



Professional Journal of the

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NEW ZEALAND

NAVY

Te Taua Moana o Aotearoa

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Professional Journal of the
Royal New Zealand Navy
Te Taua Moana o Aotearoa





Professional Journal of the **Royal New Zealand Navy**

Te Taua Moana o Aotearoa

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Te Taua Moana o Aotearoa: the New Zealand Warriors of the Sea

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COVER IMAGE

Tai-Panuku
Symbol of Command
HMNZS *Aotearoa*

HMNZS *Aotearoa's* Symbol of Command is a staff, gifted by Ngāti Te Whiti Hapū from Taranaki, the ship's home province. The staff has been named Tai-Panuku (smooth flowing tide), and was crafted at Te Karangaiti carving school, Mana Ariki, Taumarunui by Gregory Keenan, a descendant of Ngāti Te Whiti o Ngāmotu, on behalf of Te Uri o Ngāti Te Whiti. Tai-Panuku will be carried by the ship's Commanding Officer on all ceremonial occasions. See page 132 for more detail.

INSIDE COVER

"HMS *New Zealand* New Zealand's Gift to the Empire"
Gerald Maurice Burns, 1915.
Image courtesy of National Archives of New Zealand.
AAAC/898/153/NCWA 539 R22498154.

HMS *New Zealand* was an Indefatigable class battle cruiser gifted to the British government by the people of New Zealand. The gift was announced by New Zealand Premier Sir Joseph Ward in March 1909. It arose from concerns over German war preparations and a belief that Britain was falling behind Germany in the construction of capital ships. HMS *New Zealand* displaced 19,100 tonnes and had a wartime crew of 900. She saw action in all three major battles with the German High Seas fleet during the First World War: at Heligoland Bight, at Dogger Bank and at the Battle of Jutland.



Professional Journal of the Royal New Zealand Navy

Volume 1 | Number One | December 2020

Introduction and Welcome Message	7	Between Cold Wars: Old Mistakes and New Realities	76
Chief of Navy Rear Admiral David Proctor		Professor Rouben Azizian	
		<i>Professor Azizian is the Director of Massey's Defence and Security Studies programme. He is a former Soviet and Russian foreign service officer and a classmate of Sergey Lavrov, the current long-serving Russian Foreign Minister. Rouben reflects on lessons from a life in the Soviet and Russian Foreign Services.</i>	
Introduction to the Editorial Review Board	8	RESEARCH PAPERS	
		Toward a Zero Carbon Navy	80
Editorial	10	Chris Howard	
Dr Lance Beath		<i>How the RNZN could become a regional leader in the development of a comprehensive response to the need to lower carbon emissions. Chris has developed his thinking in the light of the government's commitment to achieve net zero carbon by 2050. New Zealand Defence Force Advanced Command and Staff Course (Joint) Research Essay 2019.</i>	
<i>The case for a professional journal of the RNZN that provides a place for critical and constructive comment on all matters that concern the Navy and New Zealand's maritime futures including national strategy, policy, organisation, culture, personnel policies, operations and capability.</i>		The RNZN's Littoral Warfare Force: Embracing Revolution	94
A Background to the Next Round of Strategic Reviews	14	Commander Tim Garvan RNZN	
Assistant Chief of Navy (Strategy and Engagement) Commander Des Tiller RNZN		<i>On the need for more innovative thinking in the Littoral Warfare Support community. New Zealand Defence Force Advanced Command and Staff Course (Joint) Research Essay 2018.</i>	
<i>The issues confronting Navy as it prepares for the forthcoming round of strategic reviews. These include fleet renewal, personnel numbers, future base location issues, sustainability, resilience, the security of supply lines, force protection and national security and combat options.</i>		A Maritime Security Reset for the Royal New Zealand Navy	108
Special Feature Article: Designing the Next Fleet	22	Timothy Portland	
Captain Andrew Watts RNZNR		<i>Constabulary Operations, Capability Investment and the Combating of Transnational Security Threats. New Zealand Defence Force Advanced Command and Staff Course (Joint) Research Essay 2018.</i>	
<i>With the Navy facing an unprecedented period of transition, there is an opportunity to design a coherent, affordable and sustainable fleet through the application of new technology and doctrine.</i>		BOOK REVIEWS	
Toward A New Unifying Military Concept for New Zealand	48	Why The Allies Won Richard Overy	123
Dr Lance Beath		Reviewed by Commander Andrew Dowling RNZN	
<i>In which the Editor opens up a discussion of New Zealand defence policy.</i>		The Mighty Dead: Why Homer Matters Adam Nicolson	124
OPINION PIECES		Reviewed by Commander John Sellwood RNZN	
Affordability and Value: The Defence Context	60	Super Highway: Sea Power in the 21st Century Chris Parry	125
Rear Admiral John Martin with Gareth Chaplin		Reviewed by Commander Andrew Dowling RNZN	
<i>The challenge facing the Navy's leadership.</i>		Bibliography	127
A Turning Point for New Zealand's Maritime Periphery	70	Next Issue	131
Simon Murdoch		<i>A look ahead to content in preparation for Vol. 2 No. One of the Journal, due out in May/June 2021. Notes on key dates, editorial requirements, article length, topics, image selection and requirements.</i>	
<i>A former Chief Executive of the Ministry of Foreign Affairs and Trade and Head of the Prime Minister's Department explores the implications of the growing competition for power and influence in New Zealand's maritime periphery.</i>		Tai-Panuku: Symbol of Command	132

INTRODUCTION AND WELCOME MESSAGE



CHIEF OF NAVY

REAR ADMIRAL DAVID PROCTOR

There are a number of challenges to overcome in mounting any new professional journal, particularly one that has been written and produced under Covid-19 lockdown conditions. The first challenge is to ensure that we meet the highest editorial and production standards. Objectivity, fairness and accuracy are fundamental. Beyond that I look for insight, critical thinking, interest and originality of thought and expression. The aim of the *Professional Journal of the Royal New Zealand Navy* is to encourage careful thought and debate about our naval and maritime futures.

New Zealand is a maritime nation. The Navy has a role to play, alongside our other service partners and agencies, in helping to secure New Zealand's future. That future will be increasingly bound up in our oceans and in the island countries of the South Pacific that are our closest friends and neighbours.

To explore these issues as well as those further afield, we have invited our own Royal New Zealand Navy (RNZN) thinkers on such matters, and we have reached out to the best geopolitical and maritime thinkers in New Zealand. In later issues, we will look to extend our reach further afield, including abroad. Through the pages of the *Journal* we hope to provide access to a unique array of talent with which to help the Navy explore the naval and maritime issues that will confront New Zealand and the Asia Pacific, providing us with challenges and opportunities in equal measure.

I hope that all those involved with the RNZN, either in the service or associated with it, will take this as a personal invitation from me to join us in exploring our naval and maritime futures through the pages of the *Journal*. I look forward to the journey and congratulate the team members, led by my Deputy, Commodore Melissa Ross, who have put together this first issue.

A handwritten signature in green ink, appearing to be 'D. Proctor', written over a light blue circular stamp.

Rear Admiral David Proctor
Chief of Navy

INTRODUCTION TO THE EDITORIAL REVIEW BOARD

An Editorial Review Board (ERB) has been appointed by the Chief of Navy to oversee the scope, content and standards of the *Professional Journal of the Royal New Zealand Navy*. The ERB is chaired by Commodore Melissa Ross, Deputy Chief of Navy (DCN). The initial appointees to the Board are DCN (Chair), Commodore Mat Williams, Maritime Component Commander and Commander Des Tiller, Assistant Chief of Navy, Strategy and Engagement.

The ERB has invited Rear Admiral John Martin ONZM and Dr Rory Paddock, Lead Faculty member for the Advanced Command and Staff Course (Joint) at the New Zealand Defence Force (NZDF) Command and Staff College, to join the Board as additional members and is delighted that they have both accepted.

Dr Lance Beath, General Editor of the Journal, has been appointed as Advisor to the Board.

The purpose of the *Journal* is to help meet the professional development needs of the Royal New Zealand Navy (RNZN). The *Journal* also aims to stimulate and inform debate amongst the wider New Zealand and international community interested in naval and maritime issues.

Following are brief biographic notes on the members of the Board.



Commodore Melissa Ross is the RNZN's Deputy Chief of Navy and Chair of the Journal's Editorial Review Board. Commodore Ross has extensive operational experience as a Marine Engineer. She is a graduate of the Eisenhower School for National Security and Resource Strategy in Washington, as well as the first woman appointed to Commodore rank and also the first to serve as Deputy Chief of Navy.

Commodore Mat Williams is the NZDF's Maritime Component Commander. He is a graduate of the Royal College of Defence Studies and King's College London. He is responsible to Commander Joint Forces NZ for the command and conduct of maritime operations and the provision of the naval contribution to NZDF outputs.



Commander Des Tiller is Assistant Chief of Navy, Strategy and Engagement. He is a Marine Engineer who had overall responsibility for the acquisition and design engineering of the Navy's new ocean-going replenishment vessel HMNZS *Aotearoa*. He is the point of contact in Naval Staff advising on all aspects of the *Journal* including scope and aims, budgets, commissioned work, required milestones, publishing standards and content. He provides liaison with the Editorial Review Board and with DCN.

Rear Admiral John Martin ONZM is a former Chief of Navy who is now Executive Director of the New Zealand Oceans Foundation (www.oceansnz.com). John is a Fellow of the Centre for Defence and Strategic Studies in Canberra. Since retiring as Chief of Navy, John has served in a variety of strategic advisory roles including with the Department of the Prime Minister and Cabinet and the Ministry of Primary Industries.



Dr Rory Paddock is a Teaching Fellow at the New Zealand Defence Force Command and Staff College, where he is Lead Faculty member for the Advanced Command and Staff Course (Joint). Rory retired from the Royal New Zealand Air Force as a Group Captain, with his last posting being as a Syndicate Director for the Australian Defence Force (ADF) Centre for Defence and Strategic Studies in Canberra. He is an alumnus of the Asia-Pacific Center for Security Studies in Honolulu and is currently also a member of the Editorial Review Board of the *Australian Journal of Defence and Strategic Studies*.

Dr Lance Beath is the RNZN Residential Nelsonian Fellow. He is a Senior Fellow at Victoria University of Wellington's (VUW) Centre for Strategic Studies and was Convenor of VUW's School of Government post graduate Strategic Studies Programme 2004–2012. Lance co-edited the NZDF *Maritime Doctrine* published in 2019. He is the General Editor of the *Journal* and Advisor to the Editorial Review Board.



EDITORIAL

‘Let a hundred flowers bloom; a hundred schools of thought contend’

From a speech by Chairman Mao Zedong published 27 February 1957: *On the Correct Handling of Contradictions Among the People*.

It is a pleasure to write this first editorial as General Editor for the inaugural issue of the Royal New Zealand Navy’s new professional journal. And yes, before you start a letter writing campaign to point out the obvious, I do know that the Great Helmsman’s ill-fated attempt to wake up the Chinese population did not end well. Especially for Chinese intellectuals. So perhaps, given that the Navy does not operate on quite the same scale as the Chinese populace, we do not need a hundred competing schools of thought. One or two perhaps, even three or four, but possibly not quite a hundred.

The Navy’s aim in publishing this journal is two-fold. First, the Navy wishes to use the *Journal* as a means of building the professionalism of the service by providing a safe place for the development of critical and well-informed thinking. Second, the Navy looks to the *Journal* to engage and exchange views with all those who have an interest in naval and maritime affairs, or in security and defence matters more generally.

To accomplish these aims, the *Journal* will be outward looking and inclusive in its approach to the development of content. I hope to be able to include a wide array of original material from New Zealand as well as overseas writers and commentators in future issues.

I hope that there will be room in these pages to encourage debate and discussion of all matters relating to the Navy and its sister services, the other agencies with which it works, and all individuals interested in naval and maritime affairs,

It is a special pleasure to acknowledge a number of people who have helped me generously with their time and encouragement in the production of this first issue. Within Naval Staff I wish to single out Commander Des Tiller, Russell Martin and Gail Carlson for their friendship and support during the long weeks of Covid-19 lockdown and afterwards, when it was not always clear how we were going to produce and edit the journal amidst all the disruption of the pandemic. I need to thank Captain Andrew Watts and Rear Admiral John Martin for their special support and friendship, and the members of the Editorial Review Board, chaired by Commodore Melissa Ross, for their constant encouragement, good humour and help. My thanks also to Dr Rory Paddock and W/O John Phillips at Command and Staff College who gave me much early help in locating material for publication and sharing their professional knowledge and experience of journal production. Also to Paul Clemence and Cushla Lippitt at the New Zealand Defence Force Command and Staff College library for their help and friendship.

It would be a serious omission if I did not record the early enthusiasm for the concept of a journal that one of Captain Brendon Oakley’s essays sparked amongst senior members of Naval Staff. Brendon had been studying at the US Naval War College in Rhode Island. Rear Admiral Jim Gilmour and Commodores Mat Williams, Tony Millar and Melissa Ross all read Brendon’s essay and agreed that there needed to be a journal to capture the work of selected officers attending advanced staff courses, and for others wishing to write on naval and maritime affairs.

I am grateful to them for their vision and support, and also to Rear Admiral David Proctor, Chief of Navy, for his strong support and early endorsement of the *Journal*.

I must also thank all those who have willingly volunteered their work for the *Journal* and who have put up with the cramped and often insistent demands of editing and publication I have needed to impose on them. It has been a special pleasure and professionally very rewarding to work with all of you.

Particular thanks to Commander Andrew Dowling and Captain Simon Griffiths for taking on the challenge at very short notice of preparing the Book Review pages. This is to be a regular feature that I expect will be amongst the most sought-after aspects of the *Journal*.

Finally, I must also thank and acknowledge the special assistance that Craig Pitman and Emily Brill-Holland of the RNZAF Publications, Information and Drawing Support team have given me throughout. It is their expertise that has given the *Journal* its distinctive design and professional appearance. I am proud to claim their friendship, and to have had the benefit of their advice, their professional help and their design and publishing expertise.

Naturally, any faults that remain are entirely my own responsibility. I look forward to welcoming all of you to the next issue of the *Journal*. And I especially welcome any comments you may have on this first issue. I will of course be introducing a Letters to the Editor column, and there will also be a separate Commentary section for those wishing to take issue with, support or simply add a line or two of your own thoughts on the various issues that have been debated in these pages.

Lance Beath
General Editor

LANDFALL IN UNKNOWN SEAS

Allen Curnow¹

I

Simply by sailing in a new direction
You could enlarge the world.

You picked your captain,
Keen on discoveries, tough enough to make them,
Whatever vessels could be spared from other
More urgent service for a year's adventure;
Took stock of the more probable conjectures
About the Unknown to be traversed, all
Guesses at golden coasts and tales of monsters
To be digested into plain instructions
For likely and unlikely situations...

There, where your Indies had already sprinkled
Their tribes like ocean rains, you aimed your voyage;
Like them invoked your God, gave seas to history
And islands to new hazardous tomorrows.

II

Always to islanders danger
Is what comes over the sea;
Over the yellow sands and the clear
Shallows, the dull filament
Flickers, the blood of strangers:
Death discovered the Sailor
O in a flash, in a flat calm,
A clash of boats in the bay
And the day marred by murder...

III

But now there are no more islands to be found
And the eye scans risky horizons of its own
In unsettled weather, and murmurs of the drowned
Haunt their unfamiliar beaches —
Who navigates us towards what unknown

But not improbable provinces? Who reaches
A future down for us from the high shelf
Of spiritual daring?

¹ Allen Curnow (1911-2001). Extracts from a poem commissioned by the New Zealand Government to mark the 300th anniversary of Abel Janszoon Tasman's voyage to New Zealand. Tasman was the first known European explorer to reach the shores of the country that he named New Zealand, arriving some 12-16 generations after the first of the great Māori migrations of 1200-1300 AD. His ship's log recorded his sighting 'a great land uplifted high' on 13 December 1642. It was the West Coast of the South Island. In the same year that Tasman sighted New Zealand, civil war broke out in England between Parliament and the Crown; all theatres in England were closed by order of the Puritans; Rembrandt finished his painting of the Night Watch; Galileo Galilei died; Isaac Newton was born; and the Portuguese ceded the Gold Coast of Africa to the Dutch.

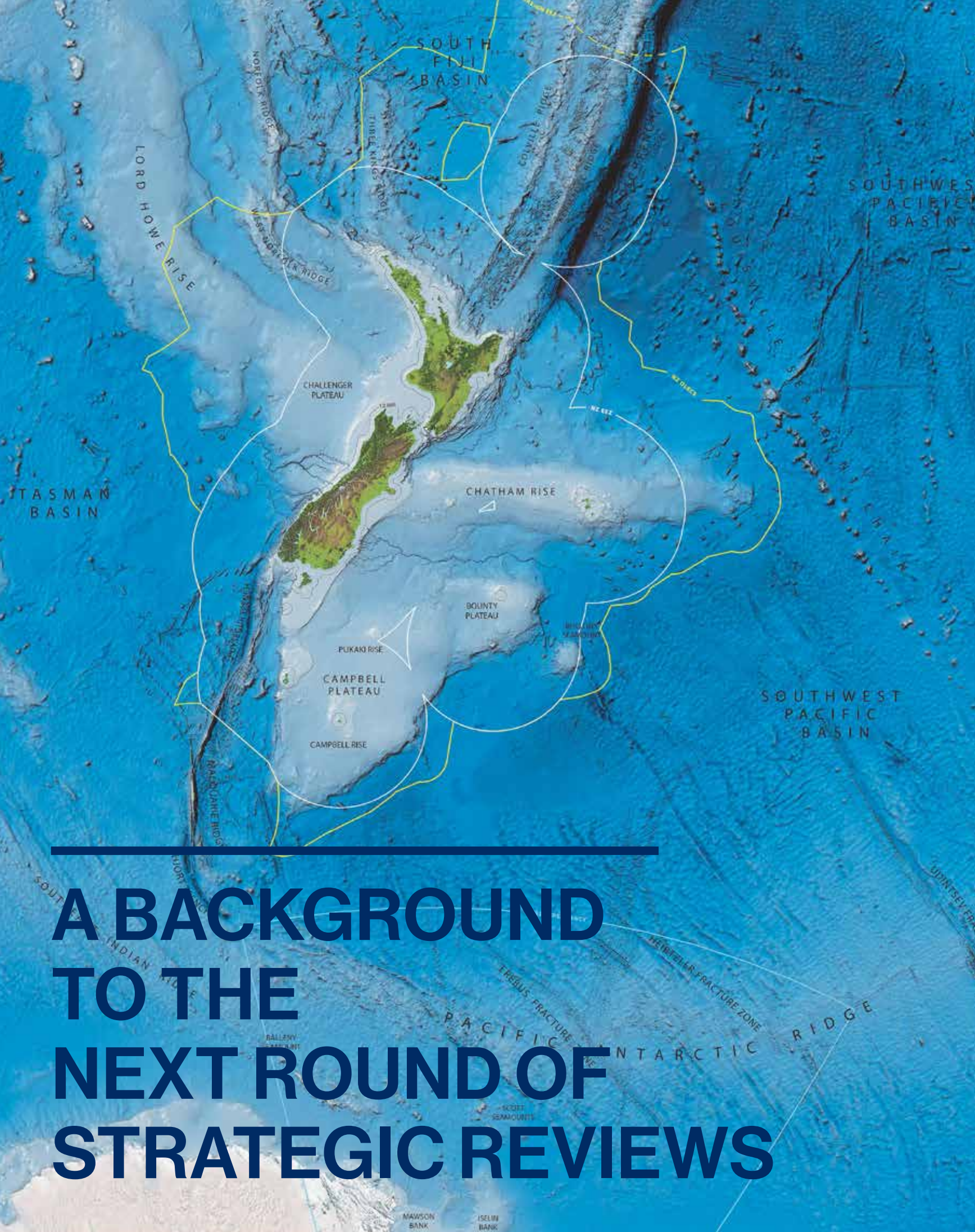
Ka tahuna te ururua ki te ahi, e kore e tūmau tonu ki te wāhi i tahuna atu ai; kāore, ka kā katoa te pārae.

When the bush is set on fire, the flames will not remain there in the dry brushwood; no, they will spread right over the plains.

The Raupō: Book of Māori Proverbs. A E Brougham & A W Reed, revised by Timoti Kāretu (1987). Reed Publishing (NZ) Ltd. 5th edition Penguin Group (NZ) 2012.

DISCLAIMER

The views and opinions expressed or implied within the *Professional Journal of the Royal New Zealand Navy* are those of the authors and do not necessarily reflect those of the Royal New Zealand Navy or the New Zealand Government.



A BACKGROUND TO THE NEXT ROUND OF STRATEGIC REVIEWS

This article by Commander Des Tiller backgrounds the next round of strategic reviews for Defence. These reviews include a new Defence Assessment, now underway, and the possibility of a new Defence White Paper.

The Defence Assessment surveys changes in New Zealand's strategic security setting and discusses implications for future defence policy. A new Defence White Paper will provide a range of defence and security policy options for government and, amongst other things, discuss and confirm the maritime capabilities and funding levels needed to deliver the Government's policy objectives.

Introduction

This article backgrounds a range of current challenges that are being considered by the Royal New Zealand Navy (RNZN) and which are relevant in the context of the strategic reviews now underway.

The challenges facing the Navy include fleet renewal,

personnel numbers, future base location issues, sustainability¹, resilience², the security of supply lines and the ability to provide a range of national security and combat options for government, including force protection for deploying land and special force elements by sea.

These are amongst the many factors that the Navy will take into account as it works with the Ministry of Defence (MoD) to define and generate the capabilities required to meet the government's defence and national security policy objectives.

Backgrounding these strategic reviews is the historic shift in the epicentre of global great power competition from Europe and the Middle East to the Asia Pacific. With US and Chinese competition for influence increasing, tension is mounting in and around New Zealand's immediate areas of interest. Many commentators are pointing to an increase in Chinese influence, principally in the maritime domain, and a perceived waning in physical presence by the US in the

Southwest Pacific as it focuses more on persistent presence in the South China Sea and Northern Asia.

Also relevant are increasing maritime resource pressures in the region, amplified by the effects of climate change, the current global pandemic, and pressure for resources to support rising national demands. The principal challenge is assessing what these factors may mean for procuring and maintaining the maritime capabilities that New Zealand will need if it is to respond swiftly and adequately to a deteriorating strategic security environment.

The role of Defence Assessments

Defence Assessments are undertaken by the MoD working with the New Zealand Defence Force (NZDF) and other agencies. The Defence Assessment assesses changes in the strategic environment and implications for New Zealand's defence policy settings.

¹ Sustainability is the ability to maintain and deliver maritime capabilities over the extended timeframes required of Defence Force assets (30 years plus).

² Resilience is the ability to maintain and generate capability in the face of the unexpected. Examples include the COVID-19 pandemic, natural disasters including severe weather events, terrorist and other hostile actions including cyber attacks and other events that are inherently difficult to plan and provide for in advance.

LEFT
New Zealand
Marine Realm.
Image supplied
courtesy of NIWA.

Defence Assessments also consider major strategic trends as well as emerging threats and issues that could affect New Zealand's national security interests. Additionally, they provide Government with broad advice on options to achieve the Government's defence policy goals.

Defence Assessments are conducted approximately every five years³ and generally precede the development of a Defence White Paper. Preparing Defence Assessments and Defence White Papers on a regular basis helps to ensure that the NZDF is able to keep pace with, and respond to, changes in the security environment. The last Defence Assessment was completed in 2014 and the most recent Defence White Paper in 2016.

Defence White Papers

Defence White Papers set out the Government's defence policy objectives in the light of the most recent Defence Assessment. They contain options for how the Defence Force should be structured and equipped to deliver these objectives and Government decisions on the broad funding levels that will be made available in order to meet these options.

The Government's Defence Capability Plan 2019

While capability issues are discussed in both Defence Assessments and Defence White Papers, the New Zealand practice in recent years has been to examine detailed capability requirements and funding implications in a series of follow-on reviews. The most recent of these capability

³ Ministry of Defence, *Statement of Intent 2020-2024*.

reviews is contained in a Defence Capability Plan (DCP) published in June 2019.⁴ The DCP sets out the Government's plans for investment in Defence capability out to 2030 along with an indication of potential investments in the period after 2030.

The DCP 2019 maintains the indicative \$20 billion in capital investment in Defence to 2030 first signalled in the 2016 Defence White Paper. It is the result of extensive consultation between MoD, the NZDF, Treasury and a range of other government agencies. It is the means by which the Defence organisations, working together, will implement the Government's *Strategic Defence Policy Statement 2018* and the Pacific Reset.

⁴ Ministry of Defence, *Defence Capability Plan 2019*.



RIGHT
An outline of the maritime capabilities set out in the *Defence Capability Plan 2019*.

BELOW
Defence Capability Plan 2019.

MARITIME CAPABILITY PROJECTS

The following are the maritime projects planned and due for delivery between now and 2032:

- Patrol and Sealift Communication Upgrades \$25–\$50 million (by 2022);
- Anzac class ships communication upgrades to support interoperability with allies and other NZDF force elements including the P-8A Poseidon and the Network Enabled Army \$50–\$100 million (by 2024);
- A new Southern Ocean Patrol Vessel \$300–\$600 million (in service by 2027);
- Enhanced Sealift Capability \$1 billion plus (by 2029);
- Maritime Helicopter replacement project \$1 billion plus (by 2028); and
- Offshore Patrol Vessel (OPV) replacements \$600 million–\$1 billion (by 2032).

Maritime capabilities due for review before the next Defence White Paper include:

- The future surface combatants to replace the Anzac frigates;
- Additional and enhanced sealift capability (to replace *Canterbury*);
- Dive and hydrographic capability (to replace *Manawanui*);
- Littoral Warfare Systems to support *Manawanui* and its replacement;
- Upgrade to Phalanx CIWS and ship-launched torpedoes on the Anzac frigates;
- Upgrades to the current fleet of SH-2G(I) Seasprite helicopters to keep them in service until they can be replaced;
- Upgrades to the machinery spaces, navigation and other capabilities on the OPVs;
- Enhanced Maritime Awareness Capability (may include maritime satellite surveillance, Unmanned Aerial Vehicles (UAV) and fixed wing assets);
- P-8A Poseidon upgrades;
- Long Endurance Unmanned Aerial Vehicles (UAVs);
- Electronic Warfare Capability upgrades; and
- Replacement of the Defence High Frequency Radio Network.

Maritime capabilities

An outline of the maritime capabilities contained in the DCP, for decision and delivery by 2030, is set out above. Also included is a list of maritime capabilities foreshadowed in the Defence Capability Plan for review before the next Defence White Paper (i.e. before 2022, based on current planning). This includes the major set of issues surrounding fleet renewal, including the question of future replacements for the Anzac class frigates.

These capabilities are the means by which the Navy works to meet the issues mentioned earlier including fleet renewal, sustainability, resilience, the security of supply lines, national security

and combat options and force protection for deploying land and special force elements. It is important to note that the capabilities identified and the proposed funding level of \$20 billion for capital investments out to 2030 are both indicative. Each investment is subject to the completion of detailed business cases and the availability of capital through the normal budget processes.

Other reviews

In addition to major Defence Assessments, the MoD has instituted a practice of regular annual reviews of the New Zealand strategic environment and a series of more specialised reviews that examine individual topics.

Examples of these reviews include the *Strategic Defence Policy Statement 2018*; a series of Climate Change Reviews, an assessment of the *Changing Character of Peacekeeping* and a policy review titled *Advancing Pacific Partnerships*.

Resilience

The recently released 2019 Treasury Baseline Review of Defence highlights a range of issues arising from multiple defence transformation and resizing programmes. One of those programmes included the civilianisation of the NZDF's workforce in response to the recommendations made by the 2010 Value for Money Review. The result of the civilianisation programme was reduced numbers of military personnel in the mid-level ranks, both at officer and rating levels.

The net result has been the need to optimally balance the delivery of operations with the need to regenerate upgraded and new capabilities as they are introduced into service.

The Defence Capability Plan 2019 identified the need for a Future Force Study to

explore the options for a more cost-effective, sustainable and future-proofed naval force structure for the 21st century. A study like this will investigate options to deliver a credible combat force that provides more resilience and a greater range of response options across the spectrum of naval and maritime national security and combat operations for government.

New Zealand's strategic environment: a maritime perspective

The ocean is the primary medium on which the vast majority of the nation's goods, imports and exports are carried to and from New Zealand by internationally owned container-carrying vessels operating to very tight schedules. The value of this cargo is immense. More than 90% of New Zealand's trade in goods by value and 99% by volume is transported in ships (over 5,000 visits to 14 commercial ports in 2017⁵). Every year 49 million tonnes of imports and exports worth \$138 billion is exchanged

⁵ Statistics New Zealand publishes New Zealand's trade statistics based on exporter and importer documentation processed through New Zealand Customs. There is a substantial lag in the statistics. 2017 is the most recent year for which figures are available.

RIGHT
The key challenges facing New Zealand from a maritime perspective over the period 2020-2050.

through New Zealand ports. New Zealand's trade, with some 240 nations and territories, accounts for 60% of its total economic activity. China alone makes up \$23 billion of that trade, which has tripled in the past decade. Any disruption to shipping would have the most serious consequences for the national economy.

New Zealand is dependent on an international rules-based order in which the interests of all countries are protected by collective agreement and action. It is critical that maritime states like New Zealand recognise the dependency of the global system of commerce on the free movement of shipping. The protection of this system is beyond the abilities of any one state. It can only be achieved by the combination

of all the instruments of states working together, including law, diplomacy, policing and the application of military power where necessary. As a maritime state critically dependent on the smooth operation of globalised trade, we have to be prepared to contribute to that effort in a manner which reflects its importance to New Zealand's national interests.

Key challenges

World population is projected to increase from 7.7 billion currently to 9.7 billion by 2050, and nearly 11 billion by 2100.⁶ Global demand for energy, food and water will increase significantly along with population growth, rising living standards and levels of consumption. This demand,

⁶ United Nations, "Growing at a slower pace".

KEY MARITIME CHALLENGES FACING NEW ZEALAND 2020-2050

- The **international security environment** is becoming more uncertain, and arguably more dangerous, in the face of increasing Great Power Competition.
- Over the last 30 years, the centre for potential **Great Power Competition** has shifted decisively from Europe and the Middle East to the Asia Pacific; confrontation and conflict, should it happen, is likely to be **maritime** rather than land-centric in character.
- **Maritime security** is fundamental to the New Zealand economy and way of life: much of the pressure being felt in the Asia Pacific region is maritime in nature.
- **Growth in world population** will place increasing pressure on maritime resources: food, water, energy, metals and minerals. This pressure is exacerbated by rising living standards and consumption levels amongst Asia's growing middle classes, falling agricultural productivity on land and large-scale refugee movements driven by climate change.
- The search for **new maritime resources** to meet increasing demand will lead to greater pressure on the Exclusive Economic Zones (EEZ) and continental shelves of South Pacific island states and metropolitans, leading to a potential breakdown in the United Nations Convention on the Law of the Sea (UNCLOS) and the International Seabed Authority (ISA).
- The **Antarctic Treaty System** and the **Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR)** are likely to come under increasing international pressure to relax existing prohibitions against the exploration and exploitation of **Ross Sea** and **Antarctic mineral and living marine resources**.
- **Pacific Island** countries are facing increasing pressures from wolf-warrior diplomacy, transnational crime, drug and people trafficking, climate change effects and rising levels of youth unemployment.
- **COVID-19** is placing increasing pressure on South Pacific health systems and resources as well as disrupting economic activity and government revenues associated with international tourism.
- **Great Power Competition** and state sponsored attacks on the international rule of law and western based values and norms, principally in the **maritime domain**, are increasing the threat of state on state conflict over the resources of the sea, deep sea and seabed as well as EEZ and continental shelf resources.

BELOW
A selection of reviews that examine individual topics.



alongside potentially static or falling agriculture productivity due to issues like climate change, may lead to increasing competition between powers for resources like energy, minerals and metals, protein, and water. This, in turn, may lead to nations attempting to explore and exploit the relatively untapped marine resources of our own region: the South Pacific Ocean and Antarctica.

By 2030, Asia is expected to have surpassed North America and Europe combined in terms of global power, military spending and technological investment. From a naval perspective, demands are changing. Great Power Competition has returned, as have state sponsored threats to the rule of law at sea. If superpower conflict results, it

is most likely to play out in the Asia Pacific maritime region.

The response

The RNZN's capacity to respond to these challenges is under increased pressure for a variety of reasons. Some of these have been highlighted in last year's baseline review of the Defence Force. The Treasury report identifies a number of areas of current concern including increased pressures on operating funding, personnel costs, maintenance and repair costs, and underinvestment in infrastructure. Additionally, it highlights what it calls a number of areas of current concern including increased pressures on operating funding, personnel costs,

NEW ZEALAND'S MARITIME RESPONSE

- When the accepted rules of law and good order at sea are under pressure, or directly challenged, New Zealand's ability to support and preserve the freedom of the high seas and sea lines of communication ultimately depends upon its maritime and naval capabilities.
- With a number of major maritime defence assets due for replacement in the 2020s and 2030s, this has significant implications for New Zealand's capacity to sustain and respond to growing pressures in the international system.
- The maritime capabilities required include those identified in the *Defence Capability Plan 2019* for investment in the period up to 2030 and those which are to be reviewed before the next Defence White Paper (currently scheduled for 2022).
 - These capabilities include major fleet assets for the Navy; enhanced maritime awareness for the Airforce, including planned upgrades for the Poseidon P-8A aircraft; the communication assets, knowledge and training required for a Networked Enabled Army to operate effectively in a combined arms maritime setting; and, for Defence, enhanced electronic warfare, cyber assets and a replacement High Frequency Radio network.
- An increasingly important part of New Zealand's response will be the investment required to improve detailed knowledge of its own maritime resources including the resources of the EEZ, the continental shelf and the contiguous areas beyond the continental shelf.
- New Zealand will need to continue assisting the small island states of the Pacific in the regulation of fishing and the development of laws and regulations to govern the deep sea mining of minerals and metals needed as a result of the international movement toward lower carbon energy systems.
- New Zealand will need to develop its capacity to contribute to international collective efforts to support and preserve the international rule of law including UNCLOS, CCAMLR and the Antarctic Treaty system.

maintenance and repair costs, and underinvestment in infrastructure. Treasury's report on the baseline review highlights what it calls '*the difficulty of reconciling fixed defence policy and funding settings with dynamic changes in NZDF's costs and operating model*' and suggests that one option for Ministers, other than additional funding, may be to revisit policy settings.⁷

Other pressures on the Navy are new, notably the impact of COVID-19 on balancing the delivery of operations, which includes protecting New Zealand's borders, with the need to regenerate upgraded and new capabilities as they are introduced into service. In addition, the inability to source a variety of the key international skills and equipment required to bring ships into service for operations is also affecting availability, as are restrictions on the movements of key personnel.

Regional engagement

Traditionally, the RNZN conducts a programme of regional engagement visits coordinated through the Ministry of Foreign Affairs and Trade. The Navy plays a key supporting role in New Zealand's diplomatic efforts and this is facilitated through defence diplomacy visits by Navy vessels to foreign ports. However, COVID-19 has seen a significant reduction in physical visits by senior leaders, ships and aircraft, and this is at a time when such visits are seen as being all the more necessary as a result of current uncertainties in the region.

LEFT
A summary of how the Navy sees its response to current challenges.

Conclusion

The RNZN will continue to work with the MoD to develop New Zealand's defence capability and responses to current and future regional and global challenges. In doing so we will not go far wrong if we remember the basic fact of our geography: that we are a maritime nation with two great seafaring heritages to preserve and build upon. And also our history. In both World Wars we lost ships in our own waters to enemy action. It follows that war and conflict is not something that is necessarily fought in distant places or in defending other countries' interests. Kippenberger once observed that the approaches to New Zealand begin in the Middle East. No doubt he was thinking of his own wartime experiences in Egypt, Syria, Greece and Crete. But since then a historic shift has taken place. Our geography has shrunk as the world has become more connected and more globalised. The epicentre of possible conflict has shifted from Europe and the Middle East to the Asia Pacific. Our approaches, wherever it is that they may start, finish by being conclusively maritime in nature. As we think about the Navy's role in the strategic reviews and the capabilities that we need to be working toward, the maritime nature of our approaches and dependency on open sea lines of communication for ongoing economic prosperity are facts that we should hang on to.



COMMANDER DES TILLER RNZN
ASSISTANT CHIEF OF NAVY (STRATEGY AND ENGAGEMENT)

In his current role, Des is the principal advisor to the Chief of Navy on naval strategy and engagement matters. The role is responsible for the leadership and oversight of the strategic direction of the Navy, including executive reporting, policy and change management.

His previous roles included Project Manager and Design Manager for the procurement of HMNZS *Aotearoa*. The new naval tanker will support a full range of NZDF deployments, including maritime sustainment and humanitarian and disaster relief operations. Additionally, the ship incorporates ice-strengthening and winterisation features to support the delivery of specialised Antarctic fuel and containerised scientific material and supplies to McMurdo Sound.

During his career, Des has served on a number of operations, including Operation Enduring Freedom (1995 and 2002), in the Solomon Islands on Operation Purple Haze (2000), and was awarded a Deputy Chief of Navy Commendation.

Des is married to Treena, and they have two adult children, Dylan and Demi. He enjoys motorcycling, rugby, sailing and a good glass of red wine.

⁷ The Treasury New Zealand, "Budget 2020 Information Release: July 2020".

DESIGNING THE NEXT FLEET

In this special feature article for the RNZN's new Professional Journal, Captain Andrew Watts RNZNR argues that new technologies and doctrines are combining to give the Navy an unprecedented opportunity to design a coherent, affordable and sustainable fleet of ships to take the Navy into the future.

Timeframes are pressing. The thinking and design processes for fleet renewal should start now

Dependence on sea-borne trade is the dominating fact of New Zealand's economic life

IMAGE

HMNZS *Te Kaha* before the Frigate Systems Upgrade (FSU) programme. Image courtesy of NZDF.

Introduction

Our navy is facing an unprecedented period of transition. Most of the ships in our existing fleet will wear out over a very short time frame in the early 2030s, and we are beginning the process of acquiring yet more diversity in capability with the Southern Ocean Patrol Vessel (SOPV)¹ and a new amphibious ship. We have an opportunity to put in place a coherent, affordable and sustainable fleet should we choose to fully exploit new technologies and doctrines, but time frames are such that we must start thinking about them now. This paper describes the fleet re-capitalisation opportunity with a view to stimulating further discussion, particularly amongst naval practitioners, New Zealand Defence Force (NZDF) capability staffs across all domains, and Ministry of Defence officials who will be confronted with the fleet re-capitalisation problem over the next two to three years.

Dependence on trade

Our dependence on sea borne trade is the dominating fact of New Zealand economic life, but the freedom of the

seas² on which this depends is neither a permanent nor a natural state of affairs. Piracy still manifests itself wherever the means and the will to defend peaceful trade against it are absent. Drugs, weapons, and people are trafficked by sea in huge quantities with de-stabilising effects on fragile systems of governance. Some of the fundamental principles underpinning the Law of the Sea are being directly challenged by nation states—China's actions in the South China Sea are by no means the only example. Challenges to the rule of law at sea may generally arise in areas remote from New Zealand, but every break down de-stabilises our rules-based order on which our security and prosperity depend. One of the enduring constants in New Zealand defence policy is that as a direct beneficiary of the rule of law at sea, we have a direct stake in the collective effort to protect it.

Exclusive Economic Zone

Coupled with this, our Exclusive Economic Zone is one of the largest in the world. The resources it contains must be protected, both for

¹ The SOPV will be designed and equipped to operate in the ice, sea state and temperature conditions typical of the Southern Ocean and Antarctic region, carrying out a wide range of scientific and security missions.

² The enormous burden borne by the United States Navy in maintaining the freedom of the seas must be acknowledged. It dwarfs the contribution of every other democratic nation.

New Zealand's protection by geography will not be permanent. Threats are mounting and technologies developing

the good of our economy and to preserve the eco-systems on which future generations will depend. Our borders are protected by the thousands of miles of ocean that surround them, but this protection will not be permanent as threats mount and technologies develop. We have constitutional responsibilities for the defence of some of our Pacific partner nations and familial ties with others which make their security interests inseparable from our own. We must be able to project and support our land and special forces when they are deployed. That these drivers for maritime defence capability exist is not contentious. Without identifying specific levels of capability (and investment), this paper discusses strategies for addressing our maritime defence capability needs, and the opportunities which underpin those strategies.

Designing a force structure (not replacing ships)

This paper is based on the premise that “like for like” replacement of the current fleet should not be the default force structure option. Fleet re-capitalisation must be based on a unified, top-down view of operational requirements, informed by technological and doctrinal opportunity and by affordability in acquisition and through-life sustainment. We must design a fleet, not replace ships, and the very short time frame in which most of our ships wear out gives us an opportunity to do so.

Force structure transitions...the history behind the present fleet

Our first force structure was established immediately after the Second World War, when a navy suited to New Zealand's needs had to be designed from scratch. The choices made were excellent; six nearly new Loch class frigates, the best Anti-submarine Warfare (ASW) ships in the world at the time, were acquired from Britain, followed by two relatively modern light cruisers. Although these ships spent a high proportion of their service lives in reserve, this credible, balanced force gave government a range of options for contributing to the type of operation most likely at the time—large allied coalitions based on operational frameworks provided by the US and Britain.

The first transition occurred when the war-built Loch class frigates and Improved Dido class cruisers ran out of service life in the early to mid-60s. The new generation of ASW frigates then being acquired by the Royal Navy (RN), Royal Australian Navy (RAN) and Royal Canadian Navy (RCN) offered an affordable means of contributing to wider allied efforts to balance Soviet naval expansion, while capitalising on the expertise in frigate operations that had been built up since the Second World War.³ The Type 12 ASW frigates HMNZ Ships *Otago* and *Taranaki* were commissioned

³ Many European and some Asian countries have since established maritime defence industries producing modern naval platforms of every type. In the post-war period, choice was effectively limited to ships of US, British, Canadian, or French origin.

Four frigates were maintained by the RNZN into the 90s

in the early 60s, followed by the Improved Type 12 (Leander class) HMNZS *Waikato* in 1966 and HMNZS *Canterbury* in 1971.⁴ Two second-hand Leander class frigates were acquired from the Royal Navy in the early 80s to replace *Otago* and *Taranaki* as a stop-gap measure, and a force of four frigates was thus maintained until the mid-late 90s when first *Southland* and then *Waikato* reached the end of their service lives.

The second transition began in the late 90s and continued until the Protector fleet became fully operational in 2010. It could be described as the outcome of a collision between two separate streams of thought concerning defence and security. Following a great deal of public and political controversy, the Palmer Labour government signed a treaty with Australia in 1989 for the supply of two Anzac class frigates with an option for two more to be exercised by 1997. In the event, the Bolger National government allowed the option to lapse, despite the intention to maintain a three-ship naval combat force expressed in the 1997 Defence White Paper and the increasing ages of the last two Leander class frigates, HMNZ Ships *Wellington* and *Canterbury*. Attempts made to re-litigate this decision became academic with the election of the Clark Labour government in 1999. It brought with it a very different view of New Zealand's security needs culminating in Project Protector, which

Project Protector delivered seven new ships...leaving the Royal New Zealand Navy with twelve ships of seven different classes...creating an enormous sustainment challenge

⁴ On the decommissioning of the last cruiser, HMNZS *Royalist*, in 1966, the Type 12 frigate HMNZS *Blackpool* was acquired on loan from the Royal Navy and returned when *Canterbury* was commissioned.

delivered seven ships with patrol and sealift capabilities. With the commissioning of the final Protector ship in 2010, the RNZN was left with a heterogenous fleet of 12 ships of seven different classes. That number now stands at 10 ships of six different classes. Even allowing for shortfalls in availability brought about by work force attrition and delays in upgrade programmes, the fact that we have been able to remain viable in the face of such diversity speaks volumes for the dedication and flexibility of people at all levels of our organisation.

The third transition is now upon us, and it brings with it force structure design challenges greater than any in our history to date. Every ship in the current fleet except HMNZS *Aotearoa* will reach the end of its projected service life in a very short time frame—by some calculations, between 2032 and 2035.⁵ In addition, a project is underway to acquire yet another distinctive ship type in the SOPV, and the *Defence Capability Plan 2019* (DCP 19) includes a new type of amphibious ship.⁶ Both SOPV and the new amphibious ship are projected to reach Initial Operational Release before 2029. We are therefore confronted with both unprecedented block obsolescence and the addition of two new ship types to a fleet that many would argue is already diverse beyond the point of sustainability.

⁵ On the one hand, this estimate assumes service lives for some ships that have yet to be subjected to detailed assessment of service life remaining. On the other hand, readers will be aware that some ships in our current fleet are already difficult to maintain.

⁶ The exemplar capability used in DCP 19 is the Amphibious Transport Dock, or LPD under the North Atlantic Treaty Organization (NATO) ship designation system.

The third transition is now upon us, bringing with it greater force structure design challenges than any in our history

The RNZN will soon be confronted by unprecedented block obsolescence AND the addition of two new ship types to a fleet that may already be diverse beyond the point of sustainability

But this is not an insoluble problem... we have the opportunity to design an affordable force structure that meets our long-term maritime defence needs

Affordability is not necessarily achieved by paying the lowest possible acquisition price...it requires sensible strategies that address both acquisition AND the management of investment in ships and systems over their service lives

This is not an insoluble problem. Rather, it presents us with an opportunity to lift our sights beyond like for like replacement and design an affordable force structure that meets our country's long-term maritime defence needs.

Affordability

Affordability is crucial and extends beyond the acquisition cost of new capability. It includes our ability to sustain our force structure over time so that it remains available for operations and adapted to evolving strategic and operational needs. Affordability is also the ability to raise and sustain a viable work force, with all that that entails.

Affordability is about how much is paid for a product or service, but it is not necessarily achieved by paying the lowest possible acquisition price. Over time, it is more likely to be brought about by sensible strategies that address both acquisition and sustainment, and by sound processes

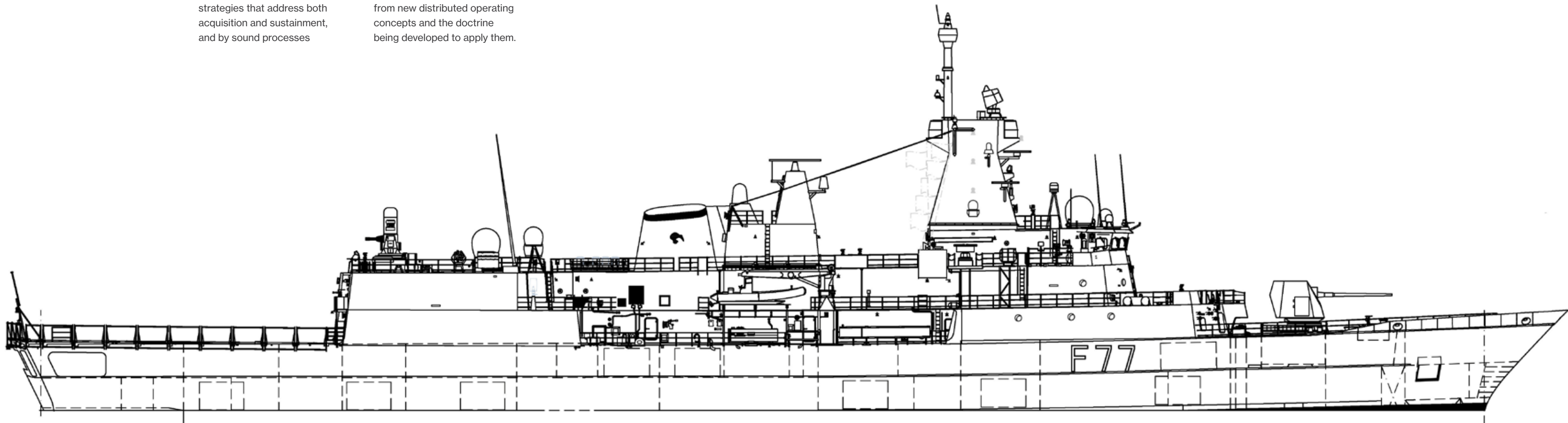
for managing investment in ships and systems over the course of their projected service lives. Above all, an investment decision taken on the grounds of cost that does not deliver the outcome sought by the investment cannot be considered affordable just because it can be achieved within a pre-set fiscal envelope. This principle is applied throughout the Capability Management System: whether a given solution will meet the requirement identified in the Strategic Case is tested at key points in the project life cycle. The same principle that the Capability Management System applies to projects must be applied to the design of our naval force structure as a whole.

The opportunity

The opportunity for our Navy is enabled by four emerging trends. Three are technological; the fourth derives from new distributed operating concepts and the doctrine being developed to apply them.

RIGHT
HMNZS *Te Kaha*:
the first of the
Anzac class frigates
to receive a Frigate
Systems Upgrade.
Image courtesy of
Canadian Defence
Public Affairs.

BELOW
Frigate Systems
Upgrade. *Te Kaha*
is now fitted with
open computing
architecture supplied
by Lockheed Martin
Canada: the CMS 330
Combat Management
System. Image
courtesy of NZDF.



The technological opportunities derive from accelerating trends in the development and adoption of open computing architectures; “modularity” in the conceptualisation of ship design; and remote and autonomous systems. The doctrinal opportunity arises because even very large navies recognise that the cost of traditional multi-function surface combatants makes it impossible to acquire sufficient numbers to address the threats posed by both peer and non-peer competitors; doctrine is being developed to address this reality. Each of these four factors is addressed below.

Open computing architectures

The application of digital computing technology to defence problems began in the 1950s. Early generations of computer-based mission systems were based on hardware and software tailored to a specific purpose, a combination of weapons and sensors, and installation.

ADAWS (fitted to HMNZS *Southland*) and NAUTIS (fitted to HMNZ Ships *Wellington* and *Canterbury*) represented huge advances over the manual capabilities that they replaced, but over time they became difficult to support and then obsolete because they could not be iteratively upgraded to any meaningful degree. They also had unique user interfaces which required time and practise for operators to become fully proficient. This process had to be repeated when operators were posted to a ship with a different system. Although the NAUTIS system fitted to *Wellington* and *Canterbury* was menu-based, operators posted to those ships who were used to the ADAWS

system fitted in *Southland* created an ADAWS type manual injection guide to help them adapt.

For some time, naval mission systems such as Combat Management Systems (CMS) have been based on open architecture software. It should be noted that there is a big difference between the terms “open architecture” and “open standards”, and the two are sometimes confused. Systems based on the latter can be maintained and enhanced by the user (such as, by the development of specific applications) without reference to the originator of the software, because the standards on which it is based are freely available. Naval systems, whilst now almost invariably open architecture, are generally proprietary, which means that the originator or “owner” controls the means by which they are upgraded and enhanced.

Large navies tend to seek control over software architecture configuration and development, which means having to pay the originator of the software very large sums of money, as the originators not unnaturally seek to recoup the cost of developing the software. Smaller navies like ours are probably better served by licensing agreements which leave software configuration control and development in the hands of the originator, as we are unlikely to be able to afford the in-house software management capability needed to “own” these functions even if we are able to afford access to source code (although a possible alternative is a cost sharing partnership with a larger navy). Regardless of the way in which it is controlled and by whom, an open architecture computing system is designed in such a way that it can be

maintained and upgraded over time almost indefinitely. As the software evolves to incorporate new capabilities or address new threats, hardware including processors (based on standard commercial hardware) can be iteratively replaced to provide the greater processing power required by a new software edition or new functionality. As new weapons and sensors are developed, an open architecture CMS can be integrated with them with relative ease. The RNZN has moved into this era with the Lockheed Martin Canada CMS 330 system being installed in the Anzac class frigates, but the best example is possibly the US Aegis system, which has been in service since the early 1980s. It will remain in service in the US and several allied navies for the foreseeable future and is being used as the basis for new generations of scalable CMS being designed for new, smaller combatants.

In addition to CMS, open architectures should be applied to other key software defined naval systems, including Integrated Platform Management Systems, Integrated Bridge Systems and communications control systems, all of which have the same need for ongoing support and development as CMS. Finally, and again crucially, open architecture computing systems can be adapted to a wide range of functions and interfaced with a wide range of physical systems, enabling standardisation across a multi-function fleet. For a navy the size of ours, the advantages thus gained in terms of standardised operator and maintainer interfaces and the rationalisation of supply chains could possibly mean the difference between a fleet (and a work force) that is sustainable in the long term, and one that isn't.

Modularity

The term modularity often creates confusion because it can be applied on different levels. A useful definition of these levels was outlined in a RAND Corporation paper released in 2016⁷:

‘Common modules used across multiple classes of ships. *These common modules are structural pieces of the ship that are built and tested in a factory-like environment. Although not currently adopted in Navy ship designs, potential applications include hotel-like functions such as galleys, medical facilities, and laundries.*

Self-contained modules that provide a plug-and-play capability for the equipment inside the module. *These modules have defined interfaces and boundaries and are designed for a specific task, such as firing a missile. Where common modules can be used across different classes of ships, self-contained modules are typically used within a single class of ships. The vertical launch system (VLS) modules on Arleigh Burke-class destroyers are an example of a self-contained module.*

Modular installations that provide a basic ship structure and services that allow various mission packages to be installed and interchanged as needed.

⁷ John F. Schank et al., *Designing Adaptable Ships: Modularity and Flexibility in Future Ship Designs*, xiii.

Modular installations, like self-contained modules, have defined interfaces but much broader defined boundaries. The U.S. Navy LCS and the Royal Danish Navy's Absalon class ships are examples of this type of modularity.'

In this paper, the term “modularity” is used in the sense of the third definition above, because, as it will hopefully become clear below, that is the level which offers us the greatest opportunity for long term operational viability. However, the second definition above is also relevant, dovetailing with the third. The Mk 41 Vertical Launching System (VLS) fits very neatly with “plug and play” modularity, in that the same basic system is compatible with almost every missile in the US inventory.⁸ A ship fitted with Mk 41 VLS can thus be adapted to different missions by altering the missile load out, and is adaptable for future missions given that future missiles will be designed for compatibility with Mk 41. If a modular platform fitted with Mk 41 were to be “re-roled” from Anti-surface Warfare (ASuW) to ASW by the installation of the necessary mission modules, the Mk 41 missile loadout could be altered to increase the proportion of ASW weapons, such as the US Anti-submarine Rocket (ASROC), to that of anti-ship missiles.

Modularity in the sense used in this paper decouples a ship's platform and “payload” systems. In this conceptualisation, a ship's hull and its core systems for propulsion, electrical power

⁸ Noting that different missiles require different launcher peripheral equipment to provide the necessary interfaces between CMS and missiles in the launcher—not a trivial consideration, but the key point above is valid.

generation, accommodation, cooling, communications and navigation are regarded as a fixed backplane to which a removable payload system tailored to a particular mission and level of capability is added. This is not a new concept. The Royal Danish Navy first deployed the STANFLEX modular system in the 1990s aboard the Flyvefisken class small combatants (54m length overall, 450 tonnes full load). A large, specialised fleet of 20 ships was replaced by 14 that could be adapted (within the limits of their small size) to ASW, ASuW, Mine Counter Measures (MCM) and other roles by the installation of role-specific modules. The platforms are almost identical, although some are fitted with a separate hydraulic propulsion system for MCM operations. Modules are designed to connect with standard container positions aboard the platforms and use standard interfaces to connect with platform systems, including the CMS. The Royal Danish Navy has extended the modularity concept to its Absalon class support ships and Iver Huitfeldt class air defence frigates and plans to replace the Flyvesfisken class with new platforms based on the STANFLEX concept.

Without access to protected sources, it is difficult to determine the extent to which the Royal Danish Navy re-roles the Flyvesfisken class by exchanging one set of mission modules for another, although early publicity suggested that this could be carried out in a matter of days. It may be that those ships with hydraulic secondary propulsion systems

are permanently equipped for MCM. Regardless of the frequency with which the changes actually occur, the STANFLEX concept enables the management of mission system obsolescence to be separated from that of the core platform. Upgrades of the sort currently underway under the Frigate Systems Upgrade project do not require the entire platform to be taken out of service for lengthy, risky and expensive open-heart surgery. An upgrade to an ASW module, for example, can be managed within the module, either by upgrading components in the existing module or by replacing it entirely. If an existing module is being upgraded, it can be removed from the ship for the necessary work to be carried out while the ship remains available for operations that do not require that particular module.

Modularity on some level has now been adopted to varying degrees and in various ways by a number of North Atlantic Treaty Organization (NATO) navies, including the Royal Navy with the Type 26 frigate and the US Navy with the Littoral Combat Ship (LCS).⁹ The latter project has been subject to much public criticism, mainly on value for money grounds, but also because the platform design emphasises very high speed at the expense of other important characteristics such as range and seakeeping. Other anticipated gains, including the need for only a very small core ship's company, have proved illusory in practice. In addition, difficulties and delays have been experienced with mission module technologies, notably the MCM package.

Possibly because of the cost of acquiring and maintaining a large number of mission modules, many of which would not be in use at any one time, the LCS operating concept no longer features regular mission module and role changeouts—ships will be more or less permanently assigned to a particular mission. However, the challenges that have been experienced with LCS should not be linked to the basic concept of modularity. The advantages described above in relation to obsolescence management and role flexibility achieved by de-coupling a platform from the mission systems it carries very much apply to LCS.

They also apply to a concept developed by Damen Shipyards Group known as the “Crossover”. Damen propose a ship that can be reconfigured for combat, patrol, or sealift operations by the addition or removal of various equipments. The space toward the stern that could be occupied by a towed body sonar, for example, could instead be allocated to troops, vehicles, and light landing craft. In a patrol configuration, the space could be occupied by boats for boarding operations, with the stern being configurable for boat launch and recovery as well as towed body sonar deployment.

With Type 26, however, core mission systems are not modular in the sense used in this paper, in that they are coupled to the platform in more or less the traditional sense—although increases in ship size and improvements in design no doubt make system replacement much easier than with older, smaller designs such as the Anzac class.

Type 26 incorporates a large mission bay capable of accommodating extra helicopters, extra boats, autonomous vehicles, or modules based on Twenty-foot Equivalent Unit containers for embarked military forces, medical facilities and the like. Type 26 is without doubt an extremely capable multi-function combatant, and the mission bay provides significant role flexibility. However, the STANFLEX and LCS concepts in which the core mission systems are modularised are closer to the modularity concept which, in conjunction with open computing architectures, could offer an opportunity for an affordable, sustainable and credible force structure for the RNZN.

Remote and autonomous systems

In late 2018, an unmanned 40-metre trimaran named Sea Hunter crossed the Pacific from San Diego to Hawaii and returned. The US Navy has requested \$579m in funding in FY2021 for the development of three large autonomous vehicles—the Large Unmanned Surface Vehicle, the Medium Unmanned Surface Vehicle and the Extra Large Unmanned Undersea Vehicle.¹⁰ Other navies have similar programmes, together with plans for the integration of these vehicles with core force structure. Autonomy is about to become a mainstream maritime defence technology for surface and undersea vehicles, as it already is for aerial vehicles. Autonomous vehicles offer advantages in the maritime space analogous to those offered by the Remotely

Modularity in core mission systems in conjunction with open computing architectures offers the prospect of an affordable, sustainable and functionally credible RNZN force structure



RIGHT
The Damen “Crossover” concept illustrates the increasing trend toward flexibility in combatant design. Images courtesy of Damen.

⁹ David Manley, “The NATO Drive to Mission Modularity”.

¹⁰ O’Rourke, *Navy Force Structure and Shipbuilding Plans: Background and Issues for Congress*, 3.

Autonomy is an excellent fit with modularity... The RNZN is actively involved in introducing autonomous systems into the Littoral Support Force for MCM and Undersea Warfare purposes

Piloted Aerial Systems being considered under the Defence Enhanced Maritime Awareness Capability project. They can carry an array of sophisticated sensors over very large areas with endurance and operating environment unconstrained by the limits of onboard human operators. Their demand for highly trained operators is not insignificant, but less than that of a manned ship or aircraft. In the case of vehicles operating in an ASW, MCM, or Expeditionary Reconnaissance (ER) role, their deployment does not entail the risk to human life associated with manned platforms. Their overall utility is such that the inclusion of large autonomous vehicles in the US Navy platform count alongside manned ships is being actively debated as the service grows to a planned platform strength of 355.

The legal implications of autonomous weapon systems are being considered by the United Nations, specifically under the aegis of the Convention on Certain Conventional Weapons to which New Zealand is a party. Our adoption of autonomous technology will certainly be subject to international legal frameworks concerning its use. It is equally certain, however, that means of compliance will be found, given the role that autonomy already plays in the defence forces of all liberal democracies.

Autonomy is an excellent fit with modularity. For instance, the LCS MCM capability is based around an autonomous vehicle with supporting containerised equipment.

Launch and recovery systems for surface and undersea systems can be standardised, as can the equivalents for aerial vehicles—the vehicles and their support systems are in themselves modules.

New ways of operating—Distributed Maritime Operations

Even the largest and most advanced navies in the world are seeking alternatives to ever more expensive multi-function surface warships. The LCS concept was intended to provide the US Navy with the platform numbers needed for operations in the littorals, freeing up cruisers and destroyers for operations where their high-end capability was essential. The Royal Navy has placed orders for five Type 31 frigates, which have been designed to a cost threshold to perform lower end “maritime security” roles, again freeing up more capable and expensive frigates and destroyers for high intensity operations.

However, the re-emergence of great power competition in the last 15 years has spurred the development of a new operating concept that could allow our naval forces to contribute to collective efforts to maintain the rule of law at sea within the bounds of affordability.

Despite the emergence of LCS, Type 31, and other forms of cost driven capability, in the context of growing great power competition the liberal democracies are still faced with the possibility (some would say likelihood) of numerical

Distributed Maritime Operations is a new operating concept... that could allow New Zealand's naval forces to contribute to collective security and maintenance of the rule of law at sea within the bounds of affordability

overmatch, given the rate at which China in particular is expanding its naval fleet and the ways in which ‘grey zone’¹¹ operational strategies are extending naval power to para-military and ostensibly civilian platforms. A competitor like China can threaten an opponent from a multitude of different directions and in a multitude of different ways across very large areas of operation.

Concentrating naval power in a small number of highly capable (and expensive) multi-function platforms simplifies the adversary’s surveillance and targeting problem and reduces operational options—even the most capable combatant can only be in one place at a time. Naval thought has therefore turned to ways of operating by which numerical overmatch can be affordably addressed while turning the tables on an adversary.

In 2015, an article appeared in the US Naval Institute *Proceedings* magazine introducing the concept of ‘distributed lethality’.¹² The following quote from that article describes the core concept:

‘Surface Action Groups [SAGs] seize maritime-operations areas for subsequent activities (including power projection), perform screening operations for larger formations, and hold

¹¹ “The grey-zone is a metaphorical state of being between war and peace, where an aggressor aims to reap either political or territorial gains associated with overt military aggression without crossing the threshold of open warfare with a powerful adversary. The “zone” essentially represents an operating environment in which aggressors use ambiguity and leverage non-attribution to achieve strategic objectives while limiting counteractions by other nation states.”
¹² Rowden, Gumataotao & Fanta, “Distributed Lethality”.

adversary land targets at risk. Additionally, by distributing power across a larger number of more geographically spaced units, adversary targeting is complicated and attack density is diluted...SAGs will be networked and integrated to support complex operations even when not supported by [a] carrier air wing and land-based patrol aircraft...’

Distributed lethality was thus about using surface forces more independently and offensively, and about complicating an adversary’s sea denial problem by distributing friendly forces over a wide area. Provided there is an evident capability to employ it, distributed lethality thus adds complexity to an adversary’s calculations, one of the classic planks of a deterrent strategy.

The authors of the article occupied highly influential positions in relation to naval capability development. At the time it was published, Vice Admiral Rowden was Commander, Naval Surface Forces; Rear Admiral Gumataotao was Commander, Naval Surface Force Atlantic; and Rear Admiral Fanta was Director, Surface Warfare, Office of the Chief of Naval Operations.

Since the article was published, the distributed lethality concept has evolved into a broader, more elaborately

articulated concept known as Distributed Maritime Operations (DMO). DMO doctrine is not publicly available, but it has been referred to as a cornerstone of US Navy strategy by successive Chiefs of Naval Operations.^{13 14} DMO is described in a paper published by the US Centre for Strategic and Budgetary Assessments (CSBA) as follows:

‘...DMO seeks to address the limitations of Distributed Lethality by integrating naval forces across domains [space, air, sea, undersea, and land] throughout a theatre to provide targeting and coordinate fires...By combining distribution, decoys, and better defences, DMO would increase the size of an attack needed for an adversary to defeat U.S. naval forces, thereby deterring aggression. It might also require the adversary to take more time to determine the most advantageous way to conduct a smaller attack, thereby delaying aggression...’¹⁵

In reading the above, it will occur to the naval practitioner (and those concerned with defence capability generally) that extolling the virtues of a numerically large force

¹³ *A Design for Maintaining Maritime Superiority Version 2.0*, issued under the signature of Admiral Jonathan M. Greenert, US Navy, Chief of Naval Operations, December 2018.

¹⁴ FRAGO 01/2019, *A Design for Maintaining Maritime Superiority Version 2.0*, issued under the signature of Admiral M. M. Gilday, US Navy, Chief of Naval Operations, December 2019.

¹⁵ Clark & Walton, *Taking Back the Seas: Transforming the U.S. Surface Fleet for Decision-Centric Warfare*, 22.

distributed over a wide geographic area is one thing; commanding and controlling such a force in an era where access to the electro-magnetic spectrum for communications will be very difficult to maintain is another. This aspect of the DMO problem has received significant attention. In an article in *Proceedings*, Admiral Scott Swift, US Navy (at the time, Commander US Pacific Fleet) drew attention to the need to distinguish between the art of Command and Control and the actions and technologies used to implement it.¹⁶

Admiral Swift pointed out that Command and Control is an art practised by Commanders, and that the creation of the Command, Control, Communications and Computing (C4) acronym (and by inference, C4ISR (Intelligence, Surveillance, and Reconnaissance)) was unfortunate, in that it conflated Command and Control with the processes and tools by which it is achieved, thus creating an institutional over-dependence on technology and diminishing the US Navy's historical reliance on the skill and initiative of the subordinate.¹⁷ Admiral Swift maintained that undue reliance on systems which allow a Commander to maintain instantaneous contact with an entire force is not only highly problematic given the threats to communications spectrum use, but inconsistent with the principle of mission command. Admiral Swift acknowledges that addressing this state of

affairs is not simply a question of accustoming forces to operating in bandwidth deprived environments and insisting that the principles of mission command be properly applied, important though it is.

In his view, the sheer quantity of data available to the modern Commanding Officer should drive the development of new tools, potentially based on artificial intelligence, that support the processing of information in a way that enables courses of action to be played out and developed. This view is supported by the following quote from the CSBA paper cited earlier:

'...U.S. forces may be unable to sustain high or moderate bandwidth communications over wide areas due to their proximity to adversary jammers and the long distances between U.S. units and theater commanders. Rather than expend scarce resources to build a new communications architecture to support desired C2 structures, communications requirements could be reduced through an alternative approach to command, control, and communications (C3) that adapts existing C2 structures to accommodate communications availability. This concept, which could be described as context-centric C3, relies on decision-support tools to help junior commanders

*develop and execute plans even when communications are lost with senior leaders...'*¹⁸

It is reasonable to assume that the principles espoused by Admiral Swift will become embedded in the operational practices of the forces with which we are most likely to operate, and that technical and doctrinal means of addressing (if not completely solving) the command and control challenges inherent in DMO will be found. If this does come about, and developments can be monitored as we operate with our partners and take part in exercises like RIMPAC¹⁹, DMO will become a useful bedrock concept on which to base our force structure.

Coupled with the technological opportunities offered by open computing architectures, modularity and autonomy, the advent of DMO provides smaller navies with an opportunity for affordable yet valued contributions to multi-national operations that can be sustained over time. To repeat, a key element of DMO is the distribution of capability across a wide area and a large number of platforms. Numbers are important, and therein lies our opportunity. Provided it can defend itself from the most likely threat—anti-ship missiles—while offering capability appropriate to a given mission, a combatant need not be capable across all mission areas in order to be valued, because its very presence complicates the adversary's calculations.

¹⁸ Clark & Walton, *Taking Back the Seas: Transforming the U.S. Surface Fleet for Decision-Centric Warfare*, 26.
¹⁹ RIMPAC is a biennial naval and maritime exercise hosted by the US Navy's Indo-Pacific Command, headquartered in Honolulu. RIMPAC stands for 'rim of the Pacific' and involves a large number of navies drawn from around the Asia Pacific region.

If we no longer have to invest in combatants permanently equipped with multi-dimensional capability in order to be operationally useful, we might be able to acquire specialised, valued combat capability that we can afford to acquire and sustain over time. Modularity could enable us to field such capability tailored to the specific needs of a given operation.

To approach the problem from a different perspective, the US is investing in 35 LCS platforms, each with specialised modular capability fits, in order to field affordable capability and complicate the adversary's surveillance and targeting problem. Similarly specialised platforms fielded by a partner nation would likely be valued, provided the navies that operate them are able to conform with DMO doctrinal principles such as those outlined above.

Wider naval missions

The narrative above has focussed on the combat capabilities needed for our navy to play a role in the preservation of the rule of law at sea. However, we are required to perform a wide range of other roles related to our wider security interests. We have resources and borders to protect, both our own and those of our Pacific partner nations. We must be able to project our land and special forces and support them in operating areas remote from New Zealand. We have a critical

DMO could be the key to affordability for smaller navies looking to help address the numerical overmatch problem in a way that is sustainable and valued

Numbers are important...and therein lies the opportunity to acquire valued combat capability

The RNZN has resources and borders to protect... land and special operations forces to project and support...HADR and SAR missions to undertake...and a host of other operational roles to undertake

¹⁶ Swift, "Master the Art of Command and Control".

¹⁷ To explain further, Intelligence is an outcome of a process of information analysis; Surveillance and Reconnaissance are activities that collect the data on which this analysis is based. Computing and Communications are technical means of exchanging, processing and presenting the information which enables Command and Control.

The fleet must not only be affordable and sustainable...it must be able to perform a wide array of missions in both war and peace

role to play in Humanitarian Assistance and Disaster Relief (HADR), both in New Zealand and in our wider region. We must be capable of search and rescue (SAR) operations in some of the most challenging maritime environments in the world. Finally, we support important scientific and conservation work carried out by other government agencies. We must therefore design an affordable force structure which addresses all these needs.

Common modular platforms

Both combat and patrol platforms need range, endurance and good seakeeping qualities. In some combat situations, such as choke point escort, speed is a critical tactical characteristic, but patrol platforms also need speed for interdiction and to respond to emergencies. Combatant design needs to consider heat, acoustic, and magnetic signature control and radar cross section reduction to reduce the ranges at which they can be detected and their vulnerability to influence mines, anti-ship missiles and torpedoes. Combatant design also needs to consider resilience—the ability to absorb damage and continue to function to a pre-determined extent. Specialised patrol platforms are much less expensive than combatants partly because their design does not need to take these factors into account.

It may be possible to reconcile differences in the speed, signature control and resilience requirements of combatant and patrol missions to enable an affordable single platform to be designed to perform both combat and patrol functions. Modern

combatants are typically designed for a maximum sustained speed of around 27kn. Modern offshore patrol vessels are typically capable of 22–24kn. The increase in propulsive power required for a given hull design and displacement to achieve an extra 3–5kn is significant, but propulsion plants themselves are typically modular, consisting of up to four separate power sources. A combined combatant/patrol platform could operate efficiently in the patrol role by using fewer power sources at any one time to prolong both range and endurance and the time between overhaul periods of the power sources. The combined patrol/combatant hull form could meet seakeeping requirements by virtue of the displacement and waterline length required for combat. Larger platforms are also better platforms for helicopters and the unmanned aerial vehicles needed for surveillance coverage and patrol efficiency.

Heat and magnetic signatures can be addressed in ways that are manageable in terms of cost. Acoustic signature control, however, is problematic. Some of the design and engineering features required to reduce radiated noise are highly sophisticated and very expensive, to the extent where it would be uneconomic for every platform in a combined combatant/patrol fleet to be “quieted” to the level of multi-function frigates like the British Type 26 or Franco-Italian FREMM. The impact of this for ASW capability needs to be considered. However, some forms of noise reduction could be affordable across a multi-purpose fleet, including the acoustic isolation of main machinery (raft mounting) and

RIGHT TOP
LCS Independence class
USS *Gabrielle Giffords*
exercising with ships of
the Japan Maritime Self-
Defence Force in the
South China Sea in June
2020. Image courtesy of
US Navy.



RIGHT BELOW
USS *Gabrielle Giffords*
on missile firing trials
October 2019.
Image courtesy of
US Navy.



electric drives. These may be sufficient for a multi-purpose platform to be effective using multi-static ASW techniques²⁰, particularly in relatively noisy and high-traffic shallow water conditions.

Damage resilience is also an expensive characteristic, but there may be design approaches that enable an affordable patrol/combatant concept to be considered. The Type 31 frigate meets combatant standards for shock resistance at a much lower cost than comparable combatants, which suggests resilience may not be as expensive as has always been assumed.

The potential for combining combat and patrol functions in a single platform able to accept modular systems for combat and/or patrol missions should thus be investigated. If achievable, the advantages in equipment standardisation and thus training, supply chain management, maintenance and upgrade management could be significant. Platform availability could be higher, even with a smaller number of platforms. Flexibility would be enhanced, given that a platform could potentially be re-configured from combat to patrol or HADR missions at short notice, and vice versa. Platform usage rates could be managed so that wear and tear and thus service life is evenly distributed across the fleet. Finally, platform standardisation could provide acquisition and sustainment price leverage on suppliers by enabling a larger scale initial “buy” with the potential for long term sustainment support from original suppliers.

²⁰ Multi-static sensing involves the use of distributed active and passive sensors. For example, a ship could tow an active sonar source, whose transmission could enable submarines to be detected using a passive towed array, or a sonobuoy field deployed by a helicopter.

Amphibious capability

Amphibious sealift is a crucial joint enabler, and limitations in current capability have been identified. In particular, it has been determined that new capability able to conduct Logistics Over the Shore operations in higher sea states than those which HMNZS *Canterbury* can cope with is required. Protected mobility is central to our land force operating concepts, which means that naval amphibious capability should be able to deliver Light Armoured Vehicles (LAV) over the shore. The same applies to Medium/ Heavy Operational Vehicles (MHOV) which are essential to land force capability for both combat and HADR missions. Amphibious capability should also be capable of lifting the considerable quantities of stores, equipment and ammunition needed by a deployed land force, and there is a strong argument for enhanced onboard medical facilities. Amphibious joint manoeuvre requires rotary wing lift, which requires space and weight-consuming hangars and flight decks. Finally, amphibious operations require significant command and control capability, which is expensive in space, computing and communications capability. These requirements are difficult to reconcile with combat and patrol missions; ships with a very large internal volume and a “well dock” for landing craft operation in typical sea states are needed.

However, significant efficiencies could be achieved by specifying the same

Protected mobility is central to our land force operating concepts

Naval amphibious capability is a critical enabler of joint force operations

family of open architecture computing systems and families of equipment across the patrol, combat and amphibious components of a fleet. It may also be possible to obtain additional price leverage by seeking a single supplier or group of suppliers for the patrol/combatant and amphibious fleet components.

The combined patrol/combatant platform suggested above could still be provided with mission modules that enable a useful degree of complementary amphibious capability. A modular platform could incorporate stern launching systems for Landing Craft Vehicle and Personnel capable of accommodating vehicles (albeit smaller than LAV and MHOV). An embarked military force could use extemporised accommodation. Space set aside for mission module equipment, such as towed array sonar, could be made convertible to short term accommodation. This conversion capability would also be useful in other scenarios, including HADR operations where there is a need to accommodate evacuees. A platform so configured would be a useful supplement to specialised amphibious platforms, providing Joint Force Commanders with additional manoeuvre options and increasing overall readiness to respond to contingencies. Our ability to support other government agencies, notably the Department of Conservation offshore islands programmes, would also be enhanced by a greater number of amphibious capable platforms. The stern launching system could be made compatible with boats used for patrol operations (reducing sea state limitations), and with towed array sensors for ASW missions.

Expeditionary Reconnaissance and Mine Counter Measures

Expeditionary Reconnaissance (ER) and Mine Counter Measures (MCM) are essential naval capabilities and are well suited to modularity. Much ER and MCM equipment is already portable or containerised, including remotely operated and autonomous undersea and aerial vehicles. Comprehensive C4 capability is critical to both ER and MCM, and open architecture platform C4 systems provided for patrol/combatant missions could be adapted for these missions. A patrol/combatant with the modular amphibious capability described above would have ample space and accommodation for ER and MCM teams, their capability modules, and their command and control elements. Above all, a modular fleet would mean that any patrol/combatant platform could be adapted for ER and MCM according to need—these capabilities would not be tied to a single specialised platform which may not be available when needed.

Acquisition of a modular combatant/patrol, ER/MCM, and amphibious fleet is a strategy that could be pursued regardless of the level of capability identified to meet policy requirements. Modularity could be pursued within a pre-set cost envelope, with the ratio of investment in numbers of platforms and numbers and types of capability modules determined by policy need. It could also be pursued before such an envelope is identified, with the scale of acquisition adjusted according to capital and operating budget forecasts when these are available. That is why modularity as a force design strategy can

Modularity as a design principle can be explored WITHOUT needing to make assumptions about capability and investment levels

be explored without making assumptions about levels of capability and investment.

People—the most important factor

Modularity offers significant work force advantages, but current approaches to work force management would need to be modified and developed.

Each platform would require a core complement for command, navigation, communications, seamanship, propulsion and generation, logistics, catering, medical support, habitability system operation and maintenance, and damage control. Each module would also require dedicated operators and maintainers, who would embark in platforms with their modules. This is not new to the RNZN. People posted to HMNZS *Matataua* are assigned to HMNZS *Manawanui* (and occasionally other ships) or detached as shore parties with their boats and equipment for discrete ER, MCM, hydrographic or diving missions, returning to *Matataua* on completion. *Matataua* provides them with leadership, administrative and divisional support, and a sense of identity exemplified by their cap tallies. This principle could be extended to ASW, Resource and Border Protection Operations, Maritime Interdiction Operations, air defence and littoral warfare teams, perhaps by the creation of a new establishment along the lines of *Matataua*.

Other issues would need to be resolved, including operating tempo for core complements, the fact that some module crews would be required at sea more than others, and maintaining currency in perishable skills when modules are not installed in ships

(simulation is likely to provide a solution), but the outcome could be improved harmony for the work force as a whole, with only those people required for missions in progress being separated from their homes and families.

Southern Ocean patrol and replenishment

The SOPV will be required to operate in ice conditions, temperatures and sea states that will require a unique hull form and structure. However, a modular payload concept could fit well with the range of missions with which SOPV will be tasked. Module/platform interfaces could be the same as those used across the rest of a modular fleet, noting that NATO has already promulgated standards for these interfaces. With regard to common platform systems, if a workable fleetwide policy can be developed in the next two to three years, it could be possible for SOPV to incorporate at least some of the systems and equipment mandated for the fleet as a whole. However, this is an ambitious target.

HMNZS *Aotearoa* provides fleet replenishment and Antarctic re-supply capability for years to come. There are no opportunities for specifying common systems, although these may emerge in time as existing systems wear out or become obsolete.

Bringing the opportunities together

Leaving aside levels of capability, if a fleet re-capitalisation strategy based on modular patrol/combatant/ER/MCM capability and a single common platform, the adoption of open computing architectures, and the standardisation of systems



RIGHT
HMNZS *Aotearoa*
during her sea trials.
Image courtesy of
NZDF.

and equipment across ship types were to be considered, it could be possible to reduce the number of platform types in the fleet from six (frigates, Offshore Patrol Vessels (OPV), SOPV, *Manawanui* (Dive/Hydro Vessel), *Canterbury* and *Aotearoa*) to four (patrol/combatants²¹, amphibious sealift, SOPV, and HMNZS *Aotearoa*) and dramatically improve long term sustainability.

However, a more radical approach consistent with the strategies outlined in this paper but emphasising autonomy could be adopted. Combat, patrol, and amphibious missions could be performed by a single large platform type able to lift and project substantial land forces, but also capable of hosting an array of autonomous air, sea and sub-sea vehicles for combat, ER, and MCM functions. A through-deck design (used for aircraft carriers and large amphibious ships) would simplify the operation of unmanned aerial vehicles and medium utility or naval helicopters, extending combat, patrol and amphibious capabilities. If large enough, it could accommodate container-based ASW, air defence, C2, HADR, ER and MCM capabilities in a variety of combinations and configurations.

It is possible that three such platforms could replace the current combat, patrol, amphibious and Dive/Hydro Vessel platforms, reducing overall fleet platform types to three (three multi-role ships, SOPV, and HMNZS *Aotearoa*). Although they would be large ships, such a fleet might be easier to accommodate in a naval base than the six ships they would replace. Such a concept may seem radical, but the necessary technologies are

in place or under high priority development—the US Navy autonomous vehicle initiatives outlined above are germane.

Italian industry has already produced a ship with most of the attributes identified above, including a medium-calibre gun for support to land forces and a significant air defence capability.

Kalaat Béni Abbès is a 9,000 tonne amphibious ship that was delivered by Fincantieri to the Algerian Navy in 2014. It is a development of the Italian Navy's San Giusto class and has many of the attributes identified above.

Conclusion

None of the specific points discussed in this paper break new ground. The technologies and doctrine identified are under active development and have been adopted to varying degrees by several of the world's leading navies. Open architectures, modularity and autonomy are being de-risked and the rate at which they are adopted by other navies is likely to accelerate. What this paper has attempted to do is offer ways in which technology and doctrine can be brought together in designing New Zealand's next naval fleet.

We are facing the most significant force structure transition in our history. However, the block service life expiry of almost every ship in our fleet over a very short time frame gives us an opportunity to design a naval fleet that in its totality meets our country's maritime defence needs and that is flexible and adaptable over time. Open computing architectures, modularity, autonomous vehicle technology and Distributed Maritime Operations doctrine could

RIGHT
Algerian Navy amphibious landing and logistical support ship *Kalaat Béni Abbès* L-474. Built and supplied by the Italian firm Fincantieri, the design is based on a development of the Italian Navy's San Giusto class. Photo supplied courtesy of Fincantieri.

KALAAAT BÉNI ABBÈS

TECHNICAL SPECIFICATIONS

Length overall
142.90 m
Beam
21.50 m
Full load displacement
abt. 8,800 t
Maximum speed
20 kn
Range at 15 kn
7,000 nm
Crew
152
Embarked force
438

COMBAT SYSTEM

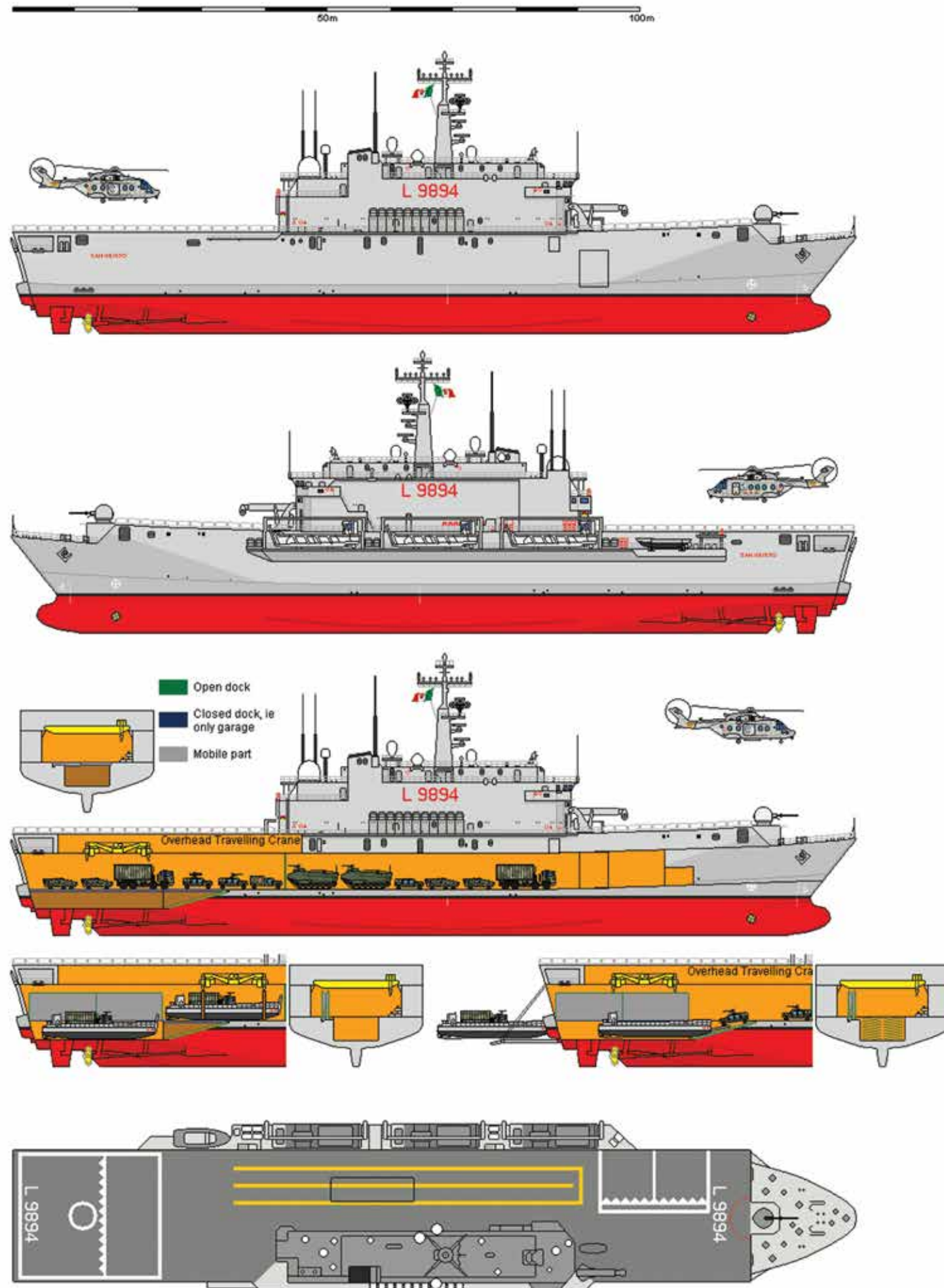
Combat Management System
76/62 SR Main Gun
Ship to Air Missile +
Multi-functional Radar

HELO CAPABILITIES

Hangar/Garage deck
up to 465 m (garage + fore area of flight deck)
Hospital area
abt. 250 m²



²¹ ER and MCM capable.



LEFT
San Giusto is an 8,300 tonne amphibious transport dock built by Fincantieri and commissioned into service with the Italian Navy in April 1994. It has a well dock allowing the transfer of people and heavy equipment ashore in a range of sea states, and the aircraft carrier style “through-deck” layout allows the operation of a wide range of helicopters and autonomous vehicles. Schematic supplied courtesy of Fincantieri.

be applied to maximise this opportunity regardless of the levels of capability identified by defence policy.

Acknowledgements

Any errors of fact and any ill-founded deductions in this paper are the author’s responsibility. However, a number of people have contributed thinking and perspectives that helped shape its development. These include fellow naval officers, both serving and retired, in the RN, RAN, RCN, US Navy, Italian Navy, Royal Netherlands Navy, German Navy, Spanish Navy and the RNZN, and a number of defence and security sector civilian officials in these countries. The author is very grateful for the generosity with which officers and officials in the US, Commonwealth and European NATO countries shared views and insights with him over the course of his duties in Capability Branch, HQNZDF, and for the generous hospitality extended to him both at meetings ashore and during visits to ships and shipyards. Aside from the realisation that his counterparts in the Dutch, Spanish, German and Italian navies spoke better English than he did, contact with them showed the author that integrated solutions to our force

structure challenges could well be found in these countries as well as in Australia, the US, the UK and Canada. Asian navies are also pushing the innovation envelope, and Asian solutions warrant closer study.

Particular mention must be made of Dr Lance Beath, whose invaluable advice has hopefully helped produce a paper that the intended audience finds readable, although as with errors of fact and deduction, any shortcoming in this regard is the author’s responsibility.

The author has been a member of The Naval Review and the United States Naval Institute for many years; the fora that both provide for the exchange of ideas has been a central factor in the formulation of the views expressed in this paper. The author thanks the editorial teams and members of The Naval Review and the USNI for extending membership to people from beyond their national orbits. The author is also a recently joined member of the Australian Naval Institute and the Canadian Naval Review and believes that these likewise contribute greatly to the thinking which will give our navies the edge we need to prevail at sea. Membership of one or more of these fora is strongly encouraged for all naval practitioners.

DESIGNING THE NEXT FLEET—POSTSCRIPT

This paper was drafted in early 2020. In the six months since the draft was completed, studies into the future force structure of the US Navy have come to light which bear out the main premise of the paper—that there are affordable alternatives to traditional multi-function frigates as the core of New Zealand’s naval combat capability.

The US Navy last conducted a force structure assessment in 2016. By and large, this assessment did not alter the emphasis on aircraft carriers, large deck amphibious ships, submarines and multi-function surface combatants that has shaped the US Navy since the Second

World War, although continued procurement of Littoral Surface Combatants (LSC) and a new class of frigates was recommended. However, in January this year, an updated force structure assessment was rejected by the US Secretary of Defence, who then directed that new studies be prepared by the US Navy and Marine Corps, by the Pentagon's Cost Assessment and Programme Evaluation (CAPE) office, and by the Hudson Institute, an independent think tank. The following quote from the Hudson Institute report¹ released recently is instructive:

'...The US fleet is at an important crossroads. Nearly twenty years after the drive for transformation led to costly and problematic programs such as the littoral combat ship (LCS), Gerald R. Ford-class aircraft carrier, and Zumwalt-class destroyer, the Navy is again starting work on new ships in every vessel category. It is essential to make smart decisions on the design of these ships, and of the fleet as a whole, to create a force that affordably supports future defense strategy and avoids mistakes of the past. The Navy is arguably facing a once-in-a-century combination of challenges and opportunities as it embarks on its new family of ships. Today its leaders, like their predecessors in the years after World War I, are reconsidering the relevance and survivability of the fleet's premier capital ship². In addition, emerging technologies are enabling new platforms and tactics that could disrupt the design of today's fleet; rising adversaries are threatening US allies and the international order; and budget constraints prevent the Navy from countering revisionist powers by simply growing the fleet with better versions of today's ships and aircraft...'

The following quote, also from the executive summary, bears out the future significance of Distributed Maritime Operations concepts, and the distribution of combat power over a large number of platforms:

'...Overcoming these threats in the face of technology proliferation and fiscal constraints will require more than simple attrition. The new joint warfighting concept that the Department of Defense (DoD) is pursuing, and the Navy's concepts for Distributed Maritime Operations (DMO) and Littoral Operations in a Contested Environment (LOCE), would suggest the Navy's theory of victory should instead rest on establishing a decision-making advantage over adversaries. This approach, drawn from maneuver warfare, would combine defensive operations to foreclose enemy attack options with a diversity of offensive capabilities and complex force presentations to degrade adversary decision-making.'

The reference to 'fiscal constraints' above is key. Senior US officials have drawn attention to the likelihood of flat US defence budgets in the wake of the Covid-19 crisis and the reality that current plans are unaffordable—the same situation that many parts of the New Zealand public sector are likely to face in future budgets.

The Hudson report recommends reductions in numbers of aircraft carriers, multi-function surface combatants, and large deck amphibious ships, and the acquisition of 80 optionally manned "corvettes" in pursuit of the distributed and more numerous force

¹ *American Sea Power at a Crossroads: A Plan to Restore the US Navy's Maritime Advantage*; Bryan Clark, Timothy A. Walton, and Seth Cropsey; Hudson Institute 1201 Pennsylvania Avenue, N.W., Washington DC; September 2020.

² The aircraft carrier.

structure proposed. Optional manning is touted as a means of increasing flexibility of employment in routine defence engagement activity and periods of tension, while allowing the platforms to be operated autonomously in high threat areas should the need arise. It seems likely that if such a concept were to be considered, modularity concepts could be employed to increase flexibility and as a means of future proofing.

The term "corvette" has become heavily loaded in senior naval circles, particularly in the UK, where it is understood that at least one First Sea Lord would not allow it in his hearing. It is a very imprecise and less than useful capability descriptor, and it is not entirely clear what the authors of the Hudson Institute intend to indicate by way of capability when they use the term. However, they indicate that they see the optionally manned corvette replacing the Large Unmanned Surface Vehicle (LUSV) in the current Navy shipbuilding programme, which has been described as follows:

*'The Navy envisions LUSVs as being 200 feet to 300 feet in length and having full load displacements of 1,000 tons to 2,000 tons. The Navy wants LUSVs to be low-cost, high-endurance, reconfigurable ships based on commercial ship designs, with ample capacity for carrying various modular payloads—particularly anti-surface warfare (ASuW) and strike payloads, meaning principally anti-ship and land-attack missiles.'*³

I am not suggesting that such a level of capability is necessarily suited to New Zealand requirements, but the points about reconfigurability and modularity align with the arguments advanced in the main body of this paper. It also seems that specialised ASuW capability would be valued in future multi-national operations.

The CAPE and US Navy and Marine Corps studies have not been made public and may not be. The Hudson report may not reflect the US Navy force structure eventually adopted, but it points to a future in which the New Zealand Defence Force has more options for acquiring an affordable force structure valued by our international partners than some commentators would have us believe.

³ O'Roarke, *Navy Large Unmanned Surface and Undersea Vehicles: Background and Issues for Congress*.



CAPTAIN ANDREW WATTS RNZN

Captain Watts joined the Navy in 1980 as a Midshipman in what was then the seaman specialisation. He qualified as Principal Warfare Officer in 1989, and commanded HMNZ Ships *Pukaki*(II), *Wellington* (F69), *Resolution* and *Te Mana*. He first retired from the Navy in 2011, spending what he describes as an immensely rewarding three years in the private sector, working for Opus International Consultants. He rejoined the Navy in 2014 at the request of the then Chief of Navy to take up an appointment as Director, Operation NEPTUNE, the Navy's year long programme of events to celebrate the 75th Anniversary of its founding in 1941. His final appointment was as Lead, Future Surface Combatant in Capability Branch, HQNZDF, and it was in this capacity that he formed the views on which this paper is based. He transferred from regular service to the standby Naval Reserve in January 2020, taking up employment in the Southern Ocean Patrol Vessel Integrated Project Team, from which he has since resigned.

Like other warfare officers, Captain Watts describes his time in Command as the highlight of his career. However, his time as Captain Fleet Personnel and Training and as Director Operation NEPTUNE were also high points, mainly because of the very high calibre of the officers and ratings and civilians he was privileged to lead and serve with. He also looks back with pride and affection on his time as Course Sponsor for Junior Officer Common Training Course I9-1, and can assure all those concerned with the future of the Navy that if these young people are anything to go by, it could not be in better hands.

TOWARD A NEW UNIFYING MILITARY CONCEPT FOR NEW ZEALAND

In this article, Lance Beath, the Editor, looks to open up a discussion about New Zealand defence policy. Historically, we have always acted in the confident belief that if we need to fight, we will do so in distant theatres.

This longheld belief means that we tend to structure our forces around discretionary contributions to conflicts on the other side of the globe. But how sound will this belief prove to be when thinking about defence policy over the next 20–30 years? And is it possible to start sketching out now the elements of a new unifying military concept for the New Zealand Defence Force?

IMAGE

Rocket Lab launch from its launch facility on the Māhia Peninsula on the East Coast of New Zealand. Image by Alamy.

‘Always to islanders danger is what comes over the sea’

Allen Curnow

Introduction

Earlier this year an internal document was circulated within Defence aimed at stimulating discussion about the role of autonomous weapons and artificial intelligence in the New Zealand Defence Force (NZDF) over the next 20 years. By way of introduction to their topic, the drafters made a number of familiar claims that deserve to be re-considered. Having done so, it is possible, I think, to see the outlines of a new unifying military concept for the NZDF that offers some advantages: the possibility of simplification and the elegance of an idea borrowed from architecture. Namely, that form should follow function.

This article suggests that in thinking about force structure options, we could do a lot worse than borrow from Tolstoy. We do not structure for war or peace. Or for the home game or the away game. We can simplify. The Defence Force is equipped and trained to offer government options for war and peace. Not one or the other. And not just war in distant theatres, but anywhere that New Zealand's interests are threatened by military force, including close

to home. And, yes, even and especially at home where the options whether or not to respond are no longer discretionary¹.

Background

Familiar statements repeated in the document referred to above include the following: *‘Short of a great power conflict, intercontinental ballistic missile attack, or collapse of global order, no conventional military threat to the territory or sovereignty of New Zealand can be plausibly imagined.’* This is coupled with the judgement that *‘Because of geography, history and political choice, the NZDF is an expeditionary force and not a territorial defence force. This is expected to still be the case in 2040.’*

What is to be said about these statements? First, there are the qualifiers: *‘Short of a great power conflict’* and *‘collapse of global order’*. What force structure conclusions should we take from these qualifying exceptions in current circumstances?

And what do we think about the statement that the NZDF will always be an expeditionary force and not a territorial defence force? As far out as 2040? And presumably as far beyond that as human imagination carries us? Are expeditionary operations versus territorial defence requirements mutually exclusive choices? Can't we do both? Shouldn't we? But if so, around what concept exactly should we prioritise?

¹ A senior naval officer, writing in this journal and whose judgement I respect, told me recently that ‘only an idiot would structure for the possibility of an attack against New Zealand’. Which puts me in mind of Lenin's purported description of Western intellectuals duped into saying good things about bad regimes: ‘useful idiots’ he called them.

Certainly, so far as the need for expeditionary forces are concerned, this sounds like a role for the New Zealand Army.

But for the Royal New Zealand Airforce (RNZAF) and the Navy, the future may well suggest the opposite of structuring primarily to act as expeditionary forces. Airforce and Navy need to be capable of expeditionary tasks, but they need to be focussed much more on the defence of our maritime approaches. Because it is here via our maritime, space-based and cyber approaches that future threats to our immediate interests almost certainly lie, and meeting these threats should therefore be the primary focus of our efforts.

Discussion

Sir Arthur Tange, the last of the great Australian public service mandarins, served as Head of the Department of External Affairs before becoming a reforming Defence Secretary in the 70s. Sir Arthur once remarked that a map of Australia was ‘the most fundamental of all the defence planning documents that we have’.

Readers will know what is coming next. Suffice to say that we have no land borders. And that we are an island country a long way from anywhere. But our geography is shrinking and our vulnerabilities are growing.

Does our remote and maritime geography mean that we are immune from physical attack of various kinds? In the document that I am discussing, the answer is a conditional yes. The judgement is that *‘Short of a great power conflict...or collapse of global order, no conventional military threat to the territory or sovereignty of New Zealand can be plausibly imagined.’*

How much planning comfort can we draw from that? How confident can we be of the conditionalities mentioned?

Plausible imaginings

Plausibility is, of course, in the mind of the beholder. But here are three future scenarios, not so far removed from the present perhaps, that are offered as a starting point for discussion. The first relates to New Zealand's entry into the space domain via the success of Rocket Lab, now a US-owned corporation with a wholly-owned New Zealand subsidiary. The second concerns New Zealand's future ambitions to become a large scale liquid hydrogen exporter to the energy dependent economies of North Asia. The third arises from the fact that we almost certainly possess large quantities of the seabed metals, minerals and rare earths likely to be in high demand as a result of the global drive to lower carbon emissions.

Rocket Lab USA

Rocket Lab was started by New Zealander Peter Beck but is now owned by a variety of US corporations including Lockheed Martin and Bessemer Venture Partners. Future Fund, the Australian Sovereign Wealth Fund, is also an equity holder. The United States Air Force and NASA are clients. Rocket Lab leases land on New Zealand's Māhia Peninsula for satellite launch operations and land in the Chatham Islands for a satellite tracking station. In the last reporting year, Rocket Lab and other New Zealand space related activities contributed \$1.69 billion to the New Zealand economy and an estimated 5,000 jobs. With its first satellite launch in 2017, New Zealand joined 10 other countries

able to launch satellites into low, medium and high earth orbit as well as lunar and interplanetary orbits. Rocket Lab has now been contracted by NASA to launch a CubeSat into lunar orbit in 2021 as part of its Artemis mission aimed at a resumption of manned missions to the moon in 2024 and beyond.

Rocket Lab provides a strong home field advantage for New Zealand. It gets us into the high technology space sector with obvious benefits for the economy. But it also brings with it security risks that we need to be thinking about.

As described elsewhere in this journal, the United States Navy (USN) is developing a new doctrine called Distributed Maritime Operations. This doctrine is aimed at improving the open ocean survivability of the USN as well as its ability to conduct Littoral Operations in Contested Environments.

The aim is to complicate an adversary's targeting and offensive options by adding to the existing fleet a large number of smaller value ships and other assets. While this is expected to make targeting of the USN by adversaries more difficult to achieve, it also increases the complexity of maintaining the Command and Control requirements associated with a highly distributed fleet. This puts an additional emphasis on the availability of the communication and surveillance assets on which US information dominance depends. From an adversary's perspective, this in turn suggests the need to be able to target the satellites on which US forces rely for their Command and Control.

To the extent that Rocket Lab USA may develop the ability to provide a backup facility based in New Zealand for the manufacture and launch of US communication and

reconnaissance satellites, the associated manufacturing, launch and tracking facilities are all likely to be potential targets in the event of hostilities. This could mean Rocket Lab's manufacturing plant in Mount Wellington, Auckland; the Māhia Peninsula launch complex and the Chatham Islands satellite tracking facility are all under potential threat.

Adversary action need not be overt of course. A stuxnet-style computer worm attack might be a possible vector, bringing with it the advantage of deniability. Equally, a localised attack by air or sea-borne forces could also be a possibility. Either way, this would be an attack on a US-owned facility based in New Zealand, bringing with it the obvious risk of New Zealand being drawn into a wider conflict.

New Zealand as a liquid hydrogen exporting country

Over the last couple of years, New Zealand has been taking the first steps toward the development of a new energy export industry based on liquid hydrogen. A memorandum of cooperation has been signed with Japan and initial ministerial-level talks held with South Korea. Both countries are moving at pace toward the development of hydrogen-fuelled transport and energy sectors, and New Zealand offers the future advantage of hydrogen manufactured by the electrolysis of water using renewable electricity ("green" hydrogen). Australia is also moving in a similar direction, though in its case through the export of "brown" hydrogen manufactured from the massive lignite coal deposits in the Latrobe Valley, said to contain enough energy to meet Japan's total electricity demand for 240 years.

Kawasaki Heavy Industries launched the world's first liquid hydrogen tanker, the *Suiso Frontier*, in December last year, aimed at trial shipments of "brown" hydrogen from Australia. When cryogenically cooled to -253 degrees Celsius, hydrogen gas becomes a liquid. In its liquid state, it is 800 times denser than as a gas, and at this temperature hydrogen has enough energy content to make it viable to transport as an energy source.

For New Zealand to be able to join Australia in becoming a significant liquid hydrogen exporter to the energy markets of North Asia, we will need to develop our renewable electricity sector. Whether this can be done and how soon this could happen remains to be seen but Ministers have been holding out the prospect in talks with Japan and Korea. China is also thought to be interested.

As with our entry into satellite-based space communications, the economic benefits of developing our hydroelectric resources through the export of green hydrogen are potentially very significant. So also are the possible security implications associated with a fleet of liquid hydrogen carriers connecting Australia and New Zealand to North Asian energy markets.

The issue is not so much the flammability of hydrogen but its intrinsic economic value and the strategic significance that importing countries will place on the maintenance of the uninterrupted shipping of liquid hydrogen.

This is very much a future security issue. Because of the strategic importance of fuel to modern economies, it is also one that carries with it the possibility of deliberate maritime interdiction and conflict.

BELOW
Suiso Frontier being fitted with its liquid hydrogen cryogenic tanks. The world's first liquified hydrogen tanker. Image courtesy of Kawasaki Heavy Industries Ltd.



Deep sea mining of metals, minerals and rare earths

New Zealand is believed to have extensive offshore deposits of metals, minerals and rare earths, many of which are expected to experience increased demand as a result of the worldwide drive toward lower emission economies and the resulting requirement for the metals and rare earths needed by “green” technologies. New Zealand’s Pacific Island neighbours are also thought to have rich endowments of these offshore resources and a number of them have already reserved areas of the international seabed beyond national jurisdictions through the International Seabed Authority (ISA) with a view to future mining activities. Many of the Asia Pacific’s larger economies have also been active in securing international seabed rights. These include China, Russia, India, Japan and Korea.

The race to access and extract minerals and metals to process into manufactured goods used in high-tech industries associated with green technologies such as wind, solar power, electric vehicles and batteries has already begun. New Zealand has both the offshore resources and the environmental standards that position it to play a leadership role in ensuring the adoption of responsible stewardship in managing the ocean resources of the Asia-Pacific Economic Cooperation (APEC) and Pacific Island regions, including offshore minerals and metals.

New Zealand’s maritime interests are engaged well beyond the legal boundaries of its maritime estate. Mining and extractive activities in areas of the international seabed beyond national jurisdictions have the potential to create harmful effects for us in much the same

way that unregulated and illegal fishing in international waters impacts our domestic fisheries.

International Seabed Authority

The ISA has entered into 15-year exploration contracts with private contractors drawn from 22 different countries. These contracts provide for exploration rights, subject to ISA regulations, for polymetallic nodules, polymetallic sulphides and cobalt-rich ferromanganese crusts in the deep seabed. The contractors are from China, Japan, Korea, India, Singapore, Russia, Germany, France, the UK, Poland, Brazil, and a consortium called the Interoceanmetal Joint Organisation which comprises Bulgaria, Cuba, the Czech Republic and Slovakia working with the Russian Federation and Poland.

Also notable in the list of contractors are a group of Pacific Island countries partnering with a range of overseas corporations: the entities involved include the Cook Islands Investment Corporation; the Marawa Research and Exploration Limited of Kiribati; Tonga Offshore Mining Limited; and, Nauru Ocean Resources Incorporated.

Two Chinese firms are involved. These are China Ocean Mineral Resources Research and Development Association and China Minmetals Corporation.

China Ocean Mineral Resources Research and Development Association has three separate exploration contracts: 1. for polymetallic nodules in the Clarion-Clipperton Zone between Hawaii and Mexico; 2. for polymetallic sulphides on the Southwest Indian ridge; and 3. for cobalt-rich ferromanganese in the Western

Pacific); China Minmetals Corporation has a contract for polymetallic nodules in the Clarion-Clipperton Zone.

In addition to these Chinese firms, others involved in Pacific Ocean exploration include corporations from the Republic of Korea (cobalt-rich ferromanganese in the Western Pacific Ocean); the Russian Federation (cobalt in the Magellan Mountains, Pacific Ocean); and Japan (exploring for cobalt in the Western Pacific Ocean).

From deep sea exploration to mining

While the technology and economics of deep seabed mining appear to be on a converging path, whether and when deep sea mining may commence is impossible to say. But given the number and range of exploration contracts already concluded through the ISA, it is apparent that international interest in the deep seabed is strong and growing.

Implications for New Zealand

With extensive offshore mineral and metal resources, New Zealand will be an attractive destination for countries which have developed the technologies and have the required capital base to finance offshore mining and extractive activity. While we have the sovereign right, under the provisions of United Nations Convention on the Law of the Sea (UNCLOS), to either use or leave untouched the mineral resources on or under the seabed in our Exclusive Economic Zone (EEZ) and extended continental shelf, we can expect to face pressure from countries with which we have close economic ties, and on whose markets we depend for our exports, to lease areas

of our seabed to them in return for ongoing market access and other concessions.

We need to develop much more detailed knowledge than we have now on the nature of the offshore mineral and metal resources in our EEZ and the extended continental shelf. Without such detailed knowledge we will not be able to place a proper price on our assets and we will be poorly placed to face a future where there is likely to be increasing demand for the “green” metals needed by the drive toward lower carbon futures. We need to consider the possibility of taking more of a leadership position within both APEC and the Pacific Islands Forum on offshore minerals and metals to help ensure that our interests, and those of our Pacific Island neighbours, are not overlooked in the scramble for position.

New Zealand’s national interests will best be served when we know more about the extent and detailed nature of our off-shore minerals and metals and other resources (e.g. gas hydrates) than any foreign power. This extends with equal force to the three Pacific Island states in the New Zealand realm, the Cook Islands, Niue and Tokelau, together with the Ross Sea dependency. As matters stand, we are a long way away from possessing the required depth of knowledge.

Defence and security implications

If form should follow function, and function follows need, what are the implications which flow from the three examples above? Defence policy provides a guide. The most recent policy statement is contained in the *Strategic Defence Policy Statement 2018* (SDPS). Published by the Ministry of Defence in July 2018,

in extensive consultation with the NZDF during its preparation, the statement makes clear the defence priorities of Government.

Looking at the text box below, we see that New Zealand Defence Policy is not cast in terms of detailed tasks or functions to be undertaken. This is because it is a policy document rather than a detailed prescription or a Concept of Operations. There is, so far as I know, no equivalent of a Mission Essential Task List² of the kind drawn up by US Forces as part of their capability requirement planning (though Joint Mission Essential Task Lists (JMETL) are used in ship evaluation and exercise planning). Nonetheless, the Government's view of NZDF priorities is clearly set out in the SDPS. The first principal role mentioned is the need to be able to lead and conduct operations in defence of our own sovereign territory, including the EEZ. The ability to contribute to the protection

² A Mission Essential Task List or METL is used as a detailed mission analysis and planning tool by US forces. It can be applied to both combat and non-combat operations. US Joint Force Commanders use a JMETL which includes the necessary conditions for each task pre-specified.

of New Zealand's critical lines of communication is also explicitly mentioned, as is the largely maritime nature of the primary operating area of the NZDF. Other roles laid down include the ability to operate alongside key allies and partners, the ability to deploy in support of South Pacific Island governments and the need to be able to contribute to collective security where New Zealand's interests are involved.

This is a very broad church. Distilling out the fundamentals can be done in various ways, but on my reading the following essentials emerge:

- New Zealand's geographic setting is recognised as being fundamentally maritime in nature (indeed, our approaches are entirely *maritime*);

- Geography as well as policy requires us to be able to operate in our *own territory including the EEZ* as well as in our neighbourhood;
- The neighbourhood is defined (over generously, one might think) as stretching from the South Pole to the Equator which, as the SDPS notes, is a '*vast and largely maritime zone*';
- The SDPS stresses the need for the NZDF to be able to operate *independently* and to lead when operating in our own territory, including the EEZ, and when required to do so in the South Pacific; and
- The operations envisaged include the *defence* of our territory and the EEZ and the *protection* of critical lines of communication.

What emerges from this is a clear recognition that, far from having an expeditionary emphasis built into our defence policy settings, the emphasis is, in reality, quite the reverse. The first priority is given as defence of territory, including the EEZ, followed by defence of our neighbourhood. It is important to note that this does not *exclude* expeditionary tasks, but these are no longer seen as the driving priority (unless the defence of the large neighbourhood of the South Pole to the Equator involves expeditionary forces, as it very well might).

Form follows function: function follows need

The summary points above define the needs that are derived from policy. Other needs can of course be inferred. Although policy stresses the maritime aspects

of New Zealand's defence requirements, we also know from long experience that we need highly trained and well-equipped land forces for stabilisation operations and for contributions to collective security including peacekeeping operations.

Successive governments have seen this need take various forms. For the moment the New Zealand requirement is seen as comprising 4,500 Regular Force personnel, 2,000 Territorial Force personnel and 500 civilians. Whether this requirement would be maintained in the event of a careful functional evaluation of need against current policy is an open question. It is possible that a functional evaluation might see the emergence of a stronger maritime orientation in our land forces.

A new unifying military concept

The military concept that emerges from the above discussion is straightforward. If we take our defence policy settings seriously, we should not focus force structure on distant contingencies, where what we do is almost always discretionary. While this has tended to be the default option in the past for planning staffs involved in capability development, this is no longer the driving requirement. Policy as well as geography requires us to look more closely at the force options New Zealand needs to conduct, as well as to lead, operations in its own maritime environment. Here, closer to home, and even at home, the need is much more existential, may be much more immediate, and is almost certainly more demanding.

That planning staffs are already moving in this direction can be seen from the Defence

EXTRACTS FROM THE SDPS

From the Minister's Foreword to the SDPS: 'The primary operating area for the Defence Force stretches from the South Pole to the Equator, a vast and largely maritime zone that will place substantial demands on Defence Force personnel and capabilities to deliver across a range of tasks.'

Defence Priorities (extracts)

172. The Government's highest priority for the Defence Force is its ability to operate and undertake tasks in New Zealand's territory (including its EEZ) and its neighbourhood, from the South Pole to the Equator...

173. The Defence Force must be prepared to operate independently – and lead operations – in these areas if required.

Principal roles of the Defence Force (extract)

177.1. Defend New Zealand's sovereignty and territory, and contribute to protecting New Zealand's critical lines of communication.

Capability Review Plan released in June last year. The indicative capabilities listed in this plan for acquisition in the period between now and 2030, and those listed for review before the next Defence White Paper (currently planned for 2022) are well suited to the requirements implied by the possibilities discussed here: notably, a network-enabled Army, capable of communicating with air and naval assets; enhanced surveillance, reconnaissance and intelligence capabilities; the replacement of major surface fleet assets including for patrol, force protection, amphibious operations and combat; and, planned upgrades to the Poseidon P-8A aircraft. A fuller list can be found in the text box labelled 'Maritime Capability Projects' (see the article in this journal by Commander Des Tiller, "A Background to the Next Round of Strategic Reviews").

Whilst all of these envisaged capability projects are subject to policy review, individual business case development and the availability of funding, the conclusion offered here is that we no longer believe, as we did in the early nineties, that capabilities required close to home are best generated from capabilities that might be needed for expeditionary employment. The reverse is now much more the norm. In thinking about capability, we start with likely requirements close to home and from those we develop the ability to offer contributions to coalition and collective security operations further afield.

This is a development in our thinking that makes a great deal of sense. It is closer in spirit to the form follows function, function follows need argument and should appeal, therefore, to the wider

audiences that Defence looks to when discussing its future requirements.

Though it is not easy to offer a succinct definition of what a new unifying military concept might look like, nor specify in one sentence what New Zealand's overarching 'military problem' might be, I offer the following elements for discussion:

Any new unifying military concept for New Zealand should:

1. Recognise the need to maintain and develop New Zealand's maritime and space-based surveillance, reconnaissance and intelligence capabilities;
2. Be centred on the need to meet threats emerging in New Zealand's maritime approaches (including air, sea and undersea threats);
3. Recognise the possibility of space and cyber-based threats emerging in addition to more traditional threats;
4. Include the need to provide force protection and other support to deploying land and special forces elements; and
5. Take account of the extent of New Zealand's 'neighbourhood' as defined in the SDPS, including the special capabilities required to operate for prolonged periods at extended distances and in widely differing geographic zones: from the tropics to the ice. Take note also of the special demands placed on ships operating in the severe sea states encountered in and around New Zealand and the Southern Oceans.

Conclusion

What high level military concept does all this suggest? I think there are just three essential components that need to be stressed:

- New Zealand's maritime setting;
- Our long lines of communication; and
- Our geographical remoteness and the economic vulnerability that we share with our South Pacific island neighbours.

If we were designing a Defence Force from scratch, these three components would suggest the need for a strong maritime bias in our capabilities and force structure. The need for intelligence would also have a very strong claim, as would surveillance, reconnaissance and air and sea transport assets.

What of the New Zealand Army? At twice the personnel strength of the Air Force and the Navy, its numbers look like something of a historic anomaly. It is of course in the nature of armies that they are personnel intensive so perhaps there is something inevitable about the seeming imbalance. Army is structured as a light infantry force capable of regional stabilisation and peacekeeping operations as well as a contribution to coalition and collective security operations further afield. These have proved to be extremely valuable capabilities in recent years. What appears to be lacking in its current orientation is its ability to operate in a maritime as distinct from a land setting.

This could well be a direction that Army in conjunction with Joint Force Headquarters might wish to

think about. Questions could include its ability to draw from existing structures to create and embark a maritime battle group; what such a group might look like, including how it should be equipped and trained; and whether it should have a permanent nucleus or be a largely ad hoc grouping put together according to the particular requirements on the day.



DR LANCE BEATH
GENERAL EDITOR AND
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Lance has a background in science (PhD Otago University, Fulbright Scholarship and Post Doctoral Fellow in Thermodynamics at UCLA) and public policy. He served 20 years in the Ministry of Foreign Affairs and Trade which included postings in Jakarta, Washington, New York, Ottawa and the Cook Islands. In Wellington he was the Director of the Australian and European Divisions of the Ministry of Foreign Affairs and Trade and Deputy Director of the Economic Division. This was followed by nine years as Manager of Strategic and International Policy in the Ministry of Defence where he worked on the 1991 and 1997 Defence White Papers and subsequent force structure reviews. At Victoria University of Wellington Lance designed and directed the first postgraduate strategic studies programme. He has also taught postgraduate papers in defence policy, civil military relations and law and national security at Massey University's Centre for Defence and Security Studies

and various short courses in strategic thinking at VUW. He has written a biography of General Jerry Singirok, Commander of the Papua New Guinea Defence Force and authored their 1998 Defence White Paper 'Service to Others'. He established and taught an academy for young Diplomatic Officers in PNG's DFAT. With Peter Cozens he designed and taught a programme in Maritime Strategy for the RNZN. Also with Peter and RADM John Martin, he established the New Zealand Oceans Foundation where he is the Research and Publications Director.

Lance has a son in the New Zealand Army, a son who works for the Salvation Army in Melbourne and a son who is an online marketer. He has two daughters, one who is an early childhood educator and the other a professional photographer. His interests include reading, conversation, good wine and being with friends and family. He collects books on naval affairs including a large and growing collection of books on the life of Admiral Lord Nelson and the publications of the UK-based Naval Records Society.

‘New Zealand will willingly afford and fund the level of capability that it can understand: the challenge facing Navy’s leadership is to build the necessary levels of understanding and ownership.’

—John Martin



AFFORDABILITY AND VALUE: THE DEFENCE CONTEXT

A number of writers in this first issue of the *Journal* have reflected on affordability and its possible impact on the future fleet. To draw out the implications further, including how we should think about “value” in the context of defence, we asked Gareth Chaplin and Rear Admiral John Martin, two professionals who have been intimately involved in defence policy and capability decisions over the years, to give us their views.

RIGHT
Gareth Chaplin.

LEFT
Computer-generated image of a RAN Hunter class ASW frigate. Based on the RN Type 26 Global Combat Ship, HMAS *Hunter*—the first of nine ships in class—is due to reach initial operational capability in 2031. Image courtesy of RAN.



Opening the discussion is **Gareth Chaplin**, Principal Economist at the New Zealand Institute of Economic Research and former Treasury Vote Manager for Defence at the New Zealand Treasury. Gareth writes about the affordability and value of New Zealand’s naval forces.

A historian by trade, Gareth has spent most of his career in organisational design, regulatory policy and financial management.

Starting in the State Services Commission and Treasury, he spent many years learning the

craft of Vote Management and organisational reviews. This culminated in six years leading Treasury advice on Defence and Security Funding, and International Economics. With a bit of a crash course in security following 9/11.

Gareth also spent six months seconded to New Zealand Defence Force (NZDF) HQ leading the original Defence Capability and Resourcing Review (under General Mataparae). He then went to New Zealand Trade and Enterprise as their Chief Economist, spent several years at the Ministry of Transport running funding and governance processes, and for the last three years has been a Principal Economist at the New Zealand Institute of Economic Research, where he does management consulting, governance and funding reviews, problem solving and occasionally teaches on public policy at Victoria University.

Apart from his six month secondment to NZDF HQ, Gareth’s connections to defence and security include a grandfather who served in Regular Force Army at Singapore (noncom 1942 and a Prisoner of War in Japan), a stepfather who serviced Lightnings as an Electrical Engineer in the RAF (then completed a PhD in Flight Simulation), and a wife who served five years in the RNZAF.

Introduction

Defence funding is a hard question for Treasury, and for Government Ministers.

The cost is immediate, the benefits are highly uncertain, and the normal budget rules don’t seem to apply.

Build a hospital, and you can run the metrics over procedures, survival rates, quality of life, and come up with a cost-benefit calculation. If it’s positive enough, you might invest in a new hospital, over a

new school, or a new piece of roading infrastructure.

To do that, Treasury has built a whole industry around Better Business Cases, Benefit Assessments and Investment Frameworks.

So, in that context, how much should be afforded to build the Navy? And how might you tell?

Our esteemed editor, in commissioning this piece, asked that I be deliberately a bit edgy. The purpose of this article, therefore, is to provoke debate. The views expressed here are my own and do not reflect those of my previous, or current, employers.

The tyranny of definitions

I would tend to define affordability to mean “purchasing an optimal amount of naval capability”.

Very Treasury, very sound. But how on earth do you define optimal?

How about, “what do other people spend?” It is always safer to be in good company, particularly when specification is hard. Ministers will want to reassure themselves about where they fit in the Organisation for Economic Co-operation and Development (OECD) pack, or against other countries they feel affinity for. This is the thinking that got us into the belief that spending 1.5-2% of gross domestic product (GDP) on defence is about ‘right’ since that is roughly what the people we benchmark ourselves against do. It does not say very much about New Zealand, or our particular needs though.

I think this is our default thinking, and it gets defence spending very much into the

“grudge spend” mindset. What is the minimum necessary we can get away with?

I think we can do a bit better. How about a slightly more granular definition:

“buying the *minimum* amount of capability that you can be *reasonably confident* will deliver *most* of the tasking you are likely to need *over the life of the asset*”.

This gets us closer to a more practical definition, but as you can see, there are a range of judgement calls baked into that statement:

- What tasking can you reasonably expect to plan for?
- Capability is a combination of platforms, systems and people. How much of each is enough and when will a refresh be necessary?
- Time matters. Navy assets have long lives, people have to be recruited, trained and given experience, ships have to be maintained. You have to be able to get up and go again following a deployment, so how much headroom do you need to allow for stewardship of the people, the service and the ships?
- Life-cycle cost matters: whole-of-life operating costs are (rule of thumb) twice the cost of the platform.
- What does “reasonably confident” mean—bleeding edge, comfortably achievable, somewhere in the middle?

There isn't a shelf full of extra Navy if you suddenly decide you need one—these are highly specific assets (in the lingo) that it takes time to raise, train and maintain. So these are matters for educated guesses.

The challenge for the Navy, and the other services, is how to help government and civilian officials to navigate through these issues.

Key issues

Government is unwilling to face up to providing clear direction about likely use and tasking of its military capability

Why this matters to Treasury: Form follows function. It is easy to see what health investment, or education investment is supposed to achieve. What does investing in military capability provide?

In the past, New Zealand has not been inclined to specificity about our strategic interests, or our military needs. We end up with lots of partial statements about disaster recovery, fisheries protection, Antarctica, Pacific neighbours, anti-piracy, price of entry to military alliance clubs (Australia, US, Five Eyes), price of admission to trade conversations (Australia, US, UK, etc) and influence in Latin America, South East Asia etc. Support to the defence of the rules-based framework is also bandied about—easy to say—and hard to quantify just how New Zealand's military capability delivers this benefit.

We then end up in inconclusive discussions

about peacekeeping, regional security, fisheries patrol in the Exclusive Economic Zone and contributions to long standing relationships and operations.

We end up with horrible metrics like percentage of GDP. 2% turned up years ago, it's an incredibly poor metric, it speaks nothing of choices, or capability, or assets. It provides a rough comparator of affordability—but is there a better one?

What benefits does having a Naval capability really deliver?

Why this matters to Treasury: There are a range of economic and social benefits that having naval capability provides. Some of the arguments are stronger than you might think, others are probably weaker. Understanding that there will be a package, and that Treasury will look at direct benefits, indirect benefits and then, maybe, wider-economic benefits (be warned, Treasury staff are trained to be deeply sceptical of benefits, and of multipliers¹). You should also invest some time in encouraging Treasury to think through arguments around option value.

A lingering doubt that the defence asset procurement system doesn't work very well

Why this matters to Treasury: In the past you could not really trust defence acquisition processes. Our recent history has seen poorly thought-out specification

¹ Business cases always contain optimism bias. The bigger the infrastructure project, and the longer it takes to deliver benefits, the worse this will get. A wise Finance Minister once said ‘Double the cost, halve the benefits, does it still make sense?’ This is very sound advice to go by.

BENEFITS OF NAVAL CAPABILITY

Benefits		Comment
Direct	<p>Contributions to meeting national security options. Combat assets when push comes to shove.</p> <p>Dispute resolution, protecting New Zealand's interests, solving problems—disaster recovery, fisheries patrol, regional security operations, anti-terrorism patrols, suppression of piracy, criminal activity, saving lives, protecting people.</p> <p>Employment during construction, technology transfer, maintenance and support over life of asset.</p>	<p>Not all easy to quantify, but there are ways to identify values and model benefits. Be aware that the cost of deploying a military asset to a task is quite high given the likely direct benefit.</p> <p>Hard to measure, but there are some proxies (value of lives saved in search and rescue (SAR) for example).</p> <p>While hard to measure, important to have benefits recognised. Our national security interests are involved.</p>
Indirect	<p>Deterrence.</p> <p>Defence diplomacy.</p> <p>Trade engagement.</p> <p>Public confidence.</p> <p>Location of vendor and supplier companies and partner companies in New Zealand.</p>	<p>Harder to quantify, but worth noting that defence diplomacy does provide payback in terms of reputational capital with other jurisdictions. Benefits in terms of trade agreements, Foreign Direct Investment (FDI) flows and information exchange.</p> <p>Hard to measure, but difficult to dispute that it exists.</p>
Wider economic benefits	<p>Spill-over technology to the private sector.</p> <p>Training provider.</p> <p>Input into wider industry sector.</p> <p>Spill-over skills.</p>	<p>Probably real, to an extent, but a defence capability is not likely to be the most cost-effective way of delivering that benefit, compared to other investment choices.</p> <p>There is probably merit in identifying the value of leadership skills to the private sector, defence leaders have experience of people management at a scale that is quite rare in civilian industry.</p> <p>Count, but with caution.</p>
Option value	<p>A term in economics that assesses and attempts to value based on three factors: (1) uncertainty about future need for the asset, (2) irreversibility or high cost of replacement if the asset is lost, and (3) non-storability of the asset.</p>	<p>Arose initially in the environmental economics and public good field.</p> <p>Directly applicable to the debate about Naval combat capability. This is a capability that you really have to use or lose.</p> <p>Hard to measure, but probably your strongest argument.</p>

processes, troubled acquisitions, and significant and material under-estimation of whole-of-life operating costs. Essentially, the civilian-led procurement system seemed systemically organised to deliver poor quality solutions.

From a Treasury perspective, because of the incentives, there is little experience in procuring major defence assets:

1. It's a once in a generation activity, so normal civilian techniques to assess business cases are used;
2. There is little expertise within the services and MoD around managing highly complex military acquisitions;
3. Other civilian players don't really have skin in the game. Will Customs or Fisheries be forced to use only defence assets?; and
4. New Zealand Defence Force (NZDF) personnel, even in acquisition roles, were in rotational postings, not specialist roles.

We aren't sure if we can really trust the advice from the Navy (or other Services) about asset choices

Why this matters to Treasury: It's not clear that the Navy has the same incentives as Treasury, or sees things the same way.

While immense steps have been made to improve procurement processes over the last decade, Treasury officials will instinctively expect that business cases will be systemically under-costed, and that benefits will be overstated (just like in the civilian world) except that defence

procurement is harder to "grip up". Skills to assess capability needs from a military perspective are scarce and unlikely to be in Treasury, so you have no choice but to go fiscal.

Given this, does the Navy turn up with one hand tied behind its back? If the Navy leadership assumes that Government is unwilling to spend, will it really put its best argument forward, or will it put up what it thinks might be acceptable?

This isn't to pick on the Navy. My perspective is that the NZDF is good at talking itself into assuming that government is unwilling to pick up the tab to fund capabilities properly.

We do use the Navy, and often quite hard

Why this matters to Treasury: There is a regular tempo of work commissioned from the Navy. We use naval assets to undertake regional diplomacy and disaster recovery. We have sent frigates to anti-piracy operations off Africa, we have back-filled alliance roles, we have deployed assets to the Arabian Gulf and elsewhere over the last decade. We lead on Bougainville, and were heavily involved in Timor. We are engaged in COVID-19 response and a regular round of search and rescue and disaster work in New Zealand (earthquakes, floods etc). Our assets are being tasked, and will continue to be tasked.

These are facts on the ground, the metrics exist, and cannot be disputed (well, you could argue we own the assets so we have to use them, but do we really deploy naval resources just because we have them?)

I think tempo is one of your strongest weapons when discussing current and future capability.

The elephant in the room— Maintaining a surface combat capability

The most expensive, most sophisticated assets the Navy operates are Anzac frigates. Post the Frigate Systems Upgrade (FSU) project, they will be capable assets. They will be able to undertake military tasking, and indeed have been regularly and extensively used in that capacity (anti-piracy, Gulf patrols, Straits of Malacca patrols etc). They represent the apex of New Zealand's maritime naval capability.

They are however ageing and presumably the hulls, engines and other systems, are deteriorating and will be increasingly expensive to maintain. Australia is well into planning for replacements. Is it time to consider being part of another Anzac purchase, or have our needs and interests diverged too much from Australia's?

The biggest question is what purpose does maintaining a very sharp spear point actually achieve for New Zealand, given the multi-billion dollar investment required?

At Treasury, we would ask whether we can get all or most of the benefits from a blunter spear. So what exactly/precisely does the really expensive, really sharp end really deliver?

You should expect that Ministers, Treasury and the people of New Zealand will need to be convinced of the value and benefits a surface combat capability actually gives New Zealand. You cannot expect to engage departmental officials on the weight of this argument over the few short months associated with a Defence Assessment or a White Paper. The argument must be part of an ongoing national conversation led by the Defence Force.

How do we even start to have this conversation in Wellington? It is probably a 9 billion dollar investment and this is for the replacement surface combat fleet alone. There are also other future maritime capabilities (including Airforce and Army-related) which will need to be taken into account in the context of a systematic investment and rebuild of New Zealand's maritime capability. A figure of 2–2.5 billion dollars a year over each of the next 10–15 years would not be out of the ballpark for maritime capability, and some of that is likely to be very "lumpy", and would also be in addition to the current indicative investment figure of 20 billion dollars for Defence capability from 2019 out to 2030.

Some factors to take into consideration, when looking at surface combat capability replacement:

Firstly, we really do use our surface combatant force.

Facts are important. New Zealand regularly deploys naval assets into environments where the need to project naval power is necessary. This is on top of regular military exercises with allies, again where military power is expected.

Secondly, you would be a brave person to assume a benign strategic environment in the Pacific for the next 30 years.

New Zealand has one of the biggest exclusive economic zones in the world, is utterly dependent on maritime trade, and asserts responsibilities into the Pacific. Our Pacific neighbours comprise some of the more vulnerable states in the world. Experience in Bougainville, Timor, the Solomons, Tonga, Fiji and Papua New Guinea suggests that democratic institutions remain

under pressure throughout our region, and this is a matter of enduring concern to us.

For most of the last 30 years, New Zealand has been able to assume a *Pax Americana* world. We are seeing a bipolar world evolving. China and India are looking to project power, the Korean Peninsula is still unstable, and the US is struggling to respond in a coherent manner. Association of Southeast Asian Nations (ASEAN) nations are clearly worried, Japan and Taiwan are investing in capability, and our Australian allies are quietly undertaking one of the biggest peacetime build-ups of maritime capability in their history.

Thirdly, losing a combat capability is incredibly difficult to replace.

Surface combat vessels are far more than hulls. They represent the apex of an entire system from doctrine, experience, systems, logistics, support etc. Experience overseas suggests it takes a generation to recover a capability if it is let go.

So where does this leave us?

Treasury and government are likely to be more sympathetic to your argument than you might sometimes think. Despite a brief moment at the fall of the Berlin Wall, history did not end, and the world remains a complex and dangerous place.

Our biggest problem, and the single most important point of failure in discussing affordability is that New Zealand has resiled from an honest conversation about what it wants its military to actually do. This is the lacuna that is central to our problem.

What I have tried to do in this short article is to suggest that there is a real need for

an effective, credible and sustainable naval capability, and this need is likely to remain significant.

Without your help, Treasury will not be able to support you in arguing for an appropriate level of investment capability unless we:

- know precisely what we will use the capability for;
- have an expectation that it will be regularly used;
- believe that the quality of the investment is sound;
- are confident that the resultant capability offers government flexible options; and
- can see that we are preserving military capability for future governments.

The closer the Navy can get to anchoring the discussion in credible tasking, and building up from there, the more confident that Treasury and Ministers will be in supporting packages of funding.

GARETH CHAPLIN'S HANDY CHECK LIST FOR NAVAL OFFICERS

1. Need to understand the 'authorising environment':
 - a. What are Ministers looking to achieve—just like us, Treasury are advisors to Government, they will respond to instructions.
 - b. Best to be grounded in something concrete, a defence assessment, a white paper, a procurement strategy—don't hit them cold.
 - c. Be in good company—there has to be a high level of NZDF joint commitment, having Ministry of Foreign Affairs and Trade, and other civilian agencies onside helps.
 - d. Build and maintain confidence in the specification process—the capability need should fall out of a transparent needs' assessment process, not be backfilled by one.
 - e. Invite Treasury into processes, they must have skin in the game. Joint problem solving is the right space to be in.
2. Recognise that they are civilians; they are smart, but they don't understand military capability, or its limitations, so it needs to be explained in terms they can understand:
 - a. scarce highly specific assets;
 - b. option value; and
 - c. benefits:
 - i. **direct benefits**—rarely used, but used in exegesis.
 - ii. **indirect benefits**—regularly used, not necessarily the least cost solution in an emergency or natural disaster, but reliably available, and will do the job (high levels of integrity and quality).
 - iii. **wider economic benefits**—real but hard to quantify (trade, diplomatic). If they get that there is tangible value, and that there is no easy way to generate equivalent value, then we're in joint problem-solving mode.
3. Remember there is always a fiscal dimension—fitting packages into envelopes and timing issues.
4. Fully cost the capability. Purchase price, operating costs, systems, system upgrades, personnel. Undercook this and it will bite you later.
5. Don't let the fiscal calculus drive the need for the capability (one frigate is not a frigate capability any more than two has proved to be, as witness the FSU non-availability issue). New Zealand has a nasty habit of penny-pinching the acquisition of critical assets, as anyone on the Auckland Harbour Bridge, or queueing for the Terrace Tunnel will remind you.
6. Remember Treasury will challenge your assumptions—it is their job. Do not get threatened or flustered by it, invite the challenge and use it to strengthen the intervention logic.
7. Finally, it's a repeat game—don't try and win today's game and end up losing the series.

¹ Mark H. Moore, *Creating Public Value Strategic Management in Government*.

'What will be needed is no less than a new nationwide conversation about the value to New Zealand of investing in maritime capability.' –John Martin

John Martin continues:

If the last eight months have taught us anything, it must be that, when required, the Government will act decisively to address a threat to the country. If necessary, it will do so alone but generally it will consult others—especially Australia. To act, the government needs options. It needs real capabilities that are well defined, practiced and can be trusted to deliver. Those capabilities must not exist in a vacuum but sit within a framework that allows them to support and be supported by the whole country. What will be needed is no less than a new nationwide conversation about the value to New Zealand of investing in maritime capability.

At the same time, the public's expectations of government agencies seem to have changed given their recent experience that the "unprecedented" does happen. Pandemics, terrorist attacks, earthquakes and wars have all impacted on the security of New Zealand within living memory. There is a clearer expectation that the Government will have adequately planned to meet threats.

In the defence arena, dealing with a national security issue requires capabilities, people, relationships and trust to be formed ahead of time to provide real options. Otherwise the outcome is that inferior

capability drives policy, reduces the options and constrains the response.

It is essential to understand the views of those upon whom you will depend to assist in procuring the maritime capability that the country will need for the future. It is trusted advisors in the Ministry of Defence, Treasury, Ministry of Foreign Affairs and Trade, Department of the Prime Minister and Cabinet, Customs, the Ministry of Primary Industries, New Zealand Police, Ministry of Transport, and Maritime New Zealand amongst many others who will help shepherd the notion of the need for new maritime capability for New Zealand.

While you and your military colleagues will be across the need for maritime defence assets, others, arguably more in tune with a wider range of government work, will try to understand where the military fits into the entire set of national priorities. Gareth's perspective offers a valuable insight into this challenge.

So, the case for the maritime recapitalisation programme for the New Zealand Defence Force needs to start with a statement, or possibly a restatement, of Government policy. As Gareth suggests, this is to be found most authoritatively in a Defence White Paper, supported by Defence Assessments, published capability plans or other government statements about capability. So, this is where the key task lies. Making sure that these high level policy statements adequately reflect the requirement for maritime capability (which, it is important to note, is contributed to by all three services along with many other agencies of government). And, in talking about affordability, to keep in

mind at all times the equivalent need for the delivery of value for every dollar spent.

In Defence, as in most areas of life, value is seldom found at the cheapest end of the cost spectrum. Or, for that matter, at the most expensive. Value has to be thought of in whole of life terms, and on that Gareth and I are completely agreed. Where we disagree is over the use of terms such as "minimum" and "reasonably confident" and "most" and "likely" and other words that gloss over some of the more brutal facts of life.

The tyranny of definitions

Gareth's view of affordability is that it is about 'buying the minimum amount of capability that you can be reasonably confident will deliver most of the tasking you are likely to need over the life of the asset.'

That sums up the approach to building that we have seen in the past. This notion that we are too small to afford what we need means that we build for now—not for the future. Consequently, we end up with half a Parliament building, half a bridge, half a tunnel, single carriage highways that need resurfacing as soon as they are built, a narrow gauge railway system, insufficient housing and so on. It is hardwired into how we have procured assets in the past. The question is, can we change that hardwiring?

Using the word "minimum" seriously undermines the reputational benefits that we seek from a professional navy. If we substituted "maximum affordable" in Gareth's definition, we would lose nothing but gain a lot. Affordable is exactly that, and given every other pressing demand on Government, we *might* end up with a combat capability (ship for ship) that is on par

with our ally, Australia; our Five Power Defence Arrangements (FPDA) treaty partners, the UK, Singapore, Malaysia; and our security partners, the US and Canada. So that when there is a need to consider the option of contributing our ships and sending them into harm's way, they will be fit for purpose. This is how we get reputational benefit as well as combat and service credibility—not by stressing how little we hope to get away with, but how much we can afford to do in a collective cause.

It helps to be upfront from the start with the actual need and the consequent cost. This must be based on an honest discussion of need against capability. As Gareth suggests, this should involve a detailed tasking and functional analysis which should lead on to the analysis of different possible ways of meeting the need.

Artificial boundaries around cost don't help and only reinforce the notion that defence and security can be a piecemeal affair. Costs forecasted in a capability plan are not the budget. There may be a temptation to temper the impact of the cost of the capability by trying to ensure that it remains within an agreed limit. Often those limits have been set many years before, are based on perceptions of what may be politically supportable, seek to reduce risk to other agencies or are simply a rough estimate.

We have seen many examples where the requirements for ships and other naval capabilities have been compromised to meet short term imperatives in the project space. These constraints, when compared to the life of an asset, are quickly forgotten and what is left is the ongoing need to manage a ship that is not fully fit for purpose.

The impact is a stifling of the capability development process while the ship is managed within design constraints until it can be replaced. Alternatively, significant organisational energy must be expended to try and design and build into the vessel those attributes that should have been there in the first place.

We need to get this right because experience suggests:

1. We often buy the cheapest because we begrudge spending to get the right fit-for-purpose ships;
2. We purchase ships that have a smaller capital cost but are often more expensive to run/ maintain through life; and
3. We take what is on offer—not what we need.

We need to be clear about the benefits of the Navy

Gareth is right that we need to not just argue the military benefit but most particularly consider the positive impacts on international relationships, the economy, New Zealand society, trust in Government and so on. This detail may not be available at the time of Defence White Papers or capability plans—but should be developed on an ongoing basis and/or for the business case. Reputable studies need to be conducted to provide the data necessary.

The doubt about the defence asset procurement system

We should have confidence that recent (2014–2020) changes to the defence capability system have reduced the risk to reputation around capability acquisition. In the past there may have been a temptation to address

acquisition risk by adjusting delivery timelines, reducing allowances for ammunition or shifting costs into the operating budget. That approach impacted on capability availability and consequently has reduced options to government. The new version of the capability system that offers greater transparency, joint ownership of risk and management of the complete lifecycle of capability will create a greater level of confidence across government.

Trusting Naval advice

Just as Treasury professionals are the trusted advisors to government on all matters to do with the economy and its management, so too are Naval professionals the expert advisors in naval capability. No one else can provide the insight on seakeeping, maritime surface warfare and the conduct of operations. It is Naval commanders who lead at sea and must transform the products of the capability process into highly organised and capable maritime forces to provide options and meet the expectations of government.

Recent experience shows that the country expects that government will have done the work before the emergency arises and will have the capability ready to deal with current, emerging and new challenges. The country values the ability to have the right capability available to allow the government to consider a range of options and deliver the right response.

The requirements for maritime forces are just as valid as the need for medical, education and social services. Yet headwinds should be expected. Gareth's insight offers some key pointers on how to argue these requirements

which I wish I had known at the beginning of my capability career—not at the end. Finally, I agree with Gareth that other agencies may be more sympathetic to the maritime argument than you might think. In my dealings with non-defence colleagues they are perplexed why the Navy is the smallest service. It is more often the case that the nation's executives are more supportive of a Naval case than officials.

We need maritime capability that supports policy and provides options that allow the required response. The maritime requirements need to be robustly argued and the advice offered must be frank and uncompromised.



JOHN MARTIN
FORMER CHIEF OF NAVY
AND ASSISTANT CHIEF
OF DEFENCE FORCE FOR
CAPABILITY

Having served New Zealand as a naval officer for four decades, John now works with a number of organisations, supporting senior decision makers in the corporate, government and not-for-profit spheres. In private life, John is the Executive Director of the New Zealand Oceans Foundation and fellow of the Centre for Defence and Strategic Studies, Canberra. He is also a member of the Institute of Directors. John has been described as offering a useful bridge between two quite different worlds or hierarchies: the universe of experience and the universe of imagination—a description his wife Sue has often pondered!



A TURNING POINT FOR NEW ZEALAND'S MARITIME PERIPHERY

IMAGE
HMNZS *Te Kaha*
alongside the
USS *Nimitz*.
Image courtesy of
the US Navy.

In May 2018, Simon Murdoch delivered a paper to a full day seminar on maritime security hosted by Victoria University's Centre for Strategic Studies with the title 'A Turning Point for New Zealand's Maritime Periphery'. Simon is a former Secretary of Foreign Affairs and Head of the Department of the Prime Minister and Cabinet. As such, his views on the evolving nature of the risks in our maritime periphery are based on deep experience and prolonged reflection.

With Simon's permission, we reproduce his speaking notes here because of their evident topicality and ongoing significance. An edited version of these notes can also be found on the online blog *Incline* at www.incline.org.nz.

Simon suggests that New Zealand may be at a strategic turning point, where thinking about our maritime periphery needs to be approached in a more fundamental and systemic way, leading potentially to a paradigm shift in our external policy settings, including how we think about our investments in operational capability, civil as well as military.

The last time I was involved in this topic was two years ago when the Centre for Strategic Studies ran a symposium on the 2016 Defence White Paper. At that time I was moved to recall that defence capability has always been, and still is, a difficult subject for New Zealand governments of all persuasions.

Generally, defence capability has been approached minimally and incrementally with no great political appetite for capability step change. In fact the biggest change was to do away with combat air capability in 1999. Those with a long enough memory may recall that when we acquired the Anzac frigates the numbers acquired were reduced from four to two. We tend to trade off capability for affordability—"built for but not with".

And specialisation is not easy. We often multirole. We buy offshore, and more often last of run than first of class; the risks of obsolescence, price or currency fluctuation are unnerving to Ministers. It is never an easy argument around the Cabinet table and if we are going to affordably renew or replace existing capabilities—let alone add new elements—it takes us a long time.

New Zealand's thinking about its maritime interests and defence priorities has favoured a customary hierarchy. Local and South Pacific regional concerns come first and then we span out eventually to global commitments. But recent developments in the East Asian littoral and the Northern Pacific suggest this approach may run New Zealand into a hole.

We may be at a strategic turning point in terms of risks to our interests and in need of a paradigm shift where policy settings can be adapted to the changes occurring in this wider maritime periphery.

The idea that New Zealand even has a contested maritime periphery is not automatic in our thinking which emphasises our quest for well-governed seas much closer to home. Thanks to advances in international law and the multilateral system since the 1970s, New Zealand today claims sovereign rights over an extensive sea and seabed estate that runs well into the West Tasman sea and deep into the Southern Ocean, abutting the waters protected by the Antarctic Treaty system.

New Zealand's rights here are also matched by our obligations of stewardship and guardianship. We regard this maritime estate as fully governed space. This means we need to have awareness within the estate as an area in which we actively manage risks. The maritime estate is regulated by New Zealand law and we must be capable of enforcing it, including by acting alone if necessary.

Second, we are accustomed to thinking about a slightly more distant area which can be called our maritime domain. Here we find New Zealand's assertion, which we have continuously made since the imperial 1900s, that we have defence and national security interests in an even more extensive maritime space. This includes Antarctica, the Tasman Sea, the Southern Ocean, the realm territories (Niue, Cook Islands and Tokelau) and beyond including the high seas of wider Oceania.

Further East the maritime domain includes independent Pacific Island nation states, with whom New Zealand has

maintained or developed peaceful and friendly relations over the last 40 years. Many of these countries are small, ecologically fragile and resource-poor. Importantly, their economic development profoundly relies on their own maritime estates. Especially in conjunction with Australia, and also with the EU, Japan and the US, and multilaterally through the United Nations Development Programme and other international agencies, New Zealand has contributed to maritime risk management in this region. This has extended to all aspects of development including the management of environmental and human security challenges. Other states, including China, Russia and India, are also increasingly engaged.

In comparison to the estate, the domain is partially governed space. New Zealand certainly undertakes risk management in this domain. We also support the collective regulation of these areas through international and regional treaties. With the consent of neighbours and the help of like-minded partners, we expect to enforce the rule of law in the maritime domain and to be able to exert some control over state behaviour, as well as over commercial actors, whether legitimate or criminal. But New Zealand's influence in the domain is less extensive than in the maritime estate.

These first and second rings are connected. It can be argued that one of the most significant missions for New Zealand diplomacy since the Second World War has been to extend the governance systems of the estate into the domain, progressively developing legal and regulatory regimes. Supporting domain governance has entailed operational and resourcing implications for

many arms of government. For the New Zealand Defence Force in particular, and also the regulatory agencies who have stewardship or guardianship roles in relation to New Zealand's maritime interests, the awareness and enforcement of this estate-domain governance connection have become core functions.

This means thinking about maritime governance in a systemic sense. Governance includes the arrangements and instruments by which a state sets the rules of public and private behaviours. It extends to monitoring that behaviour (and being aware of the risks it poses to these rules). And it means enforcing rules through deterrence, interruption, prevention, and also the imposition of penalties as a result of due legal processes. When this kind of governance regime exists between states, as a result of negotiated agreements, it is called a rules-based "order". We therefore have a maritime governance system in New Zealand which is "rules-based" and which fits within an order of plurilateral and multilateral governance arrangements under international law.

But we then need to ask where the main risks to New Zealand's preferred system of maritime rules are coming from. And here we need to recognise that there is a third space: a maritime periphery. This view of a country's maritime interests naturally appeals to the bigger players. In a recent book, Michael Green argues that America has progressively developed its Pacific periphery strategy around retaining a forward posture in maritime East Asia. In 2013, China enunciated its own "Periphery Strategy". This has had a strong continental dimension whereby

China intends to shape, or reshape, whole regions such as the Mekong Basin through infrastructure partnerships with continental Southeast Asian neighbours. But it also has a maritime dimension. We have seen this in China's shaping and reshaping of features and islands in the South China Sea and other locations, and in its surging investment in maritime capabilities.

And this leads us to the turning point. The respective maritime periphery strategies of the two biggest powers are already colliding. Nobody is sure what the outcome will be. But the reverberations are already affecting the defence and security doctrine and behaviours of many countries in the Asia Pacific. For some time experts in Asia have been talking about deteriorating political relationships, a propensity to militarise and to deploy military force as a tool of intimidation, divisions over trade and economic architecture, and the insufficiency of the existing institutional arrangements to cope with more assertive nationalistic agendas. This sort of reappraisal is now reflected in the official security policy statements of many governments, including most notably the United States. Australia is also adjusting, and its responses are particularly relevant to us.

The risks apply directly to New Zealand if we think carefully about it. Our maritime estate and maritime domain incorporate the sea-lanes and air corridors that connect us commercially with global export markets and other global flows. Notably these include the connections in the periphery between New Zealand and the Pacific Rim markets of the Americas and the supply and value chains of East Asia.

Deepening New Zealand's connectivity to this part of

the world has been the core strategic mission for our diplomacy for over the last thirty years. This extends to our participation in groupings such as Asia-Pacific Economic Cooperation (APEC) and the East Asia Summit, whose membership reflects where our economic prosperity is now predominantly centred. It has involved an outward-looking political consensus among successive New Zealand governments who have championed a persistent commitment to trade liberalisation and a progressive relationship with a growing China.

These deep economic connections alone mean that New Zealand needs to adjust its maritime security overview to recognise that it too has a maritime periphery, and one which extends beyond Oceania. Our periphery is trans-Pacific in nature and incorporates maritime South East and Northeast Asia. And it has been the location for a long period of geopolitical and geo-economic stability. There has been no interstate conflict in Oceania since the Second World War and none in wider East Asia since the Sino-Vietnam War in 1979. Political development and nation-building which has been so problematic in other regions of the world have been able to progress alongside continuous economic modernisation. This has reduced poverty and catalysed human development, nowhere more spectacularly than in China. Moreover Asia's rising economic powers have promoted intraregional trade and financial flows as states have negotiated market liberalisation arrangements and rules that encourage fairer business competition.

There have been promising signs of governance and rules. Regional political and economic

institutions have been created which have developed rules and norms for interstate conduct to reduce tensions, resolve cross-border issues by negotiation and conciliation, and restrain the use of military and other coercive powers by large states against smaller countries. Association of Southeast Asian Nations (ASEAN) has encouraged an embryonic regional agenda to support human security, and to deal with non-traditional security challenges arising from the gloomier side of globalisation. Environmental protection, especially mitigating climate change impacts, is part of that agenda.

For most of my working life this period of development, peace and progress has been underwritten by the postwar multilateral framework which has in turn been supported by US military and economic power. Washington's open market philosophies and its extended deterrence doctrine enabled by a functional network of alliances and security partnerships has been part of this picture.

The aggregate stabilising power of these factors throughout the periphery has enabled New Zealand to advance its national interests. We have been able to achieve maritime estate and domain governance goals relying on political diplomacy and levels of military investment that, in a time of overall stability, have proved sufficient.

But the erosion of US dominance coupled with China's emergence and aspirations represent a turning point in the balance of power and the politico-economic stability of the periphery. A new order may be emerging but as yet we cannot be sure of its shape or form. The Korean Peninsula situation with its obvious

flow-on for Japan will give us some portents of how the contest between the periphery strategies of the US and China may be resolved.

Beneath all this lies the bigger question of how much reliance can be placed on the primacy of international law and consensual approaches to dispute resolution in the coming decades. Are the moderating institutions, which contain and channel the raw exercise of economic or military power, and which enable collective responses to the pressures of globalisation, fit for future purpose? Will they be able to be strengthened or left to sag under the weight of too much to do with too little if the major powers cut to the chase? What happens to small states when their convening power—the ability to bring more powerful states into multilateral or regional negotiating frameworks—isn't effective any more?

This means we need to be clearer where the maritime risks for New Zealand come from. It is in New Zealand's maritime periphery that the risks to the rule of law are most pressing. And that is where the main challenges to the stability of New Zealand's maritime domain and the security of its maritime estate will also originate.

Instead of looking out from the inner to the outer maritime ring, we need to look more directly at the risks to our interests. It is in the periphery where we see the core of externally-derived risks to our national security. Competition in the periphery is the most likely generator of cross-border, cross-cutting, complex security developments and phenomena over the next 20 years. These are long-term trends and the emergent risks are long-term and strategic in nature. Provided we turn to face them with some urgency, they can be mitigated

by adjusting our domestic and external policy settings, our regulatory posture, and our approach to investing in relevant operational capabilities, civil and military.

Editor's note: We have approached Peter Mersi, Chairman of New Zealand's Maritime Security Oversight Committee (MSOC), and Chief Executive of the Ministry of Transport, for comment on Simon's article and an overview of the work of the MSOC in helping to secure New Zealand's maritime future. Depending on timing and other commitments, we hope to run Peter's follow-on piece in the next issue of the Journal.

With thanks to Incline who originally published an edited version of this article online on 31 May 2018.



SIMON MURDOCH

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BETWEEN COLD WARS: **OLD MISTAKES** AND **NEW REALITIES**

Professor Rouben Azizian is the Director of Massey University's Centre for Defence and Security Studies. In this article he reflects on his experience and observations as a Cold War veteran and long-time Asia Pacific analyst and offers some views on future possible directions for New Zealand defence and diplomatic policy.

Introduction

There is still no consensus in the expert community whether the increased strategic rivalry between the United States and China is likely to turn into another Cold (or even Hot) War. Reconciling divergent views on this matter is difficult for two reasons. Firstly, academic specialists are still debating and reassessing the very definition of the Cold War, its prerequisites, drivers and specific features. Secondly, the weakened but still influential voice of the neoliberal security community continues to emphasise the interdependence of Western and Chinese economies and the resultant reluctance on both sides to aggravate geopolitical tensions to the level of the Soviet-era Cold War. This may turn out to be a tragic mistake, paralleling the pre-WWI belief about the so-called impossibility, on economic grounds, of a war between Britain, France and Germany. Whatever the outcome of the current intellectual debate, there are at least two parallels and two differences between past and emerging superpower confrontations that need to be appreciated by diplomatic and defence communities, including those in New Zealand.

One of the West's main concerns and criticisms of China is Beijing's authoritarian communist ideology. While the internal suppressive nature of Chinese communist leadership is undeniable it would be wrong to extrapolate it onto China's external actions and assume that Beijing pursues a foreign policy with "communist characteristics". It looks like outgoing US President Donald Trump implicitly makes that connection by accusing President-elect Joe Biden of being a 'Trojan horse of socialism' and therefore "rolling over for the Chinese." President Trump is far from being the only one who adheres to this simplistic view. While Chairman Mao has reappeared in Beijing's internal propaganda there is no sign of the Chinese leadership's return to Maoist-era promotion or export of Chinese communism.

Geopolitics and ideology

The complex relationship between geopolitical and ideological vectors of communist governments' external policy was largely misunderstood during the previous Cold War as well. As a former Soviet diplomat for more than twenty years I can attest

to the fact that while publicly Moscow promoted itself as an ardent ideological sponsor of international communism, Soviet diplomacy was much more pragmatic. During my assignments in South Asia, I observed first-hand the Soviet Union's preference in foreign countries for supporting and aligning with domestic political forces that were seen by Moscow as geopolitically more relevant, and hence more useful irrespective of their ideology. The close historical relations between the Kremlin and India's National Congress party and governments, clearly a bourgeois party according to a classical Soviet ideological definition, is one such example. This close co-operation, which had anti-American and anti-

Will increased strategic rivalry between the US and China lead to another Cold War?

The relationship between ideology and pragmatism is complex...like Soviet diplomacy before, Chinese diplomacy tends to be pragmatic also, favouring the geopolitical over the ideological

IMAGE

Chinese military base on Subi (Zhubi) Reef in the Spratlys (called Nansha Islands by Beijing). Occupied by China but claimed by Taiwan, Vietnam and the Philippines.
©Getty Images/DigitalGlobe

Chinese features, lasted for many years despite the strong influence of pro-Moscow communist movements in India and their opposition to the National Congress.

During my time in Nepal where the local Communist Party was officially banned but quite visible and active, the Soviet Embassy was more interested in engaging with the Western educated and ideologically hostile monarchy than with its local comrades. The same was true of Sri Lanka where, as the head of the Soviet Embassy's political section, I spent much more time meeting with the leaders of ruling and main opposition parties than with the representatives of the Communist Party of Sri Lanka. To sum up, the Communist Government of the former Soviet Union pursued a very realist and pragmatic foreign policy focusing on geopolitical gains more than on sponsorship of communist ideas. Practically every embassy cable proposing a new diplomatic initiative or activity would justify it in terms of national Soviet and Russian interest rather than international ideological solidarity. I don't read Chinese diplomatic dispatches but I expect them to follow precisely the same pragmatic principle.

The second parallel I would like to make in terms of common misperceptions about the Soviet Union or China is the prevalent Western view that it is their military, and not so much their security agencies, that act as the main proponents and drivers of aggressive external behavior. When I regularly read today about the rising power of the People's Liberation Army (PLA) and its rapid military modernization it reminds me of the time when Western analysts and media were captivated by

the notion of an expansionist Red Army and especially Moscow's alleged quest for warm water ports in the Indian Ocean. I can assure readers that during my twelve years of diplomatic service in South Asia I never read or heard of any internal instructions from Moscow to pursue that goal. The Soviet army did of course launch aggressive external actions, such as invasions of Czechoslovakia in 1968 and Afghanistan in 1979. Both actions however were more to do with perceived threats to what was considered a Soviet sphere of influence (again with an emphasis on the geopolitical rather than ideological importance of the area) and not as a part of global military expansion and occupation. Similarly, I see the PLA's activities today more as an attempt to define and defend a specific geopolitical sphere of influence rather than unleashing an outright expansionist war.

It was, and arguably still is, the security arm of the Chinese Communist regime that implements a more global and ambitious destabilising plan by methodically trying to undermine democratic regimes, interfering in internal political processes and controlling overseas ethnic diasporas. And yet we read and know very little about the external activities of China's secretive, powerful and generously funded Ministry of State Security and its intelligence units. Perhaps the strategic response to China's external assertiveness requires some differentiation between Beijing's actions to ensure preeminence in what it perceives to be its legitimate sphere of influence and those of China's global activities which may be harmful to the interests of the larger international community.

Land versus maritime domains

My next comment hopefully directly resonates with the views of Navy and Defence professionals reading this journal. The previous Cold War's military standoff was overwhelming and overreaching. It influenced the doctrines and activities of all services from army to navy to air force. But the epicenter of the confrontation between the Soviet Union/Warsaw Pact and North Atlantic Treaty Organization (NATO) was arguably the land area. The Soviet army was obsessed with the number of tanks it needed to have while the United States, Britain and other NATO members deployed significant forces in Germany and were preparing to counter a Soviet land invasion. The Soviet navy was inferior in power, influence and capability to the army. This in a way supports my earlier argument that Moscow's main concern was to control its immediate neighborhood, including landlocked Czechoslovakia and Afghanistan.

The new superpower confrontation on the other hand has a very distinct focus on the maritime domain. As opposed to the Soviet Union, China considers the main threats to its sphere of influence to originate in the maritime zone while the West treats Chinese behaviour in the South China Sea as more that of an expansionist maritime power that threatens freedom of navigation on the high seas and acts as a powerful coercive influence over states in the region. In any case, the conclusion is obvious: the new epicentre of superpower confrontation and international tension is in the maritime theatre. This calls for an overdue reconsideration

China's actions in, for example, the South China Sea, are an attempt to defend a geopolitical sphere of influence—not an attempt to unleash war

In responding to China, it may be helpful to distinguish between China's peripheral and global geopolitical interests and activities

Super power confrontation between the US and China has a distinct focus in the maritime dimension

New Zealand needs to develop a more calibrated response

The new realities outlined here prompt serious reconsideration of New Zealand's maritime capabilities

of defence priorities and capabilities of concerned nations away from land forces in favour of naval and maritime capabilities.

Asia Pacific the new epicentre for superpower confrontation

Finally, I am not sure that there has been a real awakening amongst strategic experts and foreign policy makers to the fact that the most dangerous region of superpower confrontation is the Asia Pacific, and not Europe anymore. This truly historic shift hasn't sunk in yet, for a number of reasons. Neoliberal Western analysts tend to view China through a more benign economic prism than they ever did with Russia. Putin's Russia continues to capture a lot of attention due to its aggressive actions in Georgia and Ukraine. While Moscow's controlling actions over its neighborhood are taking place in Europe and deserve an adequate international response, they are more the death throes of a dying authoritarian empire.

While China's rise isn't without its internal problems, this is the one that is directly challenging the West's strategic preeminence. New Zealand's diplomatic, defence and security communities need to adjust to these new strategic realities by following a more sophisticated and better calibrated response. The traditional and increasingly redundant distinction between viewing China as the main and preferred economic partner, and Western nations as like-minded and reliable security allies, needs a thoughtful strategic upgrade.

Implications for New Zealand policy

In my opinion, it should be in Wellington's interests not only to diversify its economic

relations away from an excessive dependence on China, should that be possible and practical, but also to pay more attention to building security and defence relations with a wider range of countries in the Asia Pacific. Instead of being perpetually torn between security and trade paradigms and trying to avoid taking sides between powerful rivals, a more effective diplomatic response would seem to lie in proactively facilitating trust building between the two superpowers. Promoting a stronger voice for those middle and small nations who have a preference for less confrontational superpower relations would also be a useful and pragmatic step for New Zealand and one that might help to avoid the return of another Cold War era. New Zealand's positive reputation in the region, enhanced by its relatively successful handling of the COVID-19 crisis, invites a more proactive regional diplomacy than has been seen to date.

Conclusion

Most countries follow diversified external relations with elements of pragmatism, ideology or cultural tradition which are constantly competing and complementing each other in the course of their evolution and implementation. Historically, some radical regimes tried to make ideology the only pillar of their foreign policy but later realized the futility of the approach. Pure pragmatism without underpinning ideology and values can be equally problematic if not detrimental. There are however permanent strategic and geographic realities that play or should play a defining role in the way nations protect and advance their national interests.

The maritime location of New Zealand and the increased strategic maritime tension in our region prompt a serious discussion of whether the country's maritime capabilities are adequate to respond to the new realities.



PROFESSOR ROUBEN AZIZIAN

Professor Rouben Azizian is the Director of Massey University's Centre for Defence and Security Studies. He is a former Soviet and Russian diplomat who ended his extensive diplomatic career in Wellington in 1994 as Moscow's Deputy Ambassador and Chargé d'affaires. Later Rouben spent 14 years working for the US Defense Department's Asia-Pacific Center for Security Studies in Honolulu.



In this article, Chris Howard, the Royal New Zealand Navy's (RNZN) Chief Naval Architect, takes up the challenge of addressing the RNZN's response to climate change. He argues that the RNZN should aim to become the world's first Zero Carbon Navy and suggests a number of practical steps toward this goal.

IMAGE

Chris Howard with model of HMNZS Aotearoa.

TOWARD A **ZERO CARBON** NAVY

Introduction

In response to the threat of climate change, New Zealand, along with 195 other countries, ratified the Paris Agreement in 2016. In November 2019 the New Zealand Parliament passed the Climate Change Response (Zero Carbon) Amendment Act under which net emissions of all greenhouse gases, except methane, are to be reduced to zero by 2050. This Act will require all parts of society to examine their emission levels and reduce them wherever possible and practical.

Internationally, the shipping industry, through the International Maritime Organisation (IMO), is committed to achieving at least a 50% reduction in greenhouse gas emissions from 2008 levels, by 2050. The challenge explored in this article is to look at how the Royal New Zealand Navy (RNZN) can respond to climate change, including by becoming a leader within the maritime domain in the reduction of net emission levels.¹

The New Zealand Climate Change Commission

To assist the New Zealand government in meeting

¹ This article is based on a longer Research Essay completed by the author while attending the New Zealand Defence Force (NZDF) Advanced Command and Staff Course in 2019. A copy of this essay, which includes full academic references, can be obtained by writing to the author at Chris.Howard@nzdf.mil.nz. Note that the phrase 'Zero Carbon Navy' is a contraction of 'Net Zero Carbon Navy'. The goal is limited to reducing greenhouse gas emissions to net rather than gross zero.

the Net Zero Carbon goal by 2050, an independent Climate Change Commission has been established. The Commission is a Crown Entity that is responsible for offering 'independent, evidence-based advice to government to help New Zealand transition to a climate-resilient and low emissions future.' The Commission reports to the Minister responsible for Climate Change. Its first substantive report has recently been put back from 1 February 2021 to 31 May 2021 as a result of Covid-induced delays. The Commission is required to outline a series of practical steps by which New Zealand can make progress toward its net zero carbon goal. These steps are expected to include pricing mechanisms designed to incentivise the necessary changes.

The Defence response

In November 2019 Defence (Ministry of Defence (MoD)/ New Zealand Defence Force (NZDF)) released a high level implementation plan² to guide the single service response to the climate crisis. It covers the need for Defence to respond to, adapt to, mitigate against, and engage with others to meet the threat of climate change.

To develop on the broad themes covered in the 2019 Defence response plan, this article suggests a number of practical steps by which the RNZN can seek to reduce its emissions through a variety

² Ministry of Defence and New Zealand Defence Force, *Responding to the Climate Crisis: An Implementation Plan*.

of technological means and operational efficiencies. Showcasing the adoption of these across international defence, navy and maritime sectors presents an opportunity to achieve significant wider benefit.

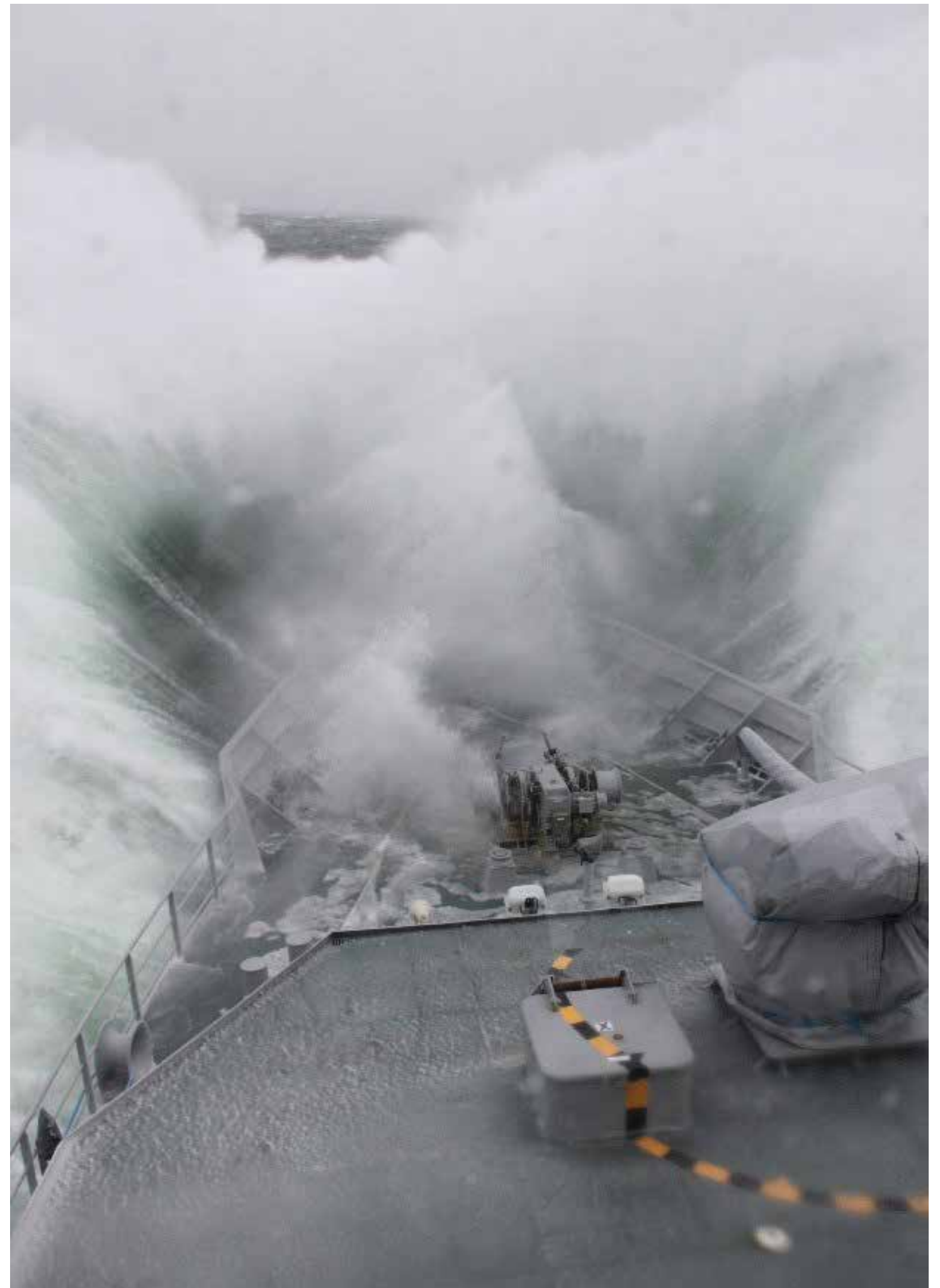
There are also pragmatic reasons for reducing energy consumption. Fuel burn is a significant operating cost. If efficiencies designed to reduce fuel burn can be achieved, then this alleviates demands on complex supply chains. This logistics and fuel cost efficiency driver has long been recognised by navies. It naturally supports pushing ship technical requirements toward the reduction of through-life emissions.

Opportunities for the RNZN to promote international engagement

The RNZN can promote the benefits of improved technologies and operating practices through its networks of naval attachés, industry engagements, navy-to-navy talks, ABCANZ (America-Britain-Canada-Australia-New Zealand) information exchanges, and the Technical Cooperation Panels (TTCP) of Defence scientific research. A potential ally in these discussions is the Royal Navy (RN).

The UK MoD, in-line with the UK government's own Zero Carbon Bill, is strongly committed to achieving energy efficiencies. It produces an

RIGHT
HMNZS Wellington in
the Southern Ocean.
Photo by M. Penny
(March 2011).





LEFT
HMNZS *Wellington*
showing ice
accretion in the
Southern Ocean.
Image by the author
(March 2011).

BELOW
RNZN/DTA
antifoul paint
coupon wharf side
experimentation,
with key performers
in hull stripe trials.
Photos by
B. Martin.



annual sustainability report, in which it is targeting further emission reductions from the 664 million litres of fuel consumed by the RN in 2017/18.³

Scientific engagement

Through ABCANZ and TTCP, opportunities exist for a broad range of collaborative research and experimentation. The NZDF can help set this agenda. It can advocate for collaboration in reducing naval emissions, or where there are spin-off benefits toward understanding the science of climate change.

Such work is already being conducted. An example is the NZDF/US Office of Naval Research programme to characterise the Southern Ocean Wave environment.

³ Ministry of Defence (UK) *Sustainable MOD: Annual Report 2017/2018*.

This involves deployment of an array of wave buoys by the RNZN. The data recorded is enabling Southern Ocean wave climate models to be validated for the first time against accurate wave buoy measurements. This is leading to better, short term forecasting for operational purposes and hindcast wave datasets for ship design purposes. The RNZN is already using the results of this work to inform the seakeeping suitability assessments of its newest ships. Supported by academia, the data can also be used to validate models investigating climate change impacts on the Southern Ocean.

Managing naval engineering research is the RNZN-Defence Technology Agency (DTA) naval platform technologies work stream. With less organisational inertia than larger defence

forces, the RNZN/DTA is well-placed to team-up with other navies and industry toward the development of new technologies, and the RNZN to provide platforms for shipborne experimentation. For example, RNZN Offshore Patrol Vessels have been used to test US Navy developed ice-phobic topside coatings, with the aim of reducing ice accretion during polar operations. This type of international navy to navy cooperation is particularly valuable.

Below waterline, the naval platform technologies work stream is trialling various paint manufacturer antifouling coatings. These are designed to keep a ship's hull slippery. This saves fuel and avoids the spread of potentially invasive marine pests. These antifoul trials have resulted in an update of RNZN coatings policies. Importantly, the recent move to a foul-release coating type is expected to save the RNZN considerable fuel, possibly as high as 8% annually.⁴

Maritime regulation

Worldwide, maritime sector emissions are significant. According to the IMO, maritime transport emits around 940 million tonnes of CO₂ annually and is responsible for 2.5% to 3% of global greenhouse gas emissions, which under a "business as usual" pathway would approximately double by 2050, due to the projected expansion in global trade. The IMO has therefore instigated a Greenhouse Gas Emission Reduction Strategy.⁵ This will require a reduction in annual greenhouse gas emissions of

⁴ Bressy and Lejars, "Marine Fouling: An Overview," 19-28.

⁵ International Maritime Organisation. *Resolution MEPC.304(72): Initial IMO Strategy on Reduction of GHG Emissions from Ships*.

at least 50% from 2008 levels by 2050. Given the expansion in global trade, this will require a reduction in carbon intensity of vessels of at least 70% by 2050. In the short- to medium-term, the strategy involves design and operational efficiency measures, but in the medium- to long-term zero carbon fuels will be required.

The primary regulatory tool for the IMO to implement the strategy is the International Convention for the Prevention of Pollution from Ships (MARPOL). Countries use nationally ratified Annexes of MARPOL to regulate pollution from ships. In 2011, a new chapter to MARPOL Annex VI was adopted to cover mandatory technical and operational energy efficiency measures aimed at reducing greenhouse gas emissions from ships. In December 2019, the New Zealand government announced that it would ratify Annex VI of MARPOL.

Ratification of Annex VI ensures that New Zealand will have a voice at the table as the IMO develops future updates in support of its greenhouse gas emission reduction strategy. It can be expected that New Zealand will advocate for technological solutions, rather than mandating practices such as slow steaming, which penalise nations that are distant from their import/export markets. As such, it would be advantageous if the RNZN adopted a “forward-leaning” stance toward the uptake of such technologies.

RNZN role in supporting tougher emission regulations

Most navies are self-regulating. To support the government’s domestic and international policy aims, the RNZN is expected to set a leading example in terms

of meeting, or preferably exceeding, regulatory ship air pollution and greenhouse gas emission requirements. For example, the two latest RNZN ship acquisitions, HMNZS *Aotearoa* (commissioned in July 2020) and HMNZS *Manawanui* (purchased second-hand in 2019) will both meet the strictest (Tier-III) air pollution compliance requirements that are new to Annex VI of MARPOL. They utilise developments in marine engineering, including urea injection, and engine and exhaust systems design, to minimise localised air pollution. These effectively minimise nitrous oxide pollution, which is also a potent greenhouse gas. Both vessels also have Ship Energy Efficiency Management Plans (SEEMP), which are a new requirement of Annex VI. Longer term, SEEMP establishes an operational mechanism to improve the energy efficiency of individual ships.

Reducing RNZN gross greenhouse gas emissions

Climate change effects in the South West Pacific may require the RNZN to adopt an increased operational tempo. For the current fleet, powered conventionally by diesel fuel, this is likely to result in increased carbon emissions. Therefore, gross carbon reduction targets for RNZN operations would be problematic, at least in the short term. Nevertheless, in order to make progress on the issue, the RNZN can explore a range of efficiency measures to apply to existing ships, and technologies for future acquisitions with the aim of reducing the carbon intensity of operations.

There are a broad range of possibilities, active as well as passive, that can be



RIGHT
HMNZS *Manawanui*.
Image courtesy of
NZDF.

explored by the RNZN. In doing so, a coordinated approach in which both technological and operational options are developed will be needed.

Baselining and measurement

Measuring the worth of potential emission reduction options will require the RNZN to establish methods for collecting and analysing ship energy consumption and operational data. Of particular developmental interest are onboard monitoring systems, such as the RNZN's Ship Monitoring Data Acquisition System. These systems assist with seeking and reporting on operational efficiencies by collecting data from the numerous sensors fitted to a modern ship. These include sensors for ship motions, machinery operation, fuel use (where fitted with fuel flow rate sensors) and ship navigation. Collecting the data is straightforward. Interpreting it can be another matter. However, advanced data analytics, through DTA applied research,

presents an opportunity to better understand the performance characteristics of individual ships and to help report on RNZN emissions. More specifically, it could provide a tool for better understanding a number of inter-related factors. These include: how vessel loading/trim affects fuel economy (and more importantly assists optimum vessel loading); how increasing sea states increase a ship's fuel burn, and to use this in optimal weather routing; how hull efficiency decreases with time since last dry-docking/cleaning; how different machinery modes affect actual fuel burn; and how far off their optimum speed and operating profile ships are actually operating. This informs the development of operational efficiency guidance.

Such monitoring and reporting systems present an opportunity to observe how well the RNZN Maritime Component Commander's Operational Orders directed toward efficient operation are being implemented, and how best to incentivise this (for example through a fleet-

wide competition for the most efficient ship). They could track the extent ships are applying efficient machinery operating modes in the interests of fuel economy, such as favouring propulsion diesel mode (in lieu of gas turbine), or single versus twin screw running at slow ship speeds. They could monitor how closely passage programming is able, in light of actual operational requirements, to implement a desire for fuel efficient operation. They could quantify how much fuel would have been saved if all transits were undertaken at a ship's most economical speed.

In this context, it is important to note that operating fast, and burning more fuel, is sometimes an operational necessity that will trump the normal fuel efficiency requirements.

The 2020s and beyond

Fuel efficiency will be recognised as a primary ship design requirement from the outset, as modifications in-service are typically much more difficult. Reflecting this philosophy it is expected that technical solutions toward a reduced carbon-footprint will be increasingly favoured by capability staffs. Capabilities that burn excessive amounts of fossil fuels will be less affordable and increasingly avoided if whole of life costings begin to reflect projected carbon cost increases. However, while we may be heading for a post-petroleum era, for the next few decades, it seems probable that most naval ships worldwide will continue to rely on diesel fuel. It should be noted here that like most navies, the RNZN does not use slow speed diesel engines, and so does not operate ships that run on carbon rich and polluting heavy grade fuel oils.

The application of modern design principles

The RNZN's newest ship, HMNZS *Aotearoa*, has been optimised to save fuel using now standard naval architecture practices, such as computational modelling and hydrodynamic tank testing. *Aotearoa* features a Rolls Royce 'Enviroship-Ledge' bow. The bow design is intended to be partially wave piercing, and so differs in form to a normal protruding bulbous bow. This should enable improved performance, with less energy lost to ship pitch motions when operating in rough waters, such as those typically found around New Zealand and in the Southern Oceans.

Aotearoa is configured with a Combined Diesel Electric and Diesel type of propulsion, with electrical power take-in to the main propulsion system. This configuration, which is not uncommon, enables efficient machinery modes of operation. The future Southern Ocean Patrol Vessel (SOPV) could take this configuration even further through the hybrid addition of electrical power take off, and battery technologies, for powering slow speed operation, such as is often required when operating close to the ice in the Southern Oceans.

SOPV design principles

The design of the SOPV is expected to feature clean, green and efficient design practices. The SOPV will operate south of Latitude 60 in the waters of the Ross Sea, and will likely support climate change science in Antarctica. As such, the part usage of methanol, as a fuel, in lieu of diesel would be worthy of consideration, noting that any spill would be almost non-toxic. New Zealand has one of the largest methanol

PASSIVE SOLUTIONS

Hull

underwater coatings

form optimisation such as bulbous bows

stern flaps to reduce wave-making resistance

bubbler lubrication to reduce frictional resistance

Topside streamlining to reduce aerodynamic drag

Propeller design tuning for more efficient propulsion

Propeller coatings

Green fuels such as biofuels, methanol, hydrogen, ammonia, liquefied natural gas¹

Electric solar panels and/or batteries/hybrid propulsion

Alternative propulsion such as sails, kites, active foils and Fettner rotor cylinders (that utilise the Magnus effect to generate aerodynamic propulsive force)

LED ship lighting to reduce hotel electrical power loads

¹ 'Green' fuels in this context are those that result in net zero or significantly reduced carbon emissions, from production to consumption.

ACTIVE SOLUTIONS

Passage planning and weather routing (including the utilisation of slow-steaming where appropriate)

Efficient machinery mode usage

Hull cleaning to remove biofouling (with divers, remotely operated vehicles or bubbling devices)

Optimisation of vessel loading condition (including ship displacement and trim)

production plants in the world, and production of “green” methanol is proposed as part of the Taranaki region’s hydrogen strategy⁶, centred on the existing petro-chemical industrial cluster at New Plymouth.

Hydrogen and ammonia are further alternative fuels worthy of consideration. Indeed, significant opportunities for New Zealand would emerge here if excess electrical power, from clean renewable sources became available: for example, with the potential closure of New Zealand’s Tiwai Point aluminium smelter. This would enable the clean production of hydrogen gas. The use of such fuels do pose technical challenges. These challenges are not insurmountable - they mainly concern their safe use, economic production and issues around their stored volumetric energy density.

Other possibilities

Small craft options also exist where the RNZN could showcase a green-ship technological commitment. For example, funds permitting, it could acquire an all-electric vessel as a tender or future VIP barge. Others in the maritime sector are already taking this demonstrator approach. New Zealand’s first all-electric passenger ferry is currently being constructed locally for Wellington-based East-by-West. Of note, this vessel also utilises lightweight carbon composite construction techniques, to offset the weight of the batteries used in the ferry’s weight sensitive design.

⁶ New Plymouth District Council, Venture Taranaki and Hiringa Energy, *H2 Taranaki Roadmap*.

More futuristic still are developments with unmanned technologies, and the opportunities these provide for reduced greenhouse gas emissions. Such autonomous vessels may one day replace the roles of much larger, and therefore less fuel-efficient, manned ships. Many types of maritime autonomous vessels are starting to emerge, such as autonomous wave and solar powered wave-gliders that have near unlimited endurance.⁷ A fleet of these could help with the remote monitoring of New Zealand’s extensive Exclusive Economic Zone (EEZ).

Carbon offsetting

Paying others to sequester atmospheric carbon dioxide (CO₂) is a necessary step if the RNZN is to achieve net zero carbon. Indeed, the Emissions Trading Scheme (ETS) is the Government’s main tool for incentivising businesses, organisations and other entities in meeting domestic and international climate change targets. By pricing carbon into all non-exempt activities it encourages people to reduce (gross) greenhouse gas emissions, and helps fund increased carbon sequestration.⁸

An opportunity exists for the RNZN to be a leader in this area. To differentiate between real and false claims of carbon neutrality, the RNZN could apply an internationally recognised standard such as BSI-PAS2060.⁹ It helps businesses with reducing their greenhouse gas emissions, quantifying their carbon footprint, identifying

⁷ Liquid Robotics. “Energy Harvesting Ocean Robot”.

⁸ Ministry for the Environment, “About the New Zealand Emissions Trading Scheme”.

⁹ Touchstone, “Demonstrate your carbon neutrality status new Standard”.



ABOVE Wellington’s new all-electric ferry. Image supplied courtesy of Wellington Electric Boat Building Company, McKay Electrical and SSC Marine.

areas for improvement, and gaining credibility with an accurate carbon neutrality statement.

Toward a net zero carbon navy

Currently there are no net zero carbon navies in the world. The RNZN is the only navy identified as paying into an ETS through an established method. The RNZN pays the New Zealand Treasury a capped NZ-ETS price of NZ\$25 per tonne of carbon dioxide equivalent (CO₂-e). It also receives a substantial NZ-ETS rebate for fuel assessed as burned overseas on task. This is because it is deemed ‘international’ and so falls outside the scope of the national scheme.¹⁰ According to a report issued in August 2018 by the New Zealand Productivity Commission, the cost of CO₂-e may need to

¹⁰ DLA Phillips Fox, “Analysis of Climate Change Response Act 2002 and Climate Change Regulations 2008: Marine Diesel for NZDF”.

rise from the current NZ\$25 per tonne to somewhere in the vicinity of NZ\$200 per tonne if New Zealand is to meet its zero carbon goals by 2050.¹¹

If the NZ-ETS unit costs were NZ\$200 per tonne, then this eight fold increase would correspondingly increase the annual ETS bill for RNZN ship fuel burn to approximately NZ\$7M and the international rebate to NZ\$2M. If such high-end carbon costings were applied to the whole-of-life business case decisions for major Defence acquisitions, then that would further incentivise the acquisition of capabilities with lower carbon footprints.

Reinvesting the ETS rebate

There are both practical and reputational reasons why the RNZN should consider reinvesting ETS rebates from its overseas deployments into research activities that

¹¹ New Zealand Productivity Commission. *Low-emissions economy: Final report*.

best align with its longer term strategic interests.

New Zealand relies heavily on forestry plantings for carbon sequestration. Being land-based, this aligns poorly with the RNZN's mission of advancing New Zealand's interests from the sea. Furthermore, tree planting funded through ETS subsidies is problematic if it becomes the main long-term means of achieving net zero carbon.

Scientists have noted that one way the world can overcome the lack of sufficient land-based carbon sinks is through tapping into the potential of the oceans. This approach to carbon sequestration is known as "blue" carbon. Conceptually, this includes promoting the growth of phytoplankton through surface iron fertilisation, and growing seaweed at an industrial scale.¹² Theoretically, when these organisms die, their carbon rich detritus sinks to the ocean depths, where, without sunlight to degrade, it stays as carbon deposits.¹³ Problems to be overcome using such an approach include the risk of increased acidification of the oceans.

If an evolved NZ-ETS scheme allowed emitters the flexibility to pay their rebates into a variety of sequestration options, then maritime operators such as the RNZN might choose to subsidise research into blue carbon concepts. The end goal would be to utilise New Zealand's expansive EEZ as both a national and a world asset for the future capture of atmospheric carbon. If ways can be found to do this without contributing to ocean acidification then it would boost

New Zealand's blue economy, convey reputational benefits and assist New Zealand and other contributing countries in meeting their carbon minimisation goals.

Prior to the Covid-19 pandemic, MSC Cruises had started pursuing such an approach, with an offset portfolio that included the first blue carbon credits to be generated.¹⁴

In the absence of a blue carbon NZ-ETS option, the RNZN could consider using its NZ-ETS international rebates to work through DTA in investing in blue carbon research. These investments in research count toward carbon neutrality under BSi-PAS2060.

Conclusions

Sir David Attenborough describes climate change as the greatest threat facing humanity: a manmade disaster of global proportions with far reaching security implications. Covid-19 magnifies the difficulty in responding. It is preoccupying governments everywhere, including our own. In the short term, Covid-related movement restrictions may have eased pollution in cities. But in the medium term, the costs associated with responding to Covid-19 may make it more difficult for governments to focus on meaningful responses to the climate crisis.

This article advocates an active response by the RNZN. The first step would be to declare an intent to work toward becoming the world's first zero carbon navy. Supporting this, the RNZN should seek recognition as the first BSi-PAS2060 certified net zero carbon navy.

Second, for the short- to medium-term, the RNZN should continue to seek ship operational and technological efficiencies wherever possible and practical. Simplistic targets for reduced gross emissions are not recommended as the security implications flowing from climate change are likely to increase the required operational tempo. Nonetheless, the RNZN supporting the uptake of alternative green fuel technologies is to be encouraged, as this is the only realistic way of achieving the IMO's longer term target of halving greenhouse gas emissions from the maritime sector.

Third, Defence ship acquisition policies and maritime regulations should be developed to further encourage technological improvements. An opportunity exists for the SOPV Project to consider the uptake of green technologies. It is noted that through-life costing of project options may lead to sub-optimal decisions without Defence policy requiring:

1. Possible increases in NZ Emissions Trading Scheme (ETS) compliance costs to be accounted for; and
2. Overseas fuel burn ETS costs to be included.

Without these policy changes, business cases may rule-out seemingly more expensive greener technologies which later prove more cost effective following anticipated ETS changes.

Fourth, the RNZN will benefit from partnering with others in the maritime domain, and with its sister services, who are also seeking to reduce

their carbon footprints. One possibility that may be worth exploring is to offer to set up a maritime reference group to work with the New Zealand Climate Change Commission in the collective journey to zero carbon. The New Zealand Oceans Foundation is already considering such a possibility; a partnership between the Foundation and the RNZN to set up a maritime reference group could be a useful supporting step. It would be appropriate to include Maritime New Zealand in any such grouping.

These four steps are relatively straight forward. Realistically however, it must be acknowledged that over the lengthy transition period leading to a post-petroleum era, the RNZN will need to continue to operate fossil fuel-burning ships. In part, this reflects

existing capability investments (HMNZS *Aotearoa* and the upgraded frigates, for example), and in part because alternative technologies are not yet fully developed. It follows that over the next few decades, the full net zero carbon goal can only be achieved by purchasing carbon offsets through the NZ-ETS. These offsets make up the deficit between the design and operational efficiencies that can be generated, and the Navy's total carbon footprint. Reinvesting ETS rebates for international fuel burn in "blue" carbon sequestration research would be in line with the RNZN mission of advancing New Zealand's interests from the sea. A partnership with DTA with this goal in mind would support the ambition to become the world's first zero carbon navy.



CHRIS HOWARD

Chris Howard works as the RNZN's Chief Naval Architect, within Naval Staff, Wellington. He is responsible for Naval Architectural policies, advice and direction, with the aim of ensuring safe and capable ships for today, and for the future. Chris is technically focussed, with an extensive ship acquisition (including in-service) engineering management background.

Chris is an experienced Naval Architect, with 20 years in a position of engineering responsibility. He recently completed the NZDF's Advanced Command and Staff Course, and was awarded a Masters of Strategic Studies (MSS) from Victoria University of Wellington in 2020. This article is based on Chris' final degree assignment—a 12,000 word research essay.

Outside of work, Chris enjoys being close to the sea, as well as assorted athletic pursuits including trail running, stand up paddle boarding, and DIY challenges of home improvement and brewing beer.

RECOMMENDED ACTIONS

The actions suggested in this article can be summarised as follows:

Commit the RNZN to the goal of becoming the world's first zero carbon navy. In support of this goal, the RNZN should seek recognition as the first BSi-PAS2060 certified net zero carbon navy.

Continue to seek operational and technological efficiencies within the RNZN wherever possible and practical.

Develop policies that further encourage the uptake of green technologies through acquisition projects.

Build partnerships with others in the maritime domain, and with the NZ Army and the RNZAF, aimed at sharing information on the common goal of achieving net zero carbon by 2050. Join with the New Zealand Oceans Foundation and Maritime New Zealand to explore the setting up of a maritime reference group to assist in broadening the work of the New Zealand Climate Change Commission.

Investigate the possibility of working with the Defence Technology Agency to set up a research fund using ETS international fuel burn credits to further research into "blue" carbon sequestration.

¹² Todd Woody, "Seaweed 'forests' can help fight climate change."

¹³ KAUST Official, "Is Deep Ocean Carbon Storage a Good Idea?"

¹⁴ MSC Cruises, "MSC Cruises Becomes The First Major Global Cruise Line with Carbon Neutral Marine Operations."



In this article, Commander Tim Garvan RNZN offers his thoughts on how the Littoral Warfare Force community can best adapt to future technological trends.

Introduction

Littoral Warfare Forces (LWF) conduct deployed beach reconnaissance, mine clearance and underwater search operations in support of New Zealand Defence Force (NZDF) and partner forces—tasks that require highly trained and well-equipped personnel to operate in small, isolated teams ahead of a main force. Emergent technologies, particularly in the area of autonomous robotics, are likely to revolutionise the way in which LWF effects can be delivered in the future.

As a small organisation reliant on people and technology to deliver military outcomes, it is vital that the Royal New Zealand Navy (RNZN) exploits opportunities as they arise, including in littoral warfare.

Defining littoral warfare

Littoral warfare is complex and dynamic, particularly when contrasted with naval warfare in the open ocean. Such complexity results from operating in the littoral zone—a heavily congested environment, comprising both coastal land areas and adjacent shallow waters—including coastal cities, high-density fishing traffic and maritime trade areas.

In addition to open-water maritime platforms, land-based anti-shipping missiles and strike aircraft, subsurface threats such as diesel submarines, autonomous underwater vehicles (AUV) and sophisticated anti-shipping mines can all be employed in the littoral zone. A wide range of potential threats, in combination with a congested operating environment, make employment of forces in the littoral particularly difficult.

While the RNZN recognises the broad nature of littoral warfare as the *'application of lethal force using a range of combat techniques and military capabilities in those regions*

WHY INNOVATE?

Innovation allows militaries to adapt to changing environments to gain or maintain tactical advantage. Such innovation must be continuous—keeping pace with technological and societal change—to produce relevant and effective forces. If adopted effectively, adaptations in technology, tactics and organisational structure can lead to revolutionary change—rendering previous methods of warfare obsolete.

However, new technologies only set the conditions for potential change. Relevant technological trends must be identified before they can be taken advantage of through iterative and continuous innovation.

LEFT
Commander
Tim Garvan.

It is anticipated that future technologies will likely revolutionise the way that littoral information is collected, processed and then prosecuted

relating to or existing on a shore or coastal region,' New Zealand's LWF capabilities are limited to supporting activities focused on the transition between land and sea.

These capabilities comprise small teams of hydrographic specialists and mine clearance divers, with associated equipment, enabling friendly-forces access to coastal waters, harbours and amphibious landing beaches. Detached teams normally operate from friendly naval vessels in order to conduct mine clearance operations, hydrographic surveys, beach reconnaissance, underwater salvage, and explosives ordnance disposal.

Crucial to successful LWF operations is the effective interface between human operators and technology.

The LWF presently uses a combination of semi-autonomous vehicles (sub-surface and aerial), tethered Remotely Operated Vehicles, human divers and boat-mounted sonar to locate and neutralise underwater threats and obstructions.

To conduct LWF operations, environmental information must be collected, allowing human operators to locate, identify and then act on potential obstructions.

Although RNZN documentation does acknowledge the wide array of military systems that may be employed in the littoral zone, New Zealand's limited range of enabling forces serve to narrow the scope of discussion surrounding littoral warfare. Opportunities to

BELOW
Example of LWS systems and outputs, including AUV system, clearance divers and hydrographic data. Image courtesy of NZDF.



exploit innovative trends and tactics—particularly technologies originating from outside the LWF community—may be being overlooked as a result. Consequently, broader discussion of the opportunities is required.

The future operating environment

Advances in anti-shipping mines, and space-based sensors able to detect friendly forces, make access to the littoral zone more difficult. Anti-shipping mines are a cheap and effective way of destroying warships with significant military resources required to detect, identify and neutralise mines. In addition to large numbers of current generation contact and influence mines¹, smarter, next-generation mines are under development.

As mines are becoming more difficult to counter, increased numbers of space-based sensors are making it more difficult to deploy LWF detachments without detection. An adversary with more opportunities to detect preparatory littoral forces is more likely to correctly interpret enemy force intentions. Consequently, LWF units of the future will need to operate more covertly to conceal operational intentions and faster to reduce the time that adversaries have to react once LWF forces have been detected.

Advances in robotics and autonomous technologies

The introduction of autonomous vehicle technology has already changed the way that the RNZN conducts

¹ Influence mines are normally deployed on the seafloor and activate based on pre-programmed firing software that uses a combination of magnetic, acoustic, pressure, seismic and electric signatures to detect target vessels.

littoral warfare. Technological advances in the last decade have seen the employment of AUV, clearance divers and tethered robotics operating from motherships that are some distance from the danger area.

Such advances have allowed tasks to be conducted from a wider range of non-specialist vessels and have also significantly reduced the risk of harm to personnel and supporting vessels.²

Progress in autonomous platforms and robotics will further reduce the requirement for LWF personnel to operate within threat areas. Moreover, autonomous vehicles are likely to become so advanced that the need for human operators to enter hazardous environments is eliminated altogether. A range of technologies will change the way in which LWF units can operate.

Firstly, autonomous surface vehicles can replace crewed boats currently used for a wide range of LWF tasks, including replacement of crewed hydrographic survey vessels and support vessels used to launch AUV.

Secondly, developments in biometric robotics will likely allow autonomous vehicles to operate in underwater conditions—including areas with strong surf, tidal streams or currents—previously requiring human divers due to poor AUV manoeuvrability.

Such systems are capable of manoeuvring in the littoral zone, identifying obstructions using sonar, tactile and chemical receptors, and neutralising threats by activating a small on-board explosive charge.³ By mimicking the form and movement of

² Hydrographic surveys produce detailed bathymetric scans of the seabed and are currently carried out using surface vessels with a crew-monitored, onboard sonar system.
³ Daniel Faggella, "RoboLobsters Have What It Takes."

Importantly for New Zealand, the cost of generating a capability based on deployable vehicles and human operators is markedly less than the cost of similar capabilities based around specialist littoral warfare vessels

organic marine life, the systems are less likely to be detected than a diver.

Third, advances in autonomous vehicle payloads offer commanders alternate methods of mine disposal, including influence sweep systems designed to “trick” enemy mines into activating by transiting a suspected minefield while transmitting acoustic signals that simulate friendly warships.⁴ While influence sweeps have been employed to counter sea mines before, use of autonomous systems for deployment allows personnel to keep clear of resultant explosions, reducing risk to personnel.

Finally, significant improvements in the dexterity of operator-controlled underwater robotics will likely remove salvage divers from the water. As remotely controlled

robotics approach a level of tool-manipulation and sensitivity similar to that of human hands, it no longer becomes necessary to place human divers in hazardous underwater environments.⁵

Advanced decision making

Through the removal of human-based decision making from tactical processes, the time taken to complete LWF tasks—including mine clearance—can be significantly reduced. These advantages stem from the ability of future autonomous systems to process collected sensor data onboard the vehicle, without human-induced delays.

Recent developments in autonomous systems combine the search, identification and neutralise tasks of littoral warfare into one vehicle.

⁴ Textron Systems, “Textron Systems Awarded \$33.8 Million for the U.S. Navy’s Unmanned Influence Sweep System.”

⁵ Lindsay Brownell, “Soft robotic arm acts as extension of human hand.”



ABOVE
Leading Diver Ben Thomson of HMNZS *Matataua* surfaces after setting a charge on unexploded ordnance near Whangaparāoa Peninsula. Image courtesy of NZDF.

Future iterations of these systems will likely be able to search, identify and then neutralise targets—with human operator approval only required at the final, neutralisation stage. By automating data processing, human-induced delays associated with current LWF methods are minimised.

The ability of systems, such as the previously described biometric robotics, to sense-think-act independently further reduces the time required to clear a designated area. Multiple biometric vehicles operating in a synchronised ‘swarm’⁶ reduces clearance timelines further by automatically finding and neutralising mine threats without waiting for human approval. An ability to communicate with each

other ensures that the swarm’s rate of effort is maximised and that designated areas are effectively searched.

Because only enemy mines and not enemy personnel are targeted, the less-lethal nature of LWF operations makes it more applicable for automated weapon systems than for other disciplines of warfare. This allows tactical tasks to be completed much faster than with systems requiring human approval.

Tactical impacts

Automation of low-level decisions will serve to make human decision-making capacity available for broader tactical concerns. With less

⁶ Autonomous swarms are made up of individually autonomous units that communicate with each other to deliver an organised, cooperative effect.

BELOW
An example of biometric autonomous systems under development. Image courtesy of Flickr/jurvetson.

LWF PROCESSES

Current mine clearance procedures comprise three primary phases: search, identify, neutralise. The search phase is conducted by a pre-programmed AUV, which collects sonar data from the seafloor. Detected mines and obstructions are then identified by a human operator through visual inspection of the sonar data, once the AUV has been recovered from the search area, with data processing consuming approximately the same amount of time as the initial search.

Sonar contacts of interest are subsequently identified as an enemy mine by a returning AUV or diver, before being destroyed by an explosive charge placed by a diver or tethered robot.

human effort expended on manual “doing” tasks, more effort may be assigned to understanding—thinking about the broader consequences of tactical actions. This will likely free-up intellectual resources for a much more extensive tasking, including automated intelligence collection and cyber functions, both of which will become increasingly important to future LWF operations.

Autonomy has also been identified as a solution for nations with small populations, seeking to optimise the delivery of military outcomes using limited numbers of personnel.⁷

Automation facilitates the deployment of larger littoral warfare forces, and—with more thought devoted to tactical decisions, such as where, when and how to deploy LWF systems—potentially more effective forces as well.

Innovation and organisational structure

Organisational structures and processes impact the way that militaries innovate. Organisations with adaptive, open and flexible processes are more likely to survive periods of change than those without.

Capability development processes and organisational strategy combine to create organisational conditions that either support or constrain innovation.

Current capability development

Development processes have a significant impact on a military’s ability to adopt and employ new technologies. The nature of these processes determines the speed with which new technologies can be identified, evaluated, adopted and applied—and the type of forces to be employed.

Capability development ensures that militaries avoid building future forces that are designed to solve tomorrow’s problems with today’s technology. Future LWF forces require a capability development process that is adaptable, supports experimentation and divergent thinking, and delivers relevant warfare systems.

But current capability development processes in New Zealand are oppressively linear. This results in a capability development process that is slow to adapt to new technologies. A focus on governance, bureaucratic

For the LWF community to effectively exploit emerging technologies, organisational change is required

Defence currently applies an Industrial Age development model to an Information Age operating environment

oversight and spending accountability induces significant delays to delivery of new capabilities.

Current processes comprise multiple linear steps—where user requirements are specified at the beginning of the process, with capability solutions delivered at the end. While the system has improved Government confidence in Defence’s ability to spend responsibly, it does not deliver capability at the rate required to leverage off rapid technological development.

By using a linear development process, Defence commits to technologies that may be obsolete before they are delivered into service. As an extreme example, the LWF community has been waiting eight years for existing capability development systems to deliver a networked communications solution, based on user requirements defined as far back as 2012. In that time Apple has developed and produced at least 14 versions of the iPhone.

Similarly, the existence of legacy capability programmes can influence future capability decision making. Rather than resulting in innovative military means to achieve political ends, such influences can lead organisations to replace systems with what are essentially only slightly more modern versions of what they already have.

While New Zealand’s LWF community did not have a legacy mine hunting ship capability to compete with when introducing the current generation of AUV, the introduction of fully-autonomous systems will likely disrupt traditional diving and hydrographic professional roles. When developing capability, the LWF community should be willing to significantly diverge

from existing military ways and means—seeking the most fit-for-purpose systems available—to deliver future military outcomes.

Developing capability for the future

More flexible capability development and funding models would allow the LWF community to quickly adapt to technology advancements. While the recently implemented Rolling Capability Refresh (RCR) programme does result in guaranteed funding allocation and allow some steps of the development process to be expedited, the RCR is still essentially linear in nature.

The RCR still requires user requirements to be defined at the beginning of the process and systems to be delivered at the end, and there is limited opportunity for lessons learnt during the development process to further inform requirements.

Incorporating more agile development models, such as a spiral model, into the RCR would likely improve capability outcomes. In a spiral development model, a basic version of the platform or system being introduced is delivered to the end user early in the development process. Iterative improvements are then added to the system based on practical user experience, allowing more informed requirements to be developed.

Spiral development also allows the user community to identify unsuitable systems before they have been through the many linear steps of the current capability development system. By ‘failing early’, effort and funding can be shifted away from systems that are unlikely to ever deliver required outcomes.⁸

⁷ Nah Liang Tuang, “The Fourth Industrial Revolution’s Impact on Smaller Nations: Boon or Bane?”

⁸ Peter Levine, “If You Want More Defense Innovation, Spend Less on Legacy Platforms.”

The relatively cheap, small autonomous systems used by the LWF are likely to incur less financial risk—making this approach more suitable for the LWF community than other areas of the NZDF, where there is reliance on a few, exquisite systems to deliver outcomes.

Experimentation

Through more experimentation the LWF capability development will be better informed, reducing the risks associated with identifying successful technologies. To achieve this, the LWF community should allocate more funds, but particularly more effort, to expanding existing experimentation programmes.

In 2016, the LWF community successfully proved a novel method of mapping beaches and coastline through the Naval Experimentation Programme.⁹

A commercially available unpiloted aerial vehicle (UAV) collected data, using software originally designed for agricultural crop monitoring, to produce three dimensional maps. More funding, more time and more recognition devoted to endeavours like this would likely produce further innovative concepts.

Organisational strategy and innovation

While the LWF does have an established vision out to 2025, the strategy for 2020 to 2025 too closely resembles that of the preceding five years.

⁹ The Navy Experimentation Programme provides funds to investigate and explore new and emerging technology by exploring Military/Commercial-off-the-Shelf equipment to prove or disprove capability-based concepts. It involves the allocation of dedicated funding to specific projects to allow investigation into the viability of certain technologies for RNZN applications.



As a consequence, obsolete equipment is often replaced with like-for-like systems and structural changes are resisted—both encouraged by a strategy that incentivises maintaining the status quo at the expense of innovation.

Improvements in this area are being made with a focus on outcomes and military effects, rather than the means to deliver them, but LWF practitioners should be prepared for, and demand, a 2025–2030 strategy that better meets the challenges

of a contemporary operating environment.

Recent changes to LWF make it uniquely suited to a strategy that supports organisational agility and innovation. In 2016, three separate hydrographic and diving units were combined under one command—with the resultant unit, HMNZS *Matataua*, assuming responsibility for delivery of the majority of New Zealand's LWF military outcomes.

Consequently, a single strategic vision for LWF can

ABOVE
An example of littoral information collected using an unpiloted aerial system. The coastline is in the top right and buildings of interest in the lower left. This information can be used to produce 3D models and maps. Image courtesy of NZDF/

STRATEGY AND INNOVATION

Innovation can be assisted by communicating a broad vision of the future and implementing an organisational strategy toward that vision. Whereas a vision describes desired future outcomes, strategy provides a path to get there. Strategy allows organisations to coordinate seemingly disparate actions and behaviours toward a common goal and allows organisations to navigate periods of change. Technological innovations are more likely to occur if the organisation's strategy is permissive and supports such change.

be communicated effectively through one command structure. Similarly, the recent establishment of a Littoral Warfare Steering Group provides a mechanism to set and promulgate strategic guidance.

The LWF community is smaller than many other warfare disciplines in the NZDF, comprising 150 personnel. This gives the LWF community opportunity to develop a strategy that has been generated through consultation with a large proportion of its members. A consultative approach is more likely to give those within the community a sense of ownership of their strategy, encouraging emergent strategies to be communicated upwards. However, for the LWF community to properly execute strategy, it must cultivate a culture that supports it.

Innovation culture

Innovative organisations embed innovation within their culture. To foster such culture, innovation must be part of an organisation's

values—integral to the organisation's 'DNA'.¹⁰ Through the adoption of innovative values an organisation is able to generate innovative norms and behaviours.

New techniques, procedures and technologies are adopted because the organisation's cultural values encourage it—while observed behaviours reinforce innovation ensuring that desired values are adopted by new personnel as they are inducted into the organisation.

To generate an innovative culture, it is important that the LWF community adopts and promotes the correct organisational values.¹¹

Through adoption of these values the LWF community may generate a culture that promotes innovation, allowing emerging trends to be identified and exploited.

Human cognition and conventional thinking

It is difficult to visualise the future, particularly when it is viewed through today's assumptions and influenced by conventional thinking. For many

¹⁰ Edgar H. Schein, "The Structure of Culture," 17.

¹¹ In their article, "Organizational culture, innovation and performance," Hogan and Coote identify eight key values as supportive of innovation, with four of these identified as vital to supporting an innovative culture within the LWF community. These are openness and flexibility, risk taking, success and appreciation.

The LWF community needs individuals able to conceive a future different from today's realities

in the RNZN, a future where biometric robots seek out, identify and neutralise an enemy sea mine may seem like fantasy. Even if conceivable, such advances may be perceived as only available to larger militaries with greater financial resources.

Those with doubts may be unaware that night vision equipment and aerial drones were once too seen as niche capabilities, only available to large industrial nations. Both technologies followed development pathways that allow them to be used today by a number of small actors, with modest budgets, including non-state organisations.

Merely projecting a modernised version of today's forces into the future is unlikely to result in capabilities that meet the challenges of a future operating environment. The LWF requires individuals capable of creative thought who are able to conceive a future that is different from the present.

New technologies and tactics may come from the periphery of littoral warfare—from another warfare discipline or separate, non-military industries. To exploit opportunities in the margins, the LWF must first be able to identify relevant trends and recognise their application. LWF personnel must be willing to seek advantage from a diverse range of sources and change their understanding of the future operating environment, as unexpected trends emerge.

To nurture such thinking, the LWF requires a culture that encourages creative thought, allowing personnel to experiment, learn and develop ideas. This can be achieved by encouraging organisational behaviours that value openness to new ideas and flexible problem solving. It is also important that effort is

dedicated to creative thinking, sharing information and monitoring non-littoral warfare sources for novel ideas.

This could be achieved by programming tactical development periods within LWF operational programmes, allowing personnel to ask themselves and each other: "How can we do this better?" Similarly, closer interaction between the LWF community and the Defence Technology Agency may provide further opportunities to explore emerging technologies and concepts.

LWF leaders can encourage creative thinking in their teams by sharing articles, thoughts and information. This should go beyond monthly editions of Jane's *Navy International* and explore a range of military and non-military sources. Australian Army Brigadier, Mick Ryan, goes further and encourages military officers to read science fiction. He argues that such reading 'forces us to think about the future' drawing 'our thinking out of current operations.' Similarly, the US Marine Corps have long included sci-fi books on their required reading lists.

By espousing values that encourage creativity, an innovative culture may be generated. Innovative culture allows the LWF community to better understand the operating environment and encourages adaptation in response to change.

Compliance culture

On the other hand, the RNZN's emphasis on compliance generates risk averse behaviours that inhibit, rather than encourage, innovation. This manifests in a culture that places emphasis on following process, instead of improving the ways and

means that achieve outcomes. Consequently, the RNZN can be prone to elevating error reduction over goal achievement—avoiding mistakes, rather than striving to do things better.

While this cultural environment is designed to minimise physical harm to serving personnel and to the reputation of the NZDF, such behaviour is indicative of an organisation that places low value on risk-taking. This influences LWF innovation. For example, cheaply produced, commercial UAV have a wide range of applications for LWF. As demonstrated through the Naval Experimentation Programme, this includes aerial reconnaissance roles.

Current regulations for introducing new equipment limit the number and type of these systems that can be used by the NZDF, severely restricting innovation to a small fraction of systems available on the commercial market. Organisationally, the risks associated with novel equipment are perceived to outweigh the benefits of innovation.

By adopting a more positive approach to organisational risk, the LWF may generate more opportunities for innovation. This does not mean that safety is compromised, rather that members of the LWF are encouraged to explore novel and different ideas without fear of potential failure negatively impacting on an individual's reputation or career. This results from an organisation that welcomes challenging of the status quo—one that actively questions the efficacy of current procedures and tactics.

Additionally, widespread use of autonomous systems could

see the LWF uniquely placed to foster a more risk-taking culture by minimising harm to people. New methods and procedures involving human operators rightly attract additional risk assessment and administration. By removing people from dangerous environments, the significant organisational effort that is currently required to keep people safe can be diverted to other tasks, including tactical development and innovation.

Warriors for the Information Age

"Fear of Replacement Syndrome" presents strong cultural barriers to technological innovation. The syndrome can result in human operators intentionally delaying the adoption of certain technologies because they fear that autonomy will eliminate or significantly change their role in the system.¹²

With future autonomous systems predicted to be able to perform many diving and hydrographic tasks, it is important that the LWF addresses such fears. Fear of replacement may be counteracted by changing the way in which an organisation culturally values success. By emphasising successful tactical outcomes—regardless of whether they are carried out by a human or autonomous system—technological innovations may be welcomed, rather than resisted.

Similarly, narrow perceptions of warrior ethos may impact the adoption of autonomous technologies. In particular, the cultural notion that war is a physical endeavour—in which human

¹² Adam Jezard, "Technophobia is so last century: fears of robots, AI and drones are not new."

A warrior ethos, adapted for the Information Age, is critical to innovative LWF outcomes

life must be at risk for war to be honourable—can obstruct the use of remote autonomous systems.

Much of New Zealand's warrior ethos is built around physical endurance and the *mana* associated with performing tasks that are dangerous. Without widespread cultural acceptance of autonomous systems, technological innovation is unlikely to occur. Consequently, to reduce cultural resistance to autonomous systems, a modern warrior ethos is required.

The LWF community must develop a warrior ethos for the Information Age. Once again, a shift toward celebrating successful outcomes may assist the LWF community's transition to such an ethos. This would require the LWF community to adjust how it currently values, rewards and recognises accomplishments. In addition to recognising hard

work and endeavour, a modern warrior ethos would emphasise victory, whether physical or moral, through novel and innovative means.

Simulation could support this by providing a competitive setting in which LWF warriors could hone their warfighting competencies against a simulated enemy or each other. Through simulated deployment of autonomous systems, LWF operators could discover and test new tactics, rehearse missions and identify potential points of failure in operational plans.

Particularly perceptive operators would be able to appreciate, and perhaps predict, ways in which adversaries may use similar technologies. In a modern warrior ethos, those who demonstrate an aptitude for developing innovative ways to achieve victory would be recognised and celebrated.

KEY POINTS

A revolution in autonomous robotics has begun and it will allow the LWF to conduct operations, faster, cheaper and with less risk to personnel. By using autonomous systems to remove personnel from dangerous situations, organisational resources currently expended on keeping people safe in operating environments can be diverted to tactical considerations and military experimentation. In order to exploit these technologies the LWF must encourage innovation through organisational and cultural change:

- The LWF should adopt an agile capability development system that is able to adapt to rapid technological change—including increased funding and effort devoted to experimentation, to identify and adopt technologies likely to provide military advantage.
- While much of the innovation in LWF will occur at the tactical level, broad strategic guidance is required. A strategy that holds innovation at its core is much more likely to produce an organisation that embraces technological change.
- The LWF community requires people who are open to novel ideas, who are willing to think creatively about the future and seek out relevant trends from unconventional sources.
- The LWF must develop a modern warrior ethos. Such an ethos would encourage the status quo to be challenged and successful military outcomes pursued through innovative ways and means. Technological change would be embraced rather than feared.

Conclusion

Emerging technologies present New Zealand's LWF community with an opportunity to revolutionise the way in which littoral warfare outcomes can be delivered. Through the integration of semi-autonomous underwater vehicles, the LWF community has already taken an important step toward a force that delivers tactical outcomes faster and minimises human exposure to operational risk.

The development of fully autonomous systems further increases the opportunities for tactical innovation. However, for the LWF community to benefit from technological advances, organisational and cultural change is required.

The LWF community must adopt a capability development system that is able to adapt to rapid technological change—including increased funding and effort devoted to experimentation to identify and adopt technologies likely to provide military advantage. While much of the innovation in LWF will occur at the tactical level, broad strategic guidance is required. As a consolidated entity, the LWF community is well-placed to establish and communicate a vision of the future.

Similarly, the LWF community must adopt a more innovative culture. A culture that resists technological change is unlikely to produce effective future forces. The LWF requires people who are open to novel ideas, who are willing to think creatively about the future and seek out relevant trends from unconventional sources. A modern littoral warrior would be encouraged to challenge the status quo and pursue successful military outcomes through innovative ways and means.

Through a combination of emerging civilian and military technological trends and innovative tactics, the delivery of littoral warfare outcomes can be revolutionised. New Zealand is uniquely placed to lead this, provided that opportunities are recognised and implemented quickly. Like an unstoppable wave, the robotics revolution is here. The RNZN's LWF can either embrace it, resulting in tactical superiority—or allow it to crash over us, resulting in obsolescence. It cannot be ignored.



COMMANDER TIM GARVAN RNZN

Commander Tim Garvan joined the RNZN in 2002. On completion of Junior Officer Common Training he served in HMNZ Ships *Canterbury*, *Manawanui* and *Resolution*, gaining his Bridge Watch Keeping certificate in 2004. Tim then specialised as a hydrographic surveyor, completing the RAN Basic Hydrographic Course, at HMAS *Penguin*, in November 2004.

His first complement sea post was as Bridge Watch Keeper in *Resolution*, conducting surveys in the Hauraki Gulf, approaches to Whangārei, approaches to Wellington, the Kaikoura coast, and Apia Harbour, Samoa.

In June 2006, CDR Garvan took the opportunity to complete an exchange posting with the Royal Navy and was appointed Gunnery Officer in HMS *Echo*. During the exchange period, *Echo* completed deployments to the Northern Arabian Gulf, Red Sea, South China Sea, Sea of Japan and west coast of Scotland.

In October 2008 he returned to New Zealand and completed various hydrographic roles including Officer In Charge of the Detached Hydrographic Survey Unit. In this role, he completed a number of Rapid Environmental Assessment tasks including environmental support to the Commander Amphibious Task Force during Exercise SEALION 12.

CDR Garvan was then appointed as Staff Officer Littoral Warfare at the Naval Warfare Development Group, where he worked on a variety of Force Protection and Amphibious Advance Force policy amendments.

From February 2014 to September 2015, CDR Garvan then commanded HMNZS *Otago* (his first sea command) completing sea-going deployments around New Zealand and the South Pacific including Raoul Island, Samoa, the Cook Islands, Tonga and Niue. During this period, *Otago* conducted a high-seas rescue of the stricken sailing vessel *Django II* resulting in the safe recovery of three sailors.

In 2016, CDR Garvan was appointed Executive Officer of the newly commissioned HMNZS *Matataua*, the RNZN's deployable Advanced Force Operations and Littoral Warfare unit.

Promoted in February 2019, CDR Garvan leads the capability integration of HMNZS *Manawanui*, and is a recent graduate of the NZDF Advanced Command and Staff Course number 59 (2018).



A MARITIME SECURITY *RESET* FOR THE ROYAL NEW ZEALAND NAVY

In this article, Timothy Portland argues the case for a major rebalancing of the Royal New Zealand Navy to enable it to focus its efforts on constabulary operations and transnational security threats in the South Pacific.

Abstract

The New Zealand Defence Force (NZDF) is facing a wide range of transnational security threats in the maritime environment. In New Zealand's primary area of interest, these include Transnational, Serious, and Organised Crime (TSOC) and environmental concerns. With the current re-focus on the Pacific, the NZDF will be expected to play a leading role in promoting peace and stability in the region. However, it faces critical capability decisions, including how to provide capabilities able to conduct the current range of military outputs as well as the ability to address emerging security threats. The approaches taken by Australia and the United States of America offer models that the NZDF could seek to emulate, in particular the investment in offshore patrol capabilities to conduct constabulary operations. Ultimately, the New Zealand government will need to strike a balance between investing in its ability to conduct high-end warfighting and the need to address transnational security threats.

LEFT
Timothy
Portland.

Introduction

In 2018 the New Zealand government made two major policy announcements that will have a significant impact on the future operations and structure of the NZDF. The first announcement was the government's signalling of a more Pacific-focused foreign policy outlook. This will see heavy investment by New Zealand into the South Pacific, with particular emphasis on addressing the increasing security challenges being faced by Pacific Island Countries through the impact of climate change. The second announcement was the release of the *Strategic Defence Policy Statement 2018* (SDPS). The SDPS affirmed the role that the NZDF would play in supporting the "Pacific Reset" and set out the nature of the security challenges that the region could expect to face in the next decade. Of particular note, the SDPS acknowledged the rapid emergence of security challenges, such as TSOC and climate change, as being major 'complex disruptors'!

Transnational security threats may require the NZDF to shift its focus away from traditional defence objectives and operations. The SDPS highlighted the disproportionate impact transnational security threats are having on small island nations in the South Pacific. Issues such as transnational crime, illegal fishing and the adverse

Transnational security challenges in the South Pacific may require the NZDF to shift focus from traditional defence objectives

¹ Ministry of Defence, *Strategic Defence Policy Statement 2018*, 16.

Transnational security threats directly impact New Zealand's national security... Meeting these threats needs to be a critical component of NZDF outputs

impact of climate change are emerging as significant security issues which are inherently as challenging as traditional military operations. To address these emerging threats, the NZDF will need to strike a balance between maintaining and developing conventional warfighting capabilities and acquiring platforms and capabilities that are more suitable for combating emerging security challenges. To build this capability, the New Zealand government will need to make significant capital investment decisions within the next decade.

This article argues that an investment in capabilities more suited to addressing transnational security threats in the maritime environment should be a priority for the New Zealand government. It is proposed that the government's increased focus on the South Pacific/Southern Ocean/Antarctica, and the wider effects of climate change and other transnational security threats, requires a regionally-focused Royal New Zealand Navy (RNZN) with enhanced offshore patrol capabilities. It is acknowledged that how New Zealand chooses to respond to transnational security threats could have a direct impact on the country's ability to contribute to wider collective defence and security activities. By investing in maritime security capabilities better suited for constabulary operations, however, it is argued that New Zealand will continue to make a meaningful contribution. By investing in the right mix of capabilities, and by working alongside traditional security partners, New Zealand could fill an important operational role that will enhance regional peace and stability.

Transnational security threats and their impact on national security

The NZDF's operating environment is rapidly becoming more complex and challenging. Beyond traditional military roles, such as the conduct of high-end combat operations, the NZDF is increasingly being called upon to conduct security operations relating to transnational security threats. These threats range from activities associated with TSOC, maritime crime, Illegal, Unregulated and Unreported (IUU) fishing, and to the security impacts associated with climate change. Within New Zealand's primary Area of Interest (AOI: defined in the SDPS as matching New Zealand's Search and Rescue Region (SRR) which encompasses South Pacific nations and the Southern Ocean and Ross Dependency), these transnational security issues are emerging as key national security challenges. They are, moreover, threats that have a significant maritime security dimension, an area this essay argues should be the primary focus for NZDF operations.

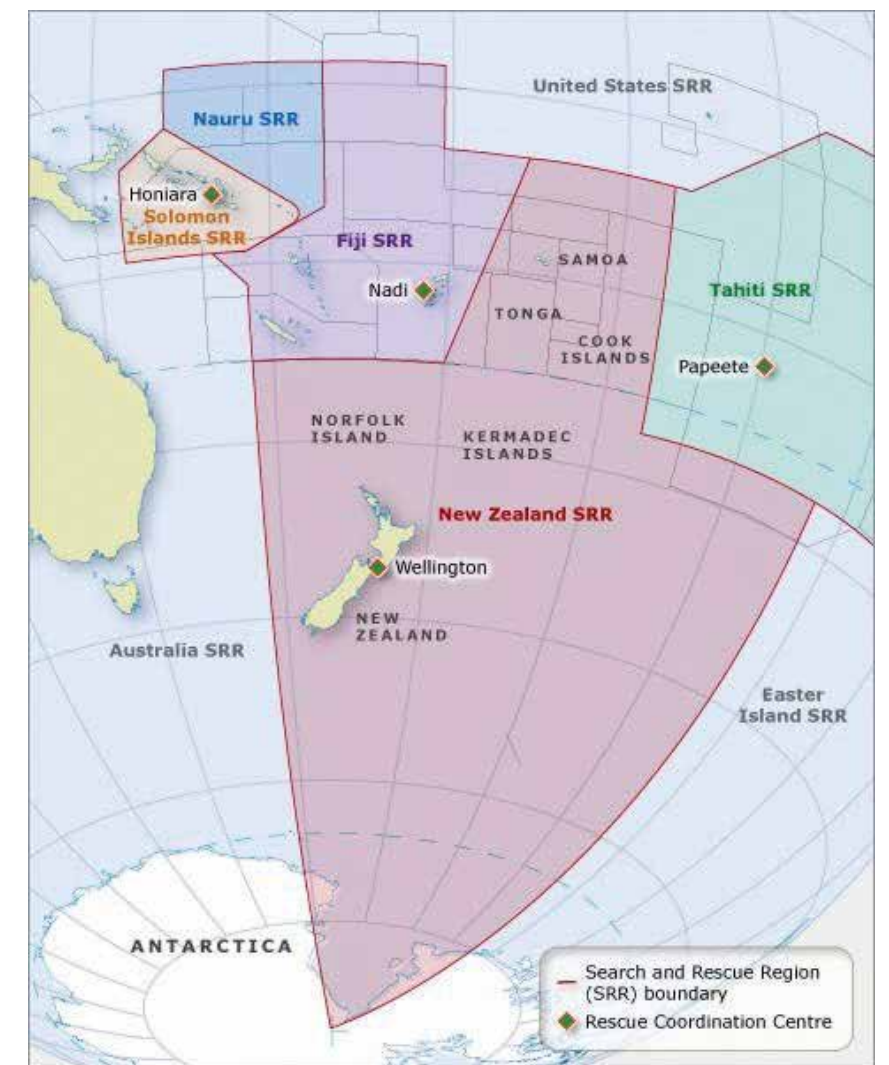
The increase of transnational security threats in New Zealand's AOI constitutes a direct threat to national security. Transnational security threats thrive in environments where the rule of law is weak and small and developing states are not resourced to deal with them. In its 2016 report on TSOC in the Pacific, the United Nations Office on Drugs and Crime (UNODC) noted that the Pacific region was very vulnerable to the impact of organised crime. IUU fishing is estimated to cost the Pacific Island nations over \$400 million USD in lost revenue and non-sustainable fishing practices deprive vulnerable communities of reliable food sources. In addition, Pacific Island nations occupy a geographic position

RIGHT ABOVE
New Zealand's SRR
superimposed over
map of Europe,
the Middle East
and Africa. Image
courtesy of NZDF.



NZDF will increasingly be called upon to conduct operations focused on transnational security threats. The immense geographic areas involved will stretch NZDF resources

RIGHT BELOW
New Zealand's
search and rescue
region showing
New Zealand's
primary Area of
Interest. Image
courtesy of Maritime
New Zealand.



that puts them in the middle of major drug transit routes between the Americas, Asia, Australia and New Zealand. The harm to New Zealand society due to drugs is estimated at \$1.1 billion NZD annually, and has been described by former New Zealand Police Commissioner, Mike Bush, as having a significant impact on national security.

Climate-related events are already beginning to impact Pacific communities. In the Solomon Islands, at least five islands have disappeared due to rising sea levels forcing a small number of villages to relocate, and in 2016, in the aftermath of Cyclone Winston, a large number of Fijian communities were left homeless and in need of resettlement.

As these events become more frequent, there will be an increased demand for military

forces to lead humanitarian assistance and disaster relief operations and to support regional stability. The increasing requirement for the NZDF to respond to transnational security issues will put stress on the NZDF's limited resources. In order to meet the increased demand for military resources, key decisions will need to be made about New Zealand's future military equipment requirements and these decisions reflected in capability development planning.²

New Zealand's broader maritime security posture

Transnational security challenges sit alongside New Zealand's broader maritime security interests. As a nation with a vast maritime AOI, New Zealand is inescapably dependent on the ocean for

its wellbeing. New Zealand's economic, strategic and environmental interests are all linked to the global maritime domain. Maritime security is a critical component of New Zealand's defence and security posture. Issues such as maritime terrorism, piracy and the increased prospect of regional conflict due to great power competition have the potential to directly impact New Zealand's interests. With these concerns as drivers, the NZDF has been an active participant in wider regional and international maritime security efforts and has maintained high-end military capabilities such as frigates and Maritime Patrol Aircraft (MPA). However, as transnational security threats within New Zealand's immediate AOI continue to increase, and the government re-focuses on the South Pacific and

² Ministry of Defence. *The Climate Crisis: Defence Readiness and Response*.



LEFT
HMNZS
Wellington on
relief operations
in Fiji in
February 2016
after cyclone
Winstone
devastates Fiji.
Image courtesy
of NZDF.

New Zealand is inescapably dependent on the oceans for its wellbeing... Our economic, strategic and environmental interests are all linked to the maritime domain

Southern Ocean/Antarctica, the challenge for the NZDF will be how to balance investment in capabilities capable of meeting the increasing range of military tasks.

Continuing to maintain a small number of capabilities that are able to perform a wide range of military operations is an increasing challenge for the NZDF. As a small defence force with a relatively small budget, the NZDF cannot realistically continue to acquire and maintain the diversity of platforms able to conduct the current range of expected military outputs. The 2001 decision by Helen Clark's government to disestablish the Royal New Zealand Air Force's Air Combat capability was a stark example of balancing government spending and policy priorities against operational requirements. With demands for constabulary missions increasing, there is a need to prioritise national security operations. But New Zealand needs the ability to conduct combat operations as well. Once again New Zealand is facing difficult investment decisions.

Recent funding announcements by the New Zealand government reflect the realities of the capability development decisions being faced. The previous National-led government purchased the new replenishment vessel, HMNZS *Aotearoa*, at a cost of nearly \$500 million. In addition to providing Replenishment At Sea functions for the naval combat force, *Aotearoa* is ice-strengthened and has a key role in supporting New Zealand's Antarctic mission. In 2018, the first major defence procurement announcement

by the Ardern government was to commit to purchasing four P-8A Poseidon MPA at a cost exceeding \$2 billion. While the P-8A and *Aotearoa* purchases are significant financial commitments, their versatility in conducting operations outside of pure combat missions provides a critical and adaptable capability. By way of contrast, due to cost over-runs associated with the upgrade of the Anzac frigates, the Ardern government was forced to postpone plans identified in the 2016 Defence White Paper for a new-build littoral warfare vessel which would have been a major contribution to maritime security operations. This highlights how the purchase, or upgrade, of a small number of highly sophisticated platforms can have a significant impact on constrained defence budgets and operational outputs.

A key capability decision that the New Zealand government will face within the next five to ten years is the replacement of the two Anzac class frigates and two Protector class Offshore Patrol Vessels (OPV). The Anzacs, HMNZ Ships *Te Kaha* and *Te Mana*, are due to reach the end of their service lives in the period 2032–35. The replacement for the two OPVs is planned for 2032 and is in addition to the procurement of a Southern Ocean Patrol Vessel (SOPV), the initial requirement definition phase for which is currently underway. A crucial consideration for the replacement of the frigates are the associated costs, which could be over \$2 billion NZD per ship.³ Meanwhile the indicative cost of the SOPV is given as being between \$300–600 million and the 2019 Defence Capability Plan Review forecast

³ Based on the projected costs for the Type 26 / Hunter class frigates. Department of Defence, *2020 Force Structure Plan: Maritime Factsheet*.

The purchase of even a small number of high-end platforms will have a significant impact on the NZDF's constrained budget

A replacement option for the Anzacs will need to be decided within the next 3–5 years

between \$600 million–\$1 billion NZD for the replacement of the OPVs.⁴ Given the significant capital investment required to replace these vessels, in particular the Anzacs, and noting the fiscal tightening likely to be a feature of the post-COVID-19 environment for the foreseeable future, it is open to question whether future governments will be able to make such a substantial financial commitment. As such, with the increase of transnational security threats in New Zealand's AOI, a more politically attractive, and affordable, option in the near-term future might be to focus on investment in vessels more suited for constabulary operations.⁵

The NZDF has been able to achieve success with its constabulary operations-focused platforms. In 2001, following an extensive review of the NZDF, it was recommended that the NZDF move away from high-end warfighting and instead focus on peace-keeping and constabulary operations. As a result of the review, the government initiated Project Protector and invested

\$500 million in procuring seven new vessels—a Multi Role Vessel (MRV), two OPVs, and four Inshore Patrol Vessels (IPV). At the time the decision created diplomatic tension with the Australian government which was concerned New Zealand should be investing in more high-end capabilities such as a third Anzac frigate.⁶

The Protector fleet, however, has proven invaluable for New Zealand's maritime security mission. The MRV and OPVs in particular have demonstrated their versatile capabilities. The MRV, HMNZS *Canterbury*, has provided valuable services in HADR crises such as the Canterbury and Kaikōura earthquakes, and extreme weather-related events in Tonga and Fiji. HMNZS *Canterbury* has been so successful that the Australian government acknowledged the vessel as a strategic regional asset. The OPVs have also performed extremely well, conducting successful fisheries surveillance patrols in the Southern Oceans and maritime security patrols and defence

⁴ The Defence Capability Plan Review of June 2019 (available on MoD's website) provides the most up to date summary of the government's capability intentions. For the Future Surface Combatants, the plan states that 'the Anzac Frigates are scheduled to be replaced with modern surface combatants relevant to New Zealand's prevailing strategic environment in the mid-2030s. Introduction of the new ships will be phased with the withdrawal from service of the existing Anzac frigates.'

⁵ The NZDF's *Maritime Doctrine* defines constabulary operations as being operations that fall short of actual combat in support of good order at sea. While combat capabilities are not necessary to conduct constabulary operations, they can lend credibility to law enforcement, and to occasionally defeat an armed opponent. Constabulary operations can form a key component of 'Grey Zone' conflict. Directorate of Seapower and Warfare, *New Zealand Defence Force Maritime Doctrine*, 92-94.

⁶ Office of the Auditor-General, "Multi-Role Vessel and Patrol Vessels (Project Protector)".

The Protector fleet has provided a credible constabulary capability for the RNZN

diplomacy missions in the South Pacific. The vessels have provided a credible capability that has lifted New Zealand's contribution to regional security.

The Protector vessels have also been considered successful because of the direct support they provide to the civilian agencies involved in maritime security and transnational security issues. In many ways the NZDF's support to the civilian agencies, in particular the New Zealand Customs Service and Fisheries New Zealand, a division of the Ministry for Primary Industries, mimics the tasks traditionally done by more law enforcement (LE)-orientated coast guards.⁷ As the constabulary role for the NZDF increases due to the proliferation of transnational security threats, the case for a more LE-focused defence force requires serious consideration. While it is unlikely that the RNZN would wish to reorganise itself as a full-time coast guard, from a functional and capability perspective, there is merit in considering a coast guard capability model as an adjunct to the combat capabilities of the RNZN and as a way to support NZDF's broader maritime security objectives.

How the Australian Defence Force and US Coast Guard combat transnational security threats

For many countries, coast guards, or an increased investment in capabilities more suited for constabulary operations, offer a realistic option to combat growing transnational security threats. Australia, for example, has focused on increasing transnational security

⁷ Geoffrey Till, *Seapower: A Guide for the Twenty-First Century*, 316.

challenges by modernising the Australian Defence Force's (ADF) maritime security capabilities alongside major combat vessel shipbuilding initiatives, and increasing support to civilian agencies. The United States Coast Guard (USCG) utilises its military, LE and civil authorities to provide maritime security for the US homeland and overseas interests. Refocusing and equipping the RNZN to conduct similar roles as the ADF and USCG offers a realistic option for managing New Zealand's maritime security interests in the South Pacific.

The US Coast Guard model

The USCG is an exemplar of a military organisation that balances military, LE and civil functions for maritime security purposes. The US faces a wide range of maritime security challenges. As a result of its vast resources, responsibilities and government structures, the US has developed a unique approach to maritime security which is led by the USCG. The USCG is a military and LE multi-mission maritime service charged with a broad range of responsibilities, including regulatory, enforcement, physical security, HADR and emergency response duties. The USCG's primary maritime security mission is combating TSOC which it does in conjunction with the US military, enabled by its dual military and LE authorities. These authorities allow the USCG to use actionable United States Intelligence Community (USIC) produced intelligence, in particular Signals Intelligence (SIGINT), in support of its LE function.⁸

To achieve its maritime security mission, the USCG

⁸ United States Coast Guard, *Coast Guard Strategic Plan 2018-2022*.

A US Coast Guard investment model could be a possible option for the NZDF in a resource-constrained environment

The USCG conducts military and law enforcement missions to combat transnational security threats



BELOW
Computer-
generated image
of a RAN Hunter
class ASW frigate.
Image courtesy
of RAN.

is upgrading its fleet of maritime vessels and aircraft. Since the late 1990s, the USCG has embarked on an extensive modernisation effort, known as the Integrated Deepwater System Program (DEEPWATER). A key deliverable for DEEPWATER has been to provide the USCG with enhanced offshore patrol capabilities. Two new vessel classes, the National Security Cutter (NSC) (also known as the Legend Class) and Offshore Patrol Cutter (OPC) (or Heritage Class), are being delivered to the USCG. The new vessels will be equipped with advanced Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) capabilities, which will improve the USCG's ability to develop situational awareness and coordination with the US Department of Defence (DoD) and international partners. The USCG anticipates that the new OPCs will become the mainstay of the maritime security mission.

It should be noted that these are relatively large and very much more expensive vessels than the current OPVs of the RNZN. The USCG NSC is 4,600 tonnes full load and 127 meters in length. The USCG OPC will be 4,520 tonnes full load and 110 meters in length. Both ship classes are larger than the Anzac class frigates (3,600 tonnes full load and 118 meters in length). By contrast, the two Protector class OPVs of the RNZN displace 1,900 tonnes each and are 85 meters in length.

With the increasing emergence of transnational security threats globally, the USCG is working more closely with the US Navy (USN) to support international maritime security operations. USCG LE teams routinely deploy on USN vessels to conduct Visit, Board, Search and Seizure operations to ensure evidential requirements are maintained. In cooperation with the USN, the USCG is increasingly deploying internationally to support

maritime security operations, partner capacity building and defence diplomacy. In addition, USCG vessels deploy as part of USN Expeditionary Strike Groups (ESG) where they provide escort, surveillance and enforcement roles. The USN considers the inclusion of USCG assets in its ESGs as an important enabler in being able to conduct the full spectrum of maritime security tasks. This type of international defence contribution is an example of what a maritime security-equipped and focused RNZN could also provide.

Australia's maritime-focused Defence outlook

Maritime security is a critical defence objective for Australia. The Australian government's 2016 DWP and 2020 Defence Strategic Update identified the need for Australia to modernise ADF's maritime capabilities

Maritime security is a critical defence objective for Australia

ABOVE
USCG National
Security
Cutter *Bertholf*
(WMSL-750)
Image courtesy
of USCG.

as a key priority.⁹ For the ADF to meet its three core defence objectives—defend the homeland, provide regional security and make global contributions—the ADF will need technologically superior, high end combat capabilities. To achieve this, a continuous shipbuilding programme has been initiated, with the aim of delivering modern submarines, frigates and patrol class vessels to augment the existing fleet. The ADF is also acquiring fifteen P-8A Poseidon MPAs and a fleet of large maritime surveillance Remotely Piloted Systems (RPS).¹⁰

To meet the need for increased constabulary operations, the Australian DWP prioritised significant investment in upgrading the

ADF's maritime patrol force through the acquisition of twelve new Arafura class OPVs. The new OPVs will be a significant improvement over the current patrol fleet and an important component of Australia's maritime security system that supports border security agencies, in particular the Maritime Border Force (MBF), which is responsible for coordination and responding to maritime security threats in Australia's maritime domain. Their bigger size will allow incorporation of capabilities, such as RPS and Electronic Warfare Systems, which will significantly improve the vessel's surveillance reach. The significant investment that Australia is putting into building up its maritime patrol

⁹ Department of Defence, 2016 *White Paper*, 89.

¹⁰ Department of Defence, 2020 *Defence Strategic Update*, 36-37.



The ADF has prioritised development of maritime patrol capabilities alongside naval combat modernisation

fleet, alongside procurement of advanced combat capabilities, highlights the importance of maritime security capabilities as a key defence output.

At a full load weight of 1,640 tonnes and length of 80 meters, the Arafura class OPVs of the RAN will be very much smaller vessels than either of the two new USCG Cutter classes. 12 Arafura class OPVs plus two MCM variants have been ordered at a reported cost of A\$3.6 billion.

Implications for the NZDF

In geographic breadth and complexity, New Zealand's maritime security interests echo those of larger nations, such as Australia and the US. Unlike New Zealand, however, those countries have significantly more resources available to cover the full-spectrum of maritime security threats. The USCG model works for the US because they have the USN to supply the core military mission. For Australia, the RAN has invested in high-end naval combat capabilities as well as patrol forces. This is unlikely to be a situation that New Zealand can replicate, hence the need to consider increased and prioritised investment in capabilities more suitable to addressing transnational security threats. Focusing on equipping the RNZN for constabulary operations, and increasing support to regional security efforts, will enable the NZDF to better address transnational security threats whilst enhancing regional security. The challenge for New Zealand will be how to do this while still making a meaningful contribution

to more traditional security requirements further afield.

The SDPS highlights the requirement for the NZDF to remain interoperable with its traditional security partners. It notes that despite the changing security environment there will be no need for a fundamental change to the NZDF's capabilities, which it argues have been slowly modernised since the 2010 and 2016 DWPs.¹¹ However, as has been shown, it will be increasingly challenging for the NZDF to meet both international and regional defence and security obligations with the current numbers and range of capabilities. This is particularly acute for the RNZN with only two combat vessels, as has been seen during the period when both vessels were withdrawn from service for the Frigate Systems Upgrade project. Noting the increased requirement for the NZDF to address transnational security threats in the maritime domain, whilst still making a contribution to international security efforts, the NZDF needs to strike a balance between combat related tasks and transnational security threats.

Given the significant costs associated with replacing the Anzac frigates, an alternative option for the NZDF is to delay the replacement of the Anzacs and instead prioritise an increase of its offshore patrol capabilities. OPVs operated by coast guard or naval patrol forces have emerged as a key platform for maritime security operations. Larger OPVs, such as the USCG's NSC and OPCs bring sophisticated capabilities such as aerial surveillance through shipborne

¹¹ Ministry of Defence, *Strategic Defence Policy Statement 2018*, 38.

Modern OPVs, when equipped and employed carefully, can play a vital military role

helicopters or RPS, advanced C4ISR sensors and weapons systems.¹² By utilising modular "plug and play" capabilities and automation, modern OPVs can also be configured to provide bespoke capabilities, such as Anti-Submarine Warfare (ASW), Electronic Warfare, and point-defence missile capabilities. As such, modern OPVs can be employed in a wide range of naval operations ranging from constabulary and "grey zone" operations to medium-intensity combat.¹³

Depending on their size and equipment specifications the costs to acquire modern OPVs are likely to be significantly less than the cost to purchase new-build frigates.¹⁴ While not suggesting that the naval combat capability be disestablished, by delaying the replacement of the Anzacs and instead investing in constabulary capabilities, the RNZN will be able to generate a force capable of addressing the more immediate security needs within the AOI. Even a modest investment to acquire a small number of additional

¹² Lee Willett, "Constabulary Maritime: OPVs and Corvettes on Patrol."

¹³ Medium-intensity combat is typically conducted in areas where there are limited air and missile threats. Tasks can include armed patrol and protection of Sea Lines of Communication (SLOCs) and choke points, intelligence and surveillance operations, and interdiction activities.

¹⁴ The RNZN's Protector class OPVs, for example, cost \$110 million per vessel when originally purchased. The RAN's 12/14 ship Arafura class purchase is reported to have a planned cost of A\$3.6 billion. The Arafura class OPVs are smaller in size than the RNZN Protector class OPVs. A new class of RNZN OPV would be likely to cost significantly more than an Arafura class OPV, noting however that costs are critically dependent on mission requirements and hence ship fitout including weapons and sensors, as well as the numbers of ships in the class over which design and build costs can be spread. The USCG NSCs are reported to be costing an average of USD \$684 million each (NZD \$1030 million).

OPVs, in lieu of one new-build frigate for example, would provide the NZDF with an increased maritime security capability. Furthermore, should the NZDF delay investment in high-end naval combat capabilities, funding could also be freed to purchase and upgrade sealift, replenishment and amphibious warfare capabilities. Although delaying the replacement of the Anzacs may create a gap in the RNZN's combat capability, this could be offset by the regional security contribution that a constabulary-focused fleet will provide.

Notwithstanding the lower costs and increased utility that modern, sophisticated OPVs can provide, there are a number of limitations that would need to be considered if the NZDF was to focus on prioritising investment in constabulary operations. OPVs do not have the same endurance and range as frigates so when operating beyond the New Zealand AOI they will require access to port and dockyard support facilities. Also, OPVs do not have the same level of survivability as frigates, so

their employment in higher intensity combat is severely limited. These challenges are not insurmountable, however. The RNZN has had success with basing personnel and vessels in Fiji for prolonged periods. The USN arrangement with Singapore, for use of Sembawang Naval Base, is a model the RNZN could follow. To address the survivability issue, how the OPVs would be employed in combat situations would need careful consideration. However, to a degree, this is the case for the Anzacs as well.

A final, more significant concern about focusing on the procurement of OPVs, however, would be the reaction from New Zealand's traditional security partners.

Security partner concerns

Any move by New Zealand to prioritise constabulary operations is likely to elicit a negative reaction from traditional security partners, in particular, Australia. Should New Zealand move to delay replacement of the

Moving away from a combat-focused fleet will cause concern for our international partners

Anzacs, a major concern for the government, as well as traditional allies, would be the reduction of the RNZN's ability to contribute to wider regional security efforts. The growing competition between the US and China risks sparking a naval conflict that could impact New Zealand's Sea Lines of Communications (SLOC). Other threats, such as maritime terrorism and piracy, increasingly threaten New Zealand's global interests. Without the ability to contribute naval combat forces to efforts aimed at deterring these threats, it would be perceived that

New Zealand was abdicating its responsibilities. In addition, a risk associated with moving investment priorities away from high-end naval combat platforms would be that the RNZN would lose its interoperability with allies and be unable to make a meaningful contribution to international operational efforts.¹⁵ Any intention by New Zealand to change its maritime security focus would need careful consultation with key partners, in particular, the Australian Government, prior to any decision being made.

Rather than reducing New Zealand's contribution to

¹⁵ Colin Robinson, "A Maritime Shift? Colin Robinson speculates on the proper force balance for the New Zealand Defence Force in the Future," 13.



LEFT
HMNZS
Manawanui
conducting officer-of-the-watch manoeuvres with HMAS *Hobart* off the coast of Oahu, Hawaii, before the start of RIMPAC 20. Image courtesy of NZDF.

Refocusing and equipping the RNZN for constabulary operations can provide a meaningful contribution to international security efforts and will allow a greater contribution to regional security

collective security, however, a constabulary-focused RNZN, if equipped and employed carefully, could bolster regional security efforts. As has been shown, larger, modern OPVs bring capabilities that span a wide range of naval operations and could allow New Zealand to complement partner capabilities and potentially free up their resources to be deployed elsewhere. Investment in advanced C4ISR, ASW, and point-defence capabilities for the OPVs would also ensure a high degree of technical interoperability with international partners. Notwithstanding the challenges associated with endurance and sustainment requirements, with an enhanced fleet of OPVs, the RNZN could continue to participate in international maritime security initiatives, such as anti-piracy missions and Freedom Of Navigation (FON) exercises, in much the same way as the USCG does in support of the USN. In the South Pacific, the RNZN could provide a more robust and sustained naval presence in support of Pacific Island nations, which would significantly support the New Zealand Government's Pacific Reset strategy and contribute to regional security initiatives.

Conclusion

As the New Zealand government faces critical decisions about its defence capabilities and future investments, the maritime security efforts of key security partners provide a potential blueprint to follow. To address maritime security challenges, including transnational security threats and geopolitical competition, constabulary-type forces equipped with OPVs have become a key

defence asset. Operations focused on surveillance, enforcement and regional engagement are critical. There would be significant financial and operational benefits if New Zealand shifted its focus from the replacement of the naval combat force and instead prioritised investment in a more robust maritime patrol force and increased sealift and amphibious warfare capabilities. By refocusing and equipping the NZDF as a constabulary-focused force, the New Zealand government will be able to better meet national security and foreign policy objectives while making a valuable contribution to collective security operations.



TIMOTHY PORTLAND

Timothy Portland is a Counsellor at the New Zealand High Commission in Canberra. In this role he is responsible for the management of key relationships with the Australian national security community.

A career public servant, over the last two decades Timothy has held a variety of analytic, representational and management roles across the defence, intelligence and foreign affairs portfolios.

Timothy's first overseas posting was to the New Zealand High Commission in Honiara, Solomon Islands in 2003, where he provided support to the New Zealand Defence Force personnel deployed as part of the Regional Assistance Mission to the Solomon Islands (RAMSI). His next posting was to the New Zealand Embassy,

Washington, DC in 2008, where he supported the reestablishment of defence and security relations with the United States of America. His current posting to the New Zealand High Commission in Canberra, Australia, commenced in early 2020. Timothy has also undertaken operational deployments to Bougainville and Afghanistan in support of NZDF operations.

Prior to joining the public service as a civilian, Timothy served in the Royal New Zealand Navy (RNZN) for six years. During his time in the RNZN, he served on the Leander class frigates HMNZ Ships *Wellington* and *Canterbury*, and at Headquarters New Zealand Defence Force in Wellington.

Timothy is a graduate of the NZDF Advanced Command and Staff Course. He holds a Diploma of Arts (Defence Studies endorsement) from Massey University and a Master of Strategic Studies (with Merit) from Victoria University of Wellington.

BOOK REVIEWS

The Guest Editor for the Book Reviews in this inaugural issue of the *Journal* is Commander Andrew Dowling. Andrew is the Deputy Director Naval Combat and Patrol Force in Capability Branch. He holds a Master's degree from King's College, London, in War in the Modern World (with Distinction). He also holds a degree from Massey University in Strategic Studies as well as being a graduate of the New Zealand Defence Force (NZDF) Advanced Command and Staff Course.

Andy has served with both the Royal New Zealand Navy (RNZN) as Operations Flight Commander and Project Manager for the Future Naval Helicopter, and with the Royal Navy (RN), where he was on the F-35 Project. He was the Strike Operations Officer on HMS *Illustrious* and the J5 of UK Amphibious Battlestaff. His goal for the Book Reviews is to introduce readers of the *Journal* to a carefully selected range of books from the worlds of contemporary naval and strategic literature as well as from the classical canon of war studies.

While Andy will be approaching colleagues to contribute to the Book Reviews, he is also happy to receive contributions from readers of the journal who have books that they particularly wish to recommend.

As Guest Editor of the Book Reviews, Andy will be assisted by Captain Simon Griffiths DSD. Simon's first command in the RNZN involved bringing the Offshore Patrol

Vessel HMNZS *Wellington* into service before taking her down to the Southern Oceans and Ross Sea. He also commanded Anzac frigates *Te Kaha* and *Te Mana*. Simon holds an undergraduate degree in History from Canterbury and a Masters Degree in Strategic Studies from Victoria University of Wellington. He is also a graduate of the US Naval War College, Rhode Island. Simon is currently Director of the Strategic Commitments Branch of the NZDF.

Note from the Guest Editor, Commander Andy Dowling RNZN

I've always been an avid reader and am not ashamed to say I started on *Commando Comics* and the *Victor Book for Boys* as my first fare. I've matured in my reading only a little since then. I am fascinated by warfare, strategy, leadership and the way the sinews of society weave together to commit and support countries in war. For me, there are three really special books. Field Marshal William Slim's *Defeat Into Victory* is still the best book on leadership. For a tremendous book on how personalities shape the interaction of allies, and the development and execution of grand strategy, my favourite is Andrew Robert's *Masters & Commanders*. Finally, to return to the maritime domain, Chris Parry's *Super Highway* is irreplaceable. It is a recent book on the often overlooked value of the seas in the contemporary operating environment and the fundamental role they play and will continue to play in the future. Every naval officer should own a copy of this.

As a military professional, I have always taken great pleasure in reading and learning from others. Professional

military reading, as any good officer will tell you, should be part of your own personal programme of development and enlightenment. But fitting it in can be difficult. As Churchill once said, 'The problem with being too busy to read is that you learn from experience. Normally with disastrous consequences.' As a self-confessed history buff, I am lucky that my hobby feeds into my job, but I recognise this is not always the case for everyone. For those who do want to expand their military knowledge, the internet abounds with reading lists, most of which contain the compulsory text by Clausewitz *On War* that most can quote from but very few have read. I gave up about a third of the way through.

Multiple demands on our time notwithstanding, I believe that there is a responsibility on the part of all officers and military professionals to engage with strategic, military and historical texts. There is nothing more awkward than asking a young officer why their armed service or branch exists and getting nothing coherent in reply. More serious than this though: as officers it is our responsibility to lead and coach our people. Reading is one way to educate ourselves about past mistakes, and, equipped with that knowledge, give ourselves a greater chance of not repeating them, particularly as we are in



Commander Andrew Dowling RNZN

a business where errors can cost lives. As officers, we should also understand the limitations and capabilities of the military. We should learn from recent and historical conflicts how the military is just one tool in society and how it relates to the machinery of government. We should understand the nature of the world and the contemporary operating environment in which we execute our duties.

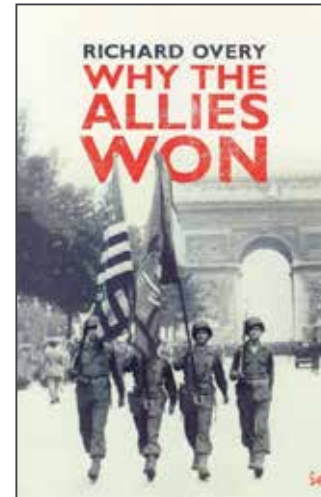
But military reading can be a daunting challenge. The key to success is to find a hook and let it draw you in. Whilst I find the tactics of World War II close air support fascinating, I'm not sure everyone does. Choose something you find interesting and see where it leads you.

The canon of writing that helps broaden the understanding of a military officer is enormous, encompassing strategy, economics, history, politics, the art of leadership, technology, philosophy, sociology and more. Ultimately, I believe there is nothing new facing our militaries and the lessons are all written down waiting for us to take them on board.

My aim is to make the book reviews relevant, insightful and most of all enjoyable. Professional military reading is a must for all military officers, yet can sometimes be viewed apprehensively. Start with something you enjoy, like *Commando Comics*, and who knows where you'll end up!



Captain Simon Griffiths RNZN



Why the Allies Won

Richard Overy
Published by Pimlico, London,
1996.
978-1845950651

As Overy makes clear from the outset, the Allied Victory of 1945 seemed far from certain. With the vast majority of Continental Europe (and its resources) in German hands and Japan carving through Asia, it appeared as though the Allies and democracy were staring down the barrel of defeat.

Overy is a Professor of History at the University of Exeter in the UK and has written extensively about World War II, with his most common theme being the strategic bombing campaign against Germany. His deep well of knowledge is evident in this book in which he takes a fresh viewpoint of Allied success and spends time on matters often overlooked by other historians or academics. Overy does not just argue that the Axis defeat was inevitable, he goes to great lengths to demonstrate the factors that led to it. He weaves the complex relationships of economics, leadership, geography, resource and military acumen to great effect.

The author's major contention is that the Allies succeeded because they had a plan that covered all the factors listed above. He argues that the German and Japanese leaders were opportunists, with no realistic long-term strategy and very little in the way of co-operation between them. For all the Axis hyperbole about total war, they had in fact the least organised economies and workforces to support their territorial aspirations. As an example, Overy asserts that the United Kingdom was perhaps the first country to fully embrace the philosophy of total war, with

women drafted into industry from 1939, whereas Germany failed to take such a measure until late 1942.

Overy goes on to illustrate the importance of planning. He notes that both the Germans and the Japanese reached a high-water mark of success in mid to late 1942, after which their paucity of long-term planning caught up with them. At around the same time, Allied planning had begun to solidify and they were gaining a lead in the industrial race. Most important of all was the Allies' understanding of how they could leverage their trump card of strong sea lines of communication. Overy contends that the Allies always had global freedom of manoeuvre, meaning no country was isolated, yet by contrast, Germany and Japan were surrounded from the beginning.

Where Overy's scholarship really shines is when he begins to thread his arguments together. He illustrates how the Allied victory was based on an interweaving of economics and security of the seas, allowing them to produce the decisive resources in the right place at the right moment.

The exterior lines of communication that the Allies possessed meant that once they contained the Axis advance, they could make their next moves at times and places of their choosing. The inherent flexibility offered by the potent combination of air and sea power, backed up by a strong industrial and resource base, was a war winning combination.

Today the globe is once more experiencing uncertainty and transformation, facing crisis upon crisis with ambitious new actors on the world stage. If we are to take anything away from Overy's superb book it is this: have a plan.

Reviewed by Commander
Andrew Dowling RNZN

The Mighty Dead: Why Homer Matters

Adam Nicolson
Published by William Collins,
London, 2014.
978-0007335527

The title that Adam Nicolson has chosen for his examination of the relevance of the poet Homer will divide his potential audience from the outset. If you don't already think that Homer matters, you may be disinclined to hear anyone else's view on the subject, even an author as distinguished and polished as Nicolson. But the very fact that writers and artists still draw inspiration from the epic tales, which are among the world's oldest extant literature, should make even the most sceptical pause for thought. Nicolson has clearly succumbed to Homer's spell despite what he admits is the 'strangeness' of the world of the Iliad and Odyssey.

The centrepiece of *The Mighty Dead* is a quest for a deeper understanding of how the Homeric poems came to be. Dismantling the idea of a single author is a stepping stone to locating the origins of the Homeric world-view much deeper in time than is first apparent; the Bronze-Age Greeks who sang the epic poems were very likely memorialising migrant ancestors who came to the Mediterranean shore from the Pontic and Russian steppes centuries prior. The ambivalent, even fearful, characterisation of the sea throughout Homer is a telling indicator of a culture with inland origins. Nicolson paints the picture of a chain of singers going back generations, working from memory, lauding a cultural ideal that may have already faded.

The archaeological, linguistic and literary evidence

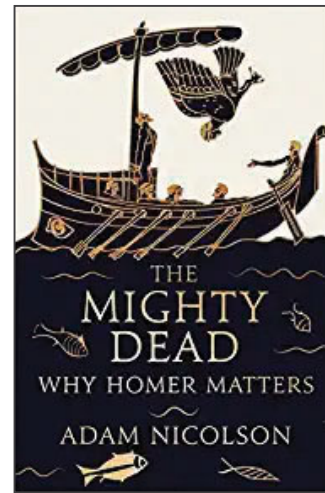
leads to the conclusion that Homer encodes an ancient source of conflict, between warrior bands—who prize freedom and personal honour—and urban civilisation, with all its order and abundance. This is one of the features of Homer that resonates to the present day, with echoes in current wars like Afghanistan. Modern readers can find themselves simultaneously uplifted by familiar themes like freedom and authority, jealousy and revenge, betrayal and faithfulness, but shocked by the pitiless violence that runs like a river through Homer. Nicolson is not asking us to approve of all that proud Achilles or wily Odysseus do, but he is asking for his audience to allow Homer's insights into human nature to have the emotional impact that has always been the poems' purpose.

Nicolson is at his best when he is peering deep into Homer's characterisations and finding his own image reflected back. The personal anecdotes and reflections woven through the text enliven the narrative and illustrate his central point; as foreign as Homer can seem on the surface, at root it is deeply familiar. Whether you have read Homer or not, Nicolson's passionate and eloquent argument for its timelessness makes *The Mighty Dead* a worthy guide to one of literature's oldest obsessions.

Reviewed by Commander John Sellwood, RNZN



Commander John Sellwood has served in the Royal New Zealand Navy since 2003 in a range of command, staff and training roles, including being deployed on operations. In 2014 he was the dux of the NZDF Advanced Command and Staff College and in 2020 was the United States Naval War College's Senior Level Course Distinguished Graduate, the first international officer to have done so in the College's history. A Wellington resident, Commander Sellwood enjoys reading widely, running around the hills and harbour and family life with his wife and two children.



Super Highway: Sea Power in the 21st Century

Chris Parry
Published by Elliott and
Thompson, London, 2014.
978-1908739841

Parry's very refreshing and accessible work sets out to contend that the importance of the seas has been forgotten and that this century will see the maritime domain reclaim its place as the world's pre-eminent strategic medium.

As a retired Rear Admiral in the Royal Navy (and Fleet Air Arm Observer) Parry's familiarity with the strategic implications of the maritime domain is well established. He was previously the head of the UK's Defence Concepts and Doctrine Centre. He argues lucidly and engagingly why the maritime domain matters to everyday society. Humans have exploited the seas for trade, resources and protection for centuries. Yet Parry contends that although human society relies on the maritime domain more than ever for the movement of goods and resource extraction, ironically societies have largely lost their connections to the sea. Below is an excerpt from the book where Parry describes the first stirrings of globalisation and how the maritime domain was essential to this from the start:

'Oceanic routes had not been attempted before because technology and the accumulated store of human knowledge did not encourage extended voyages to be undertaken with confidence. There were also insufficient incentives to bypass familiar trade routes, by risking life and fortune on the high seas. In this sense, it is significant that Columbus was the first seafarer to demonstrate the viability of linking continents by oceanic travel. All previous trading and

movements of people had occurred over land or along coastlines by ships probing short distances at a time, as with Vasco da Gama and the Portuguese explorers. As far as possible, they had maintained close contact with the land or had used known features to navigate from point to point all the way down the west coast of Africa and into the Indian Ocean. This willingness and ability to navigate successfully across the oceans represented the point at which trade went intercontinental and viral and the process of globalisation began. The oceans were the decisive facilitator of globalisation.'

This loss of connection, or appreciation of the sea on the part of society, is evidenced through Parry's description of the impact of the internet on the maritime domain. Never has it seemed easier and more straightforward for consumers to order what they want from the internet, yet e-commerce is supported by delivery and the largest medium of delivery is by the sea. As Parry points out, both the internet and the sea are used for communication and access yet in his opinion only one is recognised and appreciated.

The greatest strength of the book is that although he is a retired naval officer, Parry doesn't fall into the trap of discussing sea power as being purely the provenance of the military. Instead Parry spends much of the book explaining and linking the different contexts of the maritime: commercial, political, technological, environmental and military. This has the advantage of breaking the reader free from the sometimes blinkered and stove-piped approach of other works. This makes the book attractive not just to naval practitioners but also to a wider audience.

Perhaps the most sobering assessment in the book is Parry's contention that the seas will soon start to be increasingly colonised, and that the current adherence to territorial boundaries will be ignored. This will be triggered by actors, state and non-state, scrambling for resource deposits both under the seabed and in the oceans. The potential effects this may have on shipping routes, pollution, aquaculture, climate change and territorial incursions may require nations to adopt a different maritime mind-set. Parry argues that for any country to be successful in the 21st century and beyond it needs a well-developed and coherent maritime strategy.

This book is not an unabashed advertisement for naval forces, as might be expected from a retired Rear Admiral. It is a thoughtful, holistic appraisal of what the maritime domain will mean to the world in the coming century. Nations need to have thought about what their objectives are and how they intend to use the opportunities and vulnerabilities that the maritime domain will present in the future.

If I had it in my gift, every naval officer would own a copy of this book. It is an excellent primer as to why the maritime domain matters.

Reviewed by Commander
Andrew Dowling RNZN

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NEXT ISSUE

'Encouraging critical thinking: letting 3–4 flowers bloom'

The next issue of the *Professional Journal of the Royal New Zealand Navy* is planned for publication in May/June 2021. The close-off date for articles and contributions including Letters to the Editor, Commentary and Book Reviews is Wednesday 31 March 2021.

Articles up to 4,500–5,000 words in length will be welcomed. Shorter is even better. No special merit attaches to length. As your editor, I will be happy to work with you to help shape your thinking. If you have an idea or a theme that you would like explored, but don't have the time to set out your thinking or the expertise to do the research, let me know and I will find someone who can work with you to help develop your thoughts.

The Editorial Review Board is also there to assist and encourage you in your thinking and writing.

Intended themes for the next issue include special feature articles on the capability requirements of the future fleet as seen by the Navy; an examination of how government departments in New Zealand coordinate their overall approach to maritime security issues; a review of New Zealand's maritime interests from our earliest days; a look ahead to the defence and security issues that may arise from the deep sea mining of metals and minerals in New Zealand and the South Pacific; and the development of a large-scale liquid hydrogen export industry based on New Zealand's renewable energy resources.

My email address, and the general address for correspondence relating to the *Journal*, is lance.beath@gmail.com. If your interest is to do with the Book Reviews, Commander Andrew Dowling or Captain Simon Griffiths are more than happy to take your ideas for a book review. They can be contacted at Andrew.Dowling@nzdf.mil.nz or Simon.Griffiths@nzdf.mil.nz.

I look forward to welcoming you all back for the next issue of the *Journal*.

Lance Beath
General Editor

TAI-PANUKU: SYMBOL OF COMMAND



HMNZS *Aotearoa*'s Symbol of Command is a staff, named by Ngāti Te Whiti Hapū as Tai-Panuku (*smooth flowing tide*). Tai-Panuku was created from Kauri timber which was found as a log that had washed ashore at the Kiritehere Beach south of Kawhia in 1981 by Te Pane Ariki Alexander Phillips, Te Poropiti Whakamutunga (*The Last Prophet*). The taonga was crafted at Te Karangaiti carving school, Mana Ariki, Taumarunui by Gregory Keenan, a descendant of Ngāti Te Whiti o Ngāmotu on behalf of te Uri o Ngāti Te Whiti.

The four pāua around the Kōhatu (stone inset on the top of Tai-Panuku) represents Ngā Tōpito o te Ao (*the four compass points*): Te Tai Tokerau, Te Tonga, Te Tai Rāwhiti and Te Tai Hauāuru (*North, South, East and West*). The Kōhatu retrieved and confirmed with an appropriate Karakia under the watchful eyes of a Kaumatua, Mr Ngahina Harris of Ngāti Te Whiti, from the foot of Paritutu (also known as Paritutu Rock), which stands strikingly at Ngāmotu (the sugar loaf islands) on the coast of New Plymouth.

The Kōhatu is from the revered Paritutu that holds great Spiritual, ancestral and historical importance to both Māori and the people of New Plymouth. It is recorded in Māori oral and written history, songs and incantations as a place of shelter and refuge in times of need, He Pou (a pillar) for boundary markers, religious purposes, a lookout and fishing references. When the Settlers arrived at New Plymouth, they were guided by Paritutu as a sign of safe anchorage. Today in the shadow of Paritutu lies a place of shelter, Port Taranaki, 'Westgate'.

The two small pāua represent Te Taipari and Te Tai mitimiti (*high and low tides*); through the movements of the tides, so too is created the sea currents.

The four bounded figures represent Ngāti Te Whiti whakapapa establishing their identity. The figures also represent the people of New Plymouth comprised of all races and denominations of the four corners of the world. The figure with the emblem of the Royal New Zealand Navy above it represents the East. The figure on the right represents the North, the figure on the left represents the South and the figure with Te Raukura (*the feathers*) above it represents the West. Te Raukura is held with great esteem by Taranaki nui tonu, all of the descendants of Taranaki. The prophet Te Whiti communed to his people the significance of the Raukura.

'Korōria ki te Atua i runga rawa, Maungārongo ki runga ki te whenua. Whakaaro pai ki ngā tāngata katoa, Ahakoa ko wai.' *'Glory to God on High, Peace on Earth, Good will to all mankind, irrespective of race colour or creed.'*

The bounding rope of Unity, Te Taurawhiri ā Hinengakau, the Spiritual rope of the great Mistress, the Paramount Chief of Whanganui and Taranaki descent.

The Spiral patterns are an ancient style, with different areas having their own interpretation and meanings. On this occasion it represents the smooth flowing tides, Ngā Tai-Panuku; upon the patterns, there are seven pāua shells, which have two representations. Firstly, they represent the renowned seven migratory Māori canoes that arrived to Aotearoa. Secondly, they represent the ancient phrase for all the world's oceans The Seven Seas.

Blended into the Ngā Tai-Panuku pattern is Maui-Tikitiki-a-Taranga, who was responsible for fishing up the whenua, Aotearoa. The two head figures represent Tangaroa and Kiwa who are Ngā Kaitiaki Wairua—spiritual Guardians in relationship to all things (sea, water currents and the welfare of all that dwells within and upon). According to the Oral and written accounts of Ngāti Te Whiti ancestors and descendants including all Māori, Tangaroa and Kiwa are highly respected and treasured, often bringing wellbeing and blessings to all who harvest and travel upon the sea.

Tai-Panuku is stowed in the Commanding Officer's (CO) cabin and will be carried by the CO on all ceremonial occasions and on other special occasions associated with the ship.

EDITOR'S NOTE

In this inaugural issue of the *Journal*, the emphasis has been on naval issues and the Royal New Zealand Navy (RNZN). But to achieve its outputs, the Navy works closely with both the New Zealand Army and the Royal New Zealand Air Force (RNZAF) as well as other government agencies and civil society.

Images overleaf: Exercise Joint Waka, September 2020, Army Bay, Whangaparāoa Peninsula. The NZ Army and the RNZAF working with HMNZS *Canterbury*. Photos courtesy of Defence Public Affairs.





New Zealand Government