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Navies and Underwater Cultural Heritage: Military Legacies, Operational Practice and Shared Responsibility

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Introduction

Military operations at sea do not take place in empty waters. Naval training grounds, restricted maritime zones, live-fire areas and strategic island spaces may overlap with seascapes that hold cultural, historical and social meaning for coastal and island communities. They may also contain shipwrecks, aircraft, human remains, submerged landscapes, former battle sites and other forms of underwater cultural heritage (UCH). Some of these remains result directly from warfare or military activity; others have no military origin but may nevertheless be affected by naval operations, seabed disturbance, underwater detonations, pollution or restrictions on access. UCH therefore raises questions that extend beyond archaeological preservation, concerning memory, environmental responsibility, sovereignty, institutional practice and relationships with communities whose maritime spaces are used for defence purposes.

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In this article, UCH is understood in accordance with the 2001 UNESCO Convention on the Protection of the Underwater Cultural Heritage[1] as traces of human existence of a cultural, historical or archaeological character that have been partially or totally underwater, periodically or continuously, for at least 100 years. This includes vessels, aircraft, structures, artifacts, and human remains, together with their archaeological and natural context. Within this broader category, the term underwater military heritage is used specifically for submerged remains arising from military activity or armed conflict, including warships, military aircraft, defensive structures, submerged battlefields and war graves. Some such remains may also be sovereign vessels or aircraft, raising particular questions of ownership, immunity and state responsibility. However, sovereign status does not define UCH, and underwater military heritage represents only one part of the wider heritage that naval operations may encounter or affect. The 2001 UNESCO Convention defines UCH broadly and provides that it does not alter the rules of international law or state practice concerning sovereign immunity or state rights relating to state vessels and aircraft.

The article focuses principally on navies because of their sustained presence in marine environments, their historical relationship with submerged military remains and their technical capacities relevant to survey, monitoring and risk management. However, impacts on UCH are not confined to naval institutions. Air forces, amphibious land forces, coast guards and other state maritime or military actors may also conduct activities that affect coastal and underwater heritage. Accordingly, the article uses navies when referring specifically to naval institutions and their capacities, and military forces or maritime forces where the discussion extends to other actors. Its argument is not limited to navies protecting the material remains of their own past. It concerns their potential contribution, acting under state authority and within applicable legal frameworks, to the identification and protection of UCH of any origin within maritime spaces affected by military activity.

This article does not assume that navies are unaware of UCH or that they lack relevant procedures. Some naval institutions already possess substantial specialist

[1] UNESCO, *Convention on the Protection of the Underwater Cultural Heritage*, 2001, https://www.unesco.org/en/underwater-heritage.

expertise. In the United States, for example, the Naval History and Heritage Command's Underwater Archaeology Branch manages, researches, conserves and interprets the US Navy's submerged military craft and develops related preservation policy on behalf of the Department of the Navy. Such examples demonstrate that naval engagement with underwater heritage is already established in some contexts. The issue explored here is different: how existing recognition and expertise might be extended more consistently beyond the management of naval wrecks to wider operational planning, environmental responsibility and engagement with communities whose cultural seascapes may be affected by maritime military activity.

The central question of the article is therefore: how can navies, acting under state authority, integrate the identification and protection of UCH into operational planning, environmental management and community engagement, while maintaining military readiness? The article argues that UCH should not be approached only as a compliance obligation or as the physical legacy of past naval operations. It may also provide a framework for historical awareness, institutional responsibility, maritime knowledge and dialogue with local and Indigenous communities. This does not mean that navies hold an autonomous legal duty to intervene in underwater heritage wherever it is located. Rather, states may draw on naval expertise and capabilities, in accordance with the relevant jurisdictional and legal framework, to help avoid harm, monitor risks and support the protection of submerged heritage.

The Pacific provides a particularly revealing context in which to examine these issues. Across the region, island communities have experienced military occupation, nuclear testing, base construction, live-fire training, restricted access and environmental disturbance. These histories have left tangible traces underwater and on land, but they have also shaped contemporary concerns about authority, memory, ecological harm and the use of island territories for external security agendas. The Mariana Islands provide a contemporary example of these tensions, while Bikini Atoll in the Marshall Islands offers a historically distinct but significant lens through which to understand why present-day military activities may continue to generate distrust. The discussion that follows uses these cases not to suggest that all military activity is equivalent, nor that navies are responsible for every form of harm considered, but to examine the conditions in which

UCH becomes relevant to military practice, state responsibility and community relationships.

The Pacific as a Military Training Arena

The land, air and sea spaces of the Mariana Islands play a crucial role for the US military, providing essential training grounds for service members and their families stationed in the region.[2] The Marine Corps, Navy, Air Force and Coast Guard conduct a range of military readiness exercises across designated areas, coordinated within the Mariana Islands Range Complex (MIRC). According to the US, this expansive training and testing zone is vital for maintaining national security, operational preparedness and global military strategy.[3] However, the selection of these sites for military activities raises questions among local communities about why their islands continue to be used for these exercises and what the long-term impacts will be.

The Mariana Islands are not the first Pacific territories to be shaped by military activity. Bikini Atoll, in the Marshall Islands and now a UNESCO World Heritage Site, stands as a stark historical precedent. Between 1946 and 1958, Bikini Atoll was the site of 23 nuclear tests, including the Castle Bravo detonation, one of the most powerful nuclear explosions in history.[4] These tests, conducted under Operation Crossroads, involved the deliberate sinking of warships to study the effects of nuclear blasts. Today, the lagoon of Bikini Atoll contains the remains of vessels such as *USS Saratoga*, *USS Arkansas* and the Japanese battleship *HIJMS Nagato*, material traces of military experimentation in the Pacific.[5] The sunken ships at Bikini are now the property of the people of Bikini, with title transferred under the US–Marshall Islands agreement in accordance with Article 177 of

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[2] US Department of the Navy, *Mariana Islands Range Complex Environmental Impact Statement/Overseas Environmental Impact Statement*, vol. 1 of 2 (2009), http://www.chamorro.com/docs/mirc%20final%20eis_oeis%20volume%201.pdf

[3] Sylvia C. Frain, "Resisting Political Colonization and American Militarization in the Marianas Archipelago," *AlterNative: An International Journal of Indigenous Peoples* 12, 3 (2016): pp. 298–315.

[4] Stewart Firth, *Nuclear Playground* (London: Routledge, 2020).

[5] James P. Delgado, Daniel J. Lenihan, and Larry E. Murphy, *The Archeology of the Atomic Bomb: A Submerged Cultural Resources Assessment of the Sunken Fleet of Operation Crossroads at Bikini and Kwajalein Atoll Lagoons, Republic of the Marshall Islands*, 37 (Santa Fe: Submerged Cultural Resources Unit, National Maritime Initiative, US Department of the Interior, National Park Service, 1991).

the Compact of Free Association.[6] The nuclear testing forced Bikini's Indigenous population to relocate, with promises that they could return: a promise that remains unfulfilled due to lingering radiation.[7] United States Commodore Ben H. Wyatt requested that the islanders move to a yet-to-be-determined location and make the ultimate sacrifice of their sacred home "for the good of humanity and to prevent all future wars."[8] Sosylina Maddison, who serves as the National Coordinator for the Bikini Coalition in the US, reports that the current population of Bikini Islanders is around 7,000. Based on the 2020 census, the majority reside on Kili Island, where 548 individuals live, the final relocation site chosen after the U. nuclear tests known as *Operation Crossroads*. A significant number of Bikini descendants also inhabit Ejit Island, while others have moved to urban areas like Majuro, the capital of the Marshall Islands. These communities are administered under the Kili/Bikini/Ejit Local Government authority.[9] This is what it has been coined as nuclear colonialism, the imposition of nuclear technologies, especially weapons testing, uranium mining, and waste disposal on colonized, marginalized, or Indigenous communities without their consent. It is a form of environmental and structural violence that reflects broader patterns of colonial exploitation, where land and people are treated as expendable for the strategic or economic goals of more powerful nations.[10] The displacement and destruction of local ecosystems at Bikini Atoll echo the concerns voiced by Pacific Island communities today, who see ongoing military exercises as a continuation of a pattern of external control over their lands and waters.[11]

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[6] Daniel J. Lenihan, "Introduction," in *The Archeology of the Atomic Bomb: A Submerged Cultural Resources Assessment of the Sunken Fleet of Operation Crossroads at Bikini and Kwajalein Atoll Lagoons, Republic of the Marshall Islands*, ed. James P. Delgado, Daniel J. Lenihan, and Larry E. Murphy, 37 (Santa Fe: Submerged Cultural Resources Unit, National Maritime Initiative, US Department of the Interior, National Park Service, 1991), chap. 1

[7] Jack Niedenthal, "A History of the People of Bikini Following Nuclear Weapons Testing in the Marshall Islands: With Recollections and Views of Elders of Bikini Atoll," *Health Physics* 73, 1 (1997): pp. 28–36.

[8] The Bikini Project. Available at: https://thebikiniproject.org/

[9] The Bikini Project. Available at: https://thebikiniproject.org/the-bikini-people-today/

[10] Jessica Hurley, "Nuclear Settler Colonialism at Sea, or How to Civilize an Ocean," *American Quarterly* 74, 4 (2022): pp. 969–995.

[11] Michelle Keown, "Waves of Destruction: Nuclear Imperialism and Anti-Nuclear Protest in the Indigenous Literatures of the Pacific," *Journal of Postcolonial Writing* 54, 5 (2018): pp. 585–600.

Military exercises are deemed necessary for national defence.[12] Large-scale operations, such as Exercise Valiant Shield,[13] allow the US military to simulate combat scenarios, test new technologies, and ensure readiness for potential conflicts, particularly in the Indo-Pacific, where geopolitical tensions are rising. These activities, however, often clash with the interests of local residents, who question why their homeland must bear the burden of military experimentation and potential environmental degradation. However, communities across the Mariana and Marshall Islands have raised concerns about land use, ecological damage, and cultural preservation due to those military exercises.[14] The Bikini Atoll may seem like an extreme example, given that the exercises rendered the land uninhabitable, but islands around the world continue to be impacted by military activities in more subtle yet deeply consequential ways. From the construction of military bases to live-fire training exercises and environmental degradation, many island communities, often politically marginalized, are subjected to forms of militarization that disrupt local ecologies, economies, and ways of life. While the military attempts to mitigate environmental impacts through marine conservation programs, historical preservation efforts, and environmental monitoring, scepticism remains about whether these measures are sufficient. The tension between military necessity and local resistance highlights the broader issue of who gets to decide the future of these island territories and whether military needs should outweigh the voices of the people who have lived there for generations.

The US military presence in the Mariana Islands and the history of military experimentation in the Marshall Islands demonstrate the strategic importance long attributed to the Pacific, but they also reveal the cultural, environmental and political consequences borne by island communities. Military preparedness cannot be separated from the places in which it is pursued: for those communities, training areas, restricted waters, damaged ecosystems and submerged military remains are part of lived seascapes

[12] US Navy. Mariana Islands Training and Testing. Available at: https://mitt-eis.com/

[13] Valiant Shield is a multinational, biennial field training exercise focused on integrating interoperability in a multi-domain environment. The exercise builds real-world proficiency in sustaining joint forces by detecting, locating, tracking, and engaging units at sea, in the air, in space, on land, and in cyberspace in response to a range of mission areas. For more information, see US Pacific Fleet, available at: https://www.cpf.navy.mil/

[14] Theresa Arriola, "Securing Nature: Militarism, Indigeneity and the Environment in the Northern Mariana Islands," (PhD diss., University of California, Los Angeles, 2020), https://escholarship.org/uc/item/0x42d2sb.

shaped by memory, displacement and continuing questions of authority over land and sea. Bikini Atoll and the Mariana Islands are not equivalent cases, but together they show why contemporary military activity in the Pacific may be understood through longer histories of external control and environmental harm. In this context, UCH is relevant not only because military activity has produced submerged remains, but also because naval and wider military operations may intersect with culturally significant marine environments. Wrecks, aircraft, war graves, submerged landscapes and other underwater traces may embody institutional military histories while also carrying meaning for local and Indigenous communities. Attention to UCH cannot resolve the deeper political questions raised by militarisation, but it can provide one concrete field in which historical legacies are acknowledged, cultural values are recognised and military institutions engage more responsibly with the communities whose maritime spaces they use.

Underwater Cultural Heritage and the Armed Forces

Sunken warships, submerged fortifications, and battle sites provide direct physical evidence of past military engagements, allowing historians to reconstruct tactics, weaponry, and the evolution of naval strategies.[15] These underwater sites preserve details that may not be recorded in historical documents, such as battle damage, ship modifications, and the final moments of engagement, offering a more comprehensive understanding of naval conflicts. In fact, the study of UCH has enhanced knowledge of significant military events, including the Battle of the Atlantic in World War II,[16] the Napoleonic naval wars,[17] and Cold War-era submarine operations.[18] These sites also reveal the logistical complexities of wartime maritime operations, from amphibious landings to naval blockades, illustrating how naval power has shaped geopolitical outcomes throughout history.[19]

[15] Bill Jeffery, Jennifer F. McKinnon, and Hans Van Tilburg, "Underwater Cultural Heritage in the Pacific: Themes and Future Directions," *International Journal of Asia Pacific Studies* 17, 2 (2021): pp.135–168.
[16] Dave Parham, "The Archaeology of the Battle of the Atlantic," in *Europe's Deadly Century* (2009), p. 54.
[17] James Davey, *In Nelson's Wake: The Navy and the Napoleonic Wars* (New Haven: Yale University Press, 2016).
[18] Todd A. Hanson, *The Archaeology of the Cold War* (Gainesville: University Press of Florida, 2019).
[19] Jeffery, McKinnon, and Van Tilburg, "Underwater Cultural Heritage in the Pacific."

Beyond battlefield analysis, the preservation of underwater military heritage is essential for commemorating naval sacrifices and honouring the legacy of those who served at sea. Many sunken warships function as war graves, holding historical and cultural significance for the nations and communities connected to them.[20] Sites like *HMS Hood*, *USS Arizona*, and the wrecks from the Battle of Jutland stand as reminders of the human cost of war, while underwater archaeology helps us better understand the circumstances and significance of these historic conflicts.[21] A further issue in this regard is that underwater military heritage is increasingly coming under threat, not only from natural degradation but also from deliberate human actions such as illegal salvaging. A particularly notable case involves the plundering of the British Royal Navy battleship *HMS Prince of Wales* and the battlecruiser *HMS Repulse*, both of which were sunk by Japanese aircraft in December 1941 off the coast of Malaysia.[22] These wrecks, designated as war graves and considered highly significant sites of World War II military heritage, were reported to have been severely damaged by unauthorized salvage operations. Investigations in 2017 and again in 2023 indicated that large portions of the wrecks had been illegally dismantled and removed, allegedly by a Chinese-registered vessel using a dredger to extract valuable metals such as bronze and steel.[23] Human remains may have been disturbed in the process, raising ethical as well as legal concerns.[24] The desecration of these wrecks underscores the urgent need for stronger international mechanisms to protect underwater military heritage. Addressing these challenges could benefit from enhanced collaboration between naval authorities and UCH professionals, combining legal, technical, and ethical expertise to improve monitoring, enforcement, and

[20] Elena Perez-Alvaro, *The Hidden Hand of Underwater Cultural Heritage: Submerged Intelligence for Global Omens* (Leiden: Brill, 2024).
[21] James P. Delgado, *War at Sea: A Shipwrecked History from Antiquity to the Cold War* (Oxford: Oxford University Press, 2019).
[22] Martin Middlebrook and Patrick Mahoney, *The Sinking of the Prince of Wales and Repulse: The End of the Battleship Era* (Barnsley: Pen & Sword Maritime Classics, 2014).
[23] US Naval Institute News (30 May 2023). Authorities Detain Chinese Ship Suspected of Salvaging UK WWII Wrecks. Available at: https://news.usni.org/2023/05/30/authorities-detain-chinese-ship-suspected-of-salvaging-u-k-wwii-wrecks
[24] US Naval Institute News. (25 May 2023). UK Royal Navy 'Distressed and Concerned' by Illegal Chinese Salvage of WWII Wrecks. https://news.usni.org/2023/05/25/u-k-royal-navy-distressed-and-concerned-by-illegal-chinese-salvage-of-wwii-wrecks

preservation efforts, particularly in international or poorly monitored waters where protection remains limited.

UCH also holds another important value for navies: shipwrecks and submerged aircraft often contain unexploded ordnance, oil reserves, and classified technology,[25] making them critical sites not only for historical research but also for environmental and national and international security considerations. This is particularly relevant in the case of the 1982 Falklands conflict, during which several Royal Navy ships were lost in the South Atlantic, including *HMS Sheffield, HMS Coventry, HMS Ardent, RFA Sir Galahad* and *HMS Antelope*.[26] These wrecks, resting on the seafloor in varying states of preservation, are not only sites of historical and commemorative significance but also repositories of munitions that were never detonated during combat. In some cases, such as *HMS Antelope*, which exploded while attempts were being made to defuse a bomb onboard, the violent nature of their sinking raises additional concerns about the quantity and instability of remaining ordnance.[27] For naval forces, overseeing and safeguarding these sites plays a crucial role in mitigating environmental hazards, securing classified materials from falling into the wrong hands, and avoiding the unintended detonation of leftover munitions. In this regard, in contemporary military operations, the retrieval of aircraft that are forced to ditch -regardless of the depth of water- is a standard and urgent protocol. Two notable examples involving the Royal Navy illustrate this point: the crash of an F-35B Lightning II fighter jet during take-off from *HMS Queen Elizabeth* in the Mediterranean in 2021,[28] and the loss of a Merlin Mk4 helicopter during training exercises near Yeovilton in 2023.[29] In both cases, recovery operations were swiftly undertaken. The

[25] Perez-Alvaro, *The Hidden Hand of Underwater Cultural Heritage*.
[26] Paul Brown, *Abandon Ship: The Real Story of the Sinkings in the Falklands War* (London: Bloomsbury Publishing, 2021).
[27] Royal Navy News (24 May 2021). 'A majestically awful sight': Anniversary of the Loss of HMS Antelope. Available at: https://www.royalnavy.mod.uk/news/2021/may/24/20210524-antelope-explodes
[28] Kevin Hayes and Daniel Boardman, "Loss of an F35 Fighter Jet: The Case for Human Factors Integration," in *Contemporary Ergonomics and Human Factors*, ed. D. Golightly, N. Balfe, and R. Charles (2024), https://publications.ergonomics.org.uk/uploads/Loss-of-an-F35-fighter-jet-%E2%80%93-The-case-for-Human-Factors-Integration.pdf.
[29] Bridport News (27 September 2024). Merlin Mk4 Royal Navy helicopter brought ashore at Portland. Available at: https://www.bridportnews.co.uk/news/24613328.merlin-mk4-royal-navy-helicopter-brought-ashore-portland/

primary rationale behind such efforts is the high strategic value of the aircraft, both in terms of financial investment and the sensitive technology they carry. Fifth-generation aircraft like the F-35, for instance, are equipped with advanced stealth systems, encrypted communications, and mission-specific software that, if accessed by adversaries, could compromise national security and offer valuable insights into Western military capabilities.[30] Retrieval operations involving military wrecks are not all driven by the same rationale. In the case of recent losses, particularly submarines, aircraft, drones, weapons systems or vessels containing sensitive technologies, recovery may be linked to national security, technological protection and the prevention of intelligence exploitation. In such cases, the recovery of material is not merely a matter of retrieving hardware, but of safeguarding operational integrity and preventing technological espionage. However, this logic should not be applied too broadly to all sovereign wrecks. Older military or state-associated wrecks may no longer have any obvious operational or intelligence value, yet they have sometimes been subject to recovery because of the financial value of their cargo, including bullion, precious metals or other commercially valuable material. Examples such as *HMS Edinburgh*, sunk in 1942 while carrying Soviet gold, or *SS Gairsoppa,* whose silver cargo was recovered through a UK Government salvage contract, show that state-sanctioned recovery has not always been motivated by security concerns. The case of the Spanish frigate Nuestra Señora de las Mercedes, whose cargo was recovered by Odyssey Marine Exploration before Spain successfully asserted sovereign rights over the wreck and its contents, further illustrates the complex intersection between salvage, sovereign immunity, commercial value and cultural heritage.

This distinction is important because debates over recovery and *in situ* preservation cannot be reduced to a simple opposition between national security and heritage protection. They also involve questions of commercial exploitation, archaeological integrity, sovereign ownership, public interest, commemoration and the ethical treatment of wrecks as historic sites. The 2001 UNESCO Convention establishes *in situ* preservation as the first and preferred option. Although the Convention applies primarily to heritage that has been underwater for at least 100 years, its underlying principle raises broader questions about how more recent military losses, particularly

[30] David Bacci, "How a New Wave of Fighter Jets Could Transform Aerial Combat," *The Conversation*, 31 March 2025, https://theconversation.com/how-a-new-wave-of-fighter-jets-could-transform-aerial-combat-252949.

those with future heritage value, should be handled. A more nuanced approach is therefore required. Recent wrecks with operational or intelligence value may justify controlled recovery, restricted access or other security-driven measures. Older wrecks without such value require a different assessment, one that gives greater weight to archaeological context, human remains, historical meaning, sovereign rights and the public interest in preservation. Dialogue between military institutions, heritage professionals, governments and affected communities could help develop approaches that avoid both automatic recovery and rigid non-intervention.

Navies maintain the closest institutional connection to underwater cultural heritage, much of which derives from their own past operations. Naval wrecks, submerged battlefields, aircraft, ordnance, lost equipment, and former operational sites form part of the material record of maritime conflict and military activity. These remains may be relevant to naval history, institutional memory, training, commemoration and public engagement. They may also raise legal and ethical questions when they are sovereign immune vessels, war graves or sites associated with colonial violence, environmental harm or community trauma. For navies, engagement with underwater cultural heritage is therefore not only a matter of managing historic assets. It is also a way of recognising the long-term consequences of naval activity and of building more transparent relationships with the communities whose waters and seascapes have been shaped by military presence. Air forces also have a growing stake in underwater cultural heritage, despite their primary operational focus being the air. Many aircraft were lost over water during the Second World War, the Cold War and later conflicts.[31] These submerged aircraft and helicopters can serve as historical archives, technical records and, in many cases, war graves. Their investigation can contribute to a better understanding of past mechanical failures, operational decisions and human factors in aviation incidents. At the same time, underwater heritage offers opportunities to develop and refine technologies such as aerial mapping, remote sensing and underwater drones. These tools are increasingly relevant not only for heritage documentation and preservation, but also for contemporary surveillance, reconnaissance and maritime

[31] Agustin J. Ortiz and Blair Atcheson, "A Regional Approach to Submerged Naval Aircraft Surveys," in *Strides towards Standard Methodologies in Aeronautical Archaeology*, ed. H. W. Whitehead and M. Lickliter-Mundon (Cham: Springer International Publishing, 2023), pp. 191–209.

domain awareness.[32] Air force engagement with underwater heritage can therefore connect historical responsibility with technological innovation. Army forces, too, have a significant, though sometimes overlooked, relationship with underwater cultural heritage, particularly through amphibious, coastal and littoral operations. Historic battlefields such as the beaches of Normandy or the shores of Gallipoli are not only terrestrial landscapes. They extend into the sea, where tanks, vehicles, landing craft, engineering structures and logistical remains may survive underwater.[33] These submerged elements are essential to understanding the full scope of land-based military operations that depended on maritime access, beach landings, temporary infrastructure and coastal supply routes. Remains such as bridges, causeways, depots and submerged vehicles also highlight the role of army engineers and logistics units in shaping military history. The involvement of armed forces in underwater cultural heritage can also support civil-military cooperation. When undertaken carefully, and in collaboration with heritage professionals and local communities, such initiatives can promote transparency, shared responsibility and public engagement. They may also serve as forms of cultural diplomacy, demonstrating that military institutions are willing to recognise not only their operational histories, but also the cultural, social and ethical legacies of those histories. This approach aligns with broader international legal frameworks, including the 2001 UNESCO Convention and the 1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict.[34] It also reinforces the central argument that underwater cultural heritage should not be treated simply as a constraint on military activity, but as a field through which military institutions can engage more responsibly with the past and with the communities affected by their presence.

[32] Andrew T. Pietruszka, "Forensic Archaeology Underwater: JPAC's Inventory, Investigation and Recovery of US Casualties of War from Submerged Sites," in *Forensic Archaeology: A Global Perspective* (2015), pp. 453–461.
[33] Vincent Carpentier et al., "Archaeology, D-Day, and the Battle of Normandy: 'The Longest Day', a Landscape of Myth and Materiality," in *Conflict Landscapes*, ed. N. J. Saunders and P. Cornish (London: Routledge, 2021), pp. 260–273.
[34] UNESCO, *Convention for the Protection of Cultural Property in the Event of Armed Conflict*, The Hague,14May 1954, https://www.unesco.org/en/heritage-armed-conflicts/1954-convention

In Times of War, In Times of Peace

Navies have a unique and enduring relationship with UCH: one that extends across both times of conflict and peace. During wartime, underwater heritage is often affected not by deliberate targeting but as a consequence of military operations. The use of naval weapons, underwater mines, torpedoes, and depth charges can unintentionally damage or destroy submerged archaeological sites.

Military activities occur across a spectrum of conflict: from periods of peace and political tension to outbreaks of violence and large-scale warfare between states. UCH is vulnerable at every stage of this spectrum. In active conflict zones, such heritage faces especially acute dangers. For example, during Sri Lanka's civil war (1983–2009), the marine environment suffered repeated disturbances due to underwater explosions from both government forces and the Liberation Tigers of Tamil Eelam.[35] Explosive devices were deliberately placed on the seabed and detonated, while ordnance impacted shallow coastal waters, including areas potentially rich in archaeological significance. Some of these locations were strategically important and became targets of military operations, further increasing the risk to submerged heritage. Similarly, the waters surrounding the Korean Peninsula are believed to hold numerous underwater heritage sites that remain at risk due to the ongoing military tensions. Activities such as missile tests and the destruction of vessels -reportedly by North Korean mini-submarines- pose continual threats.[36] In response, South Korea has implemented underwater security measures, including physical barriers and nets, which may themselves interfere with sensitive heritage sites.

While the impact of military activity on UCH during times of war has been examined in the literature,[37] this article shifts the focus to a less explored dimension: the effects of military presence and operations in times of peace. Understanding these impacts is essential to developing more comprehensive and sustainable approaches to heritage protection within military contexts.

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[35] Mick de Ruyter, *Under the Cruel Sea: Effects of Armed Conflict on Underwater Cultural Heritage* (MA thesis, Flinders University, 2014).

[36] de Ruyter, Under the Cruel Sea.

[37] Perez-Alvaro, *The Hidden Hand of Underwater Cultural Heritage*.

Pollution from naval activity

Naval operations are a notable contributor to ocean pollution through multiple pathways. In particular, naval exercises have been recognized as significant sources of marine environmental degradation. For instance, over a span of two decades, the US Navy's activities off the coasts of Washington and Oregon are projected to release hundreds of thousands of pounds of flares and billions of metal-coated glass fibres into ocean waters.[38] According to some studies, the US military is responsible for more hazardous waste than the five largest US chemical companies combined, with 39,000 contaminated areas spread across 19 million acres in the US due to military activity. Notably, US military bases top the Superfund list of the most polluted places, as substances like perchlorate and trichloroethylene seep into drinking water sources.[39] Incidents such as the release of 51,000 gallons of PFAS-contaminated firefighting foam from a former US Navy base in Maine highlight the risks of chemical pollutants associated with naval facilities. PFAS compounds are persistent in the environment and have been linked to severe health issues.[40] Accidental and intentional oil spills from naval operations also pose significant threats to marine ecosystems. For example, the sinking of the *HMNZS Manawanui,* a dive and hydrographic vessel of the Royal New Zealand Navy, in Samoa resulted in the spill of approximately 200,000 litres of diesel, raising concerns about long-term environmental damage.[41]

In March 2025, a significant collision occurred off the coast of East Yorkshire, involving the stationary US tanker *Stena Immaculate* carrying approximately 200,000 barrels of aviation fuel. The incident resulted in a major fire and the release of pollutants

[38] Truthout (15 March 2017). Naval Exercises Add Trillions of Pieces of Plastic Debris to Oceans. Available at: https://truthout.org/articles/naval-exercises-add-trillions-of-pieces-of-plastic-debris-to-oceans/

[39] Heal the Planet. Military Pollution. Available at: https://healtheplanet.com/100-ways-to-heal-the-planet/military-pollution

[40] The Guardian (13 September 2024) Maine officials trying to hide scale of ex-navy base PFAS spill, advocates suspect. Available at: https://www.theguardian.com/environment/2024/sep/13/maine-pfas-spill

[41] The Guardian (18 October 2024). A sunken time bomb? Samoa fears long-lasting damage from wrecked New Zealand navy ship Available at: https://www.theguardian.com/world/2024/oct/19/a-sunken-timebomb-samoa-fears-long-lasting-damage-from-wrecked-new-zealand-navy-ship

into the marine environment. The tanker was struck by another vessel, whose Russian captain was subsequently arrested on charges of manslaughter.[42]

Legacy Military Hazards: Potentially Polluting Wrecks and Unexploded Ordnance

A related but distinct problem concerns legacy military hazards, particularly potentially polluting wrecks and unexploded ordnance. These are best considered together because many wartime wrecks contain both environmental pollutants and explosive materials. Over 3,800 shipwrecks from World War II now rest on the seafloor worldwide, and many of these are military vessels that carry significant quantities of oil, fuels, munitions, and even chemical warfare agents.[43] As these vessels corrode, they represent "ticking time bombs" that may eventually leak hazardous materials into marine ecosystems.[44] The risk is compounded by the fact that many military shipwrecks were built to endure combat and contain large quantities of fuel (oilers, tankers, and support ships), meaning that their contents can be both voluminous and highly toxic. For instance, research by Monfils estimated that more than 860 World War II oil tankers are at risk of releasing over 15 million tonnes of oil into the marine environment, posing long-term threats to fisheries, tourism, and coastal communities.[45]

This problem is further exacerbated by issues of jurisdiction and responsibility: many military wrecks are protected as war graves, which complicates remedial action (Vadi, 2012). Such wrecks are often left to deteriorate passively, with little active monitoring or risk management, increasing the potential for catastrophic oil spills and chemical releases as corrosion accelerates.[46] However, responsibility for managing

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[42] The Guardian (24 March 2025). North Sea collision: Russian container ship captain charged with manslaughter. Available at: https://www.theguardian.com/uk-news/2025/mar/14/north-sea-collision-master-of-solong-container-ship-charged-with-manslaughter

[43] Matthew Carter, Freya Goodsir, Peter Cundall, Michelle Devlin, Sascha Fuller, Bill Jeffery, Greg Hil, and Anthony Talouli, "Ticking Ecological Time Bombs: Risk Characterisation and Management of Oil Polluting World War II Shipwrecks in the Pacific Ocean," *Marine Pollution Bulletin* 164 (2021): p. 112087.

[44] IUCN. Marine pollution from sunken vessels. Available at: https://iucn.org/resources/issues-brief/marine-pollution-sunken-vessels

[45] Rean Monfils, "The Global Risk of Marine Pollution from WWII Shipwrecks: Examples from the Seven Seas," in *International Oil Spill Conference Proceedings* 2005, 1 (2005): pp.1049–1054.

[46] Kim Browne, "'Ghost Battleships' of the Pacific: Metal Pirates, WWII Heritage, and Environmental Protection," *Journal of Maritime Archaeology* 14, 1 (2019): pp. 1–28.

pollution from WWII military shipwrecks should primarily fall on the navies of the original flag states and the coastal states where these wrecks are located. However, legal complexities arise due to sovereign immunity, which means that sunken military vessels remain the property of their original nations. While some countries, like the United States, the Netherlands, and Norway, have taken steps to assess and mitigate pollution risks from wrecks within their waters, many nations lack the resources or legal frameworks to address these threats comprehensively.[47]

Coastal states have some jurisdiction under UNCLOS[48] to regulate environmental risks, but there is no binding international treaty compelling flag states to clean up their military wrecks. The Nairobi International Convention on the Removal of Wrecks (2007) excludes military vessels, leaving environmental concerns largely unaddressed. Some regional initiatives, such as SPREP (South Pacific Regional Environment Programme)[49] or Project Tangaroa,[50] have urged action on Second World War shipwreck pollution, but funding and technical challenges hinder large-scale remediation.

Navies possess significant technical capabilities, including sonar systems, remotely operated vehicles (ROVs), diving expertise and hydrographic survey tools, which states may deploy to identify, assess and monitor potentially polluting military wrecks, including those situated in remote or environmentally sensitive areas. In collaboration with environmental agencies, heritage authorities and coastal communities, naval assets may support operations to contain or remove hazardous substances from deteriorating wrecks, thereby reducing risks to marine ecosystems and culturally significant seascapes. However, the legal position requires careful distinction between navies as institutions and the states to which military vessels belong. Under international law, a warship is a vessel belonging to the armed forces of a state, and responsibility associated with sovereign immune military wrecks ultimately rests with the relevant state, not with the navy as an autonomous actor. UNCLOS similarly refers to the

[47] Camilla Moore and Isobelle Clodagh, *The Practicalities of Managing and Mapping Potentially Polluting Shipwrecks in the UK: Legal, Social and Ethical Considerations* (PhD diss., University of Southampton, 2021).
[48] United Nations, *United Nations Convention on the Law of the Sea*, 10 December 1982, https://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf.
[49] SPREP. A Regional Strategy To Address Marine Pollution From World War II Wrecks. Available at: https://www.sprep.org/attachments/Legal/Marinewrecks.pdf
[50] Project Tangaroa. Potentially Polluting Wrecks. Available at: https://www.project-tangaroa.org/

responsibility of the flag state for damage caused by warships or other government ships operated for non-commercial purposes. Navies may therefore provide the technical expertise and operational capacity required for monitoring or remediation, while diplomatic coordination, legal responsibility and decisions concerning intervention remain matters for states and their competent authorities. In cases involving deteriorating military wrecks associated with a state's historical operations, the state may also carry an ethical responsibility to address environmental and cultural risks, using its navy where appropriate as one of the principal means of fulfilling that responsibility.

Unexploded ordnance (UXO) from past conflicts, particularly from World War II, presents a significant challenge for UCH.[51] Many wartime wrecks and submerged battlefields contain bombs, torpedoes, mines, and artillery shells that remain potentially hazardous.[52] These sites are frequently recognized as cultural heritage under the 2001 UNESCO Convention, which includes historic shipwrecks and submerged landscapes, potentially even those containing UXO, as the Convention does not explicitly exclude such cases. However, the presence of UXO significantly complicates preservation efforts, as these hazardous munitions pose substantial risks to researchers, divers, and marine ecosystems alike. UXO adds a further layer of complexity to the management of underwater cultural heritage. Wartime wrecks and submerged battlefields may contain bombs, torpedoes, mines and artillery shells that remain hazardous decades after the conflict has ended. These materials can make archaeological investigation dangerous, restrict access to heritage sites and complicate conservation decisions. In some cases, high-order detonations are used to remove underwater UXO, but such methods can destroy archaeological structures, displace artifacts, and damage stratigraphy. Even where mitigation measures such as bubble curtains are used to reduce acoustic harm to marine life, they do not necessarily protect cultural heritage from blast damage. A key example is the *SS Richard Montgomery*, an American Liberty ship from World War II, which sank in August 1944 after running aground on the Nore sandbank near Sheerness in the Thames Estuary. According to the Maritime and Coastguard Agency of the UK

[51] Brett Howard, Jana Aker, and Mike Reid, "Risk Management for Unexploded Ordnance (UXO) in the Marine Environment," *Dalhousie Journal of Interdisciplinary Management* 8, 2 (2012).
[52] Jennifer S. Strehse et al., "Discussing Removal Options of Unexploded Ordnance in and near Shipwrecks," *Interreg North Sea Region*, 2023, https://vb.northsearegion.eu/public/files/

Government,[53] at the time, the ship was carrying over 7,000 tons of munitions intended for Allied forces in Europe. While salvage operations managed to remove part of the cargo, an estimated 1,400 tons of unexploded ordnance, including bombs ranging from 250 to 2,000 pounds, remain aboard in the forward holds. The wreck lies in shallow waters with its masts still visible above the surface, and the site is clearly marked due to its high-risk status. Given its proximity to densely populated areas and critical infrastructure, the *SS Richard Montgomery* is considered one of the most dangerous shipwrecks in British waters. The ongoing deterioration of the wreck has raised serious concerns among maritime safety and heritage professionals, as any accidental detonation could trigger one of the largest non-nuclear explosions in recent history, potentially creating a tidal wave and causing extensive damage along the Thames corridor.[54] The Maritime and Coastguard Agency conducts regular monitoring of the site, and proposals have been made to remove the remaining masts to relieve structural stress. However, interventions are technically challenging and could themselves destabilize the wreck.

In some cases, high-order detonations are deemed necessary for removing underwater UXO.[55] In response, mitigation measures are increasingly used to reduce collateral damage to marine ecosystems. A widely recognized method is the bubble curtain, which disperses and absorbs sound and shock waves from underwater blasts.[56] This technique significantly lessens harmful pressure waves affecting marine mammals, fish, and other sensitive species, aligning with evolving environmental best practices. However, using high-order detonations near UCH sites poses a serious, often irreversible threat. Despite acoustic mitigation, the force of explosions can obliterate archaeological structures, displace artifacts, and destroy stratigraphy, leading to permanent loss of cultural and historical information.

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[53] Maritime and Coastguard Agency Guidance UK Government. SS Richard Montgomery: background information. Available at: https://www.gov.uk/government/publications/the-ss-richard-montgomery-information-and-survey-reports/ss-richard-montgomery-background-information

[54] Liz Jackson, "Explosives-Filled Shipwreck Has Safety Work Delayed as Object Found," *BBC News*, 13 April 2024, https://www.bbc.com/news/uk-england-london-68787845.

[55] Chris Price, "Unexplored Opportunities: Multi-Sector Strategies for Collaboration in Underwater Unexploded Ordnance Remediation," *The Journal of Conventional Weapons Destruction* 25, 2 (2021): p. 12.

[56] Sven Koschinski and Karl H. Kock, "Underwater Unexploded Ordnance: Methods for a Cetacean-Friendly Removal of Explosives as Alternatives to Blasting," *International Whaling Commission Scientific Research Reports* SC/61 E, 21 (2009): pp. 1–13.

To navigate this dual challenge, there is an urgent need to invest in the research and development of alternative UXO removal techniques that are both environmentally sustainable and sensitive to cultural heritage preservation. Promising approaches include low-order deflagration, precision mechanical removal, and the encapsulation or relocation of ordnance, each offering more controlled and less destructive solutions.[57] Moreover, the integration of interdisciplinary expertise, from marine ecology and heritage conservation to explosive ordnance disposal, is essential to inform decision-making processes and support the development of site-specific, context-aware strategies.

Navies can play a pivotal role in addressing this complex issue. Balancing safety, conservation, and environmental concerns remains a major challenge in managing UXO-laden underwater heritage. With their technical capabilities, logistical resources, and operational experience in explosive ordnance disposal, navies are well-positioned to contribute to integrated solutions. Future approaches will likely require international cooperation, bringing together the expertise of heritage professionals, military specialists, and environmental scientists to develop sustainable strategies that safeguard both cultural heritage and marine ecosystems.

Military Training

Military training exercises, particularly those conducted in maritime and coastal environments, can pose significant threats to underwater and coastal cultural heritage.[58] These impacts manifest through both direct physical damage and broader environmental degradation. Live-fire exercises, amphibious landings, diving training, sonar testing, and demolition training can directly affect heritage sites located on or near the seabed and coastal zones. UCH is particularly vulnerable to disturbance or destruction from explosions, heavy equipment, and vessel anchoring. Similarly, coastal heritage sites such as fortifications, sacred landscapes, or historic settlements may suffer erosion, vibration damage, or structural weakening due to repeated military activity. For instance, military training along parts of the Western Australian coast, including the Lancelin Defence Training Area, has raised concerns about impacts on nearby Aboriginal heritage sites,

[57] Koschinski and Kock, "Underwater Unexploded Ordnance."
[58] Jeffery, McKinnon, and Van Tilburg, "Underwater Cultural Heritage in the Pacific."

both terrestrial and coastal.[59] These include sacred sites, shell middens, and submerged cultural landscapes. Limited consultation and environmental assessments in the past have led to calls for greater inclusion of Indigenous voices in planning and heritage management. However, the Underwater Training Range EPA s38 Referral Supporting Document[60] submitted by the Department of Defence, although it acknowledges the potential impacts of the proposed activities on World Heritage properties, State-registered heritage places, and Aboriginal cultural heritage sites, lacks a substantive framework for mitigation. The document identifies the presence of these culturally and environmentally significant areas but does not elaborate on specific strategies to prevent, minimise, or offset adverse effects. This omission raises significant concerns regarding the adequacy of heritage protection measures within the project's environmental assessment, particularly given Australia's obligations under both national heritage legislation and international conventions such as the 1972 UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage.[61]

One of the most pervasive impacts on UCH arises from live-fire military exercises. The detonation of ordnance in the water column or on the seafloor can result in intense shockwaves, which are capable of fragmenting or scattering submerged archaeological remains.[62] Similarly, underwater demolition training and mine clearance operations frequently involve the use of controlled blasts that can irreversibly alter submerged cultural landscapes. These activities not only damage physical remains but also compromise the stratigraphic and contextual integrity essential for archaeological interpretation. The repeated passage of submersibles, ROVs, and divers during training missions can also stir up sediments, increasing erosion and destabilising the surrounding environment.

Further threats arise from the deployment of military infrastructure. The use of anchors, mooring devices, and underwater construction machinery can physically impact

[59] Hannah Middleton, "US Bases in Australia," *Peace Review* 22, 2 (2010): pp. 144–149.

[60] Aurecon Australasia Pty Ltd. Underwater Training Range EPA s38 Referral Supporting Document. Available at:https://www.epa.wa.gov.au/sites/default/files/Referral_Documentation/Referral%20Supporting%20Document_1.pdf

[61] UNESCO, *Convention Concerning the Protection of the World Cultural and Natural Heritage*, 16 November 1972, https://whc.unesco.org/en/conventiontext/

[62] Strehse et al., "Discussing Removal Options of Unexploded Ordnance."

UCH through direct contact with the seabed.[63] For instance, Portsmouth Harbour, a site of continuous maritime activity for over a thousand years, underwent major infrastructure upgrades to accommodate the Royal Navy's new aircraft carriers, HMS *Queen Elizabeth* and HMS *Prince of Wales*. Due to their deep draft, the harbour walls were reinforced, the seabed was dredged, and new navigation markers were installed.[64] These works were accompanied by archaeological monitoring, which led to the recovery of a range of historic artifacts during the dredging process.[65] However, such oversight is not always standard practice, particularly in areas where submerged cultural heritage has not been adequately surveyed or documented. This is especially concerning in contexts involving vulnerable sites, such as ancient Aboriginal stone arrangements or submerged habitation areas, where irreversible damage can occur without prior assessment or mitigation. The construction and operation of permanent underwater infrastructure, such as sonar arrays, communication cables, or training range installations, often involves dredging, trenching, and piling. These actions can lead to the destruction or burial of UCH without adequate mitigation.[66] Even indirect effects, such as acoustic pollution and ecological disruption, may undermine preservation conditions. For example, biological encrustations and sediment layers that help protect submerged sites can be disrupted, exposing heritage materials to accelerated decay.[67]

These threats stand in contrast to the principles enshrined in the UNESCO 2001 Convention. In particular, Article 5 of the Convention (UNESCO Convention, 2001) calls on States to integrate the protection of UCH into environmental impact assessments and planning processes. However, in practice, military activities are frequently exempted

[63] Ian D. MacLeod, Vicki L. Richards, and Maria Beger, "The Effects of Human and Biological Interactions on the Corrosion of WWII Iron Shipwrecks in Chuuk Lagoon," paper presented at the 18th International Corrosion Congress, Perth, November 2011.

[64] Royal Navy News (5 November 2019). Naval Base ready for the nation's two supercarriers. Available at: https://www.royalnavy.mod.uk/news/2019/november/05/191105-portsmouth-is-ready-for-hms-prince-os-wales

[65] Garry Brimecome, "Job Done: Dredging Complete for Aircraft Carriers," *Inside DIO*, Gov.UK, 1 August 2017, https://insidedio.blog.gov.uk/2017/08/01/job-done-dredging-complete-for-aircraft-carriers/.

[66] Manuel Bethencourt, Tomás Fernández-Montblanc, Alfredo Izquierdo, Manuel María González-Duarte, and Cristian Munoz-Mas, "Study of the Influence of Physical, Chemical and Biological Conditions That Influence the Deterioration and Protection of Underwater Cultural Heritage," *Science of the Total Environment* 613 (2018): pp. 98–114.

[67] Elena Perez-Alvaro, "Climate Change and Underwater Cultural Heritage: Impacts and Challenges," *Journal of Cultural Heritage* 21 (2016): pp. 842–848.

from, or only partially addressed within, these frameworks. In many cases, they have not been seriously considered or meaningfully included in most of these discussions, leading to significant gaps in the protection of cultural heritage in contexts involving armed forces or defence-related operations. For instance, for over 60 years, the US Navy conducted live-fire training exercises on the island of Vieques, including bombing, amphibious assaults, and naval gunfire. These activities left behind unexploded ordnance, heavy metal contamination, and severe degradation of nearby coral reefs and marine ecosystems.[68] Archaeological remains of indigenous Taíno settlements and colonial-era heritage were also affected. Since the military's departure in 2003, the area has been designated a *Superfund site*,[69] and cleanup efforts continue; however, the cultural and environmental damage inflicted over decades remains significant, with many heritage sites irreversibly altered or lost, and long-term ecological impacts still unfolding.[70]

Beyond immediate damage, military training can exacerbate long-term environmental stressors that indirectly harm heritage assets.[71] Increased turbidity from seabed disturbance, changes in sedimentation patterns, and pollution from fuel and munitions can alter the preservation conditions of underwater sites, accelerating corrosion or biological decay. The use of mid-frequency active sonar has also been linked to behavioural changes and strandings in marine mammals, potentially disrupting the ecological balance around heritage-rich marine zones.[72] In general, it would be valuable to examine whether military forces systematically integrate heritage protection considerations throughout the different phases of their activities. This includes assessing whether such measures are incorporated during the initial planning stages, embedded

[68] Joel C. Yelin and S. Miller DeMond, "A Brief History of Environmental Inequity and Military Colonialism on the Isle of Vieques, Puerto Rico," *Environmental Justice* 2 3 (2009): pp. 153–159.

[69] A "Superfund site" refers to a location in the United States contaminated with hazardous substances, designated for cleanup and remediation under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund. For more information, see United States Environmental Protection Agency. Available at: https://www.epa.gov/superfund/what-superfund

[70] Sasha Davis, *When the Bombs Stop: Environmental Issues after Military Base Closures* (2015), https://u-ryukyu.repo.nii.ac.jp/record/2008045/files/24310032-honpen_8.pdf.

[71] Jeffery, McKinnon, and Van Tilburg, "Underwater Cultural Heritage in the Pacific."

[72] Brandon L. Southall et al., "Behavioural Responses of Fin Whales to Military Mid-Frequency Active Sonar," *Royal Society Open Science* 10, 12 (2023): 231775.

within the execution of operations or training exercises, and addressed in post-activity evaluations through the identification of lessons learned. Furthermore, it is important to consider whether military maps and operational charts include all known cultural heritage sites, particularly those designated by UNESCO, and whether these are clearly marked -ideally using internationally recognized symbols such as those of the Blue Shield- in order to ensure their avoidance during military manoeuvres and exercises.

Despite the impacts outlined above, many navies around the world are actively working to mitigate the effects of their operations on cultural heritage and local environments. The next section explores some of these alternatives, highlighting promising progress in several countries, particularly those with powerful military bases located in foreign territories, islands, or within or near local communities.

Examples of Military Initiatives for Impact Mitigation

Some navies already provide important examples of institutional engagement with underwater cultural heritage. In the United States, the Naval History and Heritage Command's Underwater Archaeology Branch manages, researches, conserves and interprets the Navy's collection of submerged military craft, which includes thousands of shipwrecks and aircraft wrecks. It also develops and implements policy relating to their preservation on behalf of the Department of the Navy. This example is important because it demonstrates that naval involvement in UCH is not merely aspirational. Specialist naval heritage practice already exists. The broader question is how such expertise can inform operational planning, environmental responsibility and engagement with heritage beyond sovereign-owned military wrecks.

United Kingdom

In the United Kingdom,[73] designated military exercise areas are meticulously mapped and managed to support complex training and operational requirements. Helicopter Landing Sites (HLS) within these areas are pre-selected by the Commando Mobile Air Operations Team (MAOT), a specialized component of the Commando

[73] Most of this information has neen gathered following an interview with a Royal Navy member serving across sea, air, and land domains within the Commando Helicopter Force.

Helicopter Force. The latter is a unit of the Royal Navy Fleet Air Arm and operates under the Joint Aviation Command of the British Armed Forces. The selection of HLS locations is guided by stringent safety and operational suitability criteria, ensuring that each site can support the demands of modern military aviation. Operating within the broader structure of the United Kingdom Commando Force (UKCF) of the Royal Navy and the Fleet Air Arm, the MAOT benefits from extensive institutional expertise in amphibious operations, particularly in littoral (coastal) environments. Their activities are not conducted unilaterally; rather, they are integrated into a hierarchical command system that provides both strategic direction and operational support.

Amphibious exercises typically involve coordinated helicopter and landing craft assaults, often executed as Company-level lifts into specifically designated landing zones. These operations are planned and carried out with a high degree of precision, with particular emphasis on risk mitigation, especially during the critical phase of shore landings. The careful orchestration of air and sea elements underscores the importance of joint force interoperability and the application of best practices in expeditionary warfare.

Operational procedures become more complex when deployed abroad, where host-nation constraints and logistical considerations introduce variability. Despite these differences, reconnaissance remains a constant and essential step before any landing or assault. Advanced technologies and reconnaissance missions enhance situational awareness and overall mission effectiveness in both domestic and international contexts.

Reconnaissance procedures include clearing landing sites of obstructions that might damage aircraft, assessing ground firmness to prevent sinking, and ensuring areas are free of loose debris that could become hazardous due to rotor downwash. Clear ingress and egress routes are essential. Standardized templates are used during HLS assessments to ensure consistent and accurate safety information across different aircraft types. These are supplemented with annotated maps highlighting site-specific hazards such as soft ground, graveyards, power lines, towers, and livestock. Areas of historical or cultural significance are marked in red to signal avoidance.

Although MAOT personnel are not cultural heritage subject matter experts (SMEs), they rely on high-resolution mapping and detailed ground inspections to evaluate site conditions. Photographs are systematically taken in each cardinal direction,

capturing relevant terrain features to aid aircrew orientation. This is particularly important during operations involving Red Illumination or Night Vision Goggles (NVG), where terrain familiarity significantly enhances flight safety in low-visibility conditions.

A meeting with members of the Commando Helicopter Force (CHF), including a Royal Navy Lieutenant and a Royal Marines Captain, confirmed the rigour of these planning processes. The CHF operates across a wide range of environments, from the Arctic regions of Northern Norway to the deserts of Afghanistan, with a primary focus on maritime operations. Although the interviewed personnel were not familiar with organizations such as Blue Shield or the CPPU, they underscored the detailed and structured planning that informs every stage of helicopter landing operations. These procedures collectively demonstrate a robust framework aimed at minimizing environmental and cultural impacts while preserving operational integrity.

To mitigate potential damage to cultural heritage, the Cultural Property Protection Unit (CPPU) of the Ministry of Defence should integrate with Carrier Strike Groups (CSGs) and former Amphibious Ready Groups (ARGs). This integration would enable the Command Team to gain a thorough understanding of heritage considerations, both terrestrial and underwater, within littoral zones. Prioritizing the identification and avoidance of culturally significant sites helps prevent inadvertent damage, which could otherwise generate resentment among local populations and undermine mission legitimacy.

Maybe Cultural Property Protection Units (CPPU) should be integrated within Carrier Strike Groups (CSG) and Amphibious Ready Groups (ARG). This integration would ensure that the Command Team has comprehensive situational awareness regarding cultural heritage sites, both above and below water, within the littoral domain. Such measures would serve to minimise or ideally prevent damage to cultural heritage. Although military operations prioritise strategic and tactical objectives, there is no intentional destruction of cultural heritage sites. Pre-deployment training includes instruction on hearts and minds strategies, as well as rules of engagement, to ensure that military forces do not inadvertently alienate local populations. In the context of liberation

operations, safeguarding cultural heritage is crucial to maintaining goodwill and preventing unintended hostilities.[74]

United States in Guåhan and the Northern Mariana Islands

Guam's political and historical landscape is shaped by its colonial past, strategic importance to the US, and its ongoing struggles for self-determination. Originally colonized by Spain in 1668, Guam was ceded to the US in 1898 after the Spanish-American War. During World War II, the island was occupied by Japan from 1941 to 1944.[75] After the US recaptured the island, it became a key military hub, with US military bases playing a central role in both the local economy and the island's political structure.

One of the most contentious issues on the island is, as a matter of fact, the extensive use of land for military purposes, including firing ranges, amphibious training operations, and the storage of nuclear weapons. These military activities have had significant environmental and social impacts on the island and its residents, particularly the indigenous CHamoru people. The construction and operation of live-fire training ranges, including those used for amphibious landings and artillery exercises, have led to environmental degradation, with significant portions of land and marine areas set aside for military use, often at the expense of local communities.[76] A notable example of the impact of military activities on Guam is the controversial proposed relocation of residents to make room for military training facilities. The Marine Corps Base Camp Blaz Live Fire Training Range Complex is now operational,[77] with red flags and flashing lights warning approaching fishing vessels of the danger zone, which extends up to 2.8 miles offshore, near Ritidian Beach (Litekyan), an ancestral site for the CHamoru people.[78] This area is

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[74] John D. Giblin, "Post-Conflict Heritage: Symbolic Healing and Cultural Renewal," *International Journal of Heritage Studies* 20, 5 (2014): pp. 500–518.

[75] Robert F. Rogers, *Destiny's Landfall: A History of Guam* (Honolulu: University of Hawai'i Press, 2011).

[76] Ken Kuper, Leland Bettis, and Robert Underwood, "The (Military) Value of Guam," *The Guam Daily Post*, 2024, https://www.postguam.com/forum/featured_columnists/the-military-value-of-guam/article_ccaf2dae-b60a-11ef-ac42-6f669f80da13.html.

[77] Joe Taitano, "Camp Blaz Talks Safety amid Firing Range Concerns," *Pacific Daily News*, 6 November 2023, https://www.guampdn.com/news/camp-blaz-talks-safety-amid-firing-range-concerns/article_0d80dde2-7c59-11ee-babd-9bed8f26156e.html.

[78] Gerry Doyle, Mohammad K. Vijadan, and Arathy J. Aluckal, "Island in the Crosshairs," *Reuters*, 2024, https://www.reuters.com/graphics/USA-CHINA/GUAM/myvmbqngnpr/.

also part of one of the most productive fishing grounds in northern Guam. The range and surrounding danger zone will be active for up to 273 days each year, according to Taitiano (2023). Environmental impact studies estimate that as many as 6.7 million rounds could be fired annually at the range. Stray bullets and shrapnel, especially ricochets, are a concern within the zone.

In recognition of the potential impacts of military activity on cultural resources, both terrestrial and submerged, the United States Department of Defense has engaged in formal efforts to balance defence needs with heritage preservation in Guåhan and the surrounding region. A key initiative in this regard is the Mariana Islands Training and Testing (MITT) Study Area,[79] which encompasses vast marine and coastal zones used for military exercises. As part of its environmental and cultural stewardship obligations, the US Navy has undertaken assessments to identify potential effects on submerged cultural heritage, including shipwrecks, submerged landscapes, and coastal archaeological sites. To ensure compliance with Section 106 of the National Historic Preservation Act (NHPA), the Programmatic Agreement Among the Commander, Joint Region Marianas and the Guåhan State Historic Preservation Officer Regarding Military Training and Testing on and within the Surrounding Waters of the Island of Guåhan (PATT).[80]was drafted. This agreement outlines procedures for consultation, identification, evaluation, and protection of historic properties that may be affected by military training and testing activities in and around Guåhan. It provides a framework for ongoing collaboration between the military and the Guåhan SHPO, ensuring that military operations incorporate cultural resource management best practices. The agreement also emphasizes mitigation measures, public consultation, and the integration of Traditional Cultural Properties (TCPs), reflecting the need to respect CHamoru cultural values and historic landscapes.

A key concern addressed under the PATT is the potential discovery and disturbance of human remains, particularly in areas of high archaeological sensitivity, both on land and in submerged contexts. Guåhan's coastal and underwater zones contain

[79] United States of America. Mariana Islands Training and Testing Study Area MITT Available at: https://mitt-eis.com/About-the-MITT-Study-Area.

[80] Programmatic Agreement Among the Commander, Joint Region Marianas and the Guåhan State Historic Preservation Officer Regarding Military Training and Testing on and within the Surrounding Waters of the Island of Guåhan (PATT). Available at: https://historicguam.net/project-title-training-area-selection/.

a number of culturally significant sites, including ancestral CHamoru burials, WWII-era shipwrecks, and sacred landscapes that may hold human remains. The PATT outlines protocols for consultation, documentation, and appropriate treatment of these remains, ensuring compliance with federal preservation laws such as the National Historic Preservation Act (NHPA) and the Native American Graves Protection and Repatriation Act (NAGPRA). Moreover, the agreement reinforces the importance of engaging with CHamoru communities and respecting Indigenous cultural values, particularly regarding the handling and repatriation of ancestral remains.

Another noteworthy document produced by the PATT is *Annex A*, which outlines, in detail, the activity maps, mitigation strategies, and descriptions of naval training exercises conducted by the Guam Naval Base. The document identifies various cultural heritage stressors and corresponding mitigation measures. Among the activities described is a joint multi-strike group exercise, which involves the coordinated operation of up to three Carrier Strike Groups in a dynamic *free play* battle scenario. Mitigation measures for such exercises include a reconnaissance-level pedestrian survey of coastal and inshore shallow water areas by qualified archaeologists. The document also acknowledges potential impacts on cultural remains, such as boat strikes, while noting a commitment to avoid the use of explosives within three nautical miles of the coast. Additional training activities covered in the document include parachute insertions, personnel insertions and extractions, amphibious rehearsals without landings, amphibious raids and assaults, as well as security operations such as civilian port defence and helicopter *touch-and-go* exercises conducted both at sea and on land. These activities are accompanied by proposed archaeological surveys of coastal and shallow inshore areas, with an acknowledgment of the potential for physical disturbances to cultural resources. However, although these references indicate a degree of awareness regarding cultural resources, the document offers only limited engagement with the potential impacts. For instance, unmanned underwater vehicle (UUV) training, diving training, or underwater intelligence, surveillance and reconnaissance is classified as having no impact on UCH, revealing a clear gap in the assessment framework. In an interview with representatives from the Office of Foreign and Military Affairs of the Government of Guam, two additional concerns were raised regarding the adequacy of current documentation and assessment processes. First, there was uncertainty over whether the PATT document or any similar military planning documents offer sufficient protection

for natural heritage remains, particularly those that exist in marine or coastal environments. Second, the interviewees expressed concern that intangible cultural heritage and cultural practices connected to the sea had not been comprehensively considered or documented.[81]

Although both the MITT and the PATT represent models of cooperative governance aimed at mitigating the cultural impacts of military testing and training, while also seeking to honour the deep historical and spiritual connections Indigenous communities maintain with their ancestral heritage, the reality is that local communities continue to experience significant disruptions. Military training exercises remain a source of environmental degradation, cultural erosion, and psychological stress. Despite the frameworks in place, new and more effective structures are urgently needed to ensure that Indigenous voices are not only heard but meaningfully integrated into decision-making processes, with tangible outcomes that protect both cultural heritage and community well-being.

Last reflections

This paper also prompts some additional reflections. The first concerns the challenge of valuing heritage that is not inherited. In military contexts, where personnel are temporarily deployed and often lack lasting ties to the places they operate in, cultural heritage is more vulnerable to neglect. This is especially true in Guåhan, where short, rotating tours hinder the development of long-term stewardship. While duty and regulations offer a formal framework, genuine protection requires awareness, education, and a sense of responsibility beyond operational needs. The question of whether duty alone is enough highlights the need for cultural sensitivity in military operations. Integrating local history and heritage into training and strategic planning is essential. In Guåhan, encouraging understanding of CHamoru heritage, historic battlefields, and submerged sites can help minimize accidental damage and strengthen diplomatic relations. Addressing this challenge does not necessarily require a wholly new recognition of underwater cultural heritage within military institutions. Rather, it requires building on existing expertise and good practice, making UCH more consistently

[81] Personal communication. Office of Foreign and Military Affairs of the Government of Guam. UFISINAN I MAGA'HÅGA. 28 Friday March 2025.

visible in operational planning, environmental management, training and community engagement across the range of maritime activities that may affect underwater heritage.

The second issue concerns the protection of intangible cultural heritage. While it may seem more straightforward to preserve a physical structure such as a church, safeguarding customs, oral traditions, rituals, and other intangible practices presents a far greater challenge, particularly in contexts impacted by military activity. These elements are often deeply embedded in the daily lives and collective memory of communities, yet they are also the most vulnerable to disruption and loss. The 2003 UNESCO Convention for the Safeguarding of Intangible Cultural Heritage.[82]has already laid the groundwork for international recognition and protection of such elements. It is imperative that not only civilian actors but also military institutions be fully aware of and adhere to these standards, integrating them into operational planning and training to avoid irreparable harm to living cultural expressions.

Looking toward the future, it is important to consider the increasing reliance of military units on advanced simulation technologies. These systems are now widely employed across various domains, including cockpit simulators that replicate complex manoeuvres such as deck landings at sea under both day and night conditions, and weapons systems simulators used for gunnery training. Such tools offer multiple advantages: they contribute to substantial cost savings, prevent physical damage to training grounds or surrounding environments, and eliminate risks to both personnel and equipment. In parallel, rapid advancements in artificial intelligence (AI) are poised to significantly enhance the capabilities of these simulation platforms. AI-driven systems can generate more adaptive and realistic training scenarios, simulate dynamic adversary behaviours, and tailor exercises to individual or unit performance in real time. This not only increases the training's operational relevance but also allows for more precise evaluation and feedback mechanisms. In the context of heritage protection, the integration of AI into military simulations may also offer novel opportunities to design training environments that explicitly include cultural heritage considerations, thereby reinforcing awareness and responsible behaviour in future operations.

[82] UNESCO, *Convention for the Safeguarding of the Intangible Cultural Heritage*, 2003, https://www.unesco.org/en/legal-affairs/convention-safeguarding-intangible-cultural-heritage.

Conclusions

This article has argued that navies have a significant role to play in the protection of underwater cultural heritage, not because they are uniformly unaware of its importance, but because their operations, histories and technical capacities place them in a particularly important relationship with submerged heritage. Some naval institutions already manage military wrecks, support underwater archaeology and recognise the significance of submerged remains. These practices should be acknowledged as important foundations. At the same time, naval engagement with UCH should be understood more broadly than the management of sovereign-owned military sites alone. Navies may also operate in environments containing Indigenous cultural seascapes, submerged settlements, historic commercial wrecks, ceremonial places and other forms of UCH unrelated to naval history. The challenge is therefore to extend existing recognition into a more systematic approach to all heritage potentially affected by maritime military activity.

The central question addressed in this article has been how navies can balance operational readiness with their responsibility to identify, protect and engage with underwater cultural heritage. The answer is not to place heritage protection in opposition to military effectiveness. Rather, navies can integrate UCH into the way they plan, train, operate and remember. Amphibious landings, helicopter drills, live exercises, seabed interventions and joint maritime operations all take place in environments that may contain tangible and intangible heritage. Recognising this does not prevent military preparedness. It makes preparedness more informed, more ethical and more responsive to the cultural and environmental realities of the spaces in which navies operate.

The article has also shown that naval engagement with UCH is not only a matter of avoiding harm. Navies possess technical expertise and operational capabilities that may be valuable for the protection of underwater cultural heritage, including hydrographic survey, sonar, diving expertise, remotely operated vehicles and explosive ordnance disposal. When deployed by their states and in accordance with the applicable legal framework, these capabilities can support the identification, documentation, monitoring and, where authorised, management of underwater sites at risk from pollution, unexploded ordnance or military activity. Their contribution is therefore significant, but it must be understood within the responsibilities of states, the jurisdiction

of coastal states, the rights attached to sovereign vessels and aircraft, and the requirements governing activities directed at underwater cultural heritage.

At the same time, the protection of UCH requires more than technical intervention. It requires engagement with the people and communities for whom these seascapes hold meaning. Local and Indigenous communities may understand the ocean not simply as a physical space, but as an ancestral, spiritual and cultural environment. Military heritage frameworks must therefore address not only tangible remains, but also the intangible values, memories and identities attached to submerged and coastal places. The treatment of human remains, war graves and sacred seascapes is especially important in this regard. Ethical stewardship requires consultation, cultural sensitivity and a willingness to acknowledge that naval histories are often also community histories, colonial histories and histories of loss.

Some military forces have already developed internal procedures for the protection of cultural heritage, including UCH. These measures should be recognised, but they should not remain isolated examples of good practice. Heritage protection should be embedded across military institutions, including navies, air forces and armies, through policy, training, operational planning and environmental management. Such protocols should not depend only on the advocacy of host governments or the initiative of island territories where bases are located. They should form part of the ordinary ethical and professional standards of military conduct wherever operations occur. This article does not suggest that navies may independently intervene in underwater cultural heritage beyond the authority of their states or outside the applicable jurisdictional framework. Rather, it considers how naval capabilities may be used by states, in accordance with international law and relevant domestic procedures, to support the identification, avoidance of harm, monitoring and protection of UCH.

Protecting underwater cultural heritage is therefore not a demand that navies abandon operational priorities or recognise an entirely unfamiliar responsibility. It is an invitation to build on existing expertise, extend good practice and ensure that naval operations are informed by the cultural as well as environmental significance of the maritime spaces in which they take place. By doing so, navies, acting through the authority and responsibilities of their states, can contribute meaningfully to the

stewardship of both their own submerged legacies and the wider underwater heritage shared by communities and humanity.

Ethics Statement

This article is based primarily on open and published sources, including international legal instruments, publicly available policy documents, environmental assessments, official reports, academic literature, media reports and public examples of military engagement with cultural heritage. It does not assess classified, restricted or internal naval policies and operating procedures, which may contain more detailed provisions on heritage protection than are visible in the public record. Its conclusions are therefore limited to the forms of naval and military engagement that can be examined through publicly accessible material.

The article also draws on a small number of anonymised professional communications with military personnel, public servants and heritage practitioners in the United Kingdom and the United States. These exchanges were used to contextualise published material and to clarify professional perspectives on heritage, environmental risk and military practice. No operationally sensitive information or personal data is included.

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