

Occasional Paper

Amphibious Futures: The Royal Marines in Contested New Operating Environments

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Executive Summary

This paper analyses the key adaptations that Western amphibious forces will need to make to contribute to deterrence and warfighting in the future operating environment. In particular, the paper addresses how the force design of the UK's Royal Marines will need to evolve for the marines to be able to contribute to the amphibious capabilities of an alliance or a coalition.

The paper argues that, rather than being a capability which is used to exploit sea control once a fleet has secured it, amphibious forces should represent a landward extension of the fleet. This is subtly different, as it involves closely integrating amphibious forces with two strictly naval functions: maritime strike; and efforts to secure sea control. Such a use of amphibious forces entails tactical specialisation, with a particular focus on closing a potential gap between blue-water navies and the joint force. However, as will be discussed, a tactical focus on enabling strikes need not limit the number of use cases for more specialised amphibious forces.

A major feature of the future operating environment is likely to be adversaries with enhanced anti-access capabilities and longer-ranged fires ashore. For allied and coalition amphibious forces, this means that disembarked forces will need to be distributed more widely, and the shipping that supports them will have to operate from greater distances. While this challenge will be especially acute in contexts involving near-peer opponents, the proliferation of anti-access capabilities makes it a likely challenge in several contexts in which UK and allied amphibious forces may be deployed.

This paper argues that adapting to this emerging operating environment will be best achieved through a concept of operations that subsumes amphibious power projection under the naval functions of strike and sea control. Distributed amphibious forces have a key operational role to play in tackling the challenge of enhanced anti-access capabilities through converging long-range fires capabilities. While this approach, epitomised by the US Marine Corps' Expeditionary Advanced Base Operations framework, is typically treated as synonymous with sea denial, it in fact has wider applicability. Having a mix of dispersed long-ranged fires, both afloat and ashore, and small groups of raiding forces, can present serious dilemmas to large opposing ground forces.

Though the combination of raiding and fires is not an exclusively amphibious solution, forces capable of manoeuvring both at sea and on land can compound the challenge for an opponent. In many contexts, including the narrow archipelagic seas of Europe, using amphibious forces in this way would force an opponent

to survey an extended littoral space that encompasses mainland areas, the maritime domain and offshore islands. This would considerably increase the opponent's ISR burden.

There are a number of functions on the maritime side of the littoral to which amphibious forces can also contribute, among them the exercise of sea control in politically sensitive conditions. This paper argues that amphibious operations should therefore be subsumed under two naval missions – strike and sea control – rather than being treated as a separate function.

Within this rubric, the Royal Marines have the potential to act as an enabling force, both for strike-centric partners, and for both UK and allied naval forces. As a light raiding force, the marines can set the conditions for strike missions to be conducted on favourable terms. An emphasis on a lighter disembarked force should allow the maritime enablers upon which the commando force depends to evolve in ways that make them more multifunctional. Once a requirement to move heavy equipment is reduced, more emphasis can be placed on priorities such as the ability to carry sensors and strike munitions and achieving low observability. This can then enable tasks such as sea control, as well as archipelagic warfare on both sides of the littoral.

Shifting the emphasis of the Royal Marines towards the two priorities of strike and sea control implies tactical specialisation. But it does not necessarily imply a limitation of the operational and strategic roles that marines will play. Having a strike-centric concept of operations has demonstrable utility, both in contingencies in Europe and at expeditionary reach. It would involve narrowing the tactical roles and certifications of commandos, as well as a reduced emphasis on traditional light infantry functions. However, the size of the force and the changing operating environment mean that many of these functions are likely to be redundant in any case.

Emerging threats are making theatre entry for amphibious forces as it is presently conducted increasingly difficult and increasing the demand on the rest of the fleet and the wider joint force to provide protection to such forces where they do contribute. The risk facing amphibious forces, then, is that the value of amphibious insertion comes to be seen as being outweighed by its costs and risks. It is the argument of this paper that amphibious forces, including the Royal Marines, need not cede the littoral to shore-based anti-access/area denial capabilities. Such forces have the potential to add considerable value to allied deterrence. But to be able to do so in the future operating environment, they must integrate more closely with fleets, both in conceptual terms and in force design.

Introduction

This paper is based on work conducted by the UK's Royal Marines and supported in areas by RUSI to address how the marines must evolve in the future operating environment. Its function is to elaborate the rationale for changes underway, as well as to discuss the decisions which will need to be made as the force continues to evolve. The paper addresses two research questions that will be of importance to the Royal Marines as they continue their efforts at force transformation.

1. How can Western amphibious forces, in particular those within NATO, continue to contribute to deterrence and competition in contested environments across the spectrum of conflict?
2. What will the Royal Marines, specifically, need to do to deliver value to an amphibious force generated by an alliance or coalition?

While there are a number of contexts in which amphibious forces can be useful, including a range of missions other than war, the paper's focus is on operations in environments where forces' freedom of manoeuvre is contested.

Some of the challenges that will be faced by amphibious forces in contested environments are common to all operating environments.¹ The convergence of increasingly capable methods of sensor fusion and processing with the proliferation of long-range strike capabilities will make expeditionary forces vulnerable both at sea and on land.² Both peer competitors and sub-peer challengers possess long-range strike capabilities that are becoming more cost effective and are proliferating as a result, along with – to varying degrees – the ability to cue them at reach.³

While generating wide-area situational awareness at sea remains a complex task, the proliferation of sensors both military and commercial, coupled with developments in areas such as software-defined sensors and machine learning, will equip a growing range of actors with the ability to rapidly detect, classify and engage targets at sea.⁴ Movement inland will also become increasingly

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1. Amphibious forces are defined here as those forces capable of maritime insertion under contested conditions – which distinguishes them from land forces, which can in theory be inserted into a theatre from the sea as well. Commando forces are a subset of amphibious forces typically optimised for tasks such as light infantry functions and raiding. In practice, this distinction has been less stark, with commando forces acting in a number of roles, including as line infantry.
 2. See Andrew Krepinevich, *Maritime Warfare in a Mature Precision Strike Regime* (Washington, DC: CSBA, 2014).
 3. Sidharth Kaushal, Jack Watling and Justin Bronk, 'A UK Joint Methodology for Assuring Theatre Access', *Whitehall Report*, 4-22 (May 2022), pp. 7-21.
 4. *Ibid.*

difficult. This has been illustrated in the ongoing conflict in Ukraine. An evolving man-portable air defence system (MANPADS) threat adequately networked with longer-range radar can make airborne manoeuvre and assault – which previously helped to counteract the challenge of anti-access area denial (A2/AD) capabilities – increasingly risky.⁵ Once ashore, amphibious forces will have to contend with shorter-ranged fires, cruise and ballistic missiles, and attack from fixed-wing aircraft. The threat to amphibious lodgements is not new, but it will become increasingly multi-tiered, combining threats that fly at different altitudes with different profiles, making air defence increasingly difficult.

In addition, anti-access capabilities are likely to become more potent and, crucially, are no longer the preserve of a small subset of actors. Consider, for example, the Ukrainian army's successful destruction of what were likely the forward elements of a Russian force near Odesa early in the conflict, or, in Yemen, the Houthi movement's partially successful efforts to contest the anti-Houthi coalition's freedom of movement at sea.⁶

Certainly, defensive countermeasures to the threats described above are emerging. For example, directed-energy weapons can enable the cost-effective intercept of certain types of munition.⁷ However, the incorporation of new modes of defence creates new requirements, both in relation to the size and power generation of platforms needed to defend an amphibious force, and for these platforms to be risked in forward positions. Moreover, the asymmetry of costs between missiles and vessels means that attackers enjoy more room for error and, in littoral areas, vessels can be struck by a range of both long- and short-ranged weapons, making it difficult to optimise against specific threats.⁸ Once ashore, concentrated force elements can be defended, but at increasingly high cost and for limited periods of time.⁹ While these challenges are not unique to littoral combat in every instance, the challenge of concentrating will be especially

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5. Mykhaylo Zabrodskiy et al., 'Preliminary Lessons in Conventional Warfighting from the First Six Months of Russia's Invasion of Ukraine: February–July 2022', RUSI, November 2022, pp. 26–28; on the role of vertical lift and ship-to-objective manoeuvre, see Carter A Malkasian, 'Charting a Pathway to OMFTS: A Historical Assessment of Amphibious Operations from 1941 to the Present', Center for Naval Analyses (CNA), July 2002, p. 2.
 6. Zabrodskiy et al., 'Preliminary Lessons in Conventional Warfighting from the First Six Months of Russia's Invasion of Ukraine', p. 30; Caleb Weiss, 'Analysis: Houthi Naval Attacks in the Red Sea', *Long War Journal*, 17 August 2019, <<https://www.longwarjournal.org/archives/2019/08/analysis-houthi-naval-attacks-in-the-red-sea.php>>, accessed 5 August 2023.
 7. Mark Gunzinger and Christopher Dougherty, 'Changing the Game: The Promise of Directed-Energy Weapons', Center for Strategic and Budgetary Assessments (CSBA), April 2012; Bryan Clark and Jesse Sloman, 'Advancing Beyond the Beach: Amphibious Operations in an Era of Contested Weapons', CSBA, 15 November 2016.
 8. Milan Vego, 'On Littoral Warfare', *Naval War College Review* (Vol. 68, No. 2, 2015), pp. 30–39; Wayne Hughes, *Fleet Tactics and Coastal Combat* (Annapolis, MD: Naval Institute Press, 2000), pp. 2, 200.
 9. For example, the iron dome C-RAM system used by the US Marine Corps costs \$100 million and is limited by interceptor numbers. See Missile Threat, 'Iron Dome (Israel)', CSIS Missile Defense Project, <<https://missilethreat.csis.org/defsys/iron-dome/>>, accessed 19 September 2023.

acute in the littoral context, given the vulnerability of a force when it is building up ashore, and the risks it faces if cut off from naval support.

Cumulatively, not only do these new threats make theatre entry increasingly difficult for amphibious forces, but they also increase the demand on the rest of the fleet and the wider joint force to provide protection. This will be an especially acute challenge when blue-water capabilities will have to operate at greater distances from coastlines and dedicate considerable effort to defending themselves and performing purely naval functions. The risk facing amphibious forces, then, is that the value of amphibious insertion comes to be seen as being outweighed by its costs and risks. Of course, there are a number of other roles that amphibious forces have come to play over the course of previous decades, but many of these do not depend on their amphibious roles per se.

In order for their specialism to continue delivering operational and strategic value, then, amphibious forces will need to adapt to this increasingly contested operating environment. This paper seeks to articulate an approach through which Western amphibious forces can continue to do so, in both alliance and coalition contexts. The paper's key contention is that amphibious forces should act as an extension of the fleet, with their function being to enable two naval functions – strike and sea control. Rather than being a force projected by the fleet, amphibious forces should operate as an integral part of it.

The paper's proposition is that the amphibious forces most capable of supporting the fleet will be capable of delivering convergent effects from distributed positions. This requires lower force-to-space ratios, greater mobility on both sides of the littoral, and an emphasis on long-range fires.

In the 20th century, the primary mode of adaptation to increases in the range and lethality of weapons was to reduce force-to-space ratios. The most extreme example of this is non-state actors, who must contend with superior firepower and thus typically do not have force-to-space ratios over 10 fighters per square kilometre.¹⁰ Reducing these ratios, however, makes it difficult to concentrate forces for tactical effect.

Another way of addressing the challenge is for dispersed forces to coordinate long-range strikes. For example, infantry teams equipped with portable loitering munitions can concentrate fire to saturate specific high-value targets even where they are distributed over very broad frontages.¹¹ Similarly, a system such as the US Marine Corps HIMARS can concentrate fire with munitions such as the

10. Stephen Biddle, *Nonstate Warfare: The Military Methods of Guerrillas, Warlords and Militias* (New Haven, NJ: Princeton University Press, 2021), p. 69.

11. As an example of such a munition, consider the Israeli HERO. See Rheinmetall, 'HERO Loitering Munitions: Series of High Precision Loitering Munition Systems', <<https://www.rheinmetall.com/en/products/loitering-ammunition/loitering-munitions-hero>>, accessed 25 November 2023.

500 km-range precision-strike missile without being colocated.¹² While the ability to bring a weight of fire upon opponents from dispersed positions is not a uniquely amphibious function, amphibious forces have two advantages in this field. First, their ability to operate both from land and from the maritime side of the littoral creates an expanded range of vectors from which amphibious forces can deliver fires. Integration with a maritime component command can also allow amphibious forces to draw on naval fires. Second, the relative mobility of amphibious forces can enable them to support fires with other functions, such as raiding at depths that other force elements cannot access.

Beyond strikes and raiding ashore, amphibious forces can also contribute to a range of maritime functions, including the exercise of sea control, and sea denial against adversary vessels in littoral waters. While amphibious forces already play a role in tasks such as interdiction and the generation of situational awareness, this role could be expanded if the force structure and capabilities of amphibious units were to make operating in close coordination with the fleet on both sides of the littoral into a core competency.

One proposal of this paper is that amphibious forces can become more survivable and lethal by adopting a strike-centric concept of operations that emphasises better integration with fleets. The paper further argues that the adaptations required to enable such an approach, including an emphasis on multifunctional surface manoeuvre craft rather than on dedicated connectors, can also allow marine units to better contribute to missions on the maritime side of the littoral – such as the exercise of sea control, for example. This concept of operations implies a degree of specialisation that does entail a cost in terms of multifunctionality. However, an approach based on optimisation within the fleet can make amphibious forces more relevant to the most consequential challenges that Western nations may face.

The issues outlined here will be central to the force transformation decisions of all European marine forces over the next decade. A key question for the Royal Marines specifically will be how the force model upon which its Future Commando Force programme (FCF) is based can deliver greatest value in an Allied context. The size of the Royal Marines means that the force will need to be configured to work with Allies and coalition partners.

This paper is composed of five chapters. Chapter I outlines the traditional contributions of amphibious forces and their relevance to current UK national priorities. Chapter II summarises the challenges posed to forces' effective operation by the contemporary operating environment. Chapter III articulates

12. Lockheed Martin, 'Precision Strike Missile (PrSM)', <<https://www.lockheedmartin.com/en-us/products/precision-strike-missile.html>>, accessed 25 November 2023.

the case for what the authors see as the major adaptations that amphibious forces will need to make to be effective in this environment: becoming more focused on a strike-led concept of operations; and achieving greater integration with naval forces. Chapters IV and V examine the implications for the Royal Marines' force design and capability needs.

Methodologically, the paper is informed by a combination of a review of historical literature, operations analysis and insights from experimentation and exercises undertaken under the aegis of the Royal Marines' FCF programme.¹³ An assessment of historical trends and patterns in the contemporary operating environment has been used to frame the paper's discussion of how amphibious forces might contribute to the goals of a single state, alliance or coalition.¹⁴

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13. Mark Totten is a senior officer within the Royal Marines who has been the programme director for the Future Commando Force (FCF) programme within the Royal Marines and has thus had access to the analytical work supporting it, and it is from this engagement with the findings of the Royal Marines internal analytical work that the primary evidence from exercises and wargames is derived.
 14. Much of this work is classified. However, where possible, the authors have sought to validate findings from an evidence base which cannot be shared with corroborating open source data. Moreover, while granular details of the Royal Marines' internal work cannot always be discussed, core findings and the evidential basis behind them can be discussed in ways that can enable a reader to examine assumptions and core methodologies. The only areas where classification becomes an absolute barrier is in areas such as platform specifications and the specifics of data architectures.

I. The Enduring Roles of Amphibious Forces and Their Application to UK National Priorities

There has historically been a strong case to be made for both the operational manoeuvrability and the strategic flexibility that amphibious forces offer policymakers. However, for these forces to continue to be tactically relevant, they will need to equip and operate in ways that differ considerably from current practice. Amphibious forces have in the past played a range of roles both above and below the threshold of high-intensity conflict.¹⁵ Below the threshold of conflict, their primary roles have included:

- **Signalling.** Amphibious capabilities can play a role in deterrent signalling. By virtue of the visibility of their supporting vessels, they represent a visible diplomatic signal. However, amphibious forces are scalable – a portion of a force can be deployed ashore while the rest remains offshore, for example. They can also be withdrawn from a theatre as diplomatic circumstances dictate, meaning that their deployment need not represent a commitment that is difficult to reverse.¹⁶ Scalability is important, as a key dimension of deterrence is that it must be balanced against efforts to mitigate misperception – an opponent should be able to distinguish between a deterrent threat and preparations for an attack.¹⁷ Moreover, the coordination of military means with diplomacy also necessitates the ability to demonstrate that a threat can be withdrawn if an opponent complies.
- **Presence in a theatre.** Amphibious forces have the capacity to remain engaged in a theatre over extended periods without drawing on local basing to the same degree as other capabilities. They can also, by virtue of their mobility,

15. Ministry of Defence, 'Joint Doctrine Publication 0-10: UK Maritime Power', 5th edition, October 2017; Tim Benbow, 'British Uses of Aircraft Carriers and Amphibious Power 1945–2010', Corbett Paper No. 9, 2012.

16. On the importance of the ability to calibrate signals, see Alexander George, *Forceful Persuasion: Coercive Diplomacy as an Alternative to War* (Washington, DC: United States Institute of Peace Press, 1992), p. 67.

17. See Robert Jervis, 'War and Misperception in International Politics', *Journal of Interdisciplinary History* (Vol. 18, No. 4, Spring 1988), pp. 675–700.

engage with multiple actors within a given theatre. The tasks they can perform in this capacity range from HADR (humanitarian assistance and disaster relief) activity to engaging local partners in advise-and-assist missions. In this capacity, they can contribute both to diplomatic influence and to what might be described as ‘general deterrence’, which denotes efforts to shape perceptions of a state’s commitment to an area, rather than a specific threat to dissuade a specific action.¹⁸

In escalating crises and conflict, amphibious forces have historically played the following roles:

- **Rapid reaction** to contingencies that develop outside the Euro-Atlantic area. Examples include the early deployments of the US Marine Corps in Lebanon by the Eisenhower administration in 1958 and the early deployment of the Royal Marines’ 42 Commando into Kuwait in 1961 as part of Operation *Vantage*, a successful effort to forestall an Iraqi invasion.¹⁹ Early presence is often crucial, either for deterrence or, if deterrence fails, for setting the conditions for subsequent efforts.
- **Deception and operational dislocation.** The presence of amphibious forces can force the diversion of an opponent’s resources across multiple fronts. We might consider how, historically, British forces embarked in the Downs tied down a considerable Napoleonic army or – for a more recent example – how the afloat presence of the 4th and 5th Marine Expeditionary Brigades were used to unhinge Iraqi defences during the 1991 Gulf War.²⁰
- **Disruption.** The actions of commando units during the Second World War stand out as a particularly notable example.²¹
- **Securing advanced bases or points of entry** for heavier forces to enter a theatre of combat – a role that became especially prominent for the US Marine Corps during the interwar years, and which may be one of the functions of the Marine Corps of China’s People’s Liberation Army (PLA) in a Taiwan contingency.²²

18. Michael J Mazarr, ‘Understanding Deterrence’, Perspective, RAND, 2018, <<https://www.rand.org/pubs/perspectives/PE295.html>>, accessed 5 August 2023.

19. Douglas Little, ‘His Finest Hour? Eisenhower, Lebanon and the 1958 Middle East Crisis’, *Diplomatic History* (Vol. 20, No. 2, 1996), pp. 27–54; Mustafa Salani, *Operation Vantage: British Military Intervention in Kuwait 1961* (Surbiton: LAAM, 1990).

20. Charles Quilter, ‘US Marines in the Persian Gulf 1990–1991: With the First Marine Expeditionary Force in *Desert Shield* and *Desert Storm*’, History and Museums Division Headquarters, US Marine Corps, 1993, p. 65; Geoffrey Till, *Seapower: A Guide for the Twenty-First Century* (Abingdon: Routledge, 2013), p. 187.

21. Lewis Mountbatten, *Combined Operations: The Official Story of the Commandos* (London: Macmillan, 1943).

22. W Murray and A R Millett, *Military Innovation in the Interwar Period* (Cambridge: Cambridge University Press, 1996), p. 2; Conor Kennedy, ‘China Maritime Report No. 15: The New Chinese Marine Corps: A “Strategic Dagger” in a Cross-Strait Invasion’, *CMSI China Maritime Reports*, No. 15, October 2021, p. 22.

In addition, there is a range of roles that marine units have played in both peacetime and conflict. Among these are tasks such as boarding and interdiction at sea, and the provision of niche capabilities such as riverine craft in support of joint activity.²³

The conduct of operations and the tactics used to achieve objectives will be impacted by technological change, a subject that will be explored in more depth in subsequent chapters. However, this paper's contention is that this will not fundamentally alter the roles of amphibious units as described. For example, the disruption of an opponent's rear area by amphibious units posturing offshore could, in some cases, be achieved by these units launching loitering munitions from positions on or near the coast, rather than through infantry raids. Indeed, this would be desirable in many cases, given the risks posed to landing forces by A2/AD. However, the logic of disruption that would underly such an action would remain unaltered. The most significant changes would be at the level of equipment and tactics, rather than the underlying logic of employment.

While forces' versatility to play the full gamut of the roles described above is desirable, delivering on national and Alliance-level priorities does entail emphasising some functions over others. The priorities identified in this paper are understood within the context of the UK's Integrated Review (IR) and the Integrated Review Refresh, which identify Russia as the most acute threat to British national security, while acknowledging the reality of systemic competition with China and enduring risks in areas such as the Strait of Hormuz.²⁴ With the specific roles that a state prioritises most heavily for its amphibious forces determined by the context in which they operate, this discussion focuses primarily on the strategic concerns of the UK.

Though the UK's priorities will not align completely with those of allies and partners, they do overlap to a significant degree with those of other nations within NATO, and the rank ordering of priorities in the IR is also broadly mirrored in NATO's Strategic Concept.²⁵ This makes them a useful baseline for discussing the contexts in which other Western amphibious forces might also be employed. To be sure, concepts for utilising amphibious forces will not always converge across nations (though for scenarios such as those that trigger NATO Article V, alliance-level planning will introduce some coherence). One of the aims of this paper is to articulate an idea of how the UK's amphibious forces might be used

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23. Walker Mills, 'More than Just "Wet Gap Crossings", Riverine Capabilities are Needed for Irregular Warfare and Beyond', Modern Warfare Institute, 9 February 2023, <<https://mwi.usma.edu/more-than-wet-gap-crossings-riverine-capabilities-are-needed-for-irregular-warfare-and-beyond/>>, accessed 22 June 2023; David B Crist, 'Special Operations Forces in Operation *Earnest Will*', *Joint Forces Quarterly* (Autumn/Winter 2002), <<https://apps.dtic.mil/sti/pdfs/ADA403506.pdf>>, accessed 6 July 2023.
 24. HM Government, *Integrated Review Refresh 2023: Responding to a More Contested and Volatile World* (London: The Stationery Office, 2023), pp. 29–35.
 25. NATO, 'NATO 2022 Strategic Concept', adopted 29 June 2022, pp. 5–6.

that can plausibly be aligned with the local circumstances of partner amphibious forces, based on the capabilities they either possess, or are planning to procure.

There are three scenarios attendant on the list of priorities that emerged from the IR to which amphibious forces can be particularly relevant, and which therefore deserve particular attention.

- **Dislocation and disruption** in the context of a regional war or an escalating ‘war in sight’ crisis within Europe involving NATO and Russia – a low probability but high-impact scenario. Though not a main line of effort, amphibious capabilities can provide a level of mobility at both the tactical and operational levels. This can compel the dispersion of adversary capabilities.
- **Expeditionary power projection.** This function will be of particular salience to interstate competition beyond Europe. Such competition will include elements of direct conflict, albeit at comparatively low levels of intensity. The ability to commit a unit of force alongside partner force elements that represents a meaningful contribution, but which is small enough to reflect the political constraints inherent in expeditionary activity, is an important tool when attempting to balance deterrence and escalation control.
- **Enabling sea control** in the context of either sub-threshold competition or an escalating crisis. This role can be relevant to both the European context and to theatres such as Hormuz.

This is not intended to be an exhaustive list of roles that amphibious forces can play. Rather, it outlines the contingencies where there appears to be an especially significant role that amphibious forces such as the Royal Marines can play in realising the aspirations set out in the IR.

A Crisis or Conflict in Europe

In Europe, NATO’s deter and defend framework will depend in no small part on the ability to outmanoeuvre an opponent which, for all its deficiencies, has demonstrated an ability to sustain materiel and human attrition at a scale that NATO would struggle to match.²⁶ Although bloodied by the ongoing conflict in Ukraine, Russia is likely to reconstitute its forces over the medium term.²⁷ Particularly when concentrated on a narrow front, the combination of Russia’s fires, its electronic warfare (EW) and air defences can pose a considerable challenge. Though Russia’s force is, in some respects, qualitatively degraded, the Russians have demonstrated the ability to combine smaller numbers of

26. Alex Vershinin, ‘The Return of Industrial Warfare’, *RUSI Commentary*, 17 June 2022.

27. Republic of Estonia Ministry of Defence, ‘Russia’s War in Ukraine: Myths and Lessons’, Discussion Paper, January 2023, pp. 1–10, <<https://kaitseministeerium.ee/en/mythsandlessons>>, accessed 25 November 2023.

capable infantry with large numbers of more expendable forces in a force model that, while highly wasteful in both material and human terms, is effective.²⁸

At both the tactical and the operational level, the Concept for Deterrence and Defence of the Euro-Atlantic Area (DDA) seeks to overcome the challenge of mass through a series of integrated plans. One likely consequence of developing integrated regional plans is to force the commitment of Russian capabilities on multiple fronts in a way that prevents them from being concentrated to effect.²⁹ Efforts to exacerbate Russia's traditional weaknesses in the maritime domain can contribute to this. The country remains vulnerable to operational dislocation along an extended maritime periphery – something illustrated in historical conflicts such as the Crimean War and more recently, in the 1980s, when the US Reagan administration's maritime strategy envisioned the aggressive use of Allied naval and amphibious power in the High North and Soviet Far East to draw Soviet ground and air forces away from the central front.³⁰

Today, Russia can be faced with similar challenges on its northern flank, where the Alliance's borders place key Russian facilities, such as Murmansk, within reach of long-range precision fires. This could exert an indirect influence on other parts of the Alliance's eastern flank. In the context of an escalating crisis in a region such as the Baltic, the posturing of amphibious forces on NATO's northern frontier, coordinated with activity by other force elements on other fronts as envisioned by the DDA, would impose multiple operational dilemmas on Russia. At a minimum, a decision to posture amphibious units this way would force the diversion of air assets, defensive SAM systems and some of Russia's best assault troops from the VDV and 200th Arctic Brigade, which are largely responsible for cold-weather operations, from other theatres.³¹ The requirement to resource multiple fronts concurrently could contribute to the objective of denial by preventing Russian planners from believing that they can concentrate enough force on any one front to achieve meaningful strategic effects.

As the vanguard element of a larger force, the Royal Marines would not be the biggest element in any force engaged in such an operation – allowing the Alliance

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28. Jack Watling and Nick Reynolds, 'Meatgrinder: Russian Tactics in the Second Year of its Invasion of Ukraine', RUSI, May 2023.
 29. Stephen Covington, 'NATO's Concept for Deterrence and Defence of the Euro-Atlantic Area (DDA)', Harvard Belfer Center, 2 August 2023, <<https://www.belfercenter.org/publication/natos-concept-deterrence-and-defence-euro-atlantic-area-dda>>, accessed 10 August 2023; C Todd Lopez, 'SACEUR Provides Update on Deterrence, Defense of Euro-Atlantic Area', US Department of Defense, 10 May 2023, <<https://www.defense.gov/News/News-Stories/Article/Article/3391802/saceur-provides-update-on-deterrence-defense-of-euro-atlantic-area/>>, accessed 12 June 2023.
 30. On the former, see Andrew Lambert, *The Crimean War: British Grand Strategy Against Russia 1853–56* (Abingdon: Routledge, 2020); on the Reagan-era maritime strategy, see John Hattendorf and Peter Swartz, 'US Naval Strategy in the 1980s', Newport Papers 33, US Naval War College, 2008.
 31. On Russia's cold weather troops, see Sidharth Kaushal et al., *The Balance of Power Between NATO and Russia in the Arctic and High North*, RUSI Whitehall Paper 100 (London: Taylor and Francis, 2022).

to signal deterrent, as opposed to offensive, intent. The marines could arrive and go emissions dark, leaving Russian planners guessing both their ultimate goals and whether or not they were the vanguard element of a larger force such as a US Marine Corps Marine Expeditionary Force (MEF). Uncertainty about the Alliance's force dispositions could impose considerable demands in terms of surveillance and conventional hedging. Notably, this was crucial to deterrence vis-à-vis the Soviet Union. Routine carrier deployments to the High North had limited effect until the exercise Ocean Venture, in which Soviet planners recognised they were not able to spot NATO carrier strike groups.³²

There is, of course, an escalatory dimension to any such deployment near Russia's nuclear bastions. However, an advantage of an amphibious vanguard component is that it would not pose an imminent threat to the Kola Peninsula (which hosts critical Russian naval and nuclear infrastructure) by itself, but could be the forward element of a force that could do so – it would be large enough to draw resources, but need not incur inadvertent escalation.³³ Amphibious forces played a similar role in the context of NATO's maritime strategy in the 1980s – though without the reach to be an operationally significant threat in their own right, as modern strike-enabled forces can be.

In addition to the diversion of Russian forces at the operational level, mobile forces can exacerbate Russian weaknesses with respect to dynamic targeting at the tactical level. As an example of this, we might consider the difficulty Russia had sinking Ukraine's last warship, the *Yuri Olefirenko*, while the vessel was at sea. Though Russia's targeting system can be formidable, it is at its most dangerous when many sensors can be concentrated on a narrow sector.³⁴ Expanding the geography Russian forces must survey by conducting offensive manoeuvre from the littorals can place Russian forces at a disadvantage. Consider, for example, that the landmass of a nation such as Norway increases by 20% when islets and not only the mainland are included.³⁵ Similarly, Estonia has 2,222 islands.³⁶ Forces operating from offshore islands could disrupt the rear of a Russian advance using long-range precision fires, large numbers of containerised loitering munitions, or infantry raids inland.³⁷ In theatres where narrow frontages can be saturated by adversary UAVs and ISR assets, exploiting this manoeuvre space

32. John Lehman, *Ocean Ventured: Winning the Cold War at Sea* (New York, NY: WW Norton, 2018).

33. For an example of how this logic might operate, see Eric Grove, *The Battle for the Fiords: NATO's Forward Maritime Strategy in Action* (London: Ian Allan Ltd, 1991).

34. Jeffrey Edmonds and Samuel Bendett, 'Russian Military Autonomy in a Ukraine Conflict', CNA Occasional Paper, CNA, 2 February 2022, pp. 1–2.

35. World Population Review, 'How Many Islands Are There in the World 2023', <<https://worldpopulationreview.com/geography/how-many-islands-are-there-in-the-world>>, accessed 18 June 2022.

36. *Ibid.*; ERR, 'Estonia has 800 More Islands than Hitherto Believed', 25 August 2015, <<https://news.err.ee/116562/estonia-has-800-islands-more-than-hitherto-believed>>, accessed 25 November 2023.

37. On the range of ways in which forces can generate lethality, see TX Hammes, 'Expeditionary Operations in the Fourth Industrial Revolution', *MCU Journal* (Vol. 8, No. 1, 2017).

can substantially expand the area an opponent must survey, and prevent an adversary system such as a Russian reconnaissance fire complex from operating as intended.³⁸

Expeditionary Power Projection

Another area in which amphibious forces such as the Royal Marines would likely be expected to deliver value is expeditionary operations at reach. Such operations will, with some exceptions, be of a lower intensity than those within the NATO Area of Responsibility and will involve more limited political commitment. The unit of force likely to be committed by a nation such as the UK will, then, only be strategically effective in tandem with either a coalition or local partners.³⁹

The Alliance must hedge against the possibility that, much like the Cold War, contemporary interstate competition will occur short of open war at high intensity, because the risks of a direct large-scale war are too substantial for both sides. Though not as immediately consequential as a direct great power clash, the cumulative effects of persistent competition and conflict can be considerable.

As an example, we might consider the risks to sea lines of communication (SLOCs) upon which both the inputs that sustain both the defence industry and Western trade in general depend. Many geographically crucial SLOCs, including Hormuz and the Bab el Mandeb, are flanked either by hostile powers such as Iran, or by fragile states in which internal instability can intersect with great power competition. Opponents such as Russia and Iran have proven capable of leveraging internecine conflicts in Libya, Syria and Yemen to good effect to create strategic bastions along key SLOCs, and develop leverage over regional actors such as Israel and Saudi Arabia. Not only does this pose a challenge to economically vital SLOCs, it can also threaten the flows of inputs such as microelectronics and explosive charges upon which European defence industries depend.⁴⁰ The need to pre-empt further losses in key areas makes the ability to respond rapidly to an evolving crisis beyond Europe a priority, one which will indirectly impact the security of Europe itself.

38. On the ability of Russia's fire complexes to saturate fronts when operating along narrow fronts, as in Donbas, see Zabrodskiy et al., 'Preliminary Lessons in Conventional Warfighting from the First Six Months of Russia's Invasion of Ukraine', p. 30f.

39. On the political constraints that accompany expeditionary activity at reach, see Stefano Recchia, *Reassuring the Reluctant Warriors: US Civil-Military Relations and Multilateral Intervention* (Ithaca, NY: Cornell University Press, 2015).

40. Sebastian Clapp, 'Reinforcing the European Defence Industry', European Parliamentary Research Service, June 2023, <[https://www.europarl.europa.eu/RegData/etudes/BRIE/2023/749805/EPRS_BRI\(2023\)749805_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2023/749805/EPRS_BRI(2023)749805_EN.pdf)>, accessed 16 August 2023.

The traditional functions of amphibious forces can be of relevance in such contexts. The deployment of units can generate early presence to both signal intent and deter intervention by a rival third party. Once in theatre, amphibious forces can perform a number of functions, including supporting partner forces in seizing military objectives; and enabling theatre entry by heavier forces by securing sea ports of debarkation (SPODs), and conducting raids against A2/AD capabilities to secure theatre access.

Sea Control Missions Within the NATO Area of Responsibility and Beyond

Amphibious forces can contribute to efforts to secure sea control in several ways. First, they can provide the fleet with additional ISR capabilities, and the capability to interdict hostile shipping. In peacetime competition this function will be of particular importance against opponents who may conduct activities such as minelaying or maritime sabotage using auxiliary vessels, as it will be vital to prove that a given vessel was involved in malign activity. As cases such as US special forces' seizure of the clandestine Iranian minelayer *Iran Ajr* illustrate, this requires vessels defended by armed crews to be seized, rather than sunk.⁴¹

While there is nothing especially novel about the use of capabilities such as auxiliary vessels for tasks such as minelaying and sabotage, the range of targets that can be affected by such activities is expanding, partly as a function of the growing reliance of nations on coastal and subsurface critical infrastructure.⁴² For example, while transoceanic cables have always been a chokepoint in global communications, their centrality has grown in line with states' reliance on the internet.⁴³ Moreover, the range of tools with which opponents can impact critical infrastructure is growing – a uncrewed underwater vessel (UUV) such as the Russian Harpsichord, for example, can be operated from a range of vessels to conduct either surveillance or sabotage.⁴⁴ Crucially, the ability to prevent clandestine sabotage will be important not only to protect critical infrastructure, but also to prevent an opponent from conducting shaping operations in an area such as the Baltic Sea or the Strait of Hormuz, should a crisis in one of these sites escalate.⁴⁵

41. Office of Naval Intelligence, 'Iranian Naval Forces: A Tale of Two Navies', 2009.

42. Sidharth Kaushal, 'Navies and Economic Warfare', *RUSI Occasional Papers* (January 2023).

43. *Ibid.*

44. Globalsecurity, 'Autonomous Uninhabited Underwater Vehicle (ANPA)', <<https://www.globalsecurity.org/military/world/russia/ship-anpa.htm>>, accessed 8 August 2023.

45. Marcel Hadeed at al., 'Baltics Left of Bang: The Southern Shore', Strategic Forum No. 308, Institute for National Strategic Studies, 29 January 2021, <<https://inss.ndu.edu/Media/News/Article/2487362/baltics-left-of-bang-the-southern-shore/>>, accessed 9 August 2023.

In addition to interdiction and boarding vessels, the capabilities that support marine forces can also support tasks such as generating situational awareness and preventing interdictions by hostile naval vessels. For example, we might consider how SOCOM (US Special Operations Command) used the *Hercules* and *Wimbrown*, two converted vessels used as sea bases, to counter Iranian small-boat swarms during the Iran–Iraq war.⁴⁶ In the context of conflict in a region such as the Persian Gulf, amphibious forces can support sea control by generating situational awareness about threats to vessels at sea and conducting raids to eliminate anti-access threats to vessels at sea such as coastal defence cruise missiles.⁴⁷ Amphibious capabilities should be considered for tasks of surveillance and presence, rather than simply insertion. Such usage better reflects the range of functions – including boarding – that these forces offer.

46. Anthony Cordesman, *The Lessons of Modern War, Vol. II: The Iran-Iraq War and the Lessons of Modern Conflict*, (Abingdon: Routledge, 1991), pp. 75, 80.

47. Clark and Sloman, 'Advancing Beyond the Beach', p. 4.

II. A New Operating Environment: The Need for Change

For marine forces to achieve any of the functions discussed in Chapter I under current and likely future operating conditions will require a radical change to the way these forces are structured and, in particular, greater integration between them and blue-water assets. To an extent, this change is already underway across several Western militaries. What the scope and degree of integration between naval and amphibious forces remains, however, the subject of some debate.⁴⁸

Challenges to Theatre Entry

In recent history, amphibious forces have been both the beneficiaries of sea control, and a means of exploiting it to strategic effect. Once a navy secured littoral waters, amphibious forces were inserted and typically benefited from support from the sea in the form of sustainment and air support.⁴⁹ However, in many contemporary contexts, the fleet is likely to have to fight to enter a theatre and cannot loiter near hostile shores for long. This challenge will be especially acute against a peer competitor such as Russia, but will hold even against sub-peer opponents, as illustrated by events such as Ukraine's sinking of the Russian flagship *Moskva* and the possession of anti-ship missile batteries by both the Houthis and Hizbullah.⁵⁰ This is not to say that operating in a threat envelope is impossible – solutions exist for each challenge, including EW, shipboard air defences and a growing suite of counter-UAV measures. However, it will not always be possible for fleets to loiter offshore in support of marine forces for extended periods. Instead, until adversary sensors and effectors have been considerably degraded, amphibious forces will need to be able to both fight and

48. For example, see Robert Work, 'The Opponents of Marine Reform have Lost, But Won't Move on', *War on the Rocks*, 15 May 2023.

49. Examples of this approach include the Falklands War and the Battle of Qang Tri during the Vietnam War. See Malkasian, 'Charting a Path Towards OMFTS', pp. 41–42; Earl Tilford, 'Air Power Lessons', in Bruce Watson and Peter Dunn (eds), *Military Lessons of the Falkland Islands War: Views from the United States* (Boulder, CO: Westview Press, 1984), p. 45.

50. Vego, 'On Littoral Warfare'; Kaushal, Bronk and Watling, 'A UK Joint Methodology for Assuring Theatre Access', p. 12.

deliver effects inland under the assumption that support from the fleet is intermittent, rather than persistent. If postured for deterrence by denial, amphibious forces will find themselves operating under these conditions for considerable periods – though in the later stages of a conflict they may enjoy more unfettered freedom of movement.

Once forces are disembarked, amphibious forces' lodgements ashore will be at considerable risk, and the operational pauses needed to build up capabilities will likely prove fatal. A range of capabilities, including tactical ballistic missiles, artillery UAVs and glider-equipped unguided bombs, such as the Russian FAB-500, launched from fixed-wing aircraft, will threaten disembarked forces.⁵¹ Of course the risk posed by operational pauses has long been a persistent feature of amphibious campaigns. But the diversification of air and missile threats will make protecting a lodgement even more difficult than it has been previously.⁵² Beyond Europe, the proliferation of strike capabilities would create a similar, though less sophisticated, set of challenges.⁵³ The gulf between the types of capability needed to defeat peers and sub-peers is narrowing.

A key question for amphibious forces will be how to deliver tactical and operational effects when achieving the force-to-space ratios needed to do so is very difficult, and the mechanisms that support these forces ashore and afloat are held at risk.

Changing Coastal Geography

Many environments in which expeditionary activity is likely to be conducted will also be shaped by another trend – the urbanisation of coastal areas. As of 2030, roughly 60% of the world's population will live in cities, many of which will be coastal.⁵⁴ Moreover, urban area coverage has outstripped population growth, implying that considerable stretches of many coastlines will be urbanised. As illustrated by the prominence of cities such as Aden, Marawi and Mocimboa da Praia in recent conflicts, battles within coastal conurbations will be a major feature of littoral combat.⁵⁵ This is noteworthy because urban warfare often

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51. Sergio Miller, "An Extremely Big Threat": Russian Glide Bombs Make their Debut in the War', Wavell Room, 17 April 2023, <<https://wavellroom.com/2023/04/17/russian-glide-bombs/>>, accessed 10 August 2023.
 52. Tom Karako and Wes Rumbaugh, 'Distributed Defense: New Operational Concepts for Air and Missile Defense', CSIS, January 2018.
 53. For example, see Ian Williams and Shaan Shaikh, 'The Missile War in Yemen', CSIS, June 2020.
 54. United Nations, 'World Urbanization Prospects: The 2011 Revision', <<http://esa.un.org/unpd/wup/index.htm>>, accessed 3 June 2012; Shlomo Angel et al., 'The Dimensions of Global Urban Expansion: Estimates and Projections for All Countries, 2000–2050', *Progress in Planning* (Vol. 75, Issue 2, 2011).
 55. *Reuters*, 'Rebels Seize Port in Gas Rich Northern Mozambique', 13 August 2020; Michael Knights, *28 Days to Aden: The Unknown Story of Arabian Elite Forces at War* (London: Profile, 2023); Charles Knight and Katja Theodorakis, 'The Marawi Crisis: Urban Conflict and Information Operations', Australian Strategic Policy Institute, 2019, <<https://www.aspi.org.au/report/marawi-crisis-urban-conflict-and-information-operations>>, accessed 1 August 2023.

requires considerable amounts of manpower to hold ground, as well as the expenditure of small-arms ammunition at rates that exceed consumption in open terrain by several orders of magnitude.⁵⁶ Such conditions will pose an especially acute challenge to size-restricted light expeditionary forces, and to Western nations that must balance the requirements of deterrence in theatres such as Europe with the need to project power. The challenge will be compounded by adversary efforts to shield key capabilities from the effects of Western airpower by using palliatives such as underground tunnels – something that can be seen in both urban terrain and in fortifications such as those Iran has constructed in the Tartus mountains.⁵⁷ The basic challenge that expeditionary forces will face is finding a way to deliver policy imperatives such as providing value to local partners with comparatively small forces while operating in terrain that requires considerable commitments, in terms of munitions and manpower.

Resource Burdens on Fleets

The evolving nature of sub-threshold threats at sea will require greater levels of persistent presence. While this is a naval challenge, rather than one that applies specifically to marines, it has an indirect effect, both on tasks such as maritime boarding and on the availability of hulls from the wider fleet to support amphibious forces. To justify the dedication of naval vessels to support amphibious warfare, the conduct of amphibious operations must come to more fully embrace tasks that support sea control. Marines already support sea control through activities such as interdiction, but there are broader contributions to be made.

In sum, the risk to amphibious forces in the emerging operating environment is threefold. First, they will face challenges in areas such as theatre entry and sustainment in likely combat environments. These challenges, while not unique to amphibious operations, will impose considerable burdens upon these forces. Second, they must be able to impact events in theatres such as urban environments that typically demand more manpower than expeditionary forces can expect to have at hand. The final risk is an organisational one – that the resource burden of inserting forces into a theatre and subsequently sustaining them exceeds the value they provide to the wider joint force, and to blue-water navies in particular.

The remainder of this paper describes ways that amphibious forces can address these challenges such that they can continue to contribute to Allied security in the ways that they historically have done. It also addresses the specific capability niches that the UK's Commando Force can fill in this context.

56. Anthony King, *Urban Warfare in the Twenty-First Century* (Cambridge: Polity Press, 2021), p. 140.

57. Caitlin Talmadge, 'Closing Time? Assessing the Iranian Threat to the Strait of Hormuz', *International Security* (Vol. 33, No. 1, Summer 2008), pp. 82–117.

III. New Approaches

Previous chapters have discussed the potential roles that amphibious forces can play in the context of UK and Allied national security objectives, and the operational impediments to their accomplishment. This chapter sets out the case for the paper's key argument, that to retain their utility to the wider joint force, amphibious operations in contested environments should be subsumed under two doctrinal naval functions – strike and securing sea control.⁵⁸ It also connects this argument to the strategic objectives outlined in Chapter I.

The challenges to amphibious power projection described in the previous chapter have been incipient for some time, and a variety of solutions have been proposed to mitigate them. Broadly speaking, these solutions may be grouped into three categories which, while not exhaustive, capture the major areas of focus with respect to operations in contested environments.

- Approaches that depend on distributing the force across a broad front, maintaining a high operational tempo and manoeuvring towards operational objectives, while bypassing adversary concentrations to the extent possible. This approach is captured by concepts such as the US Marine Corps' Operational Manoeuvre from the Sea (OMFTS), but early traces of it can be seen in historical amphibious operations such as the Japanese assault on Malaya in the Second World War.⁵⁹
- Strike-centric concepts that envision delivering convergent effects with distributed forces equipped with long-range fires. This is arguably a partial description of the primary focus of the US Marine Corps' Expeditionary Advanced Base Operations framework, although the concept also embraces tasks such as supporting naval forces from offshore positions.⁶⁰
- A shift in focus towards raiding and unconventional operations in a Tier 2 special forces role.⁶¹

Concepts such as the direct assault and seizure of ports, which are still seriously considered by many nations, including China, are excluded here on the grounds that direct assault to seize and hold heavily defended high-value targets is likely to entail a degree of attrition that no Western force will tolerate. For a contemporary

58. NATO Standardization Office, 'AJP-3 Allied Joint Doctrine for the Conduct of Operations (AJP-3)', Allied Joint Publication, February 2019.

59. Malkasian, 'Charting a Path Towards OMFTS'; Alan Warren, *Singapore 1942: Britain's Greatest Defeat* (London: Hambledon Continuum, 2002).

60. Department of the Navy, Headquarters, United States Marine Corps, 'Tentative Manual for Expeditionary Advanced Base Operations', February 2021.

61. Professional experience of one of the authors in interactions with allied units.

The distribution of long-range precision fires in littoral areas including offshore islands, and amphibious vessels as envisioned under concepts such as Expeditionary Advanced Base Operations, can help resolve some of the trade-offs between lethality and dispersion. Long-range precision fires can allow a convergence of effect to be achieved by dispersed forces which, by virtue of operating offshore, do not face some of the challenges that manoeuvring inland entails. However, the challenge that such an approach would face is cross-regional applicability. Strike-centric forces distributed on offshore islands have obvious utility in a theatre such as the First Island Chain, where their main function is sea denial against an opponent such as the PLA Navy. But this approach has been challenged on the basis that there is applicability for strike-centric concepts to missions other than sea denial, particularly in theatres where many important targets are likely to be on the ground, and concealed within complex terrain-challenge sets that have historically necessitated combined arms approaches.⁶⁸ These latter target sets have historically necessitated the ability to conduct a close fight with the opponent on the ground.

Finally, a special-forces-driven model can deliver value in a number of areas, including human intelligence and preparation of the battlefield. Additionally, functions such as raiding can limit some of the risks posed by A2/AD capabilities by limiting the size of forces inserted and their signatures. However, to be effective, raiding and other special forces activities must be integrated with a wider joint effort – they can rarely, if ever, deliver meaningful effects in isolation.⁶⁹

The three broad approaches outlined above can be mutually reinforcing, rather than mutually exclusive. Distributed ranged fires capabilities positioned offshore on islands, amphibious vessels and auxiliaries can provide dispersed forces ashore with the fire support needed to eliminate concentrations of adversary forces, without these forces needing to be so large that they require an operational pause, headquarters and additional enablers.⁷⁰ In turn, distributed forces ashore act both as an ISR screen for offshore fires and as a raiding force that compels adversary targets to move, unmask or concentrate for protection in ways that create vulnerabilities to offshore fires. Supported by offshore fires, comparatively light forces can also concentrate to perform tasks such as assaulting adversary strongpoints or defending SPODs.

This discussion illustrates that there is a symbiotic link between strike-centric concepts and manoeuvre inland from the sea. Thus, while amphibious power projection and maritime strike have historically been doctrinally separated,

68. On this debate, see Andrew Feickert, 'U.S. Marine Corps Force Design 2030 Initiative: Background and Issues for Congress', CRS Report, CRS, 30 June 2023.

69. Jack Watling, 'Sharpening the Dagger: Optimising Special Forces for Future Conflict', *Whitehall Report*, 1-21, May 2021.

70. Lessons from Exercise *Cold Response*.

this paper argues that they should now converge.⁷¹ Such convergence can be of importance to blue-water navies, which presently face limitations in their offensive strike capacity relative to the number of potential missions they face both at sea and on land.⁷²

Another key way that amphibious forces can be better integrated with core naval tasks is by generating presence and situational awareness at sea. Many of the enablers needed to underpin a strike-centric concept of power projection can – as will be discussed below – also enable marines to contribute capacity to sea control missions.

Instead of being viewed as a distinct maritime function, then, amphibious power projection should be subsumed under the rubric of strike and sea control – which would entail greater conceptual and functional integration with blue-water navies.

The following sections will articulate the key lines of effort that will be needed in order to realise the conceptual framework that has been described thus far. Broadly speaking, there are three lines of operational effort: a focus on sea control, archipelagic operations, and the enabling of partner forces. Success in delivering these priorities will be determined by the ability of marines to both generate fires and help the fleet win superior situational awareness.

Fires

Long-range strike could be provided by ground-based fires distributed on the littoral, but could also be delivered directly from the sea if enabled by a shift in the design principles that underpin surface connectors and enabling vessels towards a model that emphasised strike. Specifically, we might consider vessels such as the Chinese Type-22 catamaran, which can launch C-802 cruise missiles, or the British-designed *Bladerunner*, which is used as a missile launcher and more recently an air defence platform by Iran's Islamic Revolutionary Guard Corps. Such vessels are comparable in size to both existing surface connectors and ones envisioned under future programmes, and even when equipped with missiles are generally cost effective (a Type-22, for example, costs \$13 million).⁷³ A shift in design philosophy from boats dedicated to moving marines ashore to more multifunctional vessels capable of operating on and striking from the

71. NATO Standardization Office, 'AJP-3 Allied Joint Doctrine for the Conduct of Operations (AJP-3)', pp. 1–29.

72. On this, see Bryan Clark and Timothy Walton, 'Taking Back the Seas: Transforming the U.S Surface Fleet for Decision-Centric Warfare', CSBA, 2019.

73. Thomas Newdick, 'Now China has Cruise Missile Carrying Catamarans Chasing Away Ships in the South China Sea', *The Drive*, 8 April 2021, <<https://www.thedrive.com/the-war-zone/40107/now-china-has-cruise-missile-carrying-catamarans-chasing-away-ships-in-the-south-china-sea>>, accessed 26 November 2023; H I Sutton, 'Iran Reveals World's First Air Defense Small Boat', 9 March 2023.

maritime part of the littoral could significantly enhance the strike capabilities of marine units.

Recent experiments have also demonstrated that systems such as HIMARS can be used from the decks of amphibious vessels.⁷⁴ While risking dedicated shipping would likely be unacceptably hazardous, it might be more acceptable to launch containerised munitions from auxiliary vessels.⁷⁵ As seen during conflicts such as the Falklands War, non-military shipping can be repurposed. Coupled with trends towards the containerisation of both munitions and communications nodes, this could enable auxiliary assets to be used as mobile fires platforms in a conflict.

A Dispersed Contact Layer

Dispersed forward elements capable of tasks such as assessing an opponent's pattern of life and identifying elusive targets, and of passing data to strike assets via shared datalinks and network protocols, can more easily cue in fires if these forces have the tools to generate situational awareness in forward positions.⁷⁶ Forward elements can deepen situational awareness, both through technical means such as deploying UAVs, and by interacting with partner forces. As an example of the former method, we might consider how Russian forces have employed complexes of three short-ranged Orlan-10 UAVs equipped respectively with EW, optical/designator and communications relay payloads to stimulate Ukrainian SAM radars, degrade them and designate them for strikes by networked artillery and long-range missile units.⁷⁷ Evidence from exercises such as *Green Dagger* has shown that such forces can also disrupt adversaries in ways that force them to concentrate capabilities to counter raiders, in so doing becoming vulnerable to offshore strike platforms.⁷⁸

The importance of a dispersed contact layer to enable counter scouting is not exclusive to maritime operations. However, it has a particular salience in this context because the ability to move along multiple axes on the littoral (either by land, by sea or through the air) creates an expanded set of avenues for disruption by amphibious force elements.

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74. Joseph Trevithick, 'HiMARS Goes to Sea: US Marines Now Fire Guided Artillery Rockets from Ships', *War Zone*, updated 29 June 2019, <<https://www.thedrive.com/the-war-zone/15410/himars-goes-to-sea-us-marines-now-fire-guided-artillery-rockets-from-ships>>, accessed 25 November 2023.
 75. T X Hammes, 'The Navy Needs More Firepower', *USNI Proceedings* (Vol. 147, No. 1, January 2021), <<https://www.usni.org/magazines/proceedings/2021/january/navy-needs-more-firepower>>, accessed 26 November 2023.
 76. For an example of this, see Knights, *25 Days to Aden*, p. 102.
 77. James Byrne et al., 'The Orlan Complex: Tracking the Supply Chains of Russia's Most Successful UAV', *RUSI*, 15 December 2022, p. 8.
 78. Evidence gathered from Exercise *Green Dagger* by Mark Totten in his capacity as FCF programme director.

Archipelagic Warfare

Greater integration of amphibious forces with UK and Allied fleets, particularly in missions in narrow seas such as the Baltic, necessitates a focus on operating within and from archipelagos. Narrow archipelagic waterways often possess distinctive climatic conditions. For example, in the case of the Baltic Sea, fog is a frequent feature of the environment on a year-round basis, complicating the use of some sensors, such as electro-optical sensors.⁷⁹ Similarly, water temperatures relative to the air can cause either subrefraction of radar waves, limiting the range of radar, or super refraction, which makes radar more sensitive to clutter.⁸⁰ Force concealment can leverage these conditions based on local circumstances. While it is never possible to defeat the full spectrum of sensors that an opponent can aggregate, making use of climatic features to limit the effectiveness of some sensors can simplify the task of overcoming others. For example, if radar is subject to subrefraction, cueing sensors with a narrower field of view, such as electro-optical or infrared sensors, becomes more difficult. Moreover, knowing that specific sensor types represent a primary threat vector because others will be compromised by the climate can provide the focus for efforts at tactical deception.

Archipelagic contexts tend to enable smaller vessels to hide within clutter, particularly in crowded waters such as the Baltic. The navies of Baltic states have historically relied upon this when preparing for sea denial missions against a stronger Russian navy, as has the Norwegian navy in the north.⁸¹ It is possible, given the comparative weakness of the Russian surface fleet, that assets such as missile boats built for sea denial can be repurposed for sea control or projection inland. If this is the case, Allied marine units can usefully integrate with littoral-focused navies – using their platforms as launch pads for activity and strike assets, while making them more lethal against ground targets by providing them with situational awareness inland.

The geography of archipelagic contexts also lends itself to the distribution of long-ranged precision fires, something which is central to concepts such as Expeditionary Advanced Base Operations. This dynamic can also be applicable in a European context.

79. Milan Vego, *Naval Strategy and Operations in Narrow Seas* (London: Frank Cass, 2003), p. 40.

80. *Ibid.*

81. Niklas Granholm, 'Small Navies and Naval Warfare in the Baltic Sea Region', in Ian Speller, Robert McCabe and Deborah Saunders (eds), *Europe, Small Navies and Maritime Security: Balancing Traditional Roles and Emergent Threats in the 21st Century* (Abingdon: Routledge, 2019).

Sea Control

Relatedly, the requirement to support the gaining and exercise of sea control at sea will remain, but the relevance of marines to this task can grow. There will be a greater requirement for multifunctionality in areas such as surface connector design, since numbers of hulls have shrunk relative to historical force structures across Western navies (though this trend may be starting to reverse).⁸² Western navies will, for a time at least, operate with fewer hulls, even as they face a growing imperative to meet persistent challenges, including the use of auxiliary vessels by rivals for tasks such as challenging freedom of navigation and coercive signalling near critical infrastructure. There is no single solution to these challenges, but one dimension of a solution set would be to expand the capability of marine forces to provide sensor coverage and the ability to act at sea. Dedicated and auxiliary amphibious platforms have demonstrated the ability to cover wide areas using vertical lift capabilities.⁸³

Rather than being an auxiliary role, this can be a core function. Teaming existing vertical lift assets with unmanned platforms that have greater endurance could enhance this potential for a single hull to generate both presence and wide area coverage. Moreover, a shift in the design principles that determine which types of surface platforms are launched from amphibious vessels, towards an emphasis on surface manoeuvre, as opposed to ship-to-shore movement of heavy equipment, can yield amphibious capabilities that provide wide area coverage and can thus support the fleet, rather than being specialised purely for insertion.

Local Force Partnering

As noted above, many of the contexts in which the UK may wish to achieve strategic effects at expeditionary reach may be urban environments. Amphibious forces will therefore need to reconcile their often limited size with the need to support expeditionary missions that will necessarily involve an urban component. While amphibious forces will likely not have the mass to conduct urban assaults, they can fulfil niche roles within them. A strike-centric concept of operations can have relevance both in high-intensity scenarios and in lower intensity expeditionary activity in complex terrain. It is likely that, given the forces required for urban fighting, the latter form of activity will almost always be undertaken alongside a local partner – this has been the case not only in recent urban battles in which Western forces were involved, such as Mosul, but also

82. Jeremy Stöhs, 'Into the Abyss? European Naval Power and the Post-Cold War Era', *Naval War College Review* (Vol. 71, No. 3, Summer 2018).

83. Cordesman, *The Lessons of Modern War, Vol. II*, pp. 75, 80.

in many of the battles fought by non-Western militaries at expeditionary reach. Examples of the latter include the UAE's role in the Battle of Aden, and the Russian role in Aleppo.⁸⁴ In such contexts, the challenge is not necessarily providing partners with infantry or munitions, which local partners often have, but rather with offering niche capabilities, including the precision-strike capabilities needed to engage elusive and buried high-value targets, reduce fortified positions and disperse concentrations of adversary forces.⁸⁵

The challenges of operating within complex terrain, however, mean that the use of strike capabilities will often require forces postured forward to build pattern-of-life assessments, cue in fires and directly engage targets that cannot readily be struck from offshore.⁸⁶ Given that engagement opportunities will be intermittent, such operations will also require fires platforms that can remain in theatre on a more persistent basis than fast air assets.⁸⁷ Finally, a network of relationships with likely local partner forces will need to be generated – something that can be facilitated by engagement in peacetime. The potential sensitivities involved in engaging some partners creates a role for special-forces-capable elements of an amphibious force, as these force elements offer policymakers somewhat more flexibility of deployment in theatre, relative to conventional units.⁸⁸

84. Knights, *25 Days to Aden*; Lester Grau and Charles Bartles, 'Russia's Ground-Based Contingent in Syria', in Robert Hamilton, Chris Miller and Aaron Stein (eds), *Russia's War in Syria: Assessing Russian Military Capabilities and Lessons Learned* (Washington, DC: Foreign Policy Research Institute, 2020).

85. *Ibid.*

86. TELS are transporter erector launchers which are used to carry missiles. As an example, we might consider sheltered or underground TELS. See Talmadge, 'Closing Time?'

87. *Ibid.*

88. Sean Naylor, *Relentless Strike: The Secret History of Joint Special Operations Command* (New York, NY: St Martin's Griffin, 2015) p. 102.

IV. The Royal Marines: Specialisation and Force Design

Having set out in the previous chapter ways in which forces can adapt to meet the challenges posed by the emerging operating environment, this chapter focuses on the particular role of the Royal Marines within the amphibious constructs described. Size and budget constraints are likely to mean that the marines will not be able to deliver the full spectrum of capabilities needed to enable a strike-centric concept of amphibious operations or operations in support of sea control at scale. However, the UK's marines can perform niche roles within an allied amphibious construct centred on strike and sea control. At a smaller scale, it may also be possible for the Royal Marines to deliver strike and sea control on a self-contained basis for a time, to enable theatre entry by a heavier element of the joint force.

A number of Western marine forces are developing capabilities that can support a strike-led approach to power projection from the littoral. The most notable example of this comes from the US Marine Corps, whose Force Design 2030 heavily emphasises long-range strike capabilities.⁸⁹ Some European marine forces, such as the Swedish marines, also appear to be prioritising the ability to generate fires from littoral areas, through capabilities such as mortar boats equipped with NEMO mortar.⁹⁰ Moreover, a number of European navies are optimised to operate in littoral spaces. Forces such as the Swedish and Finnish navies, which were built around smaller vessels such as the *Hamina*-class missile-equipped fast-attack craft and the Swedish *Visby*-class corvette, procured for the probably now redundant task of sea denial against the Russian fleet in the Baltic (which would likely not be survivable beyond the early stages of a conflict), could readily be repurposed to generate offensive fires from Baltic littorals using the same low-observable fast-attack craft and corvettes.⁹¹

89. Department of the Navy, 'Force Design 2030 Annual Update', 2023.

90. Robin Haggblom, 'Swedish Marines to Get Shipboard Mortars', *Naval News*, 23 May 2023, <<https://www.navalnews.com/naval-news/2023/05/swedish-marines-get-shipboard-mortars/>>, accessed 11 July 2023.

91. *Naval News*, 'Finnish Navy Receives 4th and 5th Hamina-Class FAC', 15 September 2022, <<https://www.navalnews.com/naval-news/2022/09/finnish-navy-receives-4th-and-final-hamina-class-fac/>>, accessed 20 June 2023; *Naval Technology*, 'Skjold-Class Missile Fast Boats, Norway', 27 November 2012, <<https://www.naval-technology.com/projects/skjold>>, accessed 27 June 2023.

While the number of missiles a vessel such as the *Visby*-class corvette can carry is limited (the *Visby*-class has capacity for eight RB-15 surface-to-surface missiles), it is worth noting that, cumulatively, the countries of the Baltic are poised to possess a considerable force of small combatant vessels, including 13 *Visby*- and *Hamina*-class vessels (and their successor classes) that can theoretically carry a collective throw weight of 72 RB-15 and Gabriel dual-use missiles.⁹² With the presence of the Swedish marines in the Baltic, and Poland due to purchase the dual-capable naval strike missile for its coastal defences, plus Germany, which intends to equip its sea battalion with a long-range strike capability, also in possession of the NSM, ground-based fires in this region, along with the maritime assets detailed above, represent a considerable locally available long-range strike capability, comparable in many ways to that fielded by an individual MEF.⁹³ Surface manoeuvre craft supporting the Royal Marines that are capable of carrying strike capabilities such as long-range loitering munitions could augment this strike capability in the littorals.

Ukraine's successful use of Neptune Anti-Ship Cruise Missiles against high-value targets such as an S-400 and a *Kilo*-class submarine illustrates how such strike capabilities can pose a considerable threat to the limited number of operationally critical assets upon which a Russian ground force depends.⁹⁴ Of course, cohering these capabilities into a single concept of operations in littoral spaces depends on Allied agreement – something that can be pursued through engagement, both bilaterally and through frameworks such as the Joint Expeditionary Force (JEF). However, it is likely that the components of a distributed force capable of inland strike from the Baltic littorals exists in principle.

There exist, then, a number of prospective partners with whom the Royal Marines can interoperate to generate strike from littoral areas. The most important area that the Royal Marines can most readily support such forces within the confines of the model we describe is – should Allies accept it – by providing a forward-postured reconnaissance and raiding force that operates inland ahead of the offshore striking component. The function of such a force would not be to conduct raiding as an independent strategic function (as was the case during the Second World War), but rather to enable the strike capabilities held by Allies. They can achieve this in two ways: generate the situational awareness inland needed to enable strikes from the maritime vector; penalise the dispersion of adversary high-value targets through direct attack – in turn forcing the concentration of assets in ways that makes them vulnerable to strikes (see below).

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92. On the *Visby*, see *Naval Technology*, 'Visby Class Corvettes', 4 December 2020, <<https://www.naval-technology.com/projects/visby/>>, accessed 21 September 2023; *Naval Technology*, 'Hamina Class', 22 August 2010, <<https://www.naval-technology.com/projects/haminaaclass/>>, accessed 21 September 2023.
93. Based on assumptions from a DSTL wargame examining a High North scenario.
94. David Axe, 'Russia had 5 S-400 Batteries in Crimea, Ukraine Blew Up Two', *Forbes*, 14 September 2023.

Helping the Fleet to Out-Scout an Opponent

ISR Gathering

Forward-posture reconnaissance elements can complement wider efforts to generate situational awareness regarding complex target sets using capabilities such as UAVs, but they can also deliver awareness in ways that cannot be achieved from stand-off positions. For example, Israeli commandos routinely tapped the fibre optic cables underpinning Hizbullah's firing positions in southern Lebanon – delivering access to a system that UAVs could not compromise. In Vietnam, the Military Assistance Command, Vietnam Studies and Observations Group performed a similar function by placing sensors around the Ho Chi Minh Trail. In the context of a future battlefield that operates at machine speed, physically forward human operators can also play an important role in battle damage assessment.⁹⁵

Second, the inherent physical trade-offs involved in building ISR systems such as UAVs mean that they will often trade range for things such as sensor payload, except in the case of large and very expensive unmanned combat aerial vehicles.⁹⁶ It is likely, then, that UAVs with sophisticated multispectral payloads will need to be launched at relative proximity to their targets – creating a role for forward-deployed forces.

Battle Damage Assessment and Counter Deception

As methods of surveillance evolve, forward-positioned forces can also play an important role in the verification of target data, and course correction in the face of adversary deception. Surveillance enabled by computer vision can be confounded by data poisoning – the act of making AI misclassify an object by slightly modifying its physical appearance.⁹⁷ Learning when this is occurring will require data to be gathered from within an opponent's controlled areas by forces that can visually

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95. William Rosenau, 'Special Operations Forces and Elusive Enemy Ground Targets: Lessons from Vietnam and the Persian Gulf War', RAND, 2002, pp. 5–26; Ronen Bergman, *The Secret War with Iran: The 30-Year Clandestine Struggle Against the World's Most Dangerous Terrorist Power* (New York, NY: Simon & Schuster, 2008), p. 367.
96. Justin Bronk, 'Swarming Munitions, UAVs and the Myth of Cheap Mass', in Jack Watling and Justin Bronk (eds), *Necessary Heresies: Challenging the Narratives Distorting UK Defence*, RUSI Whitehall Paper 99 (London: Taylor and Francis, 2021).
97. On data poisoning, see Micah Goldblum et al., 'Dataset Security for Machine Learning: Data Poisoning, Backdoor Attacks, and Defenses', *IEEE Transactions on Pattern Analysis and Machine Intelligence* (Vol. 45, No. 2, February 2023).

identify patterns of adversary deception. This is a role that ‘Tier 2’ special forces – those certified as special forces for the purposes of special operations – can play.

Command and Control

The dedicated shipping that supports forward deployed amphibious forces can play an important role as a command node. Though vessel size can be a vulnerability, it also underpins key functions. Considerable size and power generation is required, both to underpin the processing power needed to receive and translate multiple feeds, including those from forward-deployed elements, and to then distribute data across the force.⁹⁸ A command vessel would need to loiter more than 400 km from hostile shores to avoid coastal defence cruise missiles such as the Russian P-800.⁹⁹ It would, moreover, need protection against longer-ranged threats, such as bombers. However, it would still be less vulnerable than an immobile ground-based headquarters, which can be struck by a range of land-attack missiles, and which would not present opponents with a dynamic target. The risk to static command nodes has been illustrated by the effective use of Storm Shadow missiles against Russian command nodes in Ukraine.¹⁰⁰ Maritime headquarters can – all other things being equal – co-locate more personnel and processing power at lower risk than can comparable ground-based headquarters, though they do not operate without risk.¹⁰¹ The relative proximity at which this shipping can operate – even when the need to avoid A2/AD capabilities is factored in – in addition to its size, mobility and organic protection, makes such shipping a useful node for the coordination of ISR and fires without requiring reach-back to C2 nodes in the homebase.¹⁰² In the medium to long term, improvements in processing power may enable resilient communications across self-forming networks of capabilities in littoral spaces, underpinned by systems such as those envisioned by DARPA’s DYNAMO and STITCHES programmes.¹⁰³

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98. For a broad discussion of platform requirements in areas like processing power, see James Dimarogonas et al., *Universal Command and Control Language Early Systems Engineering Study: Performance Effects of a Universal Command and Control Standard* (Santa Monica, CA: RAND, 2023).
 99. On the P-800, see Kaushal, Watling and Bronk, ‘A UK Joint Methodology for Assuring Theatre Access’, p. 19.
 100. Jack Watling, ‘Putting Russia’s Army in the Shadow of the Storm’, *RUSI Commentary*, 15 May 2023.
 101. For a discussion of challenges in the land domain, see John Cogbill and Eli Myers, ‘Decentralizing the Fight: Re-imagining the Brigade Combat Teams Headquarters’, Modern War Institute at West Point, 5 September 2020, <<https://mwi.westpoint.edu/decentralizing-the-fight-re-imagining-the-brigade-combat-teams-headquarters/>>, accessed 20 September 2023.
 102. On C2 architectures, see Jack Watling, ‘Supporting Command and Control for Land Forces on a Data-Rich Battlefield’, *RUSI Occasional Papers* (July 2023).
 103. Bryan Clark, Dan Patt and Timothy A Walton, ‘Implementing Decision-Centric Warfare: Elevating Command and Control to Gain an Optionality Advantage’, Hudson Institute, 3 March 2021, p. 24.

Raiding

In addition to their ability to support the gathering of ISR data, raiding by distributed forces can also complicate adversary efforts at concealment. Historically, concealment has depended on cover and dispersion. However, dispersion makes a force vulnerable to raiding, while concentrating to overcome raiders makes forces vulnerable to strike.¹⁰⁴

While special forces operating in a reconnaissance and raiding function have sometimes struggled in contexts such as the 1991 Gulf War, there are some reasons to believe they might fare differently under emerging circumstances. First, light UAVs that can be transported by forward-positioned teams can considerably expand the area that any given team can survey and conduct attacks on.¹⁰⁵ Secondly, a new generation of lightweight vehicles equipped with tactical strike capabilities can provide forward-deployed forces with a degree of survivability against well-armed opponents when they encounter them. For example, we might consider the Joint Light Tactical Vehicle, which is being equipped by SOCOM with a spike anti-tank guided missile.¹⁰⁶ Third, open-architecture C4ISR processing systems such as the Royal Marines' Project EVE can enable data from the wider joint force to be leveraged by forward-deployed elements through software integration.

Thus, while it should be assumed that forward-deployed forces will operate under information denial and with only intermittent access to wider joint force networks, all of the above mean that these forces will have a degree of situational awareness that exceeds that of similar forces deployed under comparable circumstances in the past.

A Future Force Design for the Royal Marines

The Royal Marines is an organisation that has long viewed the ability to force-generate small units capable of operating with minimal support as a core competency. As such, it would be well suited to the roles outlined above.¹⁰⁷ However, this would require a shift from the existing model of deploying

104. Observations from Exercise *Green Dagger*.

105. This was already a point being observed in the early 2000s, though the trends observed at the time are now reaching fruition. See Naylor, *Relentless Strike*, p. 202.

106. Andrew Eversden, 'SOCOM Receives First SPIKE NLOS System Integrated onto JLTV', *Breaking Defense*, 16 May 2022, <<https://breakingdefense.com/2022/05/socom-receives-first-spike-nlos-system-integrated-on-a-jltv/>>, accessed 23 November 2023.

107. Paul Winter (ed.), *First in Last Out: The Post-War Organization, Training and Employment of Royal Marines Commands* (Oxford: Casemate, 2021), p. 10.

commando companies. The core conclusion from internal work conducted by the Royal Marines and supported by external bodies (including experimentation, wargaming and exercises) is that a redesigned commando force built to operate as a forward screen for offshore strike elements would have, as its primary unit of force, a 12-person strike company. The order of battle of such a force would be structured as shown in Figure 1.

Such a force differs from the existing Royal Marine force design in that it implies a transition away from commando companies operating as aggregated light infantry units that can be treated as interoperable with their ground-based counterparts (as was the case in Korea and, more recently, in Afghanistan and Iraq).¹⁰⁸ Divided into strike teams of 12 individuals, the proposed force has been tested over areas spanning 40 x 30 km – implying a force-to-space ratio comparable to the average insurgent force.¹⁰⁹ Its organic vehicles, such as the MRZR, also reflect an emphasis on mobility over carrying capacity. This represents a considerable shift, which necessarily means deemphasising functions such as holding and patrolling ground, to enable the force to optimise for tasks such as strike and raiding.

Enabling Strike

This model would see the Royal Marines often acting as a source of information to cue fires generated by partner forces or the wider joint force. To illustrate, wargaming has seen the Royal Marines operate ahead of a notional II MEF ground component comprised of two marine infantry battalions and two artillery batteries comprised of M777 and HIMARS units, along with NMESIS, which has both an anti-ship and a land attack capability.¹¹⁰ Alternatively, the marines could operate as the forward element of a littoral fires capability generated by JEF partners in a region such as the Baltic Sea. In each instance, the function of the force would be to enable and support strike-heavy partners, while deemphasising seizing or holding ground in most instances.

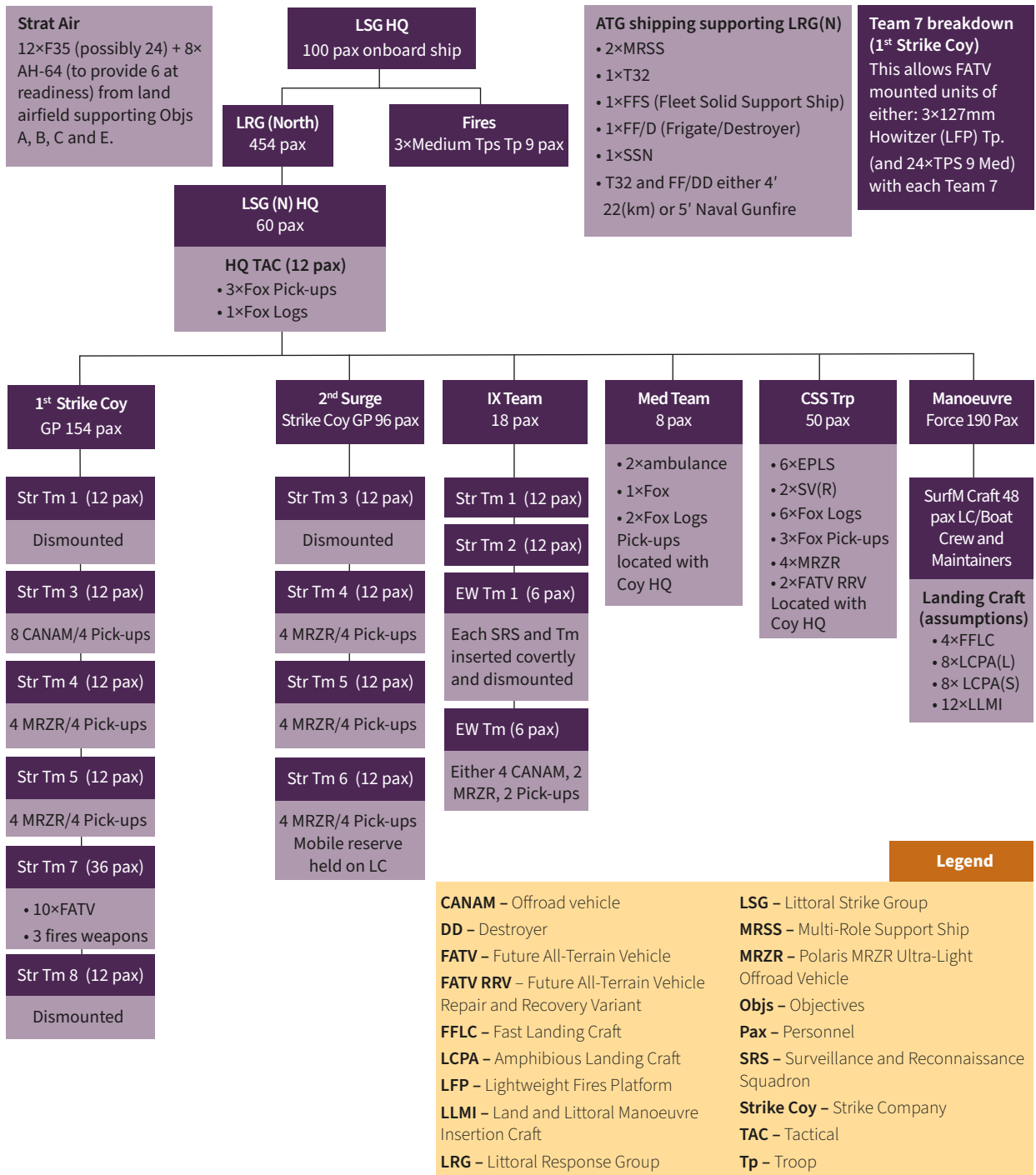
108. Winter, 'First in Last Out', pp. 1–40.

109. Author involvement with Royal Marines exercises and wargaming – the force-to-space ratios are derived from Exercises *Green Dagger* and *Cold Response*; on ratios, see Biddle, *Nonstate Warfare*, p. 124.

110. DSTL wargame examining a High North scenario.

Figure 1: The Organisation of an Individual Littoral Response Group, as Part of a Wider Littoral Strike Group

Operating from Sea-Based
ATG Centred on 2×MRSS



Source: Author generated.

The nature of the envisioned ground component has an impact on the maritime force supporting insertion and subsequent operations. The reduction of the size of individual strike teams has an indirect effect on methods of insertion. Smaller teams can be inserted using a range of mechanisms, including submersible craft.¹¹¹ This potentially obviates challenges such as the threat of UAVs near contested shores. Moreover, a reduction in the amount of heavy equipment that needs to be moved from ship to shore can enable surface manoeuvre craft to be optimised to meet other demands, such as maintaining a low observable profile and carrying fires to support the disembarked force. This will be crucial given that the force will depend on surface manoeuvre craft (as well as on Allied fires) for much of its ability to generate lethality against concentrated targets.

Surface Manoeuvre

A different approach to surface manoeuvre that emphasised longer-ranged and more complex platforms than the connectors currently used could also see the marines generate their own organic fires from littoral spaces. In the same way that complex warships are increasingly being built with modularity at their core, surface manoeuvre platforms could be built to operate either as connectors, or as launch pads for artillery or loitering munitions or C-UAS (counter-crewed aerial systems) platforms, or else as hosts for EW decoys.¹¹² As illustrated by Iran, which has placed a range of effectors such as SAM systems and anti-ship missiles on relatively cheap *Bladerunner* boats, this can be achieved at low cost. Uncrewed or optionally crewed solutions can also support such functions.¹¹³ The major trade-off here is between range and weight – relatively small vessels can carry both personnel and effectors comfortably but would struggle to move heavy vehicles. If the insertion requirement is for small teams of infantry and relatively light vehicles, this can allow for manoeuvre vessels with longer ranges and lower signatures, without creating unviable requirements in terms of size and cost.

In effect, there is a symbiotic link between transitioning to a distributed and strike-centric force ashore and supporting functions such as sea control on the maritime side of the littoral. To the extent that the force becomes more distributed,

111. For an example, see Navy Recognition, 'NAVDEX 2023 Highland Systems Unveils its Kronos Submarine', 21 February 2023, <<https://navyrecognition.com/index.php/naval-news/naval-exhibitions/navdex-2023-exhibitors-visitors-information/navdex-2023-news-official-online-show-daily/12846-navdex-2023-highland-systems-unveils-its-kronos-submarine.html>>, accessed 22 September 2023.

112. As an example, we might consider how USVs are being designed. See *Military and Aerospace Electronics*, 'U.S. Navy Considers Designing Unmanned Surface Vessel to Accommodate Modular Payloads for Specific Missions', 2 February 2022, <<https://www.militaryaerospace.com/unmanned/article/14233008/unmanned-surface-vessel-modular-payloads>>, accessed 26 November 2023.

113. *Ibid.*

the surface craft that support it can be designed in ways that allow them to be more multifunctional, as they do not need to insert and then sustain an aggregated brigade and its enablers.

The Commando Force Model in Practice

The force design described above would see the marines shift from being a multifunctional force capable of acting as auxiliary light infantry to being a more specialised force which, while deployable in multiple contexts, would deliver value primarily by optimising for specific niche tactical roles. Lethality against high-value targets and the enablement of fires would supersede holding ground.

There exists a body of empirical evidence drawn from exercises and wargaming to validate the force model described above. Royal Navy-led force development has included wargaming, live exercising, threat analysis and modelling, and studies of similar force models. Two deductions have emerged from this process. The first is that the commando force model, if equipped, organised and trained as proposed above, can achieve the range of tactical actions and operational effects that this paper calls for littoral forces to achieve.

One illustration of this comes from Exercise *Green Dagger*, in which UK commando forces operating against larger US Marine Corps formations in repeated large-scale exercises had a disruptive effect in excess of what one would expect from a battalion-sized force operating against brigade formations. 40 Commando was divided up into 12-person strike teams that operated ahead of a light defensive screen. The presence of distributed raiding strike teams of marines posed considerable challenges to the opposing US Marine commander, who could not distribute his forces without raising the risk of raiding, but was exposed to fires if he chose to concentrate to both better defend against raiding and to overrun a fairly light Royal Marine defensive screen.¹¹⁴ To be sure, 40 Commando was operating ahead of 7th Marine Regiment, and was reliant on the US Marine Corps' organic fires capabilities, as well as support from US airpower. However, it is notable that a comparably equipped Marine Corps opposing force that was not enabled by a light raiding element struggled against one that was. This was due in no small part to the challenge that a combination of fires and raiding posed – dispersion created vulnerabilities against the latter, while concentration was punished by the former.¹¹⁵

Additionally, a considerable cognitive impact was observed, whereby brigade-level C2 structures were failing to choose positive courses of action, in terms of

114. Lessons from Exercise *Green Dagger*, drawn from findings derived from *Green Dagger* available to Mark Totten in his capacity as SRO of author involvement with the FCF programme.

115. *Ibid.*

their tactical plan, because of a perceived threat from the commando force – a threat that was amplified beyond the physical reality. When the adversary force did concentrate against the Royal Marines, it became vulnerable to fires employed by the Marine Corps regiment with which the marines were partnered. Evidence from these exercises illustrates that the force can be disruptive and survivable, even early into the change programme.¹¹⁶

Niche Capabilities in the Urban Littoral

In addition to the experimental evidence regarding the utility of distributed forces in holding up larger ground formations, there is also recent historical evidence to show that forces built around the imperatives of generating situational awareness and forcing adversaries into unmasking for engagement by longer-range strike can be useful in the urban littoral specifically. Urban battles such as those between Russia and Chechen rebels in Grozny (1991) and between the IDF and Palestinian insurgents in Jenin (2002) have illustrated the utility of small teams of infiltrators, as have more recent battles, such as Aden (2016), where the Houthi movement used small teams equipped with Kornet anti-tank guided missiles to good effect.¹¹⁷ Such forces are not a substitute for heavier forces, and there is a particular utility in being able to call on both armour and large numbers of infantry in urban environments. However, backed by long-range fires, small teams can disrupt adversary movement, and support the reduction of strongpoints. Offshore fire support can be of particular utility for the latter function, as also illustrated at Aden.¹¹⁸ Low-latency links between distributed teams and fire support from either offshore or disembarked forces can help obviate one of the challenges of providing air support in urban environments – the fact that generating target sets in complex terrain is time consuming and requires careful pattern-of-life analysis, and that air power cannot always be called to bear before circumstances have changed.¹¹⁹ In the urban littoral, relatively light forces supported by maritime fires can also perform tasks such as the defence of the SPODs that heavier forces need for theatre entry.

To summarise: an emphasis on distribution with a view to enabling strike-centric operations can enable amphibious forces to be relevant to a range of tasks, from the disruption and attrition of ground formations, to the provision of niche capabilities to partner forces in expeditionary contexts that may involve urban littoral conflict. Moreover, adaptations that can enable dispersion and strike – chief among these being changes to the design philosophy of maritime

116. *Ibid.*

117. Knights, *25 Days to Aden*, p. 102.

118. *Ibid.*

119. *Ibid.*

enablers – can also allow marines to support tasks such as securing and exercising sea control.

A More Specialised Force

A major consequence of the proposed force design is likely to be the optimisation of the commando force in a way that removes certain elements of multifunctionality from its force design. An emphasis on a light force with a limited logistics tail supported by manoeuvre craft, rather than by connectors per se, is likely to remove the force's ability to aggregate as a more concentrated force to perform tasks such as replacing ground units in the line or conducting patrolling. Moreover, an emphasis on connectors that can support surface manoeuvre at reach and generating fires necessarily means design choices that deemphasise the movement of heavy vehicles. A vessel built to manoeuvre on the water and support fire missions will have a very different profile from one intended to move heavy vehicles.

It should be noted that the assumption that the marines would operate as a line unit is a product of an era in which the corps was roughly twice its current size.¹²⁰ Moreover, at Alliance level, there has been a broader shift towards threat-based planning, and implicit in this is the optimisation of forces for specific functions.¹²¹ Finally, as discussed, in most likely contested environments, heavy assets may only be moved and sustained after threats to theatre entry have been overcome. At this juncture, their movement is likely to be less reliant on connectors, given that local SPODs and aerial ports of debarkation can be used, along with methods of insertion such as roll-on-roll-off craft.¹²²

The need to optimise for strike and sea control, along with existing Tier 2 special forces functions, will also likely mean that tasks such as fleet protection in home ports will need to be deemphasised. Notably, security functions are an area where autonomous capabilities can reduce the requirements for human operators in relatively short order, given that these functions are performed in safe home ports.¹²³ Moreover, certifying marines for a wide range of competencies – a product of the era of counterinsurgency – will likely be impossible, especially if key competencies in areas such as working with autonomous platforms,

120. Grove, *Battle for the Fiords*, p. 124.

121. Robbie Boyd, speech to RUSI Missile Defence Conference 2022, 23 February 2022.

122. For example, see Conor Kennedy, 'RoRo Ferries and the Expansion of the PLA's Landing Ship Fleet', CIMSEC Capability Analysis, 27 March 2023, <<https://cimsec.org/ro-ro-ferries-and-the-expansion-of-the-pla-landing-ship-fleet/>>, accessed 25 November 2023.

123. Kris Patterson, 'NIWC Atlantic Tests and Evaluates Unmanned Systems to Enhance Base Force Protection', CHIPS, 11 February 2022, <<https://www.doncio.navy.mil/chips/ArticleDetails.aspx?ID=15438>>, accessed 20 September 2022.

supporting fires, and operating at sea in support of blue-water forces are to be adequately delivered.

The Royal Marines will need to become a more specialised force to be able to deliver the concepts of operations described above. A specialised structure is more consistent with a threat-based planning framework than is the existing force structure. Moreover, given the size of the force, the choice between multifunctionality and specialisation is a notional one – the force cannot perform roles such as line replacement in any case, even if its personnel and structures could theoretically enable it.

V. The Royal Marines: Capability Requirements

This paper has sought to articulate the use cases for the Royal Marines in the context of a broader, strike-led, Alliance-level framework for amphibious power projection. This chapter sets out the capability requirements that emerge from the discussion above. At a minimum, a redesigned commando force would need to demonstrate progress towards the following six features:

- A distributed model of tactical operations across the littoral.
- Increased range from point of launch of the system to target effect.
- Delivery of integrated effects at lower levels.
- Resilient sustainment in high-threat contexts.
- Integration of crewed/machine teaming and robotic and autonomous capabilities ashore and afloat.¹²⁴
- Deception as a central planning consideration and a capability investment line.

The chapter discusses the design principles and attendant capability sets that can enable the force to deliver progress on achieving these features. The design principles represent the foundational priorities which, if delivered, will drive progress towards attaining the six features.

Signature Management and Resilient Communication

The delivery of integrated effects at lower levels will depend on signature management and a communications architecture that can support a distributed force drawing on non-organic enablers and fires.

While exercises such as *Green Dagger* demonstrated the utility of distributed forces, a limitation in their evidence base is that they did not test the resilience of communications networks. With frequency jamming dictating with whom personnel can communicate at any given time – dependent on which EW assets an opponent is operating – the ability to communicate across multiple pathways takes on increased importance. Organisationally, this will require amphibious

124. On human-machine teaming, see Ministry of Defence, 'Human Machine Teaming (JCN 1/18)', 2018.

forces to be able to communicate across multiple component commands – if a commando unit is cut off from maritime forces, for example, it can still usefully contribute to the ISR screen of a ground component command.

This C4ISR requirement brings the ‘dispersal dilemma’ into focus. David Kilcullen has described the difficulty that comes from the need to avoid force concentration, as proximity builds a ‘targetable’ entity.¹²⁵ Applying a more distributed model that improves force survivability is inherently desirable, but the communication and information systems network capability that is needed to remain effective builds an electromagnetic spectrum (EMS) signature that offers targeting opportunities for an adversary.

In terms of capabilities, this dilemma introduces two requirements. The first is the ability to rely on multiple redundant networks to deliver data across the force. Expendable bearers such as UAVs can represent one pathway towards this.¹²⁶ Equally, as illustrated in Ukraine, a growing range of civilian satellite communications networks can be used by military units, and can remain active even in the face of concerted jamming efforts.¹²⁷ Modes of communication such as tropospheric scatter can also be used for reach-back communications, albeit with limitations on the size of data packets.¹²⁸

Emerging solutions, such as fully autonomous capability, that can operate without GPS and be fielded at the lowest tactical echelons, will form part of the answer, and feature as a force design principle. Other developments will assist in time, such as machine-learning-based systems that can identify targets from blurred images. If a single image of target quality takes 12 KB of data, machine learning enhancements will allow targets to be decided on the basis of very small data passage requirements.¹²⁹ Of course, a behavioural shift away from a currently observed desire for full-motion video (FMV) is still required.

The Commando Force programme’s ongoing technical response to the dispersal dilemma includes introducing low-signature mesh network systems and novel long-range bearer capability, alongside employment of high frequency radio and satellite communications where opportunities allow. The technical response

125. David Kilcullen, *The Dragons and the Snakes: How the Rest Learned to Fight the West* (London: Hurst, 2020), pp. 70, 91.

126. Bryan Clark et al., ‘Mosaic Warfare: Exploiting Artificial Intelligence and Autonomous Systems to Implement Decision-Centric Operations’, CSBA, 2020, pp. 10–12.

127. Valerie Insinna, ‘SpaceX Beating Russian Jamming Attack was “Eyewatering”’: DoD Official’, *Breaking Defense*, 20 April 2022, <<https://breakingdefense.com/2022/04/spacex-beating-russian-jamming-attack-was-eyewatering-dod-official/>>, accessed 20 September 2023.

128. Dizhe Yuan and Xihong Chen, ‘Troposcatter Transmission Loss Prediction Based on Particle Swarm Optimisation’, *IET Microwaves, Antennas and Propagation* (Vol. 15, No. 3, February 2021).

129. Paul Scharre, ‘Centaur Warfighting: The False Choice of Humans vs. Automation’, *Temple International and Comparative Law Journal* (Vol. 30, 2017), <<https://sites.temple.edu/ticlj/files/2017/02/30.1.Scharre-TICLJ.pdf>>, accessed 25 November 2023.

will need, however, to be complemented by the application of recently lost techniques, such as minimising communication traffic, beyond reducing forces' reliance on FMV. These behavioural adjustments will need to be matched by policy changes that enable targeting decisions to be devolved to lower levels.¹³⁰

Processing at the edge is also likely to become increasingly important, especially as processing power enables more functions to be performed without the need for reach-back.¹³¹ Project EVE, designed by the Royal Navy's Marworks team, is an example of a prospective solution here.¹³² It will enable data to be processed forward, set the computational capacity for unmanned (UXV) systems to be integrated and controlled when communications are challenged, and provide the battlespace-management platforms that enable the swift allocation of assets.

Distributed Logistics

It will not only be imperative to distribute the force tactically, but also to create a logistical model ashore that is distributed. While offshore vessels can serve as concentrated logistical nodes, once moved ashore, resupply must be distributed over a wide area, both to prevent interdiction and to meet the requirements of a similarly distributed force.

At the tactical level, logistic support to a distributed force, at greater range, within a higher threat environment, represents a considerable challenge. Trusted methodologies will need to evolve. Consider, for example, how predictable, linear, 'frontline-pull' resupply places a significant constraint on the force, as it tends to drive concentration of assets/activity that is at odds with both the threat picture that has been described above, and viable solutions to it. These tensions were at play in the Falklands campaign: Julian Thomson's logical desire to build out a beachhead before embarking on assault operations brought with it increased exposure to the Maritime Task Group that could not be accepted.¹³³ Under emergent conditions in which air-based threats of the kind faced in the Falklands will be joined by short-range ballistic missiles, cruise missiles and UAVs, concentrated logistical marshalling points will not be survivable for long.

It will be imperative, therefore, to design logistic distribution for a distributed force, with fuel, power and ammunition as the foremost logistic concerns. One means of limiting logistical demands is by managing the logistical 'pull' by

130. Data from FCF programme experimentation available to Mark Totten in his capacity with the programme.

131. Clark, Patt and Walton, 'Implementing Decision-Centric Warfare', pp. 34–36.

132. Conclusion based on Mark Totten's direct professional involvement in developing and implementing the FCF programme.

133. Lawrence Freedman, *The Official History of the Falklands Campaign: Volume II: War and Diplomacy* (Abingdon: Routledge, 2005), pp. 393–400.

making the force lighter – with heavier vehicles and assets such as the 105-mm light gun representing sources of demand that can be jettisoned. To the extent that the force is one that aims to disrupt a comparatively small number of high-value targets, as well as enable heavier strike elements, these capabilities become superfluous. Moreover, considerable striking power can be fitted on a comparatively small vehicle.

The logistical ‘push’ can also be better managed. The Royal Marines are currently conceiving a more prediction-based ‘logistic-push’ model, where supply needs are anticipated, and deposited for forces to collect at their time of choosing. This will rely on automated modelling and acceleration of uncrewed systems into service. In particular, low-cost UAVs capable of carrying large payloads over extended distances will be vital to making this model operational. Examples of cargo drones are already visible in civilian contexts and could be adapted to military requirements.¹³⁴

The disadvantages are that such models are likely to be more resource intensive, are open to compromise, and present non-kinetic targeting opportunities to adversary EW. However, the removal of concentrated logistical nodes nonetheless reduces the prospect of catastrophic failure. Instead, one might expect to see a steady loss rate in the face of adversary EW, which can be better mitigated than a single discontinuous event such as the destruction of a single concentrated hub. Some work on use of AI/autonomy proposes the rule that a push-driven model, in which the AI anticipates, is valuable in inverse proportion to the consequences of the AI being wrong. So, for resources such as food or fuel, which are not expendable, but are replaceable, it might be useful to do this on an anticipatory basis, while the movement of munitions will need to be more carefully considered depending on the risk of compromise, and may depend more heavily on surface manoeuvre platforms and collection at the coastline.¹³⁵

We see, therefore, that on both sides of the conflict threshold, the challenge of supporting a forward-deployed force is one that must be overcome, if amphibious forces are to be effectively optimised for the new operating environment. In routine operations, maintaining capability forward adds pressure to supply chains and contracting solutions. This cost growth might be offset through economies of scale, as partners (notably the US) look to develop stand-in concepts at greater mass. Another cost offset and operational benefit will be in the pressure that littoral forces at sea, positioned with warfighting stocks, takes off the ‘strategic outload’ as a significant conflict breaks out. In this situation, the benefit

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134. Stephan Baur, ‘Cargo Drones: A Potential Game Changer in the Logistics Industry’, Roland Berger, 12 December 2022, <<https://www.rolandberger.com/en/Insights/Publications/Cargo-drones-A-potential-gamechanger-in-the-logistics-industry.html>>, accessed 6 August 2023.
135. Avi Goldfarb, Ajay Agarwal and Joshua Gans, *Prediction Machines: The Simple Economics of AI* (Boston, MA: Harvard Business Review Press, 2018) pp. 30–32.

of holding combined arms capability forward, and being able to sustain it until the joint supply chain is established, will bring opportunities, both to deny the adversary room to manoeuvre, and to project more combat power early in a crisis.

Mobility and Reach on Both Sides of the Littoral

A distributed force that must deliver convergent effects will depend on reach. Many capabilities that provide reach, such as long-range fires or long endurance UAVs should, by virtue of their size, be drawn from the maritime portion of the littoral.

Thus, a critical capability underpinning the force described will be surface manoeuvre platforms (as opposed to ship-to-shore connectors), which have the size, versatility and low observability to act as either connectors, strike assets or C-UAS platforms. The aspiration for multirole surface craft – both troop and missile carrying – has previously been shown to have both defensive and offensive benefits. Such capabilities might offer a framework around which integrated coalition activity can be built in constrained geographies, such as the Baltic or Black seas. Moreover, greater ambiguity regarding the function a vessel is playing creates additional dilemmas for an opponent, even if the vessel is detected. This is unlike contemporary connectors, which can only be assault platforms, and which an opponent would likely detect. As noted, platforms such as the Chinese Type-22 low-observable missile catamaran and the Iranian *Bladerunner* boats already illustrate that potent strike and defensive capabilities can be incorporated onto relatively small vessels by nations with limited resources.¹³⁶

A key focus area for the FCF programme will be building modularity into future surface manoeuvre platforms as a design principle. This principle already underpins uncrewed solutions such as the US Navy's planned medium uncrewed surface vessel (MUSV).¹³⁷ The FCF programme's own aspirations are for future surface manoeuvre platforms to have a reach of over 400 nautical miles. An increase in reach will enable manoeuvre platforms, along with other assets, such as vertical lift capabilities, to cover a larger area of the sea with the support of a mothership – enabling sea control missions to be more easily supported in a way that removes pressure from the blue-water navy.

136. Newdick, 'Now China has Cruise Missile Carrying Catamarans Chasing Away Ships in the South China Sea'; Sutton, 'Iran Reveals World's First Air Defense Small Boat'.
137. *Military and Aerospace Electronics*, 'U.S. Navy Considers Designing Unmanned Surface Vessel to Accommodate Modular Payloads for Specific Missions'.

Improving the ability to find and strike at range allows the shipping from which force elements launch more options for maritime manoeuvre, specifically to position within protective umbrellas. Improved connector range presents not only the opportunity for more flexible ship positioning, but also the capacity to create more numerous attack profiles – for example from shore to shore, as well as from ship to shore. Needless to say, the increased size of such vessels as compared with traditional connectors would impose a requirement for size increases on host vessels such as the planned multirole support ship. However, the fact that the reach of these vessels enables motherships to operate at greater distances will, in turn, mitigate the effects of an increase in size in areas such as vulnerability to detection.

The challenge of building a correct manoeuvre option extends to mobility options ashore – what is the vehicle mix? The UK Commando Force approach sees ISR, mobility and sustainment as part of both offensive capability and force protection. The force must prioritise mobility and a limited logistical burden over protection, unless circumstances make prioritising the latter absolutely necessary. Although recent fighting has illustrated the importance of protected mobility against indirect fires, the size of the elements of the envisioned force means that their primary means of survival is likely to be evading detection to the extent possible and being mobile enough to avoid being fixed when detected.¹³⁸ Moreover, the envisioned concept of force employment would see the commando force employed before opponents could entrench and support positions with a large weight of fire. While there may be instances where protection is desired, particularly in lower-intensity conflicts, where sensitivity to casualties is likely to be higher, there is an inverse relationship between the force protection of the commando force's vehicles and its aggregate lethality.

Integration of strike and vehicle systems, particularly smaller missile and indirect-fire systems, is an objective of UK development that will serve to increase platform lethality, while reducing the footprint of tactical elements. As noted above, the integration of systems such as NMESIS and SPIKE on platforms such as the joint light tactical vehicle is analogous, if not quite identical, to the solutions that might be pursued.¹³⁹ This does not represent a new concept, therefore, but it is novel for light forces.

138. On protected mobility, see *Reuters*, 'Ukraine's Military Supplies: What Ground Vehicles are Kyiv's Allies Sending?', 20 January 2023.

139. Eversden, 'SOCOM Receives First SPIKE NLOS System Integrated onto JLTV'.

Capabilities Underpinning Tactical Deception

The benefits of deception as a design principle do not need to be rehearsed in detail, except to identify that, as is the case for autonomous systems, difficult investment choices will need to be made if a viable capability suite is to be generated.

There are a number of tools that can enable deception against at least some of the sensors on which adversary concepts of operations depend. Through the use of capabilities such as expendable uncrewed assets acting as decoys, manoeuvre elements can hide within the noise of multiple false positives. Of course, it is precisely this challenge that multispectral sensing architectures are built to defeat, but the challenge of compromising these systems in littoral spaces can be simplified through the exploitation of climatic conditions. For example, climatic conditions can lend themselves, either to subrefraction, which limits the range of radar, or super refraction, which generates false positives (a challenge that can be exacerbated using decoys).¹⁴⁰ Factors such as mist and smog can also pose a challenge for electro-optical sensors.¹⁴¹ The former is a challenge in theatres such as the Baltic Sea for much of the year, and the latter will become particularly prevalent as littoral spaces are increasingly urbanised. Urbanisation also has the effect of cluttering the electromagnetic spectrum.¹⁴² Of course, forces cannot expect to be safe from the full plethora of methods of detection, but it may be assumed that climatic conditions will confound at least some of them – meaning that the challenge is simplified, relative to that of countering those methods of detection that remain effective. Where radar can be compromised, this can be especially viable, given that many other modes of detection depend on radar.

In view of this, a primary focus for the commando force should be on uncrewed solutions that exacerbate the challenges of employing radar effectively in the littoral. This could include offboard active decoys on uncrewed surface vessels that are designed to mimic the radar returns of a surface manoeuvre platform or a larger vessel.¹⁴³ Mimicking the visual appearance of platforms and the emissions and thermal signatures of fires platforms in littoral areas is likely to be another priority for forces, to protect both themselves and allied forces. There

140. Vego, 'On Littoral Warfare', p. 20.

141. Vego, *Naval Strategy and Operations in Narrow Seas*, p. 38.

142. Mikael Weissman, 'Urban Warfare: The Challenges of Military Operations on Tomorrow's Battlefield', in Mikael Weissman and Niklas Nilsson (eds), *Advanced Land Warfare: Tactics and Operations* (Oxford: Oxford University Press, 2023).

143. Zhaodong Wu Yasong Luo and Shengliang Hu, 'Optimization of Jamming Formation of USV Offboard Active Decoy Clusters Based on an Improved PSO Algorithm', *Defence Technology*, 2023 (in press), <<https://www.sciencedirect.com/science/article/pii/S2214914723000806>>, accessed 23 November 2023.

are a number of existing solutions in this area, including relatively primitive ones, comparable to those employed by Serbian forces against NATO in 1999.¹⁴⁴ The key will be organisational experience, rather than new capabilities.

A final emerging area in which practices underpinning deception will likely need to evolve is in defeating classification, as distinct from detection. Insofar as detection is, at least to a degree, inevitable, to some extent the focus of deception should shift to defeating efforts to classify targets. For example, where opponents rely on modern methods of classification such as machine-learning-based algorithms, it may become more important to focus efforts on ‘poisoning’ data in peacetime – altering the appearance of one’s forces to lead an opponent’s algorithm to draw incorrect correlations in ways that could confound wartime classification efforts. To some extent, this will be a joint force priority, but it is one to which marines can contribute over the course of peacetime activity, such as exercises that they know are being observed. A degree of knowledge regarding adversary algorithms will likely underpin many future approaches to deception. Generating this understanding is a task which will likely be performed at higher echelon, but to which bodies such as 30 Commando Information Exploitation Group could contribute.

Multispectral concealment will be a sine qua non for forces ashore.¹⁴⁵ While the details of the specific solutions to multispectral camouflage being pursued by the commando force are not for public disclosure, the primary factor to note for future study is that the major limiting factor is cost, not capability. Thus, the further forward a force is to be placed, the smaller it must be, as viable solutions do not scale. This in turn will create considerable requirements for a small forward element to be able to survey and operate in a comparatively large area to generate value for the strike-centric forces that it is supporting.

On the organisational front, there is a pressing need for all militaries, not least those involved in littoral operations, to rediscover the criticality of deception to operational success. Indeed, there is a case for the integration action model to feature deception activity as a recognised element that must be orchestrated.¹⁴⁶

144. Martin Andrew, ‘Revisiting the Lessons from Operation Allied Force’, *Air Power Australia Analysis* (2009-04, 14 June 2009), <<https://ausairpower.net/APA-2009-04.html>>, accessed 10 August 2023.

145. Mariana Iriarte, ‘U.S. Army Selects Next Generation Multispectral Camouflage System’, *Military Embedded Systems*, 16 November 2018, <<https://militaryembedded.com/radar-ew/sensors/army-selects-next-gen-multispectral-camouflage-system>>, accessed 9 August 2023.

146. Ministry of Defence, ‘Joint Doctrine Publication 0-01: UK Defence Doctrine’, 6th edition, 2022, p. 23.

Restructuring Organisational Practices

Alongside the paradigm shift in the deception arena that is needed to enable successful combat operations, this paper has highlighted how deterrence by denial may be enhanced through a partner force, if conducted as part of a coordinated campaign approach. There must be changes, however, if this benefit is to be realised. First, within Ministry of Defence (MoD), Permanent Joint Headquarters (PJHQ) and fleet scheduling, the shift to a campaign approach has yet to take place, and operational-level planning remains ad hoc. Alignment with US Marine Corps planning routines (orchestrated with an 18-month lead-in through their force synchronisation process) might offer a beneficial forcing function. This does not mean that planning agility is removed, rather that plans are constructed among partners, all of whom realise that national priorities might change what can be done, as their political masters react to events.

Within the force, there will be changes to individual training as a new operational methodology and new technology is integrated. The primary tactical-level adjustment will come, however, in force-generation mechanisms. The UK commando force and other like-sized amphibious forces are not big enough to generate credible forward presence and maintain sequential, onshore force-generation pathways. However, force generation models that assume in-theatre development are not only possible, but deliver considerable value. Furthermore, this type of generation pathway opens the door to force development forming an element of national and Alliance statecraft.

Historically, convergent development through programmes such as Fleet Operational Sea Training (FOST) played this role within NATO and served as both a force multiplier and a diplomatic benefit to the UK.¹⁴⁷ This is something that navies have traditionally done well with their ship deployments, and it has gathered pace of late with deterrence efforts in Eastern Europe – but further development is possible. Consider, for example, how the UK, the US and Australia could form a core of littoral force development in the Indo-Pacific region around the development of Force Design 2030, and the move of the Australian Army to be more ‘amphibious’ in its approach.¹⁴⁸ UK commando forces would provide a valuable element in the force mix and would offer a catalysing presence, insofar as they are different but complementary enough to the equivalent forces of both countries. In the European theatre, they would offer the alliance-building function of a force that trains in the High North for a mission in which fires integration is predominant.

147. Gerry Mauer, ‘Train With the Royal Navy’, *USNI Proceedings* (Vol. 145, No. 7, July 2019), <<https://www.usni.org/magazines/proceedings/2019/july/train-royal-navy>>, accessed 28 June 2023.

148. Aaron-Matthew Lariosa, ‘Australian Army Shifting Priorities to Amphibious Littoral Operations’, *USNI News*, 2 October 2023, <<https://news.usni.org/2023/10/02/australian-army-shifting-priorities-to-amphibious-littoral-operations>>, accessed 13 October 2023.

Conclusion

To retain their utility in the contemporary operating environment, the Royal Marines will need to make significant change to the ways that they deploy, operate and sustain themselves. Key elements of this change will be:

- A shift in emphasis from assault to manoeuvring to enable fires held by other elements of the force.
- The ability to achieve theatre insertion at reach.
- Greater levels of dispersion once disembarked.

These adaptations require considerable adjustments to both capabilities and force models, which would see the ability to strike and raid emphasised at the expense of the light infantry functions that amphibious forces such as the marines have traditionally performed.

These changes imply a degree of ruthless specialisation in term of tactical competencies, if not overall functionality. If realised, however, this kind of change can enable the marines – and indeed other Western forces – to better utilise the advantages that maritime preponderance has historically conferred on them – the opportunity to make the political choice to engage in operations at reach, and the operational flexibility to impose multiple dilemmas on an opponent.

This paper has built on evidence from the Royal Marines' experimentation, academic literature, and previous work conducted by RUSI and the marines to inform ongoing work on the FCF. As the commando force will often find itself operating alongside allies and coalition partners, the discussion has been situated within a broader analysis of the future of Western amphibious capabilities.

A key finding of the paper is that the maritime forces of Western nations do not need to cede littoral spaces or resign themselves to a growing spatial gap between themselves and the wider joint force. While it is undeniable that challenges to littoral manoeuvre exist, these can be surmounted. To do so requires a radical rethinking, both of force design and of tactics, techniques and procedures.

First, marine forces will need to be able to generate fires that can contribute to tasks such as suppression of enemy air defences, engaging adversary vessels and striking in the deep areas of the ground fight. The reforms being undertaken by both the US Marine Corps and some European amphibious forces represent a logical progression in this direction. To a great extent, littoral manoeuvre will involve manoeuvre by fire.

The ability to use the capabilities being generated to effect against complex targets inland requires, however, the ability to survey adversary positions, conduct battle damage assessment and, where possible, force adversary units to concentrate in ways that make them vulnerable. These functions represent an area where lighter forces such as those envisioned in the FCF programme can play an important complementary role alongside heavier Allied assets.

Light, rapidly deployable special operations forces with organic shipping can also support other competitive functions, including the exercise of sea control and early posturing during a crisis that occurs beyond NATO's area of responsibility.¹⁴⁹

For the UK, development of the Commando Force is geared towards building a capability that can inhabit the littoral contact layer, bringing increased ISR and strike options to the operational commander. Further, the UK's political position in NATO, JEF and in the Indo-Pacific region, alongside the UK Commando Force's relationship with key partners at the military level, sets the conditions for the force to play a vital integration function that enhances military options and the country's deterrence posture. While the foundations have been set and progress is ongoing, achieving the benefits that this paper describes is by no means certain – both in terms of the MoD's capacity to resource the transition, and the Royal Navy's ability to implement a sufficiently rigorous and integrated programme of change. That said, the financial burden on the MoD is manageable, and the change programme, while very complex, is very much within the Royal Navy's ability.¹⁵⁰

Future efforts to build the commando force through a wargaming process that allows adaptation to be modelled and tested must include industry and address how changes to the force structure and techniques can be implemented. The lessons learned will help to drive an industrial strategy and determine the balance of investment choices to create more flexibility from production to frontlines.

Such progress will require an acceleration of the rate of experimentation. There will be a need for national capacity to model, simulate, wargame and analyse at a tempo that supports force development that will hold relevance. How this might be achieved is beyond the scope of this paper, but it is intrinsic to the successful development of littoral forces, as well forces more widely, and it deserves attention.

149. Organic capabilities are those owned by a given formation, rather than being drawn from higher echelons.

150. We might consider that over the next 10 years the budget of the FCF programme will represent roughly 0.5% of naval spending, and that many of the enablers that support the force in areas such as networking will also be required by the wider joint force. See Ministry of Defence, 'Setting the Context: Current Capability Plans to Enable Integrated Force 30', July 2022, <https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1092491/MOD_Defence_Capability_Framework_Annex_Accessible_Jul22.pdf>, accessed 23 November 2023.

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