*Type* *Sensors* *ASW weapons*	1 P3-T Sonobuoys; MAD Mk-46 Mod-5 torpedo	1 F-27 Enforcer Sonobuoys; MAD Mk-46 Mod-5 or Stingray torpedo
United States[a]	108	*Type* *Sensors* *ASW weapons*	90 P-8A Sonobuoys Mk-46 Mod-5, Mk-50, or Mk-54 Mod-1 torpedo	18 P-3C Sonobuoys; MAD Mk-46 Mod-5, Mk-50, or Mk-54 Mod-1 torpedo
Viet Nam	–	. .		

[ ] = Planned or in development; ASW = anti-submarine warfare; MAD = magnetic anomaly detector.

[a] Projected US capabilities are not included. US numbers represent estimates of its deployments in the Indo-Pacific (constituting 75% of its global forces).

Table A.2. Anti-submarine warfare helicopters in the Indo-Pacific, 2024

	No. of helicopters	Types of helicopter and onboard equipment			
Australia	23 [36]	*Type*	23 [36] MH-60R		
		Sensors	Dipping sonar		
		ASW weapons	Mk-54 Mod-0 torpedo		
China	60	*Type*	17 Z-8	15 Z-18F	22 Z-9C	6 Ka-28PL
		Sensors	Dipping sonar	Dipping sonar; sonobuoys	Dipping sonar; MAD	Dipping sonar; MAD
		ASW weapons	Yu-7 torpedo	Yu-7 torpedo	Yu-7 torpedo	Yu-7 torpedo(?)
Indonesia	5	*Type*	2 AS565MBe	3 AS332(?)		
		Sensors	Dipping sonar	Dipping sonar		
		ASW weapons	A-244/S/Mk-46 torpedo	A-244/S/Mk-46		
Japan	92	*Type*	7 SH-60L	85 SH-60J/SH-60K		
		Sensors	Dipping sonar; sonobuoys	Dipping sonar; sonobuoys		
		ASW weapons	Mk-46 Mod-5, Type-74, or Type-12 torpedo	Mk-46 Mod-5 torpedo		
Korea, North	4	*Type*	4 Mi-14PL			
		Sensors	Dipping sonar; sonobuoys			
		ASW weapons	AT-1 or APR-2 torpedo			
Korea, South	30 [12]	*Type*	8 AW-159 Wildcat	22 Lynx or Super Lynx	[12] MH-60R	
		Sensors	Dipping sonar	Dipping sonar; MAD	Dipping sonar	
		ASW weapons	Blue Shark	Mk-46 torpedo	Mk-54 Mod-0 torpedo	
Malaysia	6	*Type*	6 Super Lynx			
		Sensors	Dipping sonar			
		ASW weapons	A-244/S torpedo			
Philippines	2	*Type*	2 AW-159			
		Sensors	Dipping sonar			
		ASW weapons	Blue Shark torpedo			
Singapore	8	*Type*	8 S-70B			
		Sensors	Dipping sonar			
		ASW weapons	A-244/S torpedo			

Taiwan	25–26	*Type* *Sensors* *ASW weapons*	7–8 MD-500MD/ASW MAD Mk-46 Mod-5 torpedo	18 S-70C(M) Dipping sonar; MAD Mk-46 Mod-5 torpedo
Thailand	2	*Type* *Sensors* *ASW weapons*	2 Super Lynx Dipping sonar; MAD Stingray torpedo	
United States[a]	203	*Type* *Sensors* *ASW weapons*	203 MH-60R Dipping sonar; sonobuoys Mk-54 Mod-0 torpedo	
Viet Nam	6	*Type* *Sensors* *ASW weapons*	6 Ka-28PL Dipping sonar; MAD APR-2 torpedo; depth charges(?)	

[ ] = Planned or in development; (?) = uncertainty; ASW = anti-submarine warfare; MAD = magnetic anomaly detector.

[a] Projected US capabilities are not included. US numbers represent estimates of its deployments in the Indo-Pacific (constituting 75% of its global forces).

Table A.3. Major surface ships in the Indo-Pacific, 2024

	No. of ships	Type of major surface ships and onboard equipment				
Australia	11 [13–17]	*Type*	3 Hobart DDGs	8 Anzac FFGs	[6] Hunter	[7–11] General Purpose
		Sensors	HMS; TAS; [VDS]	HMS; TAS; [VDS]	HMS; TAS; VDS	(?)
		ASW weapons	MH-60R helicopter; MU90 torpedo	MH-60R helicopter; MU90 torpedo	MH-60R helicopter; MU90 torpedo	(?)
China	88 [3]	*Type*	2 Type-051C DDGs	1 Type-051B DDG	4 Sovremenny DDGs	2 Type-052 DDGs
		Sensors	BMS	BMS	BMS; TAS	BMS; TAS
		ASW weapons	Yu-7 torpedo	Yu-7 torpedo	Z-9 or Ka-31 helicopter; Yu-7 torpedo	Z-9 helicopter; Yu-7 torpedo; rockets
		Type	2 Type-054 and 30 Type-054A FFGs	8 Type-053H3 FFGs	1 Liaoning CV	1 Shandong CV
		Sensors	BMS; TAS(?); VDS(?)	HMS	BMS	BMS(?)
		ASW weapons	Z-9 helicopter; Yu-7 torpedo; Type-87 mortar	Z-9 helicopter; Yu-7 torpedo; rockets	Z-9C/Z-18F helicopter; rockets	Aircraft; helicopters; rockets
		Type	[1] Fujian CV	7 [2] Type-055 DDGs	22 Type-052D DDGs	6 Type-052C and 2 Type-052B DDGs
		Sensors	BMS(?)	BMS; TAS; VDS	BMS; TAS; VDS	BMS; TAS
		ASW weapons	Aircraft; helicopters(?)	Helicopters; Yu-7 torpedo; VLS	Z-9 or Ka-31 helicopter; Yu-7 torpedo	Z-9 or Ka-31 helicopter; Yu-7 torpedo
Indonesia	18 [10]	*Type*	2 Martadinata FFGs	3 Bung Tomo frigates	6 Ahmad Yani frigates	4 Diponegoro corvettes
		Sensors	HMS; VDS	HMS	HMS	HMS
		ASW weapons	AS565 helicopter; A-244/S torpedo	A-244/S torpedo	A-244/S torpedo	A-244/S torpedo
		Type	3 Fatahillah corvettes	[2] Type-31 frigates	[6] FREMM frigates	[2] Maestrale frigates
		Sensors	HMS	HMS; TAS; VDS(?)	HMS; TAS; VDS(?)	HMS; VDS(?)
		ASW weapons	Bofors mortar; Mk-46 or A-244/S torpedo	Helicopters	Helicopters	Helicopters
Japan	52 [8]	*Type*	2 Izumo CVs/CVHs	2 Hyuga CVs/CVHs	2 Maya DDGs	2 Atago DDGs
		Sensors	BMS	BMS	BMS; TAS	BMS
		ASW weapons	SH-60K helicopter; Mk-46 Mod-5 torpedo	SH-60K helicopter; Mk-46 Mod-5 torpedo	SH-60K helicopter; Mk -46 Mod-5; ASROC/Type-07 missile	SH-60K helicopter; Mk-46 Mod-5; ASROC

Japan *cont.*		*Type*	4 Kongo DDGs	6 Akizuki/Asahi DDGs	5 Takanami DDGs	9 Murasame DDGs
		Sensors	BMS; TAS	HMS; TAS	HMS; TAS	HMS; TAS
		ASW weapons	Mk-46 Mod-5 torpedo; VLS (ASROC missile)	SH-60K helicopter; Mk-46 Mod-5 torpedo; VLS (ASROC missile)	SH-60K helicopter; Mk-46 Mod-5 torpedo; VLS (ASROC missile)	SH-60J or SH-60K helicopter; Mk-46 Mod-5 torpedo; VLS (ASROC missile)
		Type	8 Asagiri DDGs	4 [8] Mogami FFGs	6 Abukuma FFGs	2 Hatakaze DDGs
		Sensors	BMS; TAS	HMS; TAS; VDS	HMS	BMS
		ASW weapons	SH-60J/SH-60K helicopter; Mk-46 Mod-5 torpedo; ASROC missile	SH-60 helicopter; Mk-46 Mod-5 torpedo; VLS (Type-07 missile)	Mk-46 Mod-5 torpedo; ASROC missile	Mk-46 Mod-5 torpedo; ASROC missile
Korea, North	2	*Type*	2 Najin FFGs			
		Sensors	HMS			
		ASW weapons	Depth charges; rockets			
Korea, South	27 [12–15]	*Type*	3 [3] Sejong the Great DDGs	6 Chungmugong Yi Sun-sin DDGs	3 Gwanggaeto the Great FFGs	[6] Chungnam FFGs
		Sensors	HMS; TAS	HMS; TAS	HMS; TAS	HMS; TAS
		ASW weapons	Super Lynx or MH-60R helicopter; Blue Shark torpedo; VLS (Red Shark missile)	Super Lynx helicopter; Blue Shark or Mk-46 Mod-5 torpedo; VLS (Red Shark missile)	Super Lynx helicopter; Blue Shark or Mk-46 Mod-5 torpedo	AWS-159 or MH-60R helicopter; Blue Shark torpedo
		Type	6 [2] Daegu FFGs	6 Incheon FFGs	2 Ulsan FFGs	1 [1–4] Nampo minelayer
		Sensors	HMS; TAS	HMS; TAS	HMS	HMS; TAS
		ASW weapons	AW-159 helicopter; Blue Shark torpedo	Lynx or AW-159 helicopter; Blue Shark or Mk-46 Mod-4 torpedo	Blue Shark or Mk-46 torpedo; depth charges	Blue Shark torpedo; K-VLS (Red Shark missile)
Malaysia	4 [6]	*Type*	2 Lekiu FFGs	2 Kasturi corvettes	[6] Maharaja Lela frigates	
		Sensors	HMS	HMS	HMS; TAS	
		ASW weapons	Super Lynx helicopter; A-244/S or Stingray torpedo	A-244/S torpedo	–	
Philippines	5 [2]	*Type*	2 Rizal FFGs	3 Hamilton frigates	[2] HHI FFGs	
		Sensors	HMS	HMS	HMS	
		ASW weapons	AW-159 helicopter	Blue Shark torpedo	AW-159 helicopter; Blue Shark torpedo	

	No. of ships	Type of major surface ships and onboard equipment			
Singapore	6	*Type*	6 Formidable frigates		
		Sensors	VDS		
		ASW weapons	S-70B helicopter; A-244/S torpedo		
Taiwan	24	*Type*	4 Kee Lung DDGs	10 Cheng Kung FFGs	6 Kang Ding FFGs	8 Fong Yang FFGs
		Sensors	BMS	HMS; TAS	HMS; TAS	BMS; TAS
		ASW weapons	S-70C helicopter; Mk-46 Mod-5 torpedo	S-70C helicopter; Mk-46 Mod-5 torpedo	S-70C helicopter; Mk-46 Mod-5 torpedo	MD-500MD helicopter; Mk-46 Mod-5 torpedo; ASROC missile
Thailand	9 [1]	*Type*	1 Chakri Naruebet CVH	2 Naresuan FFGs	1 Bhumibol Adulyadej FFG	4 Chao Phraya frigates
		Sensors	–	HMS	HMS; TAS	HMS
		ASW weapons	Super Lynx helicopter	Super Lynx helicopter; Mk-46 Mod-5 torpedo	Super Lynx helicopter; Mk-54 torpedo	–
		Type	1 Makut Rajakumam FFG (training)	[1] FFG(?)		
		Sensors	HMS	(?)		
		ASW weapons	Mk-46 torpedo	(?)		
United States[a]	92	*Type*	1 Ford CVs	7 Nimitz CVs	10 Ticonderoga CGs	21 Arleigh Burke Flight I/II DDGs
		Sensors	–	–	HMS; TAS	HMS, TAS
		ASW weapons	MH-60R helicopter	MH-60R helicopter	MH-60R or SH-60B helicopter; VLS (ASROC missile); MK-46 Mod-5 or Mk-50 torpedo	VLS (ASROC); Mk-46 Mod-5 or Mk-50 torpedo

United States *cont.*		*Type*	34 Arleigh Burke Flight IIA/III DDGs	2 Zumwalt DDGs	11 Independence FFGs	6 Freedom FFGs
		Sensors	HMS, TAS	HMS, TAS	VDS	VDS
		ASW weapons	MH-60R helicopter; VLS (ASROC missile); Mk-46 Mod-5 or Mk-50 torpedo	MH-60R helicopter; VLS (ASROC(?)); Mk-46 Mod-5 or Mk-50 torpedo(?)	MH-60R helicopter	MH-60R helicopter
Viet Nam	4	*Type*	4 Gepard frigates			
		Sensors	HMS			
		ASW weapons	Ka-28 helicopter; Test-3 torpedo (?)			

[ ] = Planned or in development; (?) = uncertainty; ASROC = anti-submarine rocket; ASW = anti-submarine warfare; BMS = bow-mounted sonar; CG = guided-missile cruiser; CV = aircraft carrier; CVH = helicopter carrier; DDG = guided missile destroyer; FFG = guided missile frigate; HMS = hull-mounted sonar; TAS= towed-array sonar; VDS = variable-depth sonar; VLS = vertical launch system.

[a] Projected US capabilities are not included. US numbers represent estimates of its deployments in the Indo-Pacific (constituting 75% of its global forces).

Table A.4. Minor surface ships in the Indo-Pacific, 2024

	No. of ships	Type of minor surface ships and onboard equipment			
Australia	–	..			
China	50	*Type*	50 Jiangdao corvettes		
		Sensors	BMS; TAS		
		ASW weapons	VLS; Yu-7 torpedo		
Indonesia	14	*Type*	14 Pattimura corvettes		
		Sensors	HMS; VDS		
		ASW weapons	A-244/S torpedo; RBU-6000 rocket launcher; depth charges(?)		
Japan	–	..			
Korea, North	3 [2]	*Type*	2 [2] Nampo corvettes	1 Sariwon corvette	
		Sensors	HMS(?)	HMS(?)	
		ASW weapons	Rockets; depth charges(?)	Rockets; depth charges	
Korea, South	5	*Type*	5 Pohang corvettes		
		Sensors	HMS		
		ASW weapons	Blue Shark or Mk-46 torpedo; depth charges		
Malaysia	–	..			
Philippines	1 [1]	*Type*	1 [1] Pohang corvettes		
		Sensors	HMS		
		ASW weapons	Blue Shark torpedo		
Singapore	–	..			
Taiwan	13	*Type*	12 Ching Chiang corvettes	1 Tuo Chiang corvettes	
		Sensors	HMS; TAS	VDS	
		ASW weapons	Depth charges	Mk-46 Mod-5 torpedo	
Thailand	8	*Type*	2 Ratanakosin corvette	3 Khamronsin corvette	1 Pin Klao destroyer escort	2 Tapi corvettes
		Sensors	HMS	HMS	HMS	HMS
		ASW weapons	Stingray torpedo	Stingray torpedo	Mk-46 torpedo	Mk-46 torpedo
United States	–	..				

Viet Nam	7	*Type*	5 Project-159 frigates
		Sensors	HMS
		ASW weapons	SET-40 torpedo; RBU rocket launcher; depth charges

[ ] = Planned or in development; (?) = uncertainty; ASW = anti-submarine warfare; BMS = bow-mounted sonar; HMS = hull-mounted sonar; TAS= towed-array sonar; VDS = variable-depth sonar; VLS = vertical launch system.

Note: Patrol craft are not included in this table.

Table A.5. Tactical submarines in the Indo-Pacific, 2024

	No. of submarines	Type of submarine and onboard equipment			
Diesel–electric submarines (SSKs)[a]					
Australia	6	*Type* *Sensors* *ASW weapons*	6 Collins BMS; FMS; TAS Mk-48 torpedo		
China	59	*Type* *Sensors* *ASW weapons*	20 Yuan* BMS; FMS Yu-3, Yu-4, or Yu-6 torpedo	13 Song BMS; FMS Yu-3, Yu-4, or Yu-6 torpedo	12 Kilo BMS TEST-71/96 torpedo	14 Ming BMS Yu-4 torpedo
Indonesia	4 [5]	*Type* *Sensors* *ASW weapons*	3 [3] Nagapassa HMS; FMS Black Shark or SUT Mod-0 torpedo	1 Cakra BMS SUT Mod-0 torpedo	[2] Scorpene Evolved† HMS; FMS Torpedo	
Japan	25 [5]	*Type* *Sensors* *ASW weapons*	2 [5] Taigei† HMS; TAS; FMS Type-18 torpedo	12 Souryo*† HMS; TAS; FMS Type-18 torpedo	11 Oyashio HMS; TAS; FMS Type-89 torpedo	
Korea, North	20	*Type* *Sensors* *ASW weapons*	20 Project-033 HMS (?)			
Korea, South	20 [7]	*Type* *Sensors* *ASW weapons*	9 KSS-I HMS [TAS] SUT-2 torpedo; White Shark torpedo	9 KSS-II* BMS; FMS; TAS SUT-2 or White Shark torpedo; [Tiger Shark torpedo]	2 [7] KSS-III*† BMS; FMS; TAS SUT-2 or White Shark torpedo; [Tiger Shark torpedo]	
Malaysia	2	*Type* *Sensors* *ASW weapons*	2 Pendara Menteri HMS Black Shark torpedo			
Philippines	[2–3]	*Type* *Sensors* *ASW weapons*	[2–3] (?) (?)			

Singapore	6 [2]	*Type*	2 [2] Type-218SG*	2 Archer*	2 Challenger
		Sensors	HMS; FMS	HMS	BMS; FMS
		ASW weapons	Black Shark torpedo	Black Shark torpedo; Type 431/451 torpedo	Type 613 torpedo; Type 431 torpedo
Taiwan	2[b] [8]	*Type*	2 Chien Lung	[8] Hai Kun†	
		Sensors	HMS	. .	
		ASW weapons	SUT-2 torpedo; Mk-48 Mod-6 torpedo(?)	Mk-48 Mod-6 torpedo	
Thailand	[3]	*Type*	[3] S26T*		
		Sensors	BMS; FMS(?)		
		ASW weapons	Yu-8 torpedo(?)		
United States[c]	–	. .			
Viet Nam	6	*Type*	6 Project-636.1		
		Sensors	BMS		
		ASW weapons	TEST-71/96 torpedo		
Nuclear-powered submarines (SSNs)					
Australia	[6–8]	*Type*	[6–8]		
		Sensors	(?)		
		ASW weapons	(?)		
China	9 [2]	*Type*	3 Han	6 [2] Shang	
		Sensors	HMS	BMS; FMS	
		ASW weapons	Yu-3 or Yu-4 torpedo	Yu-3, Yu-4, or Yu-6 torpedo	
Indonesia	–	. .			
Japan	–	. .			
Korea, North	–	. .			
Korea, South	–	. .			
Malaysia	–	. .			
Philippines	–	. .			
Singapore	–	. .			
Taiwan	–	. .			
Thailand	–	. .			

	No. of submarines	Type of submarine and onboard equipment			
United States[b]	38	*Type*	15 Virginia	20 Los Angeles	3 Seawolf
		Sensors	BMS, FMS, TAS	BMS, FMS, TAS	BMS, FMS, TAS
		ASW weapons	Mk-48 Mod-6 or Mk-48 Mod-7 torpedo	Mk-48 Mod-6 or Mk-48 Mod-7 torpedo	Mk-48 Mod-6 or Mk-48 Mod-7 torpedo
Viet Nam	–	. .			

[ ] = Planned or in development; (?) = uncertainty; ASW = anti-submarine warfare; BMS = bow-mounted sonar; FMS = flank-mounted sonar; HMS = hull-mounted sonar; TAS= towed-array sonar.

[a] SSKs marked * have air-independent propulsion; those marked † have lithium-ion batteries.

[b] This figure excludes Taiwan's 2 outdated Hai Shih class (Tench) submarines dating from World War II, which are used for training.

[c] Projected US capabilities are not included. US numbers represent estimates of its deployments in the Indo-Pacific (constituting 75% of its global forces).

Sources for tables 3.2, A.1–A.5: SIPRI Arms Transfers Database, Mar. 2024, <http://sipri.org/databases/armstransfers>; Pape, A., *Jane's Fighting Ships 2019–2020* (IHS Markit: Coulsdon, 2019); International Institute for Strategic Studies (IISS), *The Military Balance 2024* (Routledge: London, 2024); media sources; and official military websites.

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