

LEADMARK 2050

Canada in a New Maritime World



CANADIAN ARMED FORCES



FORCES ARMÉES CANADIENNES



National
Defence

Défense
nationale

Canada 

FOREWORD



Leadmark 2050: Canada in a New Maritime World is presented for discussion at a crucial time for the Royal Canadian Navy (RCN). The keel for success in future operations at sea is being laid in a range of projects that are now underway, or are soon to be, as part of a new approach to shipbuilding for all of Canada's federal fleets. Tomorrow's fleet will undoubtedly be more capable than today's. Much work lies ahead to ensure that it is successfully delivered into the hands of the men and women who serve our country at sea.

Leadmark 2050 explains why Canada has a navy, what it does and how it must evolve to meet future challenges. In doing so, the RCN sets out its understanding of a blue-water navy. That term typically means a maritime force capable of operating across the deep waters of open oceans. As *Leadmark 2050* will establish, however, a blue-water navy is not defined by *where* it operates, either in relation to the depth of water or its proximity to a coastline. For the RCN, a blue-water navy is defined by *what* it can do.

Leadmark 2050 is the RCN's self-assessment of the role that a vibrant navy can play in the future prosperity and security of our nation. It seeks to assure Canadians that the RCN understands the commitment in national treasure involved in building and sustaining a modern fleet. It explains to Canadians that such a commitment is necessary, by describing how they benefit from the work of the navy every day for their defence and security, and more deeply in terms of their prosperity and way of life. In short, *Leadmark 2050* explains why a blue-water navy matters to Canada.

We know much about our profession and the tools and procedures we employ to deliver excellence at sea for Canada. Nonetheless, many questions remain unanswered or yet to be asked. Building a navy is a national endeavour that requires a fine balance between the needs of today and those of decades to come. Just as the government of Sir Wilfrid Laurier had the vision to set the RCN on its initial heading 106 years ago, today's leaders face difficult choices. The formulation of a new heading for the RCN begins with ideas such as those presented in *Leadmark 2050*. Getting this right isn't easy, but getting it wrong will severely constrain the options for future generations, as the next class of major warships that Canada builds will still be at sea in 2050.

Getting it right requires us to identify an appropriate balance in our "fleet mix" of ships, submarines and maritime aircraft, between quality and quantity, between investments at sea and those ashore, between people and platforms, between readiness today and readiness tomorrow. Each of these considerations applies not only within the RCN, but across the entire Department of National Defence portfolio. *Leadmark 2050* will help frame these considerations as we work collectively within the broader defence community to design options for the future force—including the navy that Canada needs.

Vice-Admiral Mark A.G. Norman, CMM, CD
Commander, Royal Canadian Navy

EXECUTIVE SUMMARY

Introduction

Leadmark 2050: Canada in a New Maritime World is the RCN's vision of the future. It explains why Canada has a navy, what it does and how it must evolve to meet challenges ahead.

Serving a Maritime Nation

Canada is a maritime nation. This is not just because it borders on three oceans, the world's longest coastline. Neither is it simply a reflection of our history, although seapower played a fundamental role in shaping North America's political destiny. Canada is a maritime nation because it trades.

The vast majority of global commerce travels by sea, including more than 90 per cent of consumer goods and two-thirds of the world's oil. Some one-third of Canadian Tire's® entire inventory at any one time is in containers on ships, making its way to Canadian markets to replace goods purchased off the shelf only weeks prior.

Maritime commerce depends upon lawful and unimpeded access to the high seas, a universal principle enshrined in the United Nations Convention on the Law of the Sea. That treaty also enshrines Canada's sovereign rights and responsibilities in its home waters, an immense region surrounding our coasts that is 70 per cent of the size of the country itself. This makes Canada one of the world's largest coastal states. It is also one of the richest in terms of the natural resources found in these waters.

Through the ongoing information and transportation revolutions, the Canadian and North American economies over the past several decades have been fundamentally restructured, reorganized and reintegrated into the global economy. Today, trade accounts for more than 60 per cent of Canada's economy, second highest in the G8. But even that doesn't tell the whole story.

Consider the Ford™ F-Series™ pickup truck, that most iconic of North American domestic vehicles. While it is assembled in Missouri and Michigan, only 55 per cent of its parts are made in Canada and the United States. Another 15 per cent originate in Mexico; the remaining 30 per cent come from overseas. Just 22 of the 164 vehicle brands produced in North America in 2011 qualify as domestic, defined under U.S. commerce rules as having 75 per cent or more of their value derived from parts originating in Canada or the U.S. That's the reality of the global maritime commerce hidden in Canada's international trade figures. It permeates our entire economy.

The same forces that have shaped the global economy have also transformed societies, creating a vast, intricate web of relationships that have brought unprecedented flows of wealth, ideas, goods, services, culture and people among the world's nations. We call this hyper-connected and massively interdependent world the global system.

There are few nations more globalized than Canada or whose citizens are more dependent upon on the integrity of the global system for their prosperity and security. We are among the world's most connected societies. We are among the world's most proudly and successfully plural societies, with deep personal ties and family roots extending around

the world. And we are among the world's most active states in the international community.

No nation alone can ensure the integrity of the global system, but few have more reason than Canada to play a role in defending it. Protecting the global system, collectively with like-minded nations, is essential to Canadians' way of life.

Our Fundamental Purpose

Like armies and air forces, navies may be used when events disrupt or threaten to disrupt the global system. Or, better still, to prevent, deter or contain such disruptions. Indeed, no instrument of national influence and power is more flexible in preventing conflict than a navy, especially for states seeking options short of war.

Navies also have a deeper strategic purpose. They contribute to one of the most essential public goods of our maritime world, and they do so every day. They guarantee the maritime peace and good order upon which the global economy depends.

As mariners, the men and women who serve Canada at sea witness the global system up close, every day. Their work contributes to an ocean commons that is regulated in international and domestic law, open for all to use freely and lawfully. Their work helps safeguard the oceans' bounty in Canada's home waters for future generations. They help keep the oceans free of the troubling range of criminal activities that are increasingly drawn seaward around the world, even off of Canada's shores. They are prepared to defend Canada against those who would threaten the norms and values that sustain both the international community and the Canadian way of life.

The Government of Canada calls upon its armed forces to defend Canada, to help defend North America and to contribute to international peace and security. From these enduring roles and missions comes our understanding of the RCN's fundamental purpose in this globalized era and our unique contribution to the national interest in this new maritime world: **To defend the global system at sea and from the sea, both at home and abroad.**

Translating this statement of fundamental purpose into action, Canada's maritime forces will be employed in the coming decades to:

- **Protect** Canada by exercising Canadian sovereignty in our home waters, securing the maritime approaches to North America and contributing to maritime peace and good order abroad.
- **Prevent** conflict by strengthening partnerships and deploying forward to promote global stability and deter conflict.
- **Project** Canadian power to shape and, when necessary, restore order to the global system.

A Navy for this Globalized Era

The Canadian Surface Combatant (CSC) will still be at sea in 2050. This is the challenge that naval planners must confront in the complex world of force development.

A range of defence and security trends and drivers in today's global era have deepened the political, legal, economic and military stakes in the maritime domain. Maritime defence and security threats are both merging and expanding, at home and abroad. Operations across the spectrum of conflict are growing more complex.

This is especially the case in the relatively narrow zone around the world's coastlines, within which the vast majority of humanity resides. This is where the most serious consequences of massive change and social disruption will unfold, making intrastate conflict nearly certain to challenge Canada in the coming two decades. This is also where the RCN will need to be prepared to operate against state adversaries and their armed maritime proxies, an intensely populous littoral environment that is orders of magnitude more complex than anything the navy has yet experienced.

A reordering of global power is also underway, with profound implications for state cooperation, competition and confrontation. Nowhere is this more evident than in the evolving Sino-American relationship, which may already be the defining geopolitical issue of our times. Particularly noteworthy is the interaction of the maritime strategies that each nation is pursuing today in the Asia-Pacific region. At stake is the future integrity of the global maritime order itself, an issue central to Canada's vital interests.

As a Western democratic nation, Canada has an abiding stake in the values, norms and institutions upon which the international community is built. This ensures that the Canadian Armed Forces will continue to play an active role, contributing to peace and security when the international community resolves upon collective action in the face of aggression. The RCN must be prepared in the coming decades to be confronted both at sea and ashore by a wider range of defence and security threats and challenges than it has ever encountered.

As confirmed through operations successfully executed since the end of the Cold War, Canada will continue to require a fleet of sufficient size to operate in its three oceans and to deploy abroad on an ongoing basis, while retaining the ability to respond to major international contingencies. Canada will continue to need a navy that can act with independence to defend Canada's sovereign territory, but that is highly interoperable with the U.S. to help defend North America. Canada will continue to need a navy that can contribute effectively to major international operations.

To meet defence and security challenges in the coming decades, Canada's maritime forces will need to become better equipped for Arctic operations. They will need to become better equipped for peace-support operations, including rendering humanitarian assistance and relieving distress at sea. They will also need to sustain joint operations from the sea and to contribute to joint action ashore.

This will require a **blue-water navy** that is:

- **Balanced**—with an appropriate mix of ships, submarines, aircraft and unmanned vehicles in sufficient numbers to meet commitments at home and abroad, while retaining a naval task group at high readiness.

- **Combat-effective**—capable of combat at sea across all naval warfare disciplines, crewed for sustained high-intensity operations, able to contribute to operations ashore and highly interoperable with Canada’s allies and defence partners.
- **Multi-purpose**—across the spectrum of operations at sea and from the sea, able to work effectively with a wide range of national and international defence and security partners among government and civil society.
- **Arctic-capable**—able to conduct sustained operations in each of Canada’s three oceans, including in the High Arctic.
- **Globally deployable**—with ships and submarines that are capable of independent ocean crossing, but enabled by support ships, operating together for the duration of any assigned mission, anywhere in the world.
- **Forward-postured**—a fleet operated and sustained in a manner that allows our ships and submarines to be deployed on an ongoing basis to regions of Canadian strategic interest.
- **Survivable**—with platforms that are designed for all physical and operating environments, able to sustain and recover from significant damage.
- **Adaptable and agile**—an institution imbued with the ethos to excel and the values to make Canadians proud, whose men and women are prepared for the complexities and ambiguities of future operations in the skills and knowledge they possess.

This is the navy that Canada needs.

TABLE OF CONTENTS

FOREWORD	ii
EXECUTIVE SUMMARY	iii
TABLE OF CONTENTS	vii
ACKNOWLEDGEMENTS	viii
INTRODUCTION: A Maritime Strategic Concept	ix
PART ONE—THE ENDS: Defining the Strategic Concept	1
Canada – A Maritime Nation	1
Maritime Commerce, Seapower and the Global System	2
Challenges and Opportunities in a Maritime Era	6
Challenges	6
Opportunities	9
Statement of Fundamental Purpose	11
PART TWO—THE WAYS: Implementing the Strategic Concept	12
An Expanded Framework for Canadian Seapower	12
The Attributes of Seapower	12
Protecting Canada	13
Exercising Sovereignty in Home Waters	14
Contributing to Maritime Peace and Good Order Abroad	16
Preventing Conflict	18
Strengthening Relationships	18
Promoting Global Stability	21
Deterring and Containing Conflict	22
Projecting National Power	24
A Growing Range of Maritime Threats and Challenges	24
Future Joint Campaigns	26
Maritime Action at Sea	28
The Evolving Anti-Access Challenge	30
Maritime Action from the Sea	31
PART THREE—THE MEANS: Delivering the Strategic Concept	33
Building Tomorrow’s Navy	33
An Agile and Adaptive Navy Institution	34
Sailors and Officers Prepared as Mariners and Warriors	37
A Broadly Balanced General-Purpose Fleet	39
The Fleet Today	39
The Building Blocks	39
Assembling the Building Blocks—the Naval Task Group	43
The Fleet Tomorrow	44
Pursuing Tomorrow’s Naval Capabilities	56
AFTERWORD	59
GLOSSARY OF KEY TERMS	G-1

ACKNOWLEDGEMENTS

The Commander, Royal Canadian Navy, wishes to acknowledge the following people whose suggestions, observations, insights and critical challenge contributed significantly to the development to *Leadmark 2050*, either directly through its various drafts or through its unpublished predecessor: Bill Ansell, Jim Balsillie, Dave Benoit, Scott Bishop, Melanie Blanchard, Jim Boutilier, Corey Bursey, Brian Costello, Daphne Cunningham, Bob Davidson, Bruce Donaldson, Casper Donovan, Pat Finn, Brian Foxton, Gary Garnett, Caroline Gibson, Nigel Greenwood, Eric Gregory, Marcel Hallé, Ron Harris, Phil Henry, Dave Hudock, Rob Huebert, Steph King, Philippe Lagassé, Eric Lerhe, Ron Lloyd, Ben Lombardi, Adriano Lozer, Darren MacInnis, Greg Maddison, Paul Maddison, Meiz Majdoub, Art McDonald, Dean McFadden, Barb McIntyre, Richard Osborn, Simon Page, Ian Parker, Dave Perry, Colin Plows, Bill Reive, Tom Riefesel, Colin Robertson, Drew Robertson, Chris Robinson, Robert “Barney” Rubel, Stan Ryan, Hugh Segal, Mark Sheppard, Dan Sing, Elinor Sloan, Shawn Taylor, Hamish Thom, Geoffrey Till, Angus Topshee, Matt Walsh, Barry Walker, Stan Weeks and Kelly Williams.

Special thanks to Serge Bertrand and the Naval Association of Canada.

INTRODUCTION

A Maritime Strategic Concept

Leadmark 2050: Canada in a New Maritime World presents the Royal Canadian Navy's vision of the future. It describes how the global maritime domain is likely to evolve in the coming decades. It examines what threats and challenges are likely to emerge at sea, or migrate seaward from ashore, and how these threats and challenges are likely to alter the conduct of future operations. *Leadmark 2050* examines what those future trends may imply for the fleet, and more broadly for the Royal Canadian Navy (RCN) as part of the Canadian Armed Forces (CAF). It examines new capabilities and embraces a broader way of thinking about, and organizing for, the demands of future operations.

Leadmark 2050 updates the navy's two previous vision documents, *Leadmark: The Navy's Strategy for 2020* and *Securing Canada's Ocean Frontiers: Charting a Course from Leadmark*. As the title infers, *Leadmark 2050* does not supersede these two documents. Rather it builds upon their enduring ideas, reflecting an enhanced understanding of the evolving global defence and security environment.

Specifically, *Leadmark 2050*:

- Links the navy's strategic functions to the political, legal and economic aspects of today's global system, in order to highlight the crucial role played by seapower in Canada's security and prosperity.
- Describes how Canada's maritime forces will operate with the wider Canadian Armed Forces, as well as other national and international partners, in a comprehensive and integrated manner.¹

¹ From CAF's [*Integrated Capstone Concept*](#). See in particular pp 11-18.

As a strategic concept,² *Leadmark 2050* resides at the apex of the RCN's institutional documents and serves three important functions. First, it establishes guidelines for naval staff, inspiring and aligning their thinking about future maritime concepts and naval doctrine,³ and serving as a framework for the RCN's ongoing institutional renewal.⁴ Second, it addresses the men and women of Canada's maritime forces⁵—uniformed and civilian—speaking to them of their most fundamental *raison d'être*. Finally, it speaks directly to Canadians, contributing the RCN's professional perspective and expertise to the public discussion of defence and security matters in our country.

Why Leadmark 2050? Because a Navy is a Series of 40- to 50- year Investments

Building a navy is a series of 40- to 50-year investments, each one of which is among the most substantial purchases a government will ever make. This reflects both the size of the financial investment and the scale and complexity of the shipbuilding enterprise. More importantly, it determines what future governments will have at their disposal to respond to events that can be scarcely imagined when a class of warships is on the drawing board.

Consider, for example, Canada's *Iroquois*-class destroyers. They were conceived in the 1960s to perform anti-submarine warfare against Soviet-era second-generation submarines, as well as to counter the Soviet anti-ship missiles of the day. The designers of the *Iroquois* could not have envisaged the end of the Cold War and the world that emerged thereafter. But they designed *Iroquois* and her sister ships exceedingly well. The extensive modernization of the *Iroquois* class in the late 1980s to suit new air defence and task group command roles was made possible by the design margins for weight and volume that had been built into their hulls, for operations in the heavy seas typical of northern latitudes.

Just as important, however, was the decision taken by Canada in the mid-1980s to achieve greater relevance and influence within NATO by providing maritime task groups capable of independent operations in the Norwegian Sea. Risks there were deemed to be much greater than in the open Atlantic, leading the government to recapitalize the navy with new general-purpose *Halifax*-class frigates, as well as to modernize the *Iroquois*-class destroyers, then approaching midlife.

With its new frigates and modernized destroyers, the RCN was able to assemble naval task groups capable of conducting and leading complex multinational operations in contested waters. This fact was recognized each time Canada was assigned leadership duties at sea. This included enforcing an arms embargo in the Adriatic Sea with the Standing NATO Naval Group One in 1993 in support of the NATO-led Op SHARP GUARD; commanding counter-piracy operations off the Horn of Africa in 2008; and commanding an entire maritime theatre in the western Indian Ocean in 2003, in support of the American-led Op ENDURING FREEDOM.

Today, with one exception, the *Iroquois*-class destroyers are retired from commissioned service, some 50 years after they were originally conceived, designed and built. And the project to modernize the frigates for the second half of their lives is fast approaching completion. The ships that will be needed to replace the destroyers and eventually the frigates are still many years from fruition. The last of our modernized frigates will be more than 40 years old when it is finally retired.

² In the still highly influential article [*National Policy and the Transoceanic Navy*](#), Samuel Huntington writes that a “military service may be viewed as consisting of a **strategic concept** which defines the role of the service in national policy, public support which furnishes it with the **resources** to perform this role, and **organizational structure** which groups the resources so as to implement most effectively the strategic concept.” [bold text added] Of the three elements such of a service, he views the strategic concept as the most important. The article goes on to develop a strategic rationale for American seapower to sustain the U.S. Navy through the end of the Cold War and beyond.

³ Royal Canadian Navy Doctrine, to be published later this year, expands on *Leadmark 2050* with the analytical rigour and depth required of formal doctrine, guiding all aspects of Force Development.

⁴ See the introduction to Part Three and specifically the text box “The RCN Executive Plan”.

⁵ Canada's maritime forces comprise the *naval* and supporting forces generated by the Royal Canadian Navy as well as the *maritime air* and supporting forces generated by the Royal Canadian Air Force.

PART ONE—THE ENDS

Defining the Strategic Concept

Canada – A Maritime Nation

There is no denying Canada's maritime geography. Three of the world's great oceans serve as our borders: two of them, to the east and west, have shaped Canada's history and now a third, to the north, has begun shaping Canada's future.

For much of our southern border, we share with the United States one of the world's most important inland waterways, the Great Lakes and St. Lawrence Seaway, connecting the Atlantic Ocean to the very heart of the continent. Our Arctic islands form one of the world's largest archipelagos. Our coastline is by far the world's longest.

There is also no denying that international law has made Canada one of the world's great coastal states. The United Nations Convention on the Law of the Sea (UNCLOS) endows Canada with an immense ocean estate that is 70 per cent of the size of the country itself. We are fully sovereign over nearly one half of this area, and we hold special duties of care and custody for the resources and environment in the remainder.⁶ (See Figure 1: One of the World's Great Coastal States)

Finally, there is no denying the influence of seapower upon Canadian history. From the

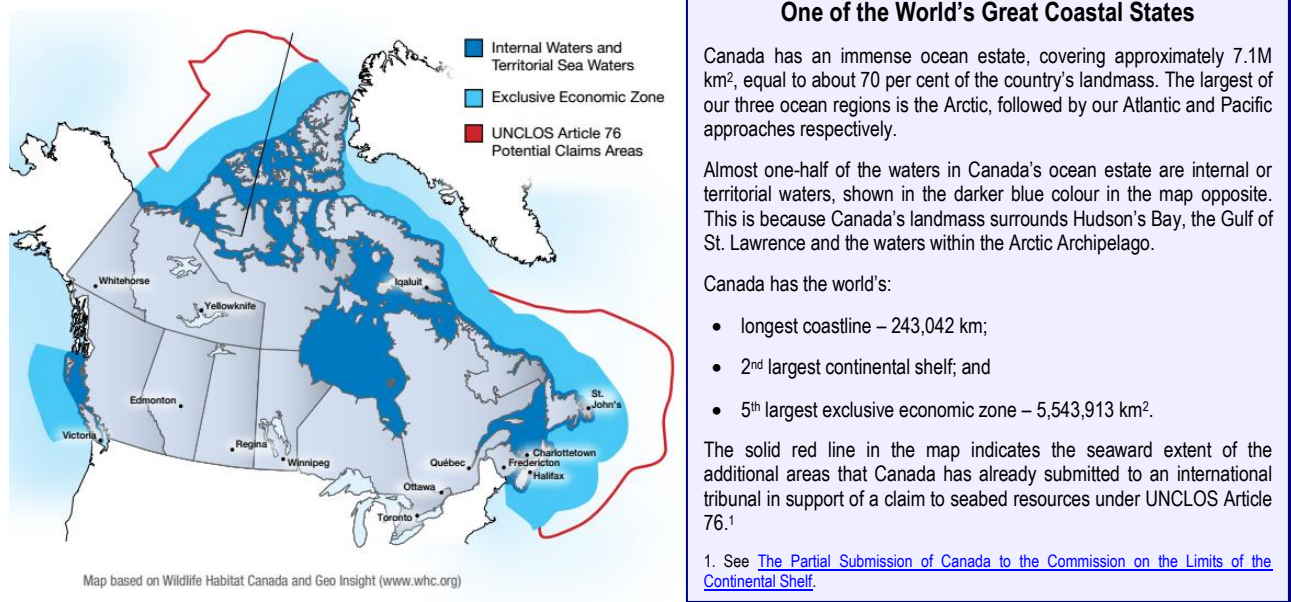


Figure 1: One of the World's Great Coastal States

earliest days of European exploration to the founding of the Dominion of Canada in 1867, the political map of Canada was drawn as much by seapower, with its influence on the

⁶ See [Canada's Ocean Estate](#), which describes how Canada's rights and responsibilities are set in international law for the six maritime zones that make up our ocean estate. *Leadmark 2050* will use the term “**home waters**” to describe Canada's ocean estate.

outcomes of conflicts on North American battlefields, as by any act of legislation. Two of our most historic cities—Halifax and Quebec—were founded upon the military logic of strategic seapower.

Most of our major cities enjoy direct access to the sea. Montreal, Toronto and Thunder Bay are seaports by virtue of the Great Lakes and St. Lawrence Seaway. Vancouver and Halifax have direct links to markets in Asia and Europe, while Churchill delivers the Prairie harvest to world markets when the Arctic releases its grip on Hudson's Bay. The majority of Canadians live within a few kilometres of navigable access to the world's oceans, either in the population corridor adjoining the Seaway, from Quebec City to Windsor, or in the lower mainland of the Fraser Valley.

Geography, history and international law make Canada a maritime nation. But there is something else, and it touches upon the daily lives of all Canadians in ways that are both subtle and profound: Canada is a maritime nation because it trades.

Maritime Commerce, Seapower and the Global System

Canadians tend understandably to think of their prosperity in terms of Canada's access to the U.S. and the networks of bridges, roads and rail that move goods within North America. In reality, these networks are part of a larger global economy made possible by maritime commerce.

The oceans have long served as the principal medium for trade among the continents. Today, more than 90 per cent of all goods travel by sea, including two-thirds of the world's oil. Maritime commerce has quadrupled in the last four decades and is expected

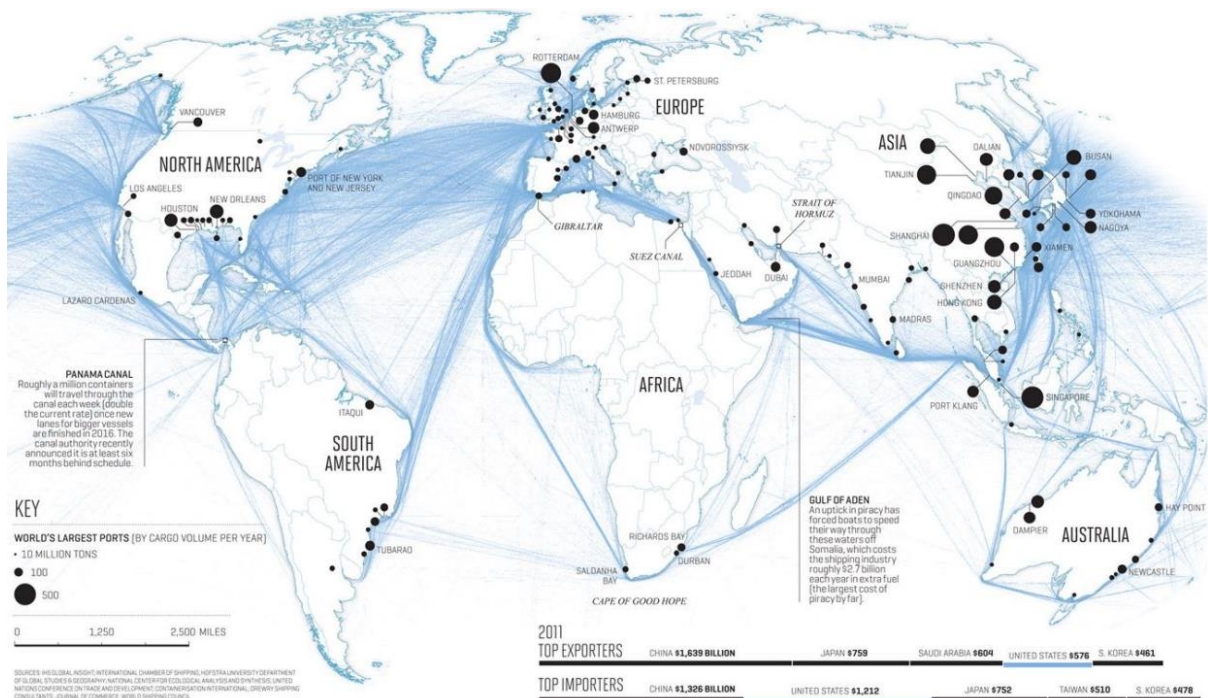


Figure 2: Global Shipping

to double in just the next 15 years. Ships have become the lifeblood of the global economy. (See Figure 2: Global Shipping, page 2)

Maritime commerce touches Canadians' lives each day. They experience it in the variety of goods they choose from as consumers, and they interact with it through virtually every purchase they make.

The pervasiveness of maritime commerce is only partly observable in Canada's international trade figures.⁷ Hidden in the data is the deeper structural reality that national and regional economies over the last few decades have been completely reorganized into an integrated global economy. (See: Maritime Commerce and the Global Economy)

While the global economy has enriched Canadians' lives as producers and consumers of goods, it has also created deep interdependencies the world over. The economies of the United Kingdom or Japan, for example, would begin faltering in a matter of days without maritime commerce, so significant is their dependence on the seaborne delivery of energy. But even North America, arguably the most self-contained regional economy in the world, depends heavily on international maritime commerce. The U.S. alone accounts for nearly 20 per cent of the world's ocean-borne trade.⁸

Consider one salient example: the FordTM F-SeriesTM pickup truck, that most iconic of North American domestic vehicles. It is assembled in plants in Kansas City, Missouri, and Dearborn, Michigan, yet only 55 per cent of

Maritime Commerce and the Global Economy

Today's global economy began to emerge when the Portuguese first rounded the Cape of Good Hope, regaining access to the vast and enormously profitable intercultural oceanic trading system of the Indian Ocean that the Roman Empire once enjoyed. Our Western way of life has been shaped by oceanic trade ever since.

However, what makes today's globalized era unique in relation to earlier periods of world trade is the extent to which national and regional economies have been fundamentally restructured and reorganized into an integrated global economy. The information and transportation revolutions have fundamentally transformed the exchange of goods and services, allowing modern firms to leverage economies of scale and economic competitive advantage on a global scale. Companies operate on razor-thin margins of inventory, with the invention of the multi-modal **container**, but also because they have nearly complete visibility into their global supply chains.

They use instantaneous **global communications** systems to transmit production orders from the cash register to the factory floor, as well as to conduct all associated transactions with their suppliers. These orders pass between the continents along transoceanic seabed cables that serve as the **Internet's** principal data highways. Moreover, today's firms are able to keep track of goods in transit, down the individual container, through **satellite** communications. Finally, they are able to organize precisely choreographed transfers of goods between their maritime, rail, air and road networks, bringing an unprecedented velocity of goods through their manufacturing and distribution systems.

The efficiencies created in the global economy as a result of these developments are staggering. Wal-Mart®, the world's largest retailer, earned US\$485.7 billion in 2014. If the chain were a country, it would rank 28th in the world in Gross Domestic Product, right behind Norway.

⁷ Canadian exports of goods and services were equivalent to 30.2 per cent of GDP in 2012, and total trade (exports plus imports) was equivalent to 62 per cent, the second highest ratio in the G8. While trade with the United States accounted for 70.3 per cent of this activity, overseas trade remained an indispensable direct source of Canadian wealth. See Global Affairs Canada's [State of Trade Update](#).

⁸ See the National Chamber Foundation of the U.S. Chamber of Commerce Trade and Transportation 2003 [Study of North American Port and Intermodal Systems](#). Although the data therein are a little dated, the document remains revealing, noting the importance of maritime commerce as well as the state of North American maritime and intermodal infrastructure, which more recent studies have also underlined.

its parts are made in Canada or the U.S. Another 15 per cent originate in Mexico; the remaining 30 per cent come from overseas. Indeed, of the 164 vehicle brands manufactured in North America in 2011, only 22 qualify as domestic vehicles, defined under U.S. commerce rules as having 75 per cent or more of their value derived from parts originating in Canada or the U.S.⁹

The forces that have created a global economy have also transformed societies, constructing a vast and intricate web of relationships—political, economic, financial and social—that have permitted unprecedented flows of wealth, ideas, goods, services, culture and people among the world’s nations. We call this hyper-connected and massively interdependent world order the “global system”.¹⁰

Canada’s prosperity, indeed Canadians’ very way of life, depends on the smooth functioning of this system, the integrity of its networks and assured access to five “global commons”: the world’s oceans and the airspaces above them, the electromagnetic spectrum, cyberspace and outer space.¹¹

Each of these is vulnerable to disruption, but the maritime commons differs from the others in one crucial respect: the enormous volume of international traffic that must pass through fewer than two dozen maritime chokepoints, the most important of which also lie within the world’s most geopolitically vital crossroads.¹² This imbues these chokepoints with enormous economic and strategic value. As one early 16th century observer put it, with the strength of expression characteristic of the time: “Whoever is Lord of Malacca has his hand on the throat of Venice.”¹³

⁹ From [*Domestic Bliss: A Look at what’s “Made in America”*](#).

¹⁰ The term “**global system**” is intended not only to describe today’s world order, but also to convey the idea that many contemporary societal, political, economic, climatological and security challenges are essentially global in scope, multi-dimensional in connecting across multiple policy domains and borderless in relation to national and international governance.

¹¹ The term “commons” originates in Roman legal concepts for property: *res privatae*, which consisted of things capable of being possessed by an individual or family; *res publicae*, which consisted of things built and set aside for public use by the state, such as public buildings and roads; and *res communes*, which consisted of natural things used by all, such as air or water. For the purposes of *Leadmark 2050*, the term “**global commons**” refers to those domains, physical or otherwise, that are not sovereign to any state.

¹² See *Sea Lane Security and U.S. Maritime Trade: Chokepoints as Scarce Resources*, from [*Globalization and Maritime Power*](#).

¹³ Tomé Pires, *Suma Oriental: An Account of the East, from the Red Sea to China, Written in Malacca and India, 1512-1515*.

Seapower, the Law of the Sea and the Maritime Order

Today's maritime order is based on a delicate balance between two central but essentially competing ideas:

Mare Liberum—The idea that the seas cannot be made sovereign and hence are free for all to use.

Mare Clausum—The idea that the seas can be made sovereign to the limits of effective state control.

These ideas began to take their modern forms in the contest between England and the United Provinces (modern-day Netherlands) for maritime commercial and naval supremacy, a conflict that lasted for the greater part of the 17th century. *Mare Clausum* had found its most extreme expression in 1494 in the Treaty of Tordesillas, which purported to divide the world's oceans between Portugal and Spain. As a legal doctrine, however, the antecedents of *Mare Clausum* originated in the territorial claims of England. These were said to derive from the English Crown itself, as part of a process wherein feudal authority had gradually concentrated in the royal personification of the state. By the end of the 16th century, England had established sovereign claims over "British Seas," as they were called, which were immodestly defined to include all seas touching upon British shores, extending toward the opposite continent along the four cardinal points of the compass.

Hugo Grotius, father of modern international law, was first to publish a comprehensive legal attack on the doctrine of *Mare Clausum*. In 1608, he published *Mare Liberum*, originally intended to defend the trading interests of the Dutch East India Company against the commerce rights that were purported by Portugal and Spain to flow out of the Treaty of Tordesillas. His argument—that the seas were free and could not be made sovereign—struck at the heart of British claims. *Mare Liberum* sparked one of the great juridical debates in the history of international law, while setting the Dutch and English on a collision course that ultimately led to three naval wars.

By the close of the 17th century, however, the doctrine of *Mare Liberum* had gained a clear ascendancy over *Mare Clausum*. As England continued to raise herself to the front ranks of maritime nations, she found herself increasingly in agreement with her former antagonist that the doctrine of *Mare Clausum* had become incompatible with her growing mercantile and security interests.

What remained to be settled in the first half of the 18th century concerned the extent of coastal waters. A consensus gradually emerged around the concept of effective power, that physical power and presence were the basis of a coastal state's exclusive rights. The extent of coastal waters became linked with the range of coastal batteries, commonly held as three nautical miles. Through the concept of effective power, a number of other concepts eventually coalesced into the modern concept of jurisdiction, and by 1840, the distinctions between the territorial sea and the high seas had taken their modern form.

The doctrine of *Mare Liberum* remained dominant from the Congress of Vienna in 1815 to the end of the Second World War. Underwriting this period of legal stability was Great Britain's naval supremacy, upon which the economic and military security of her empire depended. As the dominance of the Royal Navy waned in the first half of the 20th century, the other leading naval powers—the U.S., France and Japan—joined in Great Britain's cause to maintain the ocean regime that had served their collective maritime interests so well.

Ironically, the reshaping of ocean politics in the latter half of the 20th century began when, in 1945, the U.S. asserted exclusive rights to the mineral and energy resources found on or under its adjoining continental shelf. This sparked a breathtaking transition to a new ocean regime, centred on the rights of coastal states the world over. It was driven by both economics and nationalism, as the collapse of colonialism and the emergence of a large number of new but under-developed coastal states significantly altered the global balance in ocean politics.

Maritime powers and coastal states were each prepared to use force to protect their interests. Their actions in this regard played an important part in shaping the 1982 Law of the Sea Convention. At the same time, however, the increasing resort to force underscored how unstable ocean politics had become. Uncertainty served the interests neither of the maritime powers nor the coastal states. Accordingly, the international community resolved to settle its differences through negotiation, a process that culminated in the singular and historic achievement of the 1982 Convention on the Law of the Sea.

Maritime order has evolved significantly since the Convention was drawn up more than three decades ago. The oceans themselves have become central to prosperity and security in a globalized era, as has the need to ensure that they are well regulated. Ocean politics have intensified, reflecting the legal, economic and military issues at stake. Navies exist, in the final analysis, so that states may pursue their national interests in peace and war, while international law dictates how these interests may be pursued within the community of nations. Accordingly, it is inevitable that seapower and international maritime law will continue to influence each other.

It remains to be seen whether the international consensus behind the 1982 Convention will continue to hold in the face of existential pressures upon states both large and small. However, there are few questions of greater importance in these opening decades of the 21st century. This is especially the case for a country such as Canada, which has benefitted from the 1982 Convention both as a coastal state and major trading nation.

For a fuller discussion of the evolving relationship between seapower, international law and the maritime order, see Donna J. Nincic's *The International Law of the Sea in a Globalized World* from [Globalization and Maritime Power](#), and Navies, the Law of the Sea and the Global System in the 21st Century from [Ocean Yearbook Volume 26](#), on which much of this text box is based.

Today's global system has evolved markedly from its roots in that long-ago era. Across five centuries, the leading economic power of the day—Spain, the Netherlands, Great Britain and today the U.S. and its Western allies—was also the dominant seapower of its era. This highlights a deep relationship between dominant seapower and the economic, legal and political order of the day. While that relationship has evolved across the centuries, it remains as powerful as it ever was. (See: *Seapower, the Law of the Sea and the Maritime Order*, page 6)

In today's globalized era, seapower is intricately woven into the global system itself. This makes navies unique among a nation's instruments of influence and power. Navies do not simply respond to events that disrupt or threaten the global system. They are also the principal guarantor of maritime peace and good order¹⁴ upon which the global economy depends.

Challenges and Opportunities in a Maritime Era

It is evident from the headlines that the world's most intractable problems will not soon be resolved. Nor will the volatility that characterizes global politics quickly disappear. But amidst uncertainty in the evolving defence and security environment, one thing is clear: Ocean politics¹⁵ will continue to intensify in the coming decades, the result of a number of trends and drivers reshaping the maritime domain profoundly, which may well alter the legal and political foundations of the current maritime order.¹⁶

Challenges

From the maritime perspective, these key trends and drivers include:¹⁷

- **Maritime geopolitics.** The Indian Ocean is likely to become increasingly important in geopolitical terms, as relationships among three of the world's leading maritime powers—the U.S., India and China—interact and intersect. This region borders on three of the world's most important maritime chokepoints: The Malacca Straits to the east and the Straits of Hormuz and the Bab-el Mandab to the west.

The geopolitics of the Indian Ocean is likely to be exceeded in importance only by the geopolitics of the Asia-Pacific. Indeed, one of the defining issues of our times will be

¹⁴ By **maritime peace and good order**, *Leadmark 2050* refers to a condition in which the high seas are kept safe and free for all to use lawfully, without infringing upon a coastal state's rights to protect its maritime resources, enforce its territorial integrity and regulate its home waters through domestic and international law.

¹⁵ **Ocean politics** deal with the struggle for values, resources and power in relation to the ocean. See Peter Jacques and Zachary A. Smith, *Ocean Politics and Policy: a Reference Handbook*, p.2.

¹⁶ The **maritime domain** comprises all areas, entities and related activities on, under, or adjacent to a sea, an ocean or other navigable waterway. The maritime domain includes infrastructure, people, cargo, vessels and other conveyances.

¹⁷ This analysis builds upon on National Defence's most recent assessment [The Future Security Environment 2008-2030](#). Other more current allied assessments were also reviewed, most notably the National Intelligence Council's [Global Trends 2030: Alternative Worlds](#), and the US Marine Corps 2015 Security Environment Forecast, [Futures 2035-2045](#).

how the relationship between China and the U.S. evolves around issues of great power cooperation, competition and confrontation.¹⁸

China has conflated its “core interests”¹⁹ with *a priori* historical claims to waters in the East and South China Seas that it calls its “near seas”, while invoking an unusually expansive interpretation of UNCLOS in its perceived national interest.²⁰ Meanwhile the U.S., as the ultimate guarantor of the global and maritime order, must find ways to accommodate China’s rising ambitions and interests without fundamentally changing that order.²¹ Moreover, the U.S. must contend with the prospect that China could well succeed in changing the maritime order, without approaching the rough parity of naval power needed to match the United States Navy’s ability to project power globally. Indeed, if China were to deny the U.S. access to its near seas, a period of grave instability in the global maritime domain would ensue, bringing with it heightened prospects of regional inter-state conflict.

- **Diffusion of maritime power.** Great powers such as China are not the only actors seeking security in a period of major geopolitical transition. Russia has reasserted itself at sea, deploying with a pace not seen in the last twenty years, as it shapes events in its periphery and elsewhere in its national interest. India is well on the way toward acquiring an advanced navy that matches its growing regional interests and ambitions, while Brazil has taken significant steps to do the same. Many smaller coastal states are introducing significant military capabilities into their navies. In this regard, highly sophisticated submarines—whose ability to dominate the maritime domain is well understood by nations both large and small—are being acquired around the world in large numbers, especially in the Indian Ocean and Asia-Pacific regions. The majority are diesel-electric submarines, equipped with advanced weapons and sensors and in some cases with air-independent propulsion for enhanced stealth.²²

The proliferation of advanced naval technologies may eventually cascade to non-state actors, especially those acting as proxies for potential state adversaries. This would greatly complicate the challenges of gaining and securing access in a number of regions. Finally, the submersible vehicles and related technologies recently adopted by organized criminal organizations for trafficking narcotics may well be acquired by others for additional purposes, including terrorism.

- **Climate change.** Global warming will physically alter our operating environment, with increased impact around the world and especially in the Arctic. Climate change will intensify the severity of weather, alter patterns of rainfall and food production,

¹⁸ For one the most concise and cogent analyses of the interaction between Chinese and American maritime strategies, see Andrew S. Erickson’s [Are China’s Near Sea “Anti-Navy” Capabilities Aimed directly at the United States?](#)

¹⁹ Defined in China’s national security law as “the political regime; the sovereignty, unity, and territorial integrity of the nation; and people’s livelihoods, sustainable economic development of society, and other major interests.”

²⁰ For an excellent interactive summary, see the Council of Foreign Relations’ [China’s Maritime Disputes](#).

²¹ See the [2015 National Military Strategy of the United States](#).

²² See, for example, [Global Submarine Proliferation: Emerging Trends and Problems](#) and the related [Submarine Proliferation Resource Collection](#).

melt polar ice and Arctic permafrost, change ocean chemistry and stress delicate ocean ecosystems. Many of these effects will be most strongly felt in coastal regions. Of greater importance will be their social consequences, which will add to already significant pressures facing many coastal states.

- **Demographics.** The world's population will age and continue to grow before levelling off at mid-century, even as it further occupies and progressively urbanizes coastal areas. Denser populations in coastal regions will increase demands upon finite resources on land and at sea, stressing the physical environment and creating numerous social problems that will challenge the institutions of many coastal states. As we are witnessing today in the Mediterranean, migration will likely become a more or less permanent feature of the international landscape, as people seek to escape the world's most impoverished or troubled places. Many will attempt to do so by sea, perhaps even hazarding a perilous journey to Canada's distant shores. Migration may emerge as both a cause and effect of conflict.
- **Energy.** Despite increasing efforts to reduce the rate of climate change, the global demand for energy will continue to escalate in the next two decades and beyond, driven by population growth and rapidly rising incomes in newly developed economies.²³ Energy will remain as crucial to the viability of advanced economies as food and water are to life. Necessity will drive states with advanced economies to secure sources of vital materials and energy—especially oil—both extracted directly from the sea bed and delivered by maritime commerce.

Issues related to energy security and the supply of other strategically important resources already animate most maritime boundary disputes among coastal states. Should scarcity begin to impede economic growth, tensions could give way to conflict. This would have significant implications for Canadian interests and the global system as a whole.

- **Globalization.** Globalization has created deep and complex interdependencies among states and peoples. In some instances, particularly in countries such as Canada, where the population diversity contributes to an active interest in global affairs, these linkages are likely to reinforce political imperatives for engagement. More relevant international legal norms related to military intervention may emerge. So too will the need to protect the global system where it is most vulnerable to strategic disruption—in the vicinity of maritime chokepoints.

Moreover, the very openness of the global commons that has contributed to our prosperity has also created significant vulnerabilities, as the events of 9/11 proved so dramatically. This darker side of globalization includes trafficking in humans and drugs, both of which have touched Canada's shores; the proliferation of weapons of mass destruction, which touch upon Canada's national interests; and the means to attack Canada directly, through our ports or maritime infrastructure.

²³ According to the International Energy Agency's [World Energy Outlook 2015](#), the expected global energy transition towards more efficient and cleaner technologies will be offset by energy demand in India and developing Asia.

- **Failed and failing states.** Many coastal states find themselves sorely challenged in dealing with the implications of massive change in every human dimension—social, cultural, technological, economic and demographic. Some states may collapse from accumulated and cascading pressures. As we have seen in Somalia, for example, such a collapse can remove large territories from the reach of the rules-based international order. It can also leave neighbouring states and adjacent ocean approaches at risk from potentially deep-rooted and systemic criminality and violence by a range of non-state actors.
- **Technology.** Evolving technology will continue to change the means and methods of warfare, sometimes in unexpected directions, including its unanticipated impact upon societies. Information technologies and social media will empower individuals and non-state actors in relation to the state, even as states attempt to restore the balance through “big data”. The cyber domain will provide an irresistible stage for disruptive action, both for state and non-state actors. The technological edge that Western navies have long enjoyed is likely to be narrowed as advanced weapons become more widely available, with important implications for the conduct of maritime operations. Moreover, the arrival of advanced and potentially revolutionary naval technologies developed by the U.S. will significantly complicate force planning for Western allies, as they strive to maintain interoperability with their most important defence partner.

Opportunities

While the emerging defence and security environment presents numerous challenges, it also brings many opportunities:

- Security of the maritime commons has risen as a global issue, as well as an arena for strategic cooperation, even among states that have rarely partnered at sea. Such cooperation will be crucial to the evolving Sino-American relationship, as each power seeks ways to engage with and balance against the other. Cooperation in anti-piracy operations off the Horn of Africa from 2008 onwards serves as one salient example, as do recent efforts to broaden the applicability of the recently approved Code for Unplanned Encounters at Sea.²⁴

²⁴ The Code for Unplanned Encounters at Sea, signed at the 2014 gathering of the Western Pacific Naval Symposium, is a system similar to the one co-developed during the Cold War by the U.S. and the former Soviet Union. It is intended to reduce potential miscalculation and escalation of events by naval forces at sea.

- New opportunities for maritime partnerships will present themselves, including efforts to improve the maritime security capacity of developing coastal states. Alliances such as NATO and other regional security organizations will create more comprehensive approaches to maritime security, as the international community finds increasing incentives to develop the instruments necessary to deal with criminality at sea.
- At the same time, other more supple international security arrangements, similar to the Proliferation Security Initiative²⁵, will be devised to orchestrate effective international responses to a broadening range of maritime threats and challenges.

Trends and Drivers in the Arctic

Just as all lines of longitude meet at the North Pole, many of the drivers and trends shaping our 21st century also converge in the Arctic. In fact, we are likely to see more change in the Arctic in the coming three decades than has occurred since Europeans first arrived in Greenland.

Climate change will open up the high North as a commercially viable sea route between Europe and Asia for the first time in recorded history, much sooner than many thought possible even a few years ago. In all likelihood, that sea route will emerge across the Arctic Basin well before the fabled Northwest Passage, running through Canada's Arctic Archipelago, or the Northern Sea Route, running along Russia's Arctic coast. When the Arctic eventually opens, shipping patterns will change significantly world-wide. The Suez and Panama Canals, as well as major ports far removed from the Arctic Circle, may see significant reductions in revenue as a result.

Just as ocean politics are intensifying elsewhere, this region is gaining in geopolitical import, as the five Arctic coastal states—Canada, Denmark, Norway, Russia and the United States—establish their claims to the vast energy and mineral reserves that have already been discovered, or are believed to lie, in the Arctic Basin and its periphery. Receding ice and improvements in extraction technologies are likely to make these resources commercially exploitable, perhaps decades sooner than was thought possible only recently, bringing with them a host of economic opportunities, but also accelerating social change in northern societies as traditional lifestyles and economies are progressively altered. New and unprecedented levels of human activity in the high North will also pose risks to the environment even as global warming continues to alter Arctic ecosystems.

Interest in the Arctic extends well beyond the Arctic states themselves, as reflected in the 12 states that have observer status at the Arctic Council¹. Most prominent among these is China, whose clear interests in shipping, ocean science and international seabed energy and mineral resources its officials have begun framing in terms of China becoming "a polar Arctic power".²

Historically, geopolitical pressures of this magnitude have led to increasing competition and confrontation, and indeed the future appears to be unfolding in precisely this manner in the Asia-Pacific as maritime disputes continue to intensify, especially in the East and South China Seas. In the Arctic, however, where the exploitation of seabed resources is more latent than actual, competition is being moderated for the time being by cooperation among the Arctic coastal states, even as the region is being remilitarized. Strategic cooperation is likely to remain in the interests of the members of the Arctic Council for some time to come, as their activities today suggest in relation to search and rescue and environmental protection, for example, given the challenges of operating in the Arctic.

However, strategic calculations may one day change, perhaps dramatically so. The trends suggest a much more complex geopolitical situation emerging for "Canada's carefully crafted balance of interests", as one scholar recently put it.³ Accordingly, the Canadian Armed Forces must continue to hasten the delivery of the maritime, enabling joint and other capabilities that will safeguard our northern sovereignty and security, while they also underwrite the peaceful development of our high North.

1. The five coastal states are joined on the Arctic Council by Finland, Iceland and Sweden. A further 12 states are observer members. A number of nongovernmental agencies also have observer status, and six indigenous peoples are permanent participants on the Council.

2. See, for example, Annie-Marie Brady, [China's Undeclared Arctic Foreign Policy](#) and Bree Feng, [China Looks North: Carving out a Role in the Arctic](#).

3. See Rob Huebert, [Canada and Future Challenges in the Arctic](#).

²⁵ The Proliferation Security Initiative (PSI) is a voluntary framework for international cooperation to stop illicit transfers of weapons of mass destruction, as well as their delivery systems and related materials. See *The Proliferation Security Initiative*

- A growing understanding that the oceans are environmentally at risk will compel coastal states and the international community to improve oceans management.²⁶ This understanding will be spurred by the potential depletion of once plentiful species and the environmental disasters that regrettably will accompany increased exploitation of ocean resources.

The implications of these challenges and opportunities for the RCN will be examined in the second part of *Leadmark 2050*. Of more immediate interest is what they tell us about the navy's fundamental purpose. (See: Trends and Drivers in the Arctic, page 10)

Statement of Fundamental Purpose

There are few countries more globalized than Canada, or that have integrated globalization as completely and as successfully into the daily life of society.²⁷ Few trading nations have benefitted more than Canada from the global system and the regulated ocean commons upon which this system depends. Few nations are as blessed by an international maritime order that has made Canada one of the world's great coastal states.

Few nations have more of a reason to play a role in defending the global system than Canada. One country alone cannot ensure the integrity of the global system, but contributing to its defence is not a matter of choice for Canada. Defending the global system, collectively and collaboratively with like-minded nations, is essential.

As mariners, the men and women who serve Canada at sea witness the global system at work every day. They understand that maritime peace and good order is among the most essential public goods. Their work contributes to an ocean commons regulated by international and domestic law that is open for all to use freely and lawfully. They help safeguard the oceans' bounty for future generations. They help keep the oceans free of the troubling criminal activities that are increasingly being drawn seaward around the world, even to Canada's shores. Ultimately, they are prepared to defend Canada against those who would threaten the norms and values that sustain both the international community and the Canadian way of life.

This is the RCN's statement of fundamental purpose, our "organizing principle" for the application of 21st century Canadian seapower in the national interest:

To defend the global system at sea and from the sea, both at home and abroad.

As the next part of *Leadmark 2050* will demonstrate, this strategic concept is fundamental to the enduring roles and missions assigned to the Canadian Armed Forces. It is also their logical and ultimate outcome.

²⁶ The broader regimen of inter-departmental and inter-agency measures, official and otherwise, undertaken within both domestic and international contexts, with the aim of ensuring the regulation of activities on, under and above the sea.

²⁷ See A.T. Kearney's *The Global Top 20*. In 2015, Canada was ranked the world's sixth most globalized country, when measured against political engagement in the international community, technological connectivity, personal contact and economic integration.

PART TWO—THE WAYS

Implementing the Strategic Concept

An Expanded Framework for Canadian Seapower

As the first part of *Leadmark 2050* explained, the deepest problems of the global system have woven new patterns of crisis and conflict through the world's affairs. Profound and seemingly intractable transnational security challenges have emerged in these opening decades of the 21st century, as have a range of new non-state actors. A reordering of global power toward the Asia-Pacific region is underway, with profound implications for state cooperation, competition and confrontation. We live in an era of unprecedented and massively complex interdependency. As ocean politics intensify in the coming decades, the enduring constabulary, diplomatic and military roles of a navy are more relevant than ever before.²⁸

This part of *Leadmark 2050* will examine each of these roles in the context of the emerging defence and security environment and present a coherent strategic design for the application of Canadian seapower in this new maritime world.

In defending the global system, Canada's maritime forces will:

- **Protect** Canada by exercising Canadian sovereignty in our home waters, securing the maritime approaches to North America and contributing to maritime peace and good order abroad;
- **Prevent** conflict by strengthening partnerships and deploying forward to promote global stability and deter conflict; and
- **Project** Canadian power to shape and, when necessary, restore order to the global system.

The Attributes of Seapower

Maritime forces have distinct attributes that make them highly flexible as instruments of national influence and power. These attributes combine in significant ways, although the degree to which they may be fully exploited varies widely, especially in relation to a potential adversary.

- Highly **responsive**, maritime forces can be held for extended periods and deploy within days or hours.
- Maritime forces can lawfully operate in all waters outside of any state's territorial sea. This gives them immediate **access** to much of the earth's surface, most of its population and the coastlines of more than three-quarters of the world's nations.
- They are **self-sufficient**, permitting them to operate forward without the need for a staging or logistics "footprint" within another state's territory, bypassing the need to

²⁸ Ken Booth, *Navies and Foreign Policy*, 1977. The three strategic functions Ken Booth ascribes to navies as instruments of national policy serves as the foundation of RCN doctrine. For a fuller description see in particular the original [Leadmark](#), pp. 29-40.

seek permission to do so and avoiding potential political and tactical liabilities associated with placing “boots on the ground”.

- Naval forces are inherently **mobile**. They are able, even at moderate speeds, to cover hundreds of nautical miles per day, for several days, when operating independently. With a support ship in company, a group of warships can deploy around the world.
- They are **persistent**, able to remain on an assigned mission and station for extended periods.
- Naval forces are **poised** to present a range of diplomatic effects, from a benign and non-menacing presence that reassures and supports to one that is intended to deter, dissuade or coerce. Inherent in poise is the ability of maritime forces to be committed incrementally and progressively as events unfold, then just as readily withdrawn.
- **Versatile and flexible**, maritime forces can adapt quickly to emerging mission requirements or undertake completely new missions in theatre without needing new equipment, crewing or training. Forward deployed, they provide a broad set of immediately available response options for governments seeking to avert or contain conflict, and they can act decisively when conflict breaks out.
- They have **strategic reach** in their ability to deploy globally, **operational reach** in their ability to manoeuvre throughout a maritime theatre of operations to place an adversary's force at risk and **tactical reach** in their sensors and weapons, extending to several dozens or even hundreds of kilometres, well beyond the visible horizon.
- Modern warships are highly **resilient**. They are designed to operate in the highest threat conditions and are able to receive significant damage, but then can be restored to partial or full fighting status.
- Appropriately equipped, maritime forces can act as a **sea base**, providing the platform from which forces can be projected ashore, supported, sustained and recovered.

Ready, Responsive and Relevant

Question: What do the Korean conflict, the Cuban missile crisis, the attack by Iraq on Kuwait and the attacks by Al-Qaeda on the United States have in common?

Answer: In each instance, Canada needed to express its solidarity with its friends and allies. It needed to do so quickly and with determination. It needed to contribute meaningfully to a gathering international response, while the full extent of the crisis was still unfolding, desired outcomes remained uncertain and the mission was yet to be determined. In other words, it needed a forceful, flexible and versatile military option it could immediately dispatch, without knowing exactly what it would eventually be called upon to do.

In each instance, the Government of Canada had just the tool it needed: a high-readiness task group.

Few military assets can match those of the fleet in the range of response options they provide across the spectrum of operations. A modern warship represents an entire “Swiss Army knife” of capabilities, able to transition from one major theatre to another in a matter of days, from building orphanages and shaking hands in one place to engaging in full combat operations in the next.

Protecting Canada

The importance of the RCN's constabulary role has grown significantly in the past two decades as an outcome of two major developments. The first was UNCLOS, which codified today's rules-based maritime order and made Canada one of the world's largest coastal states. The second was 9/11, which demonstrated how the openness of the global

commons—in this case air routes—could be used by a determined and resourceful adversary to cause great harm, while highlighting that Canada was equally vulnerable from the sea. The events of 9/11 forcibly reminded us that new defence and security threats and challenges require a new approach to maritime security.

The RCN's constabulary role will continue to increase in importance in the coming decades, as climate change gradually opens the Arctic to commercially viable transit and destination shipping²⁹ for the first time in recorded history, bringing new and unprecedented levels of human activity. (See: The Arctic as a Maritime Theatre of Operations)

The Arctic as a Maritime Theatre of Operations

Canada's Arctic archipelago is one of the world's largest, and it's a long way from anywhere. The Northwest Passage is farther from Halifax and Victoria than it is from London and Tokyo. The archipelago is enveloped in an icefield that defines and dominates the environment. The Arctic today remains largely inaccessible for all but a short season in the late summer and early fall. Even then, it is only partially navigable by vessels that are designed to operate in multi-year ice that can be as hard as concrete. Nowhere else on earth, with the exception of Antarctica, is less forgiving of the ill-prepared.

All of these factors have been considered in the design of the *Harry DeWolf* Arctic and Offshore Patrol Ship (AOPS). *Harry DeWolf* and her sister ships will serve as the RCN's primary springboard for meeting our growing defence and security obligations in the Arctic. They are able to help regulate our Arctic home waters as well as to monitor and respond to events, with responsibilities ranging from assuring the safety of mariners and responding to environmental disasters to confronting incursions against Canada's sovereignty.

These ships will also help build the nation, by contributing to the peaceful development of Canada's High North. The Nanisivik Naval Facility, a forward logistics site from which the Canadian Coast Guard and the RCN will be able to extend their patrols of northern waters, is a case in point. The Arctic is unlikely to witness an explosion of road and rail networks to drive and sustain development, as was the case with the great westward settlement by Europeans across North America. Northern communities, as they develop in the coming decades, will be connected by air and sea, not by wagon-trains, railways or 18-wheelers. Hence the need for Nanisivik.

Building our High North will call for a concerted whole-of-government effort, in which the RCN will play a part. Its effort will include supporting the charting of still largely unknown Arctic waters for the safety of ocean shipping; contributing to ocean science, to improve Canada's understanding of fragile but changing Arctic ecosystems; supporting our federal partners to manage and protect Canada's Arctic resources; and supporting the Canadian Coast Guard's annual resupply of isolated coastal communities.

Exercising Sovereignty in Home Waters

Our most fundamental military task is to defend Canada's home waters from a broad range of defence and security threats. We do so primarily through support to our federal partners, which are mandated to enforce Canada's jurisdictions, rights and obligations as a coastal state. This requires the RCN to exert its presence where and when needed, including the requirement to control events at sea through the latent or actual use of force. (See: The Turbot War, page 15)

²⁹ **Transit shipping** refers to maritime traffic passing through a body of water from one market to another. **Destination shipping** refers to maritime traffic destined for a specific location within a body of water.

The ability to do so is founded upon an awareness of the maritime domain—an understanding of *who* is operating in our waters, *what* they are doing and *why*.³⁰ The outcome of these three maritime capabilities—**awareness, presence and control**—allows Canada to exercise its sovereignty at sea.

The vastness of our home waters has long been an important factor driving Canada toward an integrated approach in oceans management.³¹ But what had once been a matter of good governance also became, after 9/11, a defence and security imperative. Indeed, the pervasiveness of maritime defence and security threats, and the consequences of a failure to prevent a successful attack from the sea upon North American territory, drove a range of government-wide responses, including the establishment of Marine Security Operations Centres (MSOCs). (See: Canada’s Marine Security Operations Centres, page 16)

Domestic maritime security operations for the most part take place within our own home waters. However, the pervasive nature of maritime security threats to Canada often requires the RCN to operate at extended range from home. For example, Canada’s maritime forces deploy routinely to the eastern Pacific and Caribbean basin, working in concert with allies and regional partners to interdict the northward flow of narcotics headed to North America and Europe. Even further abroad, the RCN has conducted drug interdictions as far away as the west coast of Africa, working closely with the RCMP.

The requirement to project the rule of law, self-evident in home waters given the sovereign need to exercise our rights and obligations as a coastal state, extends well beyond our jurisdictions, as this document examines next.

The Turbot War

The support that Canada’s maritime forces give to the Department of Fisheries and Oceans became anything but routine when a dispute broke out in 1995 between Canada and Spain over the turbot fishery on the Grand Banks. The conflict had its roots in the collapse of the cod fishery, with its devastating economic and social impacts in Atlantic Canada, coupled with concerns that other species of fish would soon be depleted. Canada exerted the right to protect such fisheries beyond the 200 nautical-mile limit of its exclusive economic zone (EEZ), where foreign trawlers were operating. But this position was contested by countries including Spain, supported by the European Union.

Matters came to a head when Canada reinforced its position by having forces board the Spanish trawler *Estai*, arresting its master and crew. They recovered nets that the *Estai* crew had cut loose while attempting to evade the boarding, subsequently displaying them with sensational international effect on a barge in the Hudson River, opposite the United Nations headquarters. Canada pointedly refused to negotiate a settlement until Spain had withdrawn its fishing fleet completely from the Grand Banks. The Spanish declined, dispatching a patrol boat to support their fishing fleet, while the Spanish Armada began preparations to dispatch a surface task group.

In response, Canada stepped up its maritime air surveillance and surface patrols and buttressed its Rules of Engagement. The RCN activated NATO safety protocols related to submarine operations, subtly warning Spain that our submarines were likely to be in the area.

Canada has never publicly disclosed whether a submarine was ever deployed, but the knowledge that a submarine *might* be present would have altered the calculations of Spanish political and naval authorities.

The Armada’s task group never sailed. The dispute was ultimately resolved through diplomacy, with the EU accepting Canada’s right to regulate coastal fisheries beyond the EEZ. Canada’s resolve in using maritime force—latent or otherwise—contributed to that outcome.

³⁰ The International Maritime Organization (IMO) defines **maritime domain awareness** as “the effective understanding of anything associated with the maritime domain that could impact the security, safety, economy, or environment.” IMO, in turn, defines the **maritime domain** as “all areas and things of, on, under, relating to, adjacent to, or bordering on a sea, ocean, or other navigable waterway, including all maritime-related activities, infrastructure, people, cargo, and vessels and other conveyances.”

³¹ See [The Role of the Canadian Government in the Oceans Sector](#) for a description of Canada’s approach, which is among the world’s most integrated regimes for oceans management.

Contributing to Maritime Peace and Good Order Abroad

Much of the world's oceans remain safe for lawful commerce, and many of the world's coastal states are able to regulate their coastal waters effectively. However, a number of states, such as Somalia, lack the capacity to effectively regulate their ocean estates. A growing number of them may no longer be able to secure their maritime approaches from the more comprehensive threats and challenges that are emerging at sea, with two crucial consequences:

- Coastal states lose precious revenues when they cannot regulate their ocean approaches, exposing their oceanic resources to unsustainable or environmentally harmful practices.³² Maritime insecurity compounds issues related to the prosperity, stability and capacity of coastal states, leading to further consequences for Canada's maritime security, such as migration and human trafficking.

Canada's Marine Security Operations Centres

On a typical day, about 2,000 vessels are tracked by Canada's two coastal Marine Security Operations Centres (MSOCs), one in Halifax and the other in Victoria. (A third MSOC in Niagara Falls, managed by the RCMP, tracks marine activities in the Great Lakes and St. Lawrence Seaway.)

The vast majority of these vessels are going about their lawful business, but some are not. This makes maritime domain awareness one of the government's most complex information management challenges, because each vessel represents a potential threat until its lawful purpose can be assured. In addition to tracking, it is necessary to know each vessel's flag of state and commercial ownership, its ports of call, routing and destinations, as well as information concerning its master, crew and cargo. Even more information may be required on a vessel of specific threat interest, including detailed elements of its design, layout and machinery.

This information is gathered from diverse commercial, intelligence, police and military sources on a need-to-know basis. Sources and data must be protected by the relevant national and international agencies involved. These relationships and protocols are not only crucial to success; they also are required under Canada's legislative framework, including the Canadian Charter of Rights and Freedoms.

This information in turn must be integrated into a theatre-wide or operation-level picture. It is compiled by fusing sensor information from vessel traffic and identification systems, a range of sensors from seabed to space and the surveillance and reconnaissance operations of the government's federal fleets.

Canada is recognized as a world-leader in maritime domain awareness. This is the result of two developments. The first is Canada's integrated approach to ocean management, which has led federal departments, including National Defence, to develop effective protocols for cooperation at sea. The second development is military. As a result of long-standing NATO, NORAD and continental maritime defence commitments, the RCN made significant investments over several decades in its ability to direct allied and Canadian maritime forces at sea from its shore-based operation-level headquarters in Halifax and Victoria.

Maritime domain awareness, shared among our key federal and international maritime security partners, serves as the basis for coordinated action in Canada's home waters.

See: [The Marine Security Operation Centres Project](#)

³² For example, more than US\$2 billion is lost annually to 11 Gulf of Guinea coastal states. See Raymond Gilpin, [Enhancing Maritime Security in the Gulf of Guinea](#).

- The absence of effective coastal state control can render adjacent ocean spaces vulnerable to a range of criminals, terrorists and irregular forces. They use the oceans as a springboard for their operations and as a superhighway to support the flow of information, money, weapons, technicians and the volunteer cadres that sustain them.

Over the past 25 years, Canada's maritime forces have repeatedly deployed to the Greater Middle East, given the region's geopolitical importance as a principal source of oil for the global economy. While these deployments spanned the spectrum of operations, they particularly targeted criminal and terrorist networks that were exploiting the relative ease of ocean passage from the Greater Middle East to their operations in Afghanistan. Later deployments to the region were also used to counter piracy, a threat that emerged in 2008 and posed a substantial risk to ocean commerce in the Gulf of Aden and off the Horn of Africa. At the end of the first decade of the new century, many of the world's navies converged on the region, some for the first time ever, to collaborate in both ad hoc and standing maritime coalitions. (See: *Contributing to Maritime Peace and Good Order Abroad*, page 18)

Somali piracy—and its attendant costs to the global economy—crested in 2011 and then receded, for the most part as a result of the ongoing presence of international navies. Piracy remains a concern for lawful commerce elsewhere, particularly off the Horn of Africa, in the Gulf of Guinea and in Southeast Asia.³³

The persistence of maritime security issues in a number of regions underscores the need to enhance the capacity of coastal states to regulate their own maritime approaches. Modest investments in the training of partner navies and coast guards, along with the transfer of knowledge and expertise through exercises and other mutual exchanges, have the potential to be returned many times over, while complementing other international developmental objectives.

³³ At its height, Somali piracy was estimated to have cost the global economy US\$7 billion in 2011, resulting from theft, extortion, shipping delays, evasive routing, warship contributions, prosecutions and the costs of private security and war insurance to shippers. These costs have subsided to approximately US\$2.2 billion per year, as a result of international action. For a recent and comprehensive assessment, see the One Earth Future Foundation's report [*Oceans Beyond Piracy*](#).

The need to build the maritime security capacity of other coastal states, however, points to the fact that maritime peace and good order should be understood as part of a broader, more comprehensive design intended to project the nation's influence and leadership abroad, which is the next topic examined.

Contributing to Maritime Peace and Good Order Abroad

Op APOLLO, 2001-2003: Canada's contribution to the U.S.-led Op ENDURING FREEDOM, the campaign against terrorism. Over a two-year period, virtually the entire navy then available for operations deployed to Southwest Asia to conduct naval operations in theatre. Specific duties included the defence of large coalition naval units, monitoring regional navies, providing at-sea replenishment support to other coalition units, and conducting maritime interdiction to deny Al-Qaeda the use of the seas. From February through June 2003, leadership of the Combined Task Force (CTF) 150 was assigned to Canada.

Op SIRIUS, 2001-2005: Canadian Forces participation in the NATO campaign against terrorism, Op ACTIVE ENDEAVOUR, comprising maritime interdiction operations in the Mediterranean Sea. In 2004, two CP-140 Aurora maritime patrol aircraft also deployed in support of the operation.

Op ALTAIR 2004-2008 and Op SAIPH, 2009-2012: Canada's naval contribution to Op ENDURING FREEDOM. On each of the first four rotations, a frigate was integrated into a U.S. Navy carrier strike group. On the last rotation of ALTAIR, which featured a deployment by a three-ship Canadian task group, leadership of regional coalition anti-piracy operations was assigned to Canada.

In **2008**, HMCS *Ville de Québec* redeployed from a NATO mission in the Mediterranean to escort vessels chartered by the UN World Food Programme to delivery of aid into Mogadishu. In **2009**, HMCS *Winnipeg* deployed to the Horn of Africa as part of NATO's counter-piracy mission Op OCEAN SHIELD, during which she also provided support to the UN World Food Programme. HMCS *Fredericton* deployed to the region in **2010** for several months to conduct interdiction operations with both NATO (counter-piracy) and CTF 150 (counter-terrorism).

Op REASSURANCE, 2016-ongoing: As a result of a joint request brought by Germany, Greece and Turkey to the North Atlantic Council, the Standing NATO Maritime Group 2 (SNMG2), including HMCS *Fredericton*, was repositioned to the Aegean Sea to conduct surveillance, reconnaissance and monitoring of migrant crossings in the Aegean, in cooperation with relevant authorities.

Preventing Conflict

Over the last couple of decades, we have witnessed a significant expansion of naval operations to render humanitarian assistance and relieve distress following large-scale natural disasters, both at home and abroad. There is a broadened understanding of the possibilities offered by naval diplomacy to prevent conflict in a globalized era, using an approach that recognizes our security, coupled to the general welfare of other societies and other states.

Strengthening Relationships

Global engagement³⁴ serves as the RCN's foundation for conflict prevention and comprises activities that are intended to strengthen defence and security partnerships.

A nation such as Canada must decide where to engage, under the national interest. Moreover, how we engage will depend on a range of factors—historical, cultural and geopolitical—including our strong preference to operate collectively through regional

³⁴ Global Engagement, also called defence diplomacy, denotes the peaceful application of defence resources to achieve positive outcomes in the development of a country's bilateral and multilateral relationships.

security organizations. In this context, our engagement activities will be shaped by the robustness and maturity of the regional security system (or lack thereof), as well as its particular orientation.

The ties we share with the U.S. for continental defence and maritime security are unique in their scope and breadth, virtually without parallel anywhere in the world.³⁵ In Western and Eastern Europe, the RCN's engagement is based primarily, but not exclusively, upon our activities as a founding member of NATO. This includes our notable and influential contributions to developing NATO's naval tactics and doctrine; promoting naval interoperability over several decades as a member of NATO's standing maritime forces; and participating, forward-deployed, in a full range of NATO maritime exercises and operations since the alliance was created.

In the same vein as our continental and NATO defence arrangements, our membership in the "Five Eyes" community³⁶ is a unique and highly privileged international partnership for the sharing of intelligence production and analysis, tactical development and advanced interoperability.

Notwithstanding the importance of maintaining close ties with our U.S., NATO and Five Eyes partners, government policy and directed operations in recent decades have led to a significant expansion in the RCN's strategic horizons:

- The Greater Middle East has been the site of a majority of RCN's operational deployments since the

³⁵ See [The Canada-U.S. Defence Relationship](#).

³⁶ Also called AUSCANZUKUS, from of its five participants: **A**ustralia, **C**anada, **N**ew **Z**eland, the **U**nited **K**ingdom and the **U**nited **S**tates.

The RCN in the Americas

Designed to support [Canada's Strategy for Engagement in the Americas](#), the Canadian Armed Force's *Global Engagement Strategy* in the hemisphere, is centred upon fostering strong relationships with the land, air and sea services of the region's militaries. For the RCN's part, activities include:

- Routine training, conducted under the auspices of RCN, but designed to foster regional defence and security ties, as well as contributing to regional capacity-building. Such activities include participation in recurring regional exercises, including the U.S.-led PANAMAX, UNITAS and TRADEWIND series, as well as numerous bilateral exercises with regional navies, from basic to highly advanced.
- Goodwill visits to major ports of call, where the presence of Canada's warships are used to advantage by Canadian diplomats for outreach and engagement purposes, as well as to promote national policy objectives.
- Regular deployments by maritime forces, under the auspices of Op CARIBBE, to conduct surveillance operations in the Eastern Pacific and Caribbean basin in support of the Joint Interagency Task Force (JIATF) South, a U.S.-led multiagency/international organization dedicated to the interdiction of narcotics originating in South America.
- Deployments to contribute to the maritime security of regional head of state and ministerial gatherings.
- Anticipatory deployments to the Caribbean during the hurricane season, permitting the government to respond quickly to events, as was the case when HMCS *St. John's* provided support to the UN World Food Programme in Haiti in 2009.
- Responsive deployments in support of major Canadian Armed Forces operations, as was the case following the 2010 earthquake in Haiti.
- Participation in the hemispheric security system, more specifically the Inter-American Naval Conference, the region's most senior gathering of hemispheric navies, as well as a number of its subordinate activities.
- Staff talks with leading regional navies, including those in Argentina, Chile and Brazil, as well as the U.S.
- Participation in regional defence and security war games, attendance at defence symposia and conferences, reciprocation of visits at the service-chief level, personnel exchanges, attendance at foreign war colleges etc., designed to strengthen relationships among current and future naval leaders.

end of the Cold War, principally in the maritime approaches to the Arabian Peninsula and the western Indian Ocean. This has provided the RCN an opportunity to engage effectively with a number of maritime partners in the region.

- The Americas have been the focus of a sustained policy-directed engagement effort by the RCN since Canada joined the Organization of American States and its related regional security organization. (See: The RCN in the Americas, page 19)
- With fewer ships at its disposal in recent years, the RCN's engagements in the Asia-Pacific region have fallen well short of need. However, as fleet capacity is restored through the completion and delivery of current major Crown projects, the RCN expects that it will be called upon to conduct a much-expanded Asia-Pacific engagement effort, consistent with Canada's growing national interests in the region. The RIMPAC, or Rim of the Pacific, multinational exercise biennially sponsored by the U.S. Navy—the world's largest and most complex multinational maritime exercise—will continue to serve as a premiere national-level military engagement and training activity for the Canadian Armed Forces. Moreover, Canada's membership in the Western Pacific Naval Symposium, a modest but meaningful entry into the region's security system taken in 2010, permits the RCN to continue engaging directly in a multinational dialogue with 20 other member and 3 observer navies, including China and the U.S.
- The challenges of operating in the Arctic will draw a number of the five Arctic states to cooperate strategically in regulating the Arctic, particularly as climate change gradually opens the region to commercially viable maritime activities. This will create opportunities to further enhance the RCN's engagement in the Arctic.
- Opportunities to strategically partner elsewhere should not be overlooked, specifically off the Horn of Africa, the Gulf of Guinea and Southeast Asia, where maritime

As the adjacent vignette illustrates, The RCN's ability to engage in capacity-building will improve significantly in the near future, from activities already underway or planned for delivery to the fleet.

Illustrative Maritime Vignette—Strengthening Relationships

HMCS *Harry DeWolf* and her sister ship HMCS *Margaret Brooke*, the first two of Canada's Arctic and Offshore Patrol Ships, deploy to the Gulf of Guinea in January 2020, prior to planned deployments later that year into Canada's High North. Working alongside elements of the U.S. Coast Guard (USCG), their four-month mission is to conduct maritime surveillance and interdiction operations in the Gulf of Guinea under the auspices of the African Union, as well as to build the maritime security capacity of coastal states, in collaboration with regional authorities.

A CH-148 *Cyclone* is embarked in *Harry DeWolf*, along with an enhanced boarding party, while a USCG legal detachment is embarked in *Margaret Brooke*. Also there is one of the RCN's newly established maritime security reform teams, as well as a range of specialists involved in building Canadian maritime domain awareness, from across the whole of government.

The *Harry DeWolf*-class is ideally suited to support such missions. Its range and endurance will permit nearly uninterrupted operations in the Gulf of Guinea, aside from the need to periodically rest crews and replenish victuals and other stores. Equipped with generous deck arrangements to support a wide variety of littoral and riverine operations, it is able to launch and recover larger and faster boats required for maritime interdiction. In addition, the *Cyclone*, with its sophisticated suite of maritime sensors, extends the reach of the vessels, and is also able to outrun any potential wrongdoers attempting to evade boarding and search. To enhance their capacity-building function, the ships are generously provided for in terms of accommodations and spaces dedicated to the work of other government departments and non-governmental agencies, supporting activities both onboard and ashore.

security is most urgently needed. (See the illustrative maritime vignette: Strengthening Relationships, page 20)

Promoting Global Stability

Navies have long served as ambassadors for nations. During the age of sailing discovery, they provided a principal means through which diplomacy was conducted between continents, from the moment of initial contact. That historical tradition continues in the present day. Warships are considered sovereign territory under customary international law and enjoy sovereign immunity, whether on the high seas or within the territorial seas and internal waters of a foreign state.³⁷

Every warship deployment and port-of-call is laden with symbolic and diplomatic meaning. A warship alongside provides an impressive and “up close” example of national “hard power” competence, while the actions of the crew, for example engaging with local citizens through acts of goodwill, provides stirring examples of “soft power” in action. Canadian missions overseas almost unfailingly report through diplomatic cables that a warship visit has materially advanced and reinforced national policy goals through the goodwill that our sailors generate.

Providing Relief to Others

Maritime forces deploy regularly as part of major Canadian Armed Forces operations to respond to disasters and provide humanitarian relief, both at home and abroad. The key lesson these operations reaffirm is the ability of military forces to respond quickly and meaningfully to events. When societies are hard-struck and life-essential services are destroyed or severely disrupted, time is of the essence, as is an understanding that help is on its way.

This is precisely why maritime forces can be leveraged to such tremendous effect. Consider, for example, the ability of a ship or task group to be dispatched rapidly. This can happen within a matter of days, which was the case in 2005 when Canada responded in the aftermath of Hurricane Katrina (**Op UNISON**) in the U.S. states that border on the Gulf of Mexico. It can even happen within hours, as occurred when maritime forces were dispatched to Haiti following the massive 2010 earthquake (**Op HESTIA**). Such assistance can often be rendered even more promptly by ships already forward-deployed, as was the case in 2008 when, on two separate occasions, Canadian warships were re-tasked from ongoing operations to respond to requests from the UN World Food Programme. They escorted vessels bringing relief supplies into Somalia (conducted under the auspices of **Op ALTAIR**) and rendered assistance in Haiti when it was hit in quick succession by a number of hurricanes (**Op HORATIO**).

The RCN has also deployed in response to domestic events, including:

- Search-and-rescue operations following the crash of Swissair Flight 111 in St. Margaret's Bay in 1998 (**Op PERSISTENCE**), the largest Canadian search-and-rescue/salvage operation ever mounted at sea.
- **Op LAMA**, a humanitarian response effort, conducted in 2010 in southeastern Newfoundland to assist coastal communities that had been devastated by Hurricane Igor.
- The flooding of the Red River in 1997 (**Op ASSISTANCE**), the Richelieu River/Lake Champlain in 2011 (**Op LOTUS**) and the Assiniboine River between Brandon and Winnipeg that same year (**Op LUSTRE**). In each, RCN expertise in small boats was applied in riverine operations to support populations that had become trapped by flood waters.

Prompt action signals a nation's support and instils hope that relief is at hand. Not as immediately evident is the flexibility inherent in a navy's ability to stop at intermediate waypoints to acquire materials as needs become clearer in the days following departure. On arrival, maritime forces with the appropriate ship-to-shore connectors—principally landing craft and helicopters—can immediately begin offloading meaningful volumes of materiel where required, without further burdening stressed or failed infrastructure.

Few organizations approach the flexibility of a ship's company dealing with the unique demands of disaster response. Not only are sailors trained to cope with the uncertainties and stresses of naval combat, but within every ship's company can be found the knowledge and skill to repair and restore a full range of municipal services, as these types of services are also required in a warship. This ability is matched by few combat organizations of such size. Two other cultural strengths permit sailors to adapt well in crisis response: the emphasis that all navies place on restoring a ship's ability to fight from a battle-damaged state, as well as independent thinking and problem-solving that is instilled by life at sea.

³⁷ For a succinct information paper on this topic, see Darin Reeves' [*Warships: Sovereign Immunity versus Sovereign Territory*](#).

The employment of military forces in humanitarian assistance and disaster relief missions is the logical extension of such efforts. It signals an acceptance of the broadening diplomatic role performed by militaries in a globalized era—a new and more salient form of diplomacy that encompasses societies as well as states. (See: Providing Relief to Others, page 21)

The Canadian Armed Forces cannot be everywhere at all times. Canada’s national interest guides where and how it acts, both to relieve distress and render assistance in the face of immediate disaster as well as to promote stability in the global system through peace-support operations.

Forward-deployed maritime forces are well-suited to such purposes. They can be mission-configured with a range of joint and integrated capabilities, from enhanced medical facilities to construction troops. They can deploy for extended periods, pre-positioned in anticipation of seasonally triggered events, or rapidly deployed in response to specific contingencies. When deployed forward on an ongoing basis, maritime forces can promote goodwill and build the pillars of trust and confidence upon which Canada’s broader developmental and diplomatic efforts stand.

Peace-support operations “from the sea” require the capability and capacity, in relatively permissive environments, to mount an expedition as well as to deliver a joint force ashore. This should include other government and non-government relief and aid agencies, which could need to be sustained for extended periods, without reliance on shore-based infrastructure. (See the illustrative maritime vignette: Peace-Support Operations)

Deterring and Containing Conflict

Notwithstanding the growing importance of diplomacy directed towards societies, traditional diplomacy directed towards states will remain central to the employment of

Future surface platforms being acquired by the RCN, beginning with AOPS and the Interim AOR, will be able to contribute more effectively to peace-support operations, as a result of incremental improvements being built into them. This vignette provides better insight into the range of possibilities a dedicated peace-support ship would provide to Canada to support broad policy and development objectives.

Illustrative Maritime Vignette—Peace-Support Operations

It is 2024, and the Peace Support Ship HMCS *Lester B. Pearson* is deployed for her third six-month deployment since she was acquired in 2020 through an innovative public/private partnership. Her two previous and highly successful goodwill tours were conducted in the Americas and the Gulf of Guinea, respectively. On this occasion, she has deployed to Southeast Asia on an anticipatory basis during the tropical cyclone season, her first time in this important but still-developing region. Her mission is to cooperate with local governments and non-governmental agencies, providing medical and dental services to isolated coastal communities throughout the region as well as contributing to the improvement of municipal services.

Lester B. Pearson sails with two CH-148 *Cyclone* helicopters, as well a reinforced infantry company, elements of a service battalion, influence operations and civil-military coordination specialists from the Canadian Army, as well as the forward elements of the deployable Joint Headquarters. She is well-prepared to address a broad set of contingencies, should they arise, as well as to support her assigned mission, all assisted by regional experts from non-governmental agencies. Their local knowledge and contacts have proven to be instrumental in establishing the trusted networks and relationships that her previous deployments had demonstrated were necessary for peace-support operations.

Lester B. Pearson is well equipped for the types of peace-support operations inspired by her namesake. This includes a mix of high-capacity landing craft; a roll-on/roll-off capability; deck arrangements that permit disembarking supplies when port services are limited; a hangar that can accommodate the *Cyclone*; a flight deck capable of landing and refueling large lift helicopters; dedicated medical and dental facilities; spaces and facilities for coordinating peace-support activities; accommodations for non-combatant evacuees and disaster victims; screening and isolation facilities; as well as ample capacity for the sealift of military, recovery and utility vehicles, ambulances and bulk relief supplies.

Two months into the mission, an earthquake in the Java Sea creates a tsunami that devastates much of the adjacent littorals, including the northern coast of Java. This is not the disaster that had been anticipated, but *Lester B. Pearson* is ready. Only 30 hours away at best speed, she will be among the first allied naval assets to arrive, ready to play a role both in delivering and helping to coordinate the initial crucial relief effort ashore in support of the Indonesian authorities.

maritime forces as instruments of national policy. Indeed, diplomacy “from the sea” in this globalized era is arguably becoming more important than “gunboat diplomacy” ever was. (See: Promoting Global Stability, page 24)

- Deterring conflict builds upon ongoing global engagement, using maritime forces to both reassure partners as well as to dissuade potential adversaries. The importance Canada ascribes to desired strategic outcomes in a given region may be signalled in an inherently scalable manner, from the occasional warship or submarine deployment, to the maintenance of a sustained forward presence. In either instance, the decision to formally integrate within allied or coalition command arrangements, or to deploy more loosely in cooperation with allied or coalition forces in theatre, provides additional diplomatic nuance. In the same vein, the periodic deployment of a naval task group creates a strong signal of Canada’s interests in a region, while creating opportunities for international leadership.
- Following the moment of crisis, the decision to deploy additional maritime forces, up to and including a naval task group, signals immediate national intent and resolve in the face of aggression, while creating the time for diplomacy to identify solutions short of force. If such forces are already deployed in a different theatre of action, their redeployment to the theatre in dispute will have the same effect.
- Forward-deployed maritime forces give the government the capacity to respond to rapidly unfolding events in theatre, even as they prepare the way for follow-on joint forces. This flexibility, including the capacity to be readily committed or withdrawn, is especially valuable when parties are seeking ways to avoid conflict. (See the illustrative maritime vignette: Crisis in the Asia-Pacific)

This vignette is intended to illustrate the kinds of contributions the RCN could make as part of a major allied and/or coalition effort to prevent or defuse a major international crisis, based on the capabilities that are planned for delivery over the next decade.

Illustrative Maritime Vignette—Crisis in the Asia-Pacific

It is 2028. The United States and China have been generally successful in balancing their relations over much of the past 15 years, despite enduring differences in China’s so-called “near seas”. More troubling however, is the fact that China has steadily lost its ability to influence its erstwhile client North Korea, whose imminent collapse has now enveloped the Korean peninsula in crisis. With both North and South Korea preparing for imminent war as a result of North Korea’s most recent military adventurism, the stability of the global system is threatened.

Canada determines to respond as part of a major international effort led by the United States, alongside its closest allies and partners in the Asia-Pacific. Among Canada’s first military actions is the decision to commit RCN assets already deployed in theatre as part of Canada’s heightened Asia-Pacific engagement:

- HMCS *Victoria* was deployed to the region in 2027 for a two-year period, under a tri-lateral arrangement with the United States and Japan, where she was being employed to train American and Japanese forces in theatre-level anti-submarine warfare. The last submarine to be recertified for operations following her recent submarine life extension (SELEX), she is well equipped for the broad range of deterrent operations she will conduct in the Sea of Japan under the operational control US Commander Seventh Fleet.
- HMCS *Vimy Ridge*, lead ship of the highly regarded Canadian Surface Combatant, is ordered to remain under the operational and tactical control of the US Expeditionary Striking Group (ESG) within which she has been fully integrated over the past eight months, as the force repositions towards the Yellow Sea as both a show of force towards North Korea and a strong signal of reassurance to South Korea.
- The naval task group’s vanguard unit, HMCS *Winnipeg*, is retasked from its current NATO assignment to deploy to the Pacific theatre of operations via the Suez Canal, while the high-readiness naval task group, held at 21 days notice to deploy, is ordered as a precautionary measure to begin preparations to sail for a mission to be determined as events unfold.

However, even the most comprehensive approaches to conflict prevention will not always succeed. This is why Canada requires maritime forces that can contribute meaningfully to major combat operations. As is shown next, this calls for a blue-water navy that is prepared to project the nation's power at sea and from the sea, against an unprecedented range of maritime threats and challenges.

Projecting National Power

A Growing Range of Maritime Threats and Challenges

While the underlying and very human nature of conflict will not change, the means of warfare will continue to evolve both ashore and at sea in the coming decades, with crucial

Promoting Global Stability

Op DELIVERANCE, 1992-1993: Canada's contribution to UN efforts to control and limit conflict in Somalia. HMCS *Preserver* was employed as part of the Canadian joint force to escort relief convoys. Her helicopters conducted tactical surveillance in support of land forces ashore.

Op FORWARD ACTION, 1993-1994: Canadian support of a UN embargo following the 1991 military coup that ousted Haitian president Jean-Bertrand Aristide. Canadian ships deployed to support the enforcement of UN Security Council resolutions designed to compel the military leadership of Haiti to return power to the duly elected authority. The RCN supported six rotations into theatre, involving nine Canadian warships.

Op SHARP GUARD, 1993-1997: A joint NATO/Western European Union (WEU) enforcement operation in the Adriatic Sea to support UN economic sanctions as well as an arms embargo against the former Republic of Yugoslavia and rival factions in Croatia and Bosnia, through a naval blockade established in the Adriatic Sea. The RCN supported 12 warship rotations into theatre and at one point exercised international command at sea through the Standing Naval Force Atlantic.

Ops PREVENTION, DETERMINATION and AUGMENTATION, 1997-2002: Sequential operations in the Persian Gulf and Arabian Sea to enforce UN-imposed economic sanctions against Iraq. Over the five-year period, the RCN supported 10 warship rotations into theatre.

Op TOUCAN, 1999-2000: Canada's contribution to the International Force in East Timor (INTERFET). The maritime component of the Canadian joint force consisted of the replenishment ship HMCS *Protecteur*, which provided underway replenishment to the multinational naval force positioned visibly offshore, both to reassure the newly formed East Timor and to dissuade others from attacking it.

Op MOBILE, 2011: Canada's significant contribution to an international intervention in Libya, in support of a UN Security Council resolution to contain military actions by forces loyal to the Gaddafi regime against the Libyan people. In the initial stages of the operation, the frigate HMCS *Charlottetown* was positioned to enforce an arms embargo in the immediate approaches to the port city of Misrata, while two *Aurora* maritime patrol aircraft were tasked to support the theatre-wide intelligence, surveillance and reconnaissance effort.

Op REASSURANCE, 2014 to present: Canada's support of NATO's assurance measures in response to Russian actions in Eastern Europe. Since 2014, four frigates have been assigned to NATO's standing maritime forces for counter-terrorism and maritime security operations throughout the Mediterranean region, in addition to maritime exercises designed to showcase NATO interoperability and capabilities while promoting regional stability and security. In 2014, HMCS *Toronto* conducted a historic deployment into the Black Sea, the first time the RCN has traversed the Dardanelles since the end of the Cold War, for a three-week exercise with regional navies and partners.

implications for both intrastate and interstate conflict.

- Intrastate conflict will likely remain the most immediate military challenge for Canada and its allies, as events and interests prompt the international community to engage or intervene. Western militaries in all likelihood will continue to be confronted by

adversaries that asymmetrically blend all forms of violence, ranging from the purely criminal through the irregular to the conventional. These adversaries will use their superior knowledge of the local physical, social and cultural terrains to fight from a position of relative advantage, avoiding Western militaries where they are relatively strong and engaging them where they are relatively weak.

Such adversaries have not yet mastered the maritime domain to the extent required to challenge advanced navies, but the trend toward improved capabilities and competence at sea is clearly evident in some notable recent attacks.³⁸ Threats ranging from transnational criminal gangs to more highly organized maritime armed groups³⁹ are already latent in a number of regions, where they can act with very little or no warning. RCN usually deploys high-readiness combatants to such regions.

In some instances, interventions may involve operations against well-armed and highly organized maritime proxies that have been committed to battle by a regional state that is seeking advantage in relation to its neighbours. Given the disruptive synergies involved and the perceived benefits of plausible deniability, such states will have a strong incentive to improve the capabilities and competence of their maritime proxies, including equipping them with the weaponry needed to place advanced navies at risk.

- In the longer term, it remains impossible to predict the consequences of the powerful geopolitical forces that are reshaping the international order. Cooperation and competition may well continue to co-exist, as they do now. However, the gradual transition from competition to confrontation, readily apparent today in certain regions, suggests that the shadow of interstate conflict is likely to loom ever-larger in the coming decades. This is the case not only in the context of regional interstate conflict, but potentially also in the context of conflict among the great powers themselves.⁴⁰ In either instance, Canada will be neither immune to the global consequences nor impartial to the outcomes.

As a Western democratic nation, Canada has an abiding stake in the values, norms and institutions upon which the international community is built. The Canadian Armed Forces will continue to play an active role in peace and security whenever the international community resolves upon collective action in the face of aggression. The RCN must be prepared in the coming decades to be confronted both at sea and ashore by an ever-wider range of defence and security threats and challenges.

³⁸ The suicide attack on the USS *Cole* (2000); the attack by al-Qaeda on the French oil tanker *Limburg* (2002); Hezbollah's attack on the Israeli corvette *Hanit* using a variant of the C802 Silkworm anti-ship missile (2006); and terrorist attacks launched from the sea against Mumbai (2008).

³⁹ **Maritime armed groups** are organizations capable of maritime action that are party to an armed conflict but that do not answer to, and are not commanded by, one or more states. Among such contemporary groups, the most evolved in its maritime capabilities and organization is the Liberation Tigers of Tamil Eelam (LTTE). See Rohan Gunaratna, [*The Threat to the Maritime Domain: How Real Is the Terrorist Threat?*](#)

⁴⁰ See, in particular, the National Intelligence Council's *Global Trends 2030*, pp. 61-65. Its authors believe that interstate conflict will arise as a result of three inter-related factors: changes in geo-strategic calculations of key players; contention over strategic resources; and "a wider spectrum of more accessible instruments of war."

Future Joint Campaigns

Across the spectrum of conflict, future operations will unfold within highly complex and politically ambiguous environments, more often than not taking place in the narrow zone astride coastlines, where the vast majority of humanity resides. These are the world's littorals, where the air, land and maritime domains intersect and interact in complex ways.⁴¹ This is where a range of threats will be confronted both at sea and ashore, a human landscape where the consequences of massive change and disruption in all its social, climatological and technological dimensions will play out in the coming decades.

Success in the littorals will likely demand new approaches to joint campaigns. These will increasingly shun traditional distinctions between peace, conflict and war. In a future

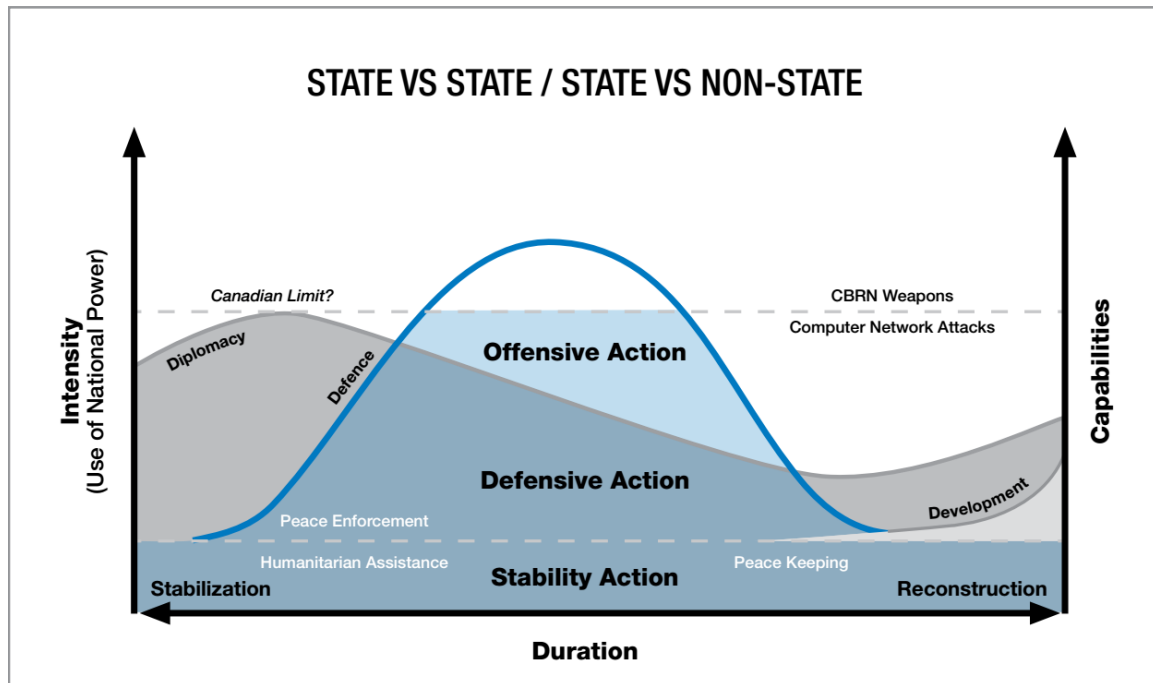


Figure 3: A Comprehensive and Integrated View of Conflict

allied and coalition campaign, for example, maritime and Special Forces will begin to prepare the way for the joint force well before combat operations, through their diplomatic and influence activities. This will include exploiting of any opportunities to de-escalate and reconcile the situation. Should such efforts fail, the most immediate and fundamental task of a coalition's maritime forces will be to achieve and maintain sea control,⁴² in order to:

⁴¹ Militaries have adopted an operational view of the term **littoral**, rather than a strictly geographic one. U.S. joint doctrine, for example, defines the littorals as consisting of two segments: seaward, the area from the open ocean to the shore, which must be controlled to support operations ashore; and landward, the area inland from the shore, which can be supported and defended directly from the sea.

⁴² **Sea control** refers to the capacity of maritime forces to control events at sea through the latent or actual use of force. It is analogous to a land force's capacity to take and hold ground or an air force's ability to control the skies. Sea control is not absolute: it is always considered in relation to an adversary, and it is usually limited in both time and space. It is a *condition*, created by the action of maritime forces, which permits the sea to be used for one's own purpose.

- Gain access to the theatre of operation for the joint and combined force;
- Protect the sea lines of communication that allow a flow of materiel into the theatre;
- Project maritime power ashore, from the covert insertion of special forces to full-scale amphibious operations against a prepared adversary;
- Contribute to land operations through the provision of command and control afloat, intelligence, surveillance and reconnaissance, joint fires,⁴³ and force protection; and
- Establish a seabase⁴⁴ or lodgement ashore from which follow-on forces can be introduced into theatre and supported thereafter.

Canada's maritime forces have contributed toward three major joint and multinational campaigns since the end of the Cold War. In each instance, Canada's maritime forces were among the first assets deployed by Canada, well before the nature or extent of employment had been fully determined. The RCN's unmatched interoperability proved crucial in deciding upon the employment that was most needed as events evolved. Moreover, the RCN's skills in naval task group operations—particularly in command and control—brought important appointments at the tactical and operational levels of coalition command. The scale of Canada's response—ranging from the rotation of a single frigate in theatre to a maximum effort that involved all of the RCN's available major combatants over a two-year period—demonstrated the inherent flexibility of maritime force response options. (See: *Projecting National Power at Sea and from the Sea*, page 28)

Although the maritime environment was far from benign in all three cases, the contested littorals, as described next, will present a far more difficult environment in which to achieve sea control. Moreover, only in certain circumstances will a future campaign in the littorals be concluded successfully solely through the action of joint or coalition maritime forces at sea, as was the case in the Libyan Civil War. Nonetheless, few campaigns are likely to be possible without sea control being attained as a precursor to joint action ashore. Part Two of *Leadmark 2050* concludes by describing what sea control is likely to encompass in the contested littorals, as well as how sea control is likely to be employed to enable joint action throughout the theatre of operations.

⁴³ The term “**joint fires**” refers to the coordinated employment of lethal and non-lethal systems by more than one component of a joint force, in support of a common objective. Long-range cruise missiles are an example a weapons system that can be employed for joint fires.

⁴⁴ A “**seabase**”, literally “a base at sea” from which operations ashore are supported and sustained from the sea, ranging from an individual ship to a larger formation of ships.

Projecting National Power at Sea and From the Sea

Op FRICTION, 1990-91: Canada's contribution to the international coalition effort to evict Iraq from Kuwait saw 4,500 Canadian Forces personnel participate in the first Gulf War. The navy's contribution was a three warship naval task group, consisting of HMC Ships *Athabaskan*, *Terra Nova* and *Protecteur*. The commander of Canada's naval task group was the only non-U.S. officer within the maritime coalition accorded the status of an independent warfare commander, charged to protect the flow of materiel by sea into the theatre of operations.

Op APOLLO, 2001-03: Upon arrival in theatre following the decision by Canada to deploy forces in response to the attacks of 9/11, a Canadian task group, consisting of HMC ships *Iroquois*, *Charlottetown* and *Halifax*, was assigned to the defence of an American Amphibious Ready Group (ARG) whose Marine Expeditionary Unit (MEU) was about to deploy into Afghanistan. The Canadian commander was also assigned several U.S. destroyers and frigates to support this combat mission, which was to defend a seabase. Among his many tasks was the monitoring of regional navies, to ensure they did not stray beyond the control line to which they had mutually agreed. At the same time, HMCS *Preserver*, also deployed as part of the Canadian task group, was tasked to provide combat logistics support to coalition maritime forces gathering in the theatre of operations.

Op MOBILE, 2011: As events in Libya deteriorated from crisis to open civil war, the focus of HMCS *Charlottetown* shifted from con-combatant evacuation and embargo enforcement to a classic sea control mission. As one of the few NATO assets authorized to operate within Libyan waters, *Charlottetown* remained close inshore to control allied air operations, acquire highly detailed maritime intelligence and surveillance as well as to defend NATO mine-hunters operating to keep Libyan ports open for resupply. Her operations included leading a number of surface action groups against Libyan special maritime forces. It was during this that *Charlottetown* was fired upon by shore-based rocket artillery, the first time since the Korean conflict that the RCN had received enemy fire. *Charlottetown* ultimately played a key role in the defence of the port city of Misrata, by providing surveillance and coordinating precision targeting of NATO air strikes against pro-Gadhafi forces.

Maritime Action at Sea

Traditional naval warfare may conjure up visions of classic gunnery struggles between battle fleets within sight of one another, or their more modern missile-age equivalents fought at distances of hundreds of kilometres. In the contested littoral in the future maritime operations versus hybrid and state adversaries at sea may feature elements of both.⁴⁵ (See: The Contested Littorals: Urban Combat at Sea, page 29)

To mitigate the risks inherent in littoral operations, extensive preparations will be required at the strategic and operational levels. Detailed and ongoing tactical and environmental analysis will also be needed to reduce the advantage of local knowledge held by the adversary in the initial stages of a campaign.

Future adversaries will nonetheless attempt to exploit their initial advantage by presenting maritime coalitions with a range of conventional, irregular and high-end asymmetric threats in the same maritime space. This will bring together a range of such actors in more or less common purpose, potentially against a backdrop of widespread disorder and criminality ashore.

These adversaries will initially seek to avoid engaging the maritime coalition to meet its strengths. They will use political and informational levers to indirectly deny access through political action or popular will, or through the extensive use of relatively inexpensive mines. For many potential adversaries, mines and submarines will remain the

⁴⁵ See as well, Milan Vego's excellent [On Littoral Warfare](#), to which this part of *Leadmark 2050* is strongly indebted.

most effective platform to deny access, given the significant resources and level of effort required to counter such weapons.

In more openly hostile situations, adversaries may launch “swarming” attacks, using relatively unsophisticated but very fast and highly manoeuvrable speed-boats in large numbers, armed with optically sighted hand-held weapons. Others will have access to longer-range missiles that can be launched inconspicuously from commercial vehicles ashore. Among more developed coastal states, the arsenal of weapons employed to deny access⁴⁶ to maritime approaches will include land-based fighter aircraft, diesel-electric submarines, corvettes and fast-attack craft, coastal artillery (rocket and gun) batteries, midget submarines, mines and medium-range and short-range ballistic missiles.

Certain adversaries in extremis might contemplate using so-called weapons of mass destruction—biological, chemical and nuclear—to attack maritime forces directly at sea. They might also consider using such weapons indirectly, to contaminate the maritime environment, in an ultimate bid to deny access.

Regardless of the means at their disposal, future adversaries can be expected to deliberately mask their actions in the clutter and congestion of the littorals, exploiting the natural environment to reduce the effectiveness of our networks, sensors and weapons. They can be expected to seek refuge in civilian populations at sea and ashore, knowing that international legal and societal norms will likely constrain operations by a coalition that is sustained by notions of legitimacy and public support for multinational interventions.

Engagements may well involve an adversary’s non-conventional, irregular and asymmetric elements, while the adversary attempts to bring high-end capabilities to bear. A sophisticated adversary will likely attempt both tactics, masking the latter through the former. Engagements would develop suddenly and be conducted with intensity along multiple lines of attack, both at sea and from ashore, followed by rapid disengagement into the littoral background. In a conflict with a strong adversary the intensity of combat, and resulting consumption of fuel and

The Contested Littorals: “Urban Combat” at Sea

The littorals are already a challenging physical operating environment. Where littoral waters are contested, they are a navy’s version of urban warfare: shallow waters, straits and adjacent landmasses constrain movement at sea much as streets and alleys hamper land forces.

Coastlines, as well as the human infrastructure extending more pervasively into the sea, present numerous places where a skilled adversary with superior local knowledge can hide while waiting to strike, in the same way that a city structure can be employed by a skilled sniper. The need to discriminate between friend and foe is much more demanding. Not only is human activity many orders of magnitude greater inshore than it is on the high seas, but a maritime adversary can be expected to exploit the patterns of such activity to maximum advantage.

It is much harder to “see” here than in the open ocean. Radars, sonars and optical sensors are presented with environmental, topographic and hydrographical variations that are far more marked inshore than they are at sea. In addition, they must cope with far greater levels of clutter and background noise from both human and environmental sources.

Operations in the littorals also bring opposing maritime forces into closer physical proximity, greatly reducing the time available for potential life-and-death decisions. In some circumstances this reduces the tactical and operational freedom of movement that is central to maritime operations.

⁴⁶ **Anti-access and area denial (A2/AD)** are modern terms referring to sea denial strategies focused on preventing an opponent from operating military forces near, into or within a contested region. See Sam J. Tangredi, [*A2/AD and Wars of Necessity*](#).

munitions, would be high. For a deployed force, at-sea combat logistics would be essential.

Maritime operations inherently emphasize offensive action, applying information, intelligence and tactical initiatives against such adversaries. But offensive action is incomplete without extensive preparations to counter an adversary's expected actions. This thwarts how the adversary would prefer to fight, denying both the means and opportunities it would use to target the coalition and eliminating or neutralizing the adversary's capabilities before they can be brought into action.

Complementary to offensive action is the extended defence in depth that maritime forces require to blunt and ultimately defeat an adversary's attacks. Contemporary trends in weapons, sensors and networks (which will be examined in Part Three of *Leadmark 2050*) are blurring previous distinctions between the capabilities required at the unit and force levels. Nonetheless, success in littoral operations will continue to require a wide diversity in deployed sensors, weapons and platforms, as well as robust command arrangements that are well-adapted to the rapidity of naval combat.

In summary, littoral operations will require fully integrated offensive and defensive actions across all physical dimensions in the maritime domain—from the seabed to space—as well as full use of the electromagnetic and cyber environments. This will mean far more than bringing together a coalition at the time of crisis. It will demand ever-higher degrees of interoperability⁴⁷ to merge allied and coalition maritime forces at the technical, tactical and doctrinal levels.

The Evolving Anti-Access Challenge

Much attention has been devoted in recent years to the fact that China and Russia are investing in a range of highly advanced capabilities intended to prevent access to their regions by the U.S. and NATO. These include:

- Cruise and hypersonic anti-ship missiles supported by sophisticated integrated targeting networks, advanced air defence systems and fifth-generation fighter aircraft, information-enabled shored based artillery, and an increasingly sophisticated arsenal of undersea weapons. These include advanced submarines, wake homing and supercavitating torpedoes, smart mines and autonomous underwater delivery systems.
- In addition to those “kinetic” A2/AD weapons, a range of complementary “non-kinetic” systems is designed to operate through adverse effects upon maritime sensors and communications systems, as well as protecting their own networks from such attack.

⁴⁷ **Interoperability** is defined as “the ability to act together coherently, effectively and efficiently to achieve tactical, operational and strategic objectives”. At the strategic level, interoperability is an enabler for building partnerships, centered on harmonizing world views, strategies, doctrines, and force structures. ‘Technological interoperability’ reflects the interfaces between organizations and systems and focuses on communications and information systems to address information management challenges across Alliance or coalition partners. Interoperability at the operational and tactical levels is focused on doctrine, tactics and procedures. It is where strategic interoperability and technological interoperability come together in the conduct of joint and combined operations. (Taken after the RAND Monograph Report *Interoperability: A continuing Challenge in Coalition Air Operations* - Chapter 2, [A Broad Definition of Interoperability](#).)

Some might question what role Canada could play in the types of operations contemplated at this highest level of combat intensity. However, events along NATO's eastern periphery demonstrate that Canada is already contributing to cooperative strategies that seek to avoid such conflict. The fact that Canada's maritime forces are designed to operate in today's high intensity environments makes their contributions strategically relevant not only for NATO but also for Canada, as a sovereign actor with global interests.

Such considerations are unlikely to change in the future. Indeed, they are likely to become increasingly important in the coming decades in both relative and absolute terms, especially at sea, where the balance of naval power in the Asia-Pacific will play a fundamental role in determining the future maritime order. Moreover, force-planners must also account for the likelihood that a number of advanced A2/AD technologies described above could eventually be provided by Russia or China to a third party (as Russia is doing today in Syria), complicating the littoral access challenge that would be presented to an international coalition elsewhere in the world.

Maritime Action from the Sea

Recent operations by Canada and its major allies and partners have underscored the challenges of air-land operations in the 21st century. Future joint operations in the littorals will be no exception. In this vein, NATO's air-sea campaign fought during the Libyan Civil War may come to be viewed as typical of future air-sea battles in the contested littorals.⁴⁸

Across the width and depth of a littoral theatre, land and special operations forces will be engaged, often simultaneously and contiguously, in operations designed to defeat armed adversaries while favourably influencing populations and protecting them. At the same time, these operations will also create the conditions for other agencies and partners to restore civil services and society.

Given how closely coupled the actions of a joint force can be in the littoral context, maritime forces will play a significant role in supporting each of these three major elements of operations ashore.

It is envisaged, for example, that there will be a far greater emphasis on influencing activities before and after combat operations as well as during them. Indeed, such activities, which some have termed "the battle of the strategic narrative," will be central to all future campaigning. These activities are essential to isolate the adversary in political, economic and military terms, as well as to establish and maintain the legitimacy of intervention between the domestic and international communities and among populations within the theatre of operations. Maritime forces will play a key role in supporting forces ashore.

Similarly, stabilization activities designed to help restore civil services and institutions may be required for extended periods after combat operations have concluded. In addition to supporting a joint force ashore, maritime forces could be employed to ensure the

⁴⁸ For an exhaustive analysis see the RAND Corporation's [*Precision and Purpose: Airpower in the Libyan Civil War*](#).

movement of relief supplies into theatre. This could be used to reopen trade routes, re-establish fishing zones and stop the re-arming of belligerents by sea.

The complex and dynamic inter-relationships between influence, combat and stabilization activities may lead to new and more adaptive approaches to campaign planning. It could also create more flexible command arrangements at the tactical and operational levels. Such arrangements should anticipate the need for much greater participation by civil society. In particular, non-governmental organizations are likely to have far greater strategic insight into a given theatre upon the arrival of the joint force, as a result of their prolonged experience within the region.

Coalition forces will undoubtedly become much more networked to meet the demands of a highly cluttered, confused, complex and legally constrained battlespace. This may significantly change how combat power is distributed across the joint force.

Such trends are likely to increase the role played by Canada's maritime forces contributing toward combat operations ashore. They will be involved in activities including the insertion, support, sustainment and extraction of special operations forces; joint intelligence, surveillance and reconnaissance preparations from the sea; the provision of joint and tactical maritime supporting fires from the sea; and the protection of forces and populations ashore from an extension of a task group's force-level defensive capabilities.

All of these joint actions will be greatly enhanced by the ability of maritime forces to manoeuvre operationally once sea-control is achieved, using their inherent mobility for strategic and operational as well as tactical advantage. They will do this by placing an adversary's forces at risk along exposed flanks and using operational deception to present dilemmas to the adversary regarding the location and timing of the committal of forces ashore.

Combat capabilities that once resided at higher echelons of a land force are likely to become available even to small elements. This again holds significant implications for combat and theatre logistics, especially for those forces that remain supported and sustained from the sea. The logic of joint seabasing is likely to become more compelling in an increasingly and intensely urbanized littoral environment. This is especially true among our major allies, as ways are sought to reduce a joint and combined force's footprint ashore and its concomitant force-protection liabilities. This will also require such seabases to be defended in depth from adversaries at sea and attacks launched from ashore.

In summary, future joint campaigns will call for a blue-water navy with maritime forces that are able to contribute meaningfully to maritime and joint action, both at sea and ashore, across the spectrum of operations. This includes large-scale, high-intensity combat operations preceded by influence activities that aim to prevent conflict and followed by stabilization operations that aim to rebuild the peace.

PART THREE—THE MEANS

Delivering the Strategic Concept

Building Tomorrow's Navy

The two first parts of *Leadmark 2050* examined why Canada needs a navy and what it does to support the national interest. This final part looks at how the RCN must evolve to meet the challenges of future operations.

The essence of adaptation in a military service is to distil and internalize the lessons learned in operations, driving forward changes needed in equipment as well as associated changes in doctrine, organization and warfighting culture.

Just as the RCN's sister services, the Canadian Army and Royal Canadian Air Force, have internalized lessons hard won in Afghanistan and elsewhere, the navy has carefully examined its operational record during a time of profound change in the global maritime domain, in order to anticipate the capabilities it requires for future operations.

The navy's future success will require more than the acquisition of new capabilities. The defence and security environment continues to evolve rapidly, while potential adversaries—who have already demonstrated their creativity and agility—gradually reduce the materiel and technological advantages we have long enjoyed. If we are to preserve our strategic advantage, we need to embrace long-term and continuous adaptation as a “new normal” across the entire RCN enterprise. (See: The RCN Executive Plan)

The RCN Executive Plan

Taking its over-arching guidance from *Leadmark 2050*, the *RCN Executive Plan* is the navy's roadmap for comprehensive institutional renewal. The plan provides the detailed guidance and direction to implement our strategic concept. While it encompasses the introduction of new capabilities in the fleet, it places a much greater emphasis on adapting how we organize, prepare and train to fight, including readying our people for the ambiguities, complexities and challenges of future joint and integrated operations.

Each of the three strategic means identified in this part of *Leadmark 2050* have been separated into a series of objectives and assigned to lead agents that have been assigned to the authorities and staffs in order to advance them on behalf of the RCN as a whole. This “one navy” approach is being advanced through fundamental changes in RCN governance, organization and readiness processes—the so-called “back end” of our business—that constitute the current main effort of the *RCN Executive Plan*. Collectively, these changes will lay the institutional foundation for the arrival of the future fleet—the “front end” of our business—when the main effort will have shifted toward the introduction of new platforms, capabilities and competencies for joint and integrated operations, both in the Arctic and abroad in the contested littorals.

This strategic concept will be implemented in the coming decades through the following three strategic means:

- A **strategically agile and adaptive RCN institution** that anticipates how conflict is likely to evolve, driving forward changes in how we prepare, train, equip and organize naval forces for future operations.
- **Sailors and officers prepared as warriors and mariners** for the complexities and challenges of future operations, **and equipped as leaders and managers** to guide the future RCN/Canadian Armed Forces at the tactical, operational and strategic levels.

- A **broadly balanced, combat-effective fleet**, capable of independent action at sea and able to contribute substantially to operations ashore.

An Agile and Adaptive Navy Institution

Experience has taught us to expect shocks and surprises; in the coming decades they are virtually assured. We must be ready. Agility and adaptability must be the defining hallmark of the RCN. This is critical across the entire institution, from the strategic through the tactical levels, from the individuals that make up the organization to the defence industrial base that supports it.

Several key attributes will underscore the navy's agility and adaptability as a warfighting institution:

- **Strategic Insight.** A key element of agility is being able to properly interpret strategic indications and warnings. These include a potential adversary's hostile intentions, preparations for war, policy shifts and advances in military capability. The RCN will achieve a greater understanding of the global maritime domain through a more robust approach to the intelligence and assessment functions. This is supported through the fleet's ongoing forward deployments and an understanding developed from global engagements, long-term regional partners, alliances and security organizations in regions of strategic interest to Canada.
- **Strategic Relationships and Partnerships.** In addition to our strong partnerships with the U.S., NATO and the Five Eyes community, the RCN is cultivating a growing number of relationships with other navies of similar culture and strategic outlook. These new relationships and partnerships will offer opportunities for strategic cooperation and collaboration, burden-sharing, mutual-leveraging and confidence-building. In addition, we will need to engage more directly with the most important navies in regions that are of interest to Canada. These are Brazil, India, China and, through NATO, Russia.

The RCN will address the need to build the capacity of other states to regulate their own maritime approaches, working with different arms of government to effect maritime-sector security reform. The RCN will create teams for this purpose and provide opportunities to train other navies and coast guards in the range of disciplines associated with maritime security. It will dedicate an appropriate fleet effort in support of this important defence diplomacy objective.

- **Interoperability.** Closely associated with strategic partnering is a requirement for the highest possible interoperability at the technical, tactical and doctrinal levels with our closest allies and defence partners, specifically the U.S. and other Five Eyes partners.

Interoperability is central to this concept, reflecting a cooperative and collective approach to the defence of the global system. The RCN will continue to advance interoperability through the auspices of NATO and other regional security arrangements, as well as stressing interoperability in its force-planning considerations.

- **Comprehensive Integration.** As standing "whole-of-government" organizations, Canada's Marine Security Operations Centres are already pointing the way toward

new kinds of organizations,⁴⁹ supple partnerships, information-sharing arrangements and related information systems.⁵⁰ These are critical to address contemporary and emerging defence and security challenges at home and abroad.

- **National Maritime Industrial Base.** A technologically intensive organization such as the RCN cannot be strategically agile without a robust industrial base that can respond to emerging needs. Modern warships are among the most complex machines on the planet, and the business by which they are conceived, designed, built and delivered is among the largest and most complex public/private enterprises in Canada.

In this vein, the National Shipbuilding Strategy (NSS) is critical to the RCN's technological agility and adaptability in the future. By enabling industry to plan for the long term—making investments in research and development, capital, infrastructure, supply chains and know-how—the NSS will create the high-technology capacity that Canada needs as unexpected developments occur.

- **Technological Agility.** Adaptability and agility at the level of ship and system design will be essential if we are to match the RCN's cycle of technological adaptation with the highly dynamic cycle of adaptation that appears to be a key characteristic of emerging threats and challenges.

Recent advances in design have made it possible to build much more flexibility into warships. This includes incorporating weight, power and cooling design margins⁵¹ in the initial build of a ship, as well as adopting public standards-based open architectures.⁵² This will enhance the RCN's adaptability at the fleet and platform levels, in order to meet emerging requirements. Greater use will also be made of containerized mission modules, which will offer additional flexibility in warship employment where requirements do not need to be embedded in platform design.

Technological agility, moreover, will be necessary to address urgent and unforeseen requirements. This includes a capacity for the ongoing and rapid development and testing of solutions, the development of associated tactics and procedures using simulation and the rapid implementation of solutions in an already-deployed force.

- **Technological Innovation.** The RCN has a successful history of technological innovation, founded in effective relationships with the Department of National Defence's research and development and materiel arms. There is also highly successful collaboration among the maritime operational, technical and scientific

⁴⁹ Identifying complexity as the central and defining feature of the future defence and security environment, the Integrated Capstone Concept calls for a "revised approach" that is "comprehensive, integrated, adaptive and networked." See in particular pp. 11 – 19.

⁵⁰ For example, the Interdepartmental Maritime Integrated Command, Control and Communication (IMIC3) system, soon to be deployed across 66 platforms of the Canadian Coast Guard, as well as *Kingston*-class coastal defence vessels, are portable and designed for interdepartmental coordination and situation awareness, as well as mission planning and execution.

⁵¹ In this context, the additional capability or capacity that may be specified to compensate for evolution in requirements.

⁵² Architectures (system, interface, software) whose specifications are public. This includes officially approved standards as well as privately designed architectures whose specifications are public rather than proprietary.

communities in experimentation and systems development.⁵³ These relationships will no doubt remain important to future innovation as the RCN focuses more on the conceptual exploration of emerging technologies in operational settings, using a frigate that is dedicated expressly to the task of experimentation.

- **Tactical and Doctrinal Innovation.** Tactical and doctrinal innovation will remain essential as operations evolve and our potential adversaries continue to narrow the technology gap. The RCN's tactical development community enjoys the closest of ties with the Canadian joint community and with sister naval institutions in Australia, the United Kingdom and the U.S. These ties span a full range of functions, including operational research and analysis; tactical development; operational test and evaluation; requirements definition, concept development and experimentation; training and education; and collaborative wargaming.

Highly sophisticated modelling and simulation are crucial to each of these functions, as are distributed simulation environments⁵⁴ that link the Canadian Forces Maritime Warfare Centre with other Canadian and allied warfare development and experimentation centers. Continued investments in these capabilities will assume increasing importance in the future, as the RCN increases the rigour of its science-derived understanding of all aspects of force development. Such tools have already proven to be instrumental in the acceptance of modernized frigates, as well as in the development of performance-validated requirements for the Canadian Surface Combatant. These tools are also being used to explore alternative concepts to warship crewing and to study future air defence systems architectures, to name but two examples. In the future, these tools could prove crucial in reducing the feedback loop between lessons learned and the implementation of delivered systems solutions, with a cycle of tactical adaption that is likely to become much more compressed than it is today.

- **Innovation in Naval Materiel and Support Organizations.** As a technologically intensive organization, the RCN is only as good as the materiel and support organizations that get the fleet to sea and keep it there. The RCN and the Department of National Defence therefore need to continue to invest in dockyard infrastructure and quality naval and national materiel acquisition and support organizations. The expansion of ongoing efforts to adopt best practices in naval maintenance and materiel assurance is critical, coupled with information-enabled systems for platform systems management and equipment health monitoring. Optimizing and rationalizing class-based support programs and implementing performance-based principles and practices within in-service support contracts is also important. Another key requirement is continuing to develop the competence of our highly skilled and knowledge-based

⁵³ The more notable examples include the successful integration of large helicopters with destroyer escorts in the 1950s, the commissioning in 1963 of the world's first support ship to integrate the full range of TG combat logistics in a single hull (HMCS *Provider*), the development of the Canadian Towed Array and AN/SQS 510 hull-mounted sonars through the 80s, as well as the original suite of combat management, communications and machinery control systems for the *Halifax*-class, which were among the most sophisticated of their era.

⁵⁴ A distributed simulation (or synthetic) environment is a shared computer-based representation of the real world, which permits simulators that are not physically co-located to interact with one another.

naval and civil trades, as well as logistics engineering, procurement and project management professionals.

- **Innovation in Naval Training and Education.** The RCN makes a significant effort to train and educate its people, recognizing that they represent a key strategic advantage and will continue to do so. We have invested a great deal in the use of shore-based simulators, and are recognized as world leaders in this regard. Current efforts focus on adopting a campus-approach to the delivery of training, using online systems and virtual classrooms to improve efficiencies and reduce the time sailors spend away from home. In addition, work is advancing to improve embedded training shipboard systems, helping our people retain and build upon the skills they have acquired.

These improvements notwithstanding, there are likely limits to what such technologies can achieve to prepare our people for future operations. Those below the threshold of open hostilities are especially likely to require a shift in the way the RCN looks at maritime warfare. We need to look beyond tactics and technologies to address the human dimensions of conflict in an increasingly populous and intense littoral landscape. This will require new doctrine, new organizational approaches and new competencies, which is examined next.

Sailors and Officers Prepared as Mariners and Warriors

Success in operations is the supreme measure against which the Canadian Armed Forces are rightly judged. It is central to our credibility as an armed force and an essential element of the trust that Canadians have placed in us to wield the nation's arms. In warfare, humans matter more than any other single factor. The investments we make in preparing our people relative to other militaries will remain crucial to maintaining our strategic advantage. This fact will become increasingly evident in future operations whose complexity may defy solutions based solely in technology or the traditional application of military power.

Our success as a naval service in the coming decades will continue to reside in our ability to attract Canadians who represent the rich diversity in our communities across the nation. They must be able to master complex skills and understand the rewards that come from doing so, while feeling a sense of calling to the sea and our profession of arms. They need to retain a sense of duty and commitment toward their country and seek to work actively toward a better world. (See: Warrior Ethos and RCN Warfighting Culture, page 38)

Our success will continue to reside in our ability to produce “deck plate” leaders who fully embrace principles of accountability and integrity, who accept risks and manage them prudently. Our success will continue to reside in policies and practices that permit our people to realize their full potential, that attend to their well-being and the well-being of their families and that provide for the care of the injured as a matter of profound responsibility.

Our success will also continue to reside in our ability to employ the reserve and regular elements of the RCN as complementary partners at sea and ashore, across the maritime force. This one-navy approach is advanced under the auspices of the RCN Executive Plan in a manner that recognizes the fundamental strategic functions of the Naval Reserve and the need to develop the sea-going competencies and skills of our reservists around part-time service. A dedicated fleet-wide effort is needed to sustain the Naval Reserve in its own right as a strategic force, preparing naval reservists for employment at sea or ashore in support of operational missions.

While we have been successful to date in preparing our people to master their extraordinarily difficult military specialities, we must prepare them in the decades ahead to address a far broader range of threats and challenges. They must be prepared to understand the political and historical context from which conflict arises and to achieve strategic insight from a cultural understanding of other societies. They will need to operate effectively in an enabling rather than a leading role and to demonstrate flexibility, agility, adaptability and creativity in accomplishing their mission, including the need to act with confidence in situations of great uncertainty and ambiguity. Such characteristics will be required by all leaders and decision-makers in our highly decentralized command structures at sea and ashore.

For example, our people will need to be expert members of a naval combat team at sea while enabling organizations whose core role is to provide relief or humanitarian assistance ashore. This will require the development of appropriate naval civil-military affairs skills to support whole-of-government efforts in the aftermath of natural

Warrior Ethos and RCN Warfighting Culture

The men and women of Canada's maritime forces are first and foremost part of the Canadian Armed Forces, an organization unlike any other in the nation that exists to fight for the things that Canadians deem essential to their way of life. Their profession of arms is distinguished by the concept of service before self, the lawful and ordered application of military force and the acceptance of unlimited liability.

Canadian Armed Forces ethos derives from fundamental Canadian values, as do the core military values that are imperative to success in battle—integrity, loyalty, courage and duty—all underscored and sustained by personal and professional competence. In the RCN, competence centers on our people's skills and knowledge as **mariners** and naval **warriors**, as well as their development as **leaders** and **managers**.

The Royal Canadian Navy is marked by an operational culture forged out of the harsh demands and common perils of the sea, where a sense of identity is tied not to individual units such as ships, squadrons or regiments but to the service as a whole. RCN culture incorporates timeless expectations of its members, founded in the accomplishments and sacrifices of succeeding generations of men and women who have served their nation at sea in both peace and war, inspiring those who serve today to excel.

RCN culture has unique approaches to teamwork, problem-solving and highly decentralized decision-making. It is shaped by a physical environment that allows for unencumbered movement across global distances for friend or foe alike, yet where today's technologies have compressed life-or-death decisions in naval warfare to a matter of mere seconds. In short, RCN culture, like its counterparts in the Canadian Army and the Royal Canadian Air Force, is a pillar upon which the success of a joint and integrated Canadian Armed Forces depends.

calamities. They will be part of missions to promote diplomacy in a region and carry out stabilization activities to re-establish the conditions for peace following a major conflict. Others at more senior levels will be required to act as military advisors in maritime security sector reform. Proficiency in languages and an understanding of other cultures and societies will be important in such instances. We are fortunate that we are able to draw upon an ethnically and culturally diverse population in Canada, but we must become better at leveraging the inherent plurality of Canadian society to the RCN's strategic advantage.

Individual and collective training that addresses the full complexity of the future operating environment will be essential to prepare our people for future challenges, imparting the new skills and competencies that *Leadmark 2050* calls for. Moreover, a greater emphasis will be placed on education, giving our people a broader perspective and greater agility to deal with the unexpected. Finally, a more structured and comprehensive approach to mentoring will ensure the transfer of knowledge from senior to more junior leaders in all areas.

A Broadly Balanced General-Purpose Fleet

The Fleet Today

The fleet today is organized to support three lines of operations: to sustain our three-ocean domestic defence and security commitments; to sustain forward-deployed continental and international operations; and to hold a naval task group at readiness against contingencies. (See: Navy Math and the RCN's Three Lines of Readiness Effort, page 42)

The Building Blocks

Fleet operations today comprise submarines, surface combatants, support ships and maritime aircraft.

- **Submarines.** Unique among the assets in the Canadian Armed Forces inventory, submarines are weapons of strategic deterrence whose presence—actual or inferred—can alter an adversary's decision-making across an entire maritime theatre of operations. They are the RCN's ultimate warfighting capability, a platform through which Canada can control a substantial ocean space or deny it to others. Moreover, Canada's submarines can prosecute an assigned mission to successful completion without being visible to other nations or the Canadian people—an invaluable asset when discretion in military action is needed.

Using unrivalled stealth, persistence and lethality, submarines such as Canada's *Victoria*-class can place an adversary's maritime forces at risk in a given theatre of operations through offensive action. They can also amplify the defence in depth of the surface forces they are assigned to protect. They remain the most effective means to counter an adversary's submarine force and can operate where surface combatants would be placed at great risk. This is especially the case in the early stages of a joint or major maritime campaign, before sea control is achieved. Their small size makes them especially useful in the littorals. They can operate much closer inshore than the larger and thus less manoeuvrable nuclear-propelled submarines of our key allies. They excel in collecting intelligence in covert surveillance and reconnaissance missions, using

their own sensors as well as being able to host, insert, support and extract special operations forces in a highly covert manner. Our *Victoria*-class submarines are equipped with highly sensitive acoustic, electro-optic and electromagnetic sensors, as well as the world's most advanced bow sonar. As a result, they can monitor large undersea areas for other submarines and detect and track surface vessels at great distance. This makes them suitable not only for naval combat, but also for surveillance and patrol missions at home and abroad.

- **Combatant Ships.** Modern frigate or destroyer-sized surface combatants serve as the backbone of fleet operations for medium naval powers the world over. Canada is no exception. But Canada is exceptional in one crucial respect that leverages the ability of a frigate or destroyer to be employed across the spectrum of operations, far more than any other fleet asset. This is because the RCN is one of only a handful of navies—of any size, anywhere—that regularly undertakes operations around the world.

In addition to being able to defend themselves in all three maritime-warfare dimensions (air, surface and underwater), today's modernized *Halifax*-class frigates have the long-range weapons and sensors to conduct offensive operations against adversarial surface forces and submarines. They can also defend an escorted force in depth from such threats. However, until the *Iroquois*-class destroyers are replaced, Canada lacks a surface combatant equipped with the long-range weapons and sensors that are traditionally used to defend an escorted force in depth from air threats.

The modernized *Halifax*-class frigates will serve as the RCN's bridge to the future fleet, a transition set to happen over a ten-year period beginning in the middle of next decade. Significant improvements have already been made to their combat suite, including new radar, communications and electronic warfare systems, and a new combat management system. Further investments are planned to upgrade the frigates' underwater warfare suite to address the acute environmental challenges of conducting anti-submarine warfare in the littorals against advanced submarines. Such investments highlight the need for an ongoing infusion of technology into the fleet in order to maintain a combat-effective maritime force.

- **Maritime Helicopters.** Operated by the Royal Canadian Air Force (RCAF), maritime helicopters are an integral component of the fleet. Modern maritime helicopters are powerful and highly flexible combatants, equipped with a range of passive and active sensors, tactical information systems and weapons that are instrumental to surface and underwater warfare. They are able to operate independently at a significant range from a naval task group, greatly extending the reach and lethality of the task group and providing in-depth defences against adversarial surface forces and submarines. These are the most effective assets immediately available to a task group commander for intelligence, surveillance and reconnaissance (ISR). They are capable of the full range of functions, from intelligence-preparation of the battlespace to post-combat enemy damage assessment.

Maritime helicopters also perform a host of administrative and logistics support functions, including search-and-rescue, medical evacuation and vertical replenishment⁵⁵. A sufficient number of aircraft are deployed as part of the task group to ensure that a suitable complement can be airborne at all times during periods of high risk. This extends the task group's sensor envelope, provides defence in depth and offers an ability to attack a submarine a substantial distance from the force. Equipped with a state-of-the-art sensor package and an integrated mission suite tied directly to the task group's operational network for the automated exchange of tactical data, the CH-148 *Cyclone*, once matured, will provide the RCN with one of the most effective ship/helicopter systems of any navy.

- **Maritime Patrol Aircraft.** Also operated by the RCAF, maritime patrol aircraft (MPA) are an equally indispensable component of maritime and joint operations. MPA have extended endurance and sufficient speed to expand the breadth of a maritime theatre of operations and conduct an assigned task over a tactically meaningful period of time. Canada's updated CP-140 *Aurora* MPA have been equipped with active and passive sensors that can fully exploit the electromagnetic, acoustic and optical/infrared spectrums in wide-area ISR missions, both at sea and over land. In recent operations they have proven to be exceptionally effective as theatre-level ISR assets. They are also equipped with the communications, tactical information systems and weapons to prosecute adversarial surface forces and submarines, in cooperation with other maritime forces.
- **Support Ships.** Support ships are an essential element of a blue-water navy and an integral component of Canada's naval task group. They allow the task group to deploy around the globe and to sustain its operations in a given theatre for extended periods. Technically called Auxiliary Oiler Replenishment (AOR) ships, they carry the task group's combat logistics—the marine and aviation fuel, ammunition, stores, food and water required for fleet operations. They are also equipped with facilities to provide medical and dental services to task group personnel, both for routine medical support and combat medicine.

Support ships serve as an integral component of a naval task group's air operations, providing both an aviation maintenance facility for a task group's helicopters and a flight deck/hangar from which to independently operate aircraft. The ability to conduct air operations, while simultaneously replenishing two warships underway, allows a Canadian AOR to support high-tempo task group operations. In addition, they are equipped with point-defence and damage-control systems to work in contested waters, as well as a modest command management system for task group operations.

In addition to their combat logistics function, support ships can independently conduct a range of peace-support operations, given their capacity for humanitarian cargo and sealift, the deck space they provide for multiple “sail away” mission modules, as well as their ability to operate helicopters.

⁵⁵ The use of a helicopter for the transfer of materiel or personnel to or from a ship.

- **Patrol Ships.** Compared with the RCN's combatant ships, the *Kingston*-class coastal defence vessels are modestly but adequately equipped and armed for domestic coastal surveillance, sovereignty patrol and mine countermeasure roles. In addition, they have

Navy Math and the RCN's Three Lines of Readiness Effort

The RCN's mission is to generate¹ maritime forces for operations. From a readiness perspective, the RCN's tasks may be aggregated into three interdependent lines of effort that drive the numbers of ships, aircraft and submarines needed in the maritime force, which is determined through operational research.

- **Domestic operations** are the RCN's first line of readiness effort. The key driver here is the sheer size of Canada's maritime estate, coupled with the fact that we border on three widely separated oceans. One ship and its crew are kept ready to sail with eight hours' notice in both Halifax and Victoria. Called the Ready Duty Ship, it is used for search-and-rescue, domestic contingencies and emergent support to other government departments. The latter includes, for example, the need to intercept traffickers as they approach our home waters. The fleet relies heavily on maritime domain awareness, generated in our Marine Security Operations Centres, to determine precisely where and when it is needed in our Atlantic and Pacific home waters, which are readily accessible from our East- and West-Coast ports, respectively. The Arctic, however, requires a forward-deployed posture, given the distances involved in getting there. It is also necessary to operate independently on extended patrols in the Arctic without the need to refuel. These were two of the key considerations that drove the requirement for the planned delivery of six high-endurance *Harry DeWolf* AOPs, as well as the Nanisivik Naval Facility at the eastward entrance to the Northwest Passage, which will serve as the RCN's Arctic forward logistics site.
- **Forward-deployed continental and international operations** are the RCN's second line of readiness effort. The driver in this case is the need to maintain a presence overseas that is consistent with Canada's strategic interests, including the need to support ongoing global engagement efforts and promote stability in the global system. Based on operational analysis of RCN deployment history, the RCN requires the capacity to maintain one major combatant forward-deployed in two separate theatres of strategic interest to Canada. However, sustaining our presence in a theatre of interest on a consistent basis (for example with few gaps) requires three or four others in the operational cycle. (This number is not exact, as it depends on a range of factors.)
- **Contingencies** are the RCN's third line of operation. It maintains a Naval Task Group at high readiness that can rapidly deploy in defence of Canada or North America, as well as lead international maritime operations and contribute toward large and complex coalition/Alliance operations in the event of crisis or conflict. Units of the Naval Task Group are often forward-deployed on an anticipatory basis, acting as vanguards of the Naval Task Group, supporting our second line of readiness effort. This also puts the focus on "navy math". Three enhanced command and control (C2) ships, of the 15 Canadian Surface Combatants planned, and two or three *Queenston*-class support ships are needed, at a minimum, to ensure that one of each will always be available for contingency deployment, regardless of other taskings. Maintaining a high-readiness task group requires careful fleet-wide sequencing and synchronization of the RCN's shore-based materiel, technical and organizations to ensure that the right number of platforms is always available.

Behind these three lines of effort is a multi-year **operational cycle** that takes an individual ship or submarine from periodic and intensive maintenance periods and refits through a rigorous grooming process that includes technical trials, readiness training and warfare certifications necessary for deployed operations. For every combatant deployed there are several others at various points in their operational cycle, moving in and out of Canada's maritime industry as well as through the navy's materiel, technical and individual and collective training systems. The RCAF employs a similar approach toward managing its two maritime air fleets.

Operational research has consistently determined that the RCN requires a fleet of more than two dozen surface combatant warships supported by a minimum of three support ships as well as submarines. Today Canada has 25 such surface combatants, comprising 12 frigates, 1 destroyer and 12 coastal defence vessels, while it manages a support-ship gap through leasing arrangements until 2017, when 1 Interim AOR will enter service. Canada's four *Victoria*-class submarines are now operating at home and abroad, providing additional fleet capacity and a unique set of strategic capabilities.

Current projects aim to see the legacy fleet's capacity of 27 surface combatants and three support ships fully restored, although the acquisition of a third Joint Support Ship remains optional. Six AOPs are being added to the fleet to meet the new demands of domestic operations in the Arctic, while plans to extend the life of the *Victoria*-class submarines into the mid-2030s are being investigated as a bridge toward a new submarine capability.

1. The Canadian Armed Forces defines Force Generation "as the process of organizing, training, and equipping forces for employment." See Canadian Forces Joint Publication (CFJP) 01, [Canadian Military Doctrine](#).

proven useful in a number of continental defence and security assignments, notably in support of the hemispheric anti-drug effort and U.S.-sponsored regional exercises aimed at improving maritime security capacity in the Americas.

- **Inshore Training Vessels.** Training vessels such as the *Orca* class provide an intrinsic capacity for inshore and inland waters presence and surveillance, as a useful complement to their primary training role. This was demonstrated during Op PODIUM, when they were used to provide effective maritime security for the 2010 Vancouver Winter Olympics.

Assembling the Building Blocks—The Naval Task Group

The fleet today is organized at sea according to the assessed needs of a given task or mission. Government policy requires the RCN to maintain a high-readiness naval task group, whose ultimate purpose is to provide Canada with an independent and sovereign ability to control events at sea. In addition to this policy-directed role, the task group performs a readiness function, preparing its individual components for independent deployments with allied and coalition forces, including the honing of the commander and staff for employment in allied command ships or headquarters ashore. (See: The Naval Task Group)

The naval task group is the RCN's deployable system of systems, a tactically self-

The Naval Task Group

Current RCN Strategic Direction and Guidance defines the naval task group as a "naval Force Package¹ comprised of up to four combatants (destroyers, frigates or submarines) and a support ship, with appropriate Naval Task Group Command Staff and maritime air support." In terms of existing and planned naval projects, the naval task group will consist of:

- One Canadian Surface Combatant (CSC) with a commander and staff. Until the CSC is delivered, its command and control (C2) functions will be performed by the modernized *Halifax*-class frigates, four of which have been fitted with an enhanced command package to serve in a flagship capacity.
- Two or three modernized general-purpose *Halifax*-class frigates, ultimately to be replaced by the CSC.
- One *Queenston*-class Support Ship. Until HMCS *Queenston* is introduced into fleet service, underway replenishment and fleet support at sea will be delivered through an Interim Auxiliary Oiler Replenishment (iAOR) capability, to be delivered in 2017.
- Several CH-148 *Cyclone* maritime helicopters, distributed across the task group, to permit a suitable number of aircraft to be simultaneously airborne for extended round-the-clock operations when required.
- One *Victoria*-class SSK, depending on the assessed needs of the mission.

Maritime patrol aircraft (MPA) are not elements of the naval task group, as they are normally separately tasked to operate with a task group by a supporting commander ashore. Nonetheless, MPA provide an indispensable outer layer to a task group's extended in depth defence.

1. The CDS's Force Posture and Readiness (FP&R) directive defines a Force Package as "a grouping formed by a combination of force elements". A *Kingston*-class MCDV and a Naval Mine Countermeasures Team, for example, would comprise a Force Package consisting of two Force Elements.

sufficient grouping of ships, aircraft and submarines whose sensors and weapons are integrated into a highly cohesive warfighting whole.

While individual platforms are the most visible part of the task group, its command management and related communications and information systems—the operational network—hold the key to integrating its total combat power. The task group’s operational network knits together platforms that are often separated by dozens, sometimes hundreds, of kilometres. This permits them collectively to “see” what each of them sees individually, from the ocean depths to near space, and throughout the electromagnetic and acoustic spectrums.

Beyond the extended sensing horizon of the task group itself, the operational network can “plug into” broader national, allied or coalition networks, as well as reach back into shore-based operational command and intelligence centres. This gives the commander a theatre-wide operational and intelligence picture.

The operational network allows the kinetic and non-kinetic systems of each task group platform to be integrated by commanders in ways that greatly exceed the sum of their individual contributions. It creates extended and integrated defence in depth for the task group and its escorted force, and extends a task group’s defensive umbrella over a seabase or adjacent land force ashore. Finally, the operational network permits offensive action along multiple simultaneous lines of action.

Regardless of how individual platforms, weapons and sensors evolve in the coming decades, as is examined next, the operational network will likely remain at the heart of future naval warfare. This is because it creates unity of purpose and action among warfighters and commanders, through a shared understanding and knowledge of events in an integrated, joint battlespace.

The Fleet Tomorrow

The fleet will continue to be organized around the concept of the naval task group for the foreseeable future. But maritime operations will increasingly place significant new demands on a fleet that has begun its transition toward the competencies and capabilities it will need in the contested littorals.

This final part of *Leadmark 2050* looks into the middle of this century at the changes envisaged within the lifetime of Canada’s next class of surface combatants. Depending on the ability to implement the concepts within this RCN vision, two broad force development (FD) windows are envisaged:

- A nearer-term window, toward 2035,⁵⁶ during which a number of the concepts and ideas of *Leadmark 2050* will be introduced. This will be an evolutionary approach, driven by an informed understanding of future threats and implemented through technologies generally available today or soon to be introduced. These are candidates for inclusion in the platforms to be delivered in the coming two decades.
- A longer-term window, from 2035 onward, during which a majority of the concepts discussed in *Leadmark 2050* will be fully realized and are likely to drive the design of the RCN’s subsequent generation of warships. The acquisition of these ships will have

⁵⁶ Selected in part as the symbolic date that the last *Halifax*-class frigate will have been retired from service through the delivery of the final Canadian Surface Combatant.

begun in this latter period, posing the prospect of significant—indeed revolutionary—change to the maritime force.

Maritime Platforms for Joint Action in the Littorals. By the end of the nearer-term, pre-2035 period seen in this RCN vision, most of today's maritime forces will have been replaced or modernized, and new fleet capabilities will have been introduced.

The *Kingston*-class Coastal Defence Vessels greatly exceeded our original expectations for the class, particular in recent years when fleet capacity was significantly reduced, with the need to modernize the *Halifax*-class frigates. They have been employed successfully throughout much of the hemisphere, across a wide range of domestic and continental defence and security missions. Their ongoing utility has also underscored the need to reinvest in their mine countermeasure (MCM) capabilities. It has also highlighted the need to reinforce this specialized naval warfare discipline through doctrinal and tactical development, as well the commensurate nurturing of skills and competencies within the MCM community.

Options to extend the life of the *Kingston*-class are also being examined closely, as an efficient means of retaining the fleet capacity that successive operational research studies have concluded is needed, while also complementing the capabilities to be delivered with the *Harry DeWolf*-class.

The *Harry DeWolf* Arctic and Offshore Patrol Ship (AOPS) will provide a more complete set of capabilities for operations in Canada's home waters. The class is being designed specifically to be ice-capable, for operations throughout the navigable season in the Arctic, but with the seakeeping⁵⁷ qualities and endurance needed to perform the same mission in Canada's other two oceans during the remainder of the year. It will have the communications and information links needed to plug into Canada's domestic operational information and surveillance network. It will also serve as an effective platform for the coordination of whole-of-government operations in Arctic waters. The AOPS will have sufficient flexibility in its deck



Figure 4: Artist's Impression of the *Harry DeWolf* Arctic & Offshore Patrol Ship

⁵⁷ **Seakeeping** ability is a measure of how well-suited a watercraft is to conditions when underway. A ship or boat that has good seakeeping ability is said to be very seaworthy and is able to operate effectively, even in high-sea states.

arrangements to operate a wide variety of small boats. It will have accommodations to collaborate with the RCN's federal partners in Canadian home waters and to deploy further abroad, where it will conduct a range of constabulary and diplomatic operations.

Among the more immediate platform priorities in the pre-2035 period is the requirement to broaden the fleet's ability and flexibility to conduct operations ashore, across a range of **peace-support missions** in relatively permissive environments, including humanitarian assistance and disaster relief (HA/DR).

A number of incremental capabilities will be examined for the next generation of major combatants, much as they have been incorporated in the *Harry DeWolf*-class AOPS and the Interim AOR, to be delivered in 2017 (See: Creative Partnering in Procurement—The Interim AOR)

Such incremental improvements could include designing more flexible deck arrangements to accommodate a wider range of boats. It could also involve acquiring larger and more versatile small craft to transfer personnel and supplies ashore, as well as incorporating sufficient space for stores and accommodations. In addition, a number of "sail-away" peace-support **mission modules**, housed in standard 20-foot containers, will be developed to deliver a range of HA/DR services. Examples of options being investigated include water production, power generation and waste management.

Creative Partnering in Procurement—The Interim AOR

Efforts are underway to develop an Interim AOR (iAOR) capability for the RCN in order to improve the fleet's underway replenishment capabilities.

Through the iAOR project, the Crown has entered into contract with Project Resolve Inc., which will employ Quebec's Chantier Davie Canada to convert the Motor Vessel *Asterix*. Modifications include:

- Four replenishment stations to permit simultaneous replenishment on both sides of the ship in support of task group operations.
- Aviation support, with a helicopter deck and two hangars designed to accommodate the CH-148 *Cyclone*.
- Medical facilities for humanitarian assistance and disaster relief, with emergency accommodations for up to 150 passengers, as well as a small evacuee screening and isolation facility.
- Deck space to accommodate up to 40 large utility vehicles and 50 twenty-foot container equivalents of humanitarian cargo.

The ships will be operated privately, rather than by the Crown, with Chantier Davie Canada providing the service at sea by the fall of 2017. The initial period of service delivery will be five years, with options to extend by up to five additional one-year periods, at the sole discretion of the Crown. Although a civilian crew will operate and maintain the vessel, Canadian Armed Forces/RCN mission specialists will embark in the ship when needed. These will include replenishment-at-sea (RAS) teams, command elements, maritime air detachments and medical and dental service teams.

This creative approach to partnering in procurement is possible in permissive environments, where the requirements for operations may be met by modifying a modern vessel that has been built to contemporary commercial standards and practices. Building on the precedent of the iAOR, the acquisition of a purpose-converted or purpose-built peace-support ship for HA/DR and global engagement would appear to be a strong candidate for a public/private partnership, were such a vessel identified as a priority for acquisition.

Such measures will improve the future fleet's agility and capacity to respond to disasters at home and abroad. However, recent operations by the RCN and allied navies have highlighted a pressing need for the Canadian Armed Forces to consider the acquisition of a dedicated **peace-support ship** to meet the unique demands of HA/DR.⁵⁸

Even in relatively permissive environments, such operations typically unfold in chaotic conditions, often hampered by extensively damaged—or entirely absent—transportation networks and infrastructure. Such a ship would act as a seabase, with features that include a substantial sealift capacity to move personnel, vehicles, force logistics and humanitarian materiel into theatre. There would be equipment to embark/disembark cargo as well as transfer cargo at sea, and deck space to accommodate and operate medium- or heavy-lift aircraft and landing craft. This would act as the ship/shore connectors to project, sustain and support a force ashore, as well as to recover it. The internal space could be dedicated to a joint headquarters, civil-military coordination centre, as well as medical and dental facilities and accommodations for evacuees.

Such a vessel would likely be among the most heavily used assets in the future Canadian Armed Forces inventory. It would be capable of anticipatory pre-positioning or rapid deployment, be able to carry large volumes of humanitarian cargo, emergency vehicles and related supplies, and be equipped with facilities to act as a floating civil-military coordination centre. With these features, a peace-support ship would be an ideal platform for joint action across a range of relatively permissive expeditionary scenarios.

Situations where the ship would be used include the evacuation of non-combatants from zones of incipient conflict, as well as support to forces ashore during a post-conflict

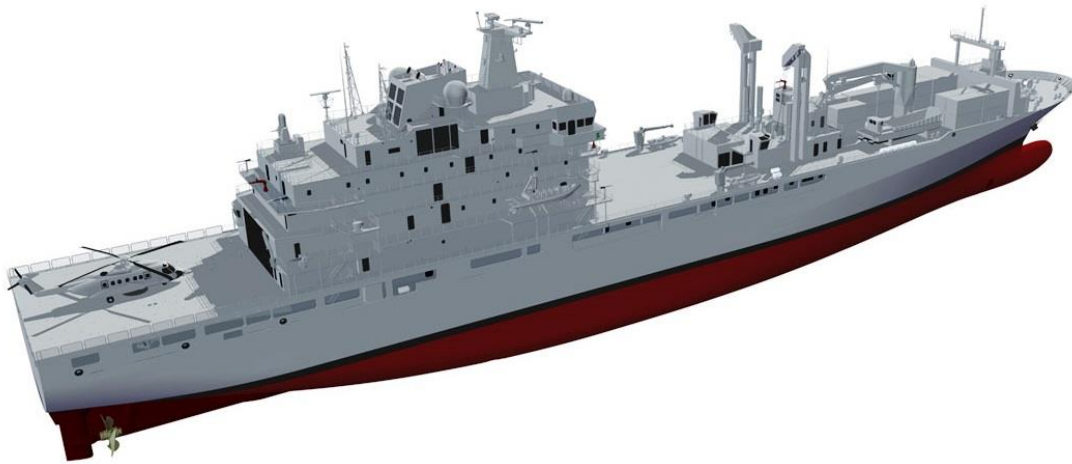


Figure 5: Artist's Impression of the Queenston-class Joint Support Ship

⁵⁸ Navies have made significant contributions to international disaster relief operations. These include the Indian Ocean post tsunami, 2004; Orleans post Hurricane Katrina, 2005; Haiti, post earthquake, 2010; Burma, post Cyclone Nargis, 2008; Padang, post earthquake, 2009; Pakistan, post monsoon flooding, 2010; Japan, post earthquake / tsunami, 2011; and The Philippines, post Typhoon Haiyan, 2014. According to a recent RAND analysis, naval HA/DR operations are especially useful in the broader Asia-Pacific not only because of the essentially maritime character of those theatres, but also because the region suffered more than half of the world's major natural disasters.

recovery or stabilization period. Moreover, such a vessel would likely emerge as the principal Canadian Armed Forces defence diplomacy asset. It would be deployed routinely to regions of strategic interest to Canada, with a range of personnel and joint capabilities to strengthen regional capacities and strategic partnerships. More broadly, it could conduct goodwill missions with other federal agencies and non-governmental organizations.

The iAOR will allow the RCN to bridge the gap in underway replenishment until the **Queenston-class Joint Support Ship (JSS)** is delivered.⁵⁹ Based on an existing design in service with the German fleet, the *Queenston* and her sister ship *Châteauguay* will support tomorrow's task group combat logistics requirements, while also providing a limited sealift capability for peace-support operations ashore.

Much as her predecessor AORs, the *Queenston*-class JSS will be fully integrated into task group operations and capable of sustaining high-paced operations, with the ability to simultaneously conduct air operations and replenish two warships alongside. It will be provided with self-defence systems to operate in contested waters, as well as a modest command management system. It will be equipped with medical and dental facilities, including surgical and post-operative recovery. It will be capable of operating two maritime helicopters, and it will provide aviation maintenance and repair facilities for the task group's other helicopters.

The transition to the **Canadian Surface Combatant (CSC)** will take place in the pre-2035 FD window. The CSC will be a major step toward the new warfare concepts and ideas described in the pages following this discussion of platform considerations. Much



Figure 6: Artist's Impression of the Canadian Surface Combatant

as the *Halifax*-class frigates, the CSC will serve as the backbone of tomorrow's navy, enabling the transition to the "navy after next" that will begin to emerge at mid-century. The CSC project will be the largest and most complex shipbuilding activity undertaken in Canada since the end of the Second World War. It will initially deliver the flagship and

⁵⁹ The RCN has also made arrangements with the Spanish and Chilean navies to lease AOR services for training and exercising with the east and west coast fleets respectively.

air defence capabilities of the RCN's *Iroquois*-class destroyers and ultimately replace the general-purpose capabilities of the modernized frigates. The CSC requirement will be centred on the high-intensity operating environment that was described in the final seven pages of Part Two of *Leadmark 2050* and is elaborated in the pages that follow.

The CSC in all likelihood will be based on a ship already or soon to be at sea, reflecting contemporary platform design considerations. These include the wide implementation of public standards-based open architectures for ship systems; the stowage of weapons systems internally to the hull, to reduce the ship's signature and improve survivability; hull and propulsion systems with enhanced efficiency and reduced environmental impact; and improved standards for crew living spaces.

The coming decades will likely see the widespread adoption of shipborne **unmanned vehicles**, which will be employed as part of a task group's maritime intelligence, surveillance and reconnaissance (ISR) assets at sea as well as in support of joint and special operations ashore. As technologies mature, the pre-2035 FD window could also witness the introduction of autonomous vehicles in all three maritime dimensions.⁶⁰ Such vehicles will be well-suited to a range of tasks that extend both the sight and reach of the task group. They will also comprise an essential component of a joint force's constellation of intelligence, reconnaissance, surveillance and strike assets, performing tasks in very high-risk environments, remotely targeting weapons, delivering precision weapons and conducting post-attack battle assessment. However, while autonomous vehicles will become increasingly capable for "dirty, dull, deep and dangerous" missions, manned vehicles will remain indispensable for complex situations requiring decentralized command and independent decision-making, even well into the post-2035 FD window.

Crew optimization⁶¹ has already emerged as a key platform consideration in the pre-2035 FD window. The aim is to reduce the life-cycle costs associated with major combatants as well as to:

- Implement new crewing concepts that will permit the RCN to sustain ships at greater distances for longer periods of time, through the rotation of personnel *in situ*. This will likely need to be accommodated by changes to materiel and support organizations, sustaining forward-deployed units through remote diagnostics and support, as well as in our personnel practices in home port.
- Keep the RCN highly competitive in the recruiting market, possibly by reducing the sea-shore ratios that permit the RCN to sustain ships at greater distances for longer periods of time.
- Position the RCN to create new organizations for specialized naval and joint operations in the littorals. Our recently introduced Enhanced Naval Boarding Parties are an example of this. Maritime Security Sector Reform teams are the logical next step, leveraging Canada's expertise in maritime domain awareness and interdiction

⁶⁰ The term "autonomous" is used rather than "remotely piloted", with the expectation that advances in onboard sensing, processing and artificial intelligence should make such systems increasingly capable over the longer term, performing tasks without the need for immediate and ongoing human intervention.

⁶¹ The term "crew optimization" is used rather than "crew reduction". Unlike a number of its allies, Canada's warfighting doctrine calls for higher and more sustained crew readiness levels across all three maritime warfare dimensions and damage control states.

operations to help future partners build their maritime security capacity. The superb work of the RCN's clearance diving community in Afghanistan and elsewhere demonstrates the continued relevance and broad utility of the skills they have perfected in explosive ordnance disposal and mine warfare, both of which could also be leveraged for purposes of capacity building.

- Potentially offset the costs associated with more lengthy investments in advanced training and higher learning, notwithstanding the evolution toward ever-leaner and more focused delivery of training and education.

Closely related to crew optimization is the need to **optimize warship and submarine maintenance practices** to improve the percentage of time within the operational cycle that a warship or submarine may be operationally employed. Shipboard maintenance management systems are expected to become increasingly information-enabled to improve the efficiency of existing maintenance practices and enhance workforce scheduling and management. Moreover, developments in areas such as equipment health monitoring and non-destructive testing may apportion naval maintenance work more effectively at the unit, dockyard and industry levels. At the same time it will be necessary for the RCN to become better-positioned for forward deployments through basing and support arrangements provided by host-nations or allies, where Canada's strategic interests determine that a sustained presence is needed.

The initial pre-2035 FD period will also see a more systematic introduction of "green-fleet" technologies to improve fuel consumption, optimize the use of shipboard electrical power, improve the thermal management of compartments, reduce the emission of engine exhaust into the environment and improve sustainable environmental practices in the fleet.

Submarines are likely to remain the dominant naval platform for the foreseeable future, and hence are an essential component of a balanced combat-effective navy. The *Victoria*-class submarines will need to be replaced as we prepare to enter the post-2035 FD window, with the acquisition process begun much sooner. From the operational perspective, the considerations likely to emerge as important elements in the acquisition of a successor submarine include the ability to contribute to joint operations in the littorals through a broader range of strike weapons, intelligence, surveillance and self defence capabilities than are resident in the *Victoria* class. Also critical is an enhanced capacity to host, insert, support and extract special operations forces; the ability to remain fully connected to naval operational networks at depth and speed; the ability to operate and recover autonomous underwater vehicles; and the ability to operate even more covertly, using air-independent propulsion.

Among the key strategic considerations for the replacement submarine will be the ability to operate in all three of Canada's ocean environments, specifically the unique requirements and design elements associated with operations under ice.

In the post-2035 FD period, new propulsion and power technologies such as all-electric propulsion, will be examined as possible candidates to succeed the CSC. Such technologies, as well as more radical solutions for platform survivability and protection, may well become feasible for future classes of surface combatants. For example, substantial improvements in ship speed, and hence survivability, may be possible by adopting multi-hull or other innovative hull arrangements. A wider mix of surface ships may also be envisaged, but much will depend on the development of information, sensing and weapons technologies. These could fundamentally change how sensors are distributed, and combat power integrated, across the joint force.



Maritime Weapons and Sensors for Joint Action. Canada's maritime forces will continue to require a broad range of systems designed to contribute to the combat power of the task group, at both the platform and force levels across all warfare disciplines, as well as contributing toward joint action ashore.

Without the capability to produce the sensors and weapons required domestically, Canada's future major surface combatants will likely be outfitted with a combat suite of best-of-breed weapons and sensors available in the international marketplace. Canada must be—and will continue to be—among the world's most demanding clients with respect to combat systems integration. These are widely and correctly regarded as the key element of Canada's highly successful *Iroquois*-class destroyers, as well as the original and newly modernized *Halifax*-class frigates.

The ability to deliver lethal effects at range and with great precision, both at sea and ashore from the sea, will become essential in a crowded and congested littoral battlespace. Equally important is the need to employ new non-lethal means at sea and ashore, as part of a comprehensive scale of graduated response and effects across the joint force.⁶²

In the pre-2035 FD window, significant improvements can be expected to be made to maritime weapon systems and sensors. Self-propelled and guided munitions will extend the reach and precision of medium-calibre naval guns several fold. Shipboard and anti-ship missiles will become progressively faster, more highly manoeuvrable and increasingly impervious to electronic countermeasures. Shipborne radars and other

⁶² The foundations for these capabilities are being set through joint experimentation, including the Canadian Armed Forces Targeting Initiative and the RCN's Joint Littoral Targeting Exercise series.

sensors will become more discriminating, while new approaches to data and information management will emerge to deal with acute environmental and propagation challenges in the littoral environment, including distributed and networked sensing strategies across the electromagnetic and acoustic spectrums. (See: Distributed Sensing and Processing)

These developments have immediate implications for the CSC, as many of them are reflected, or will be soon, in the weapons and sensors likely to be leading candidates for its combat suite. Moreover, as capable as this initial combat suite will be, the CSC's designers should anticipate the need to replace individual components as more advanced weapons and sensor systems emerge over the operational life of the class. This is much the same as the RCN has done in modernizing its *Halifax*-class frigates. Such evolved systems could include:

- Weapons designed for precision operational and tactical fires in support of the joint force. There is an expectation that developments in the pre-2035 FD period may permit the acquisition of long-range gun systems that can launch multi-configurable munitions in volume. These can be directed independently or autonomously toward their targets with great accuracy at a distance.

Distributed Sensing and Processing

Air Defence Considerations. The *Iroquois*-class destroyers introduced naval tactical data link systems (NTDS) into the RCN in the 1970s. The systems were a major innovation at the time, permitting the automated exchange of track¹ information held by all similarly equipped units in a force.

The performance of NTDS gradually improved as radars became more accurate and ship combat information systems were increasingly integrated and automated to detect and track targets. However, even today's highly capable tactical data links remain based on an exchange of information about tracks that are stored and shared electronically, rather than of the data gathered directly by ships' sensors.

The next stage of evolution is to network at the level of radar data. Techniques have emerged that permit such information to be shared across a maritime force by suitably equipped platforms, allowing them to process the data gathered across forces, using identical algorithms in real time, literally on a "dwell by dwell" basis (a dwell is a single radar "look" at a target, which may involve multiple pulses in rapid succession but at the same beam position.) The result is a completely integrated and distributed picture of such high quality that weapons can be fired remotely against a threat from platforms whose sensors have not physically detected it. The advantages of integrating and distributing radar data at the sensor level are especially pertinent in the littorals, as each potential target is simultaneously painted from various angles and aspects, mitigating environmental conditions and variability, as well as topographical features that would otherwise mask detection by any individual platform.

Underwater Warfare Considerations. Littoral waters present acute environmental and propagation challenges for traditional acoustic sensors, notwithstanding the considerable advances in signal processing in modern sonars. The solution may rest in multistatic sonar configurations. Unlike traditional monostatic operations, where the transmitting and receiving sonar are co-located, multistatic sonar operations employ multiple and distributed sonar transmitters and receivers. Among other advantages, this allows for transmitting and receiving sensors to be dispersed and optimally placed in relation to water depth and topography, for maximum detection probability. This approach also creates additional opportunities for signal processing, arising from the geometries created between transmitters, target and receiver, in addition to other data fusion techniques, which are not exploitable in monostatic systems.

1. A track is a representation of a physical object or group of objects (ships, aircraft or submarines.) It includes locating information and available kinematic data (course, speed, heading, etc.) tracking quality based on sensor accuracy, and attributes that aid in the classification and identification of the entity.

Systems for theatre-level air defence, to permit the protection of joint forces and populations ashore.⁶³

In the longer term post-2035 window, entirely new classes of weapons technologies such as directed energy weapons and electromagnetic guns may become feasible and affordable, once ship systems have evolved to meet the exceptional energy demands of such weapons.

Maritime and Joint Intelligence, Surveillance and Reconnaissance. Operations in the littorals will be characterized by extensive intelligence preparations, in which maritime forces will play a major role, contributing toward the strategic insight, operational anticipation and tactical awareness of the joint force as a whole.

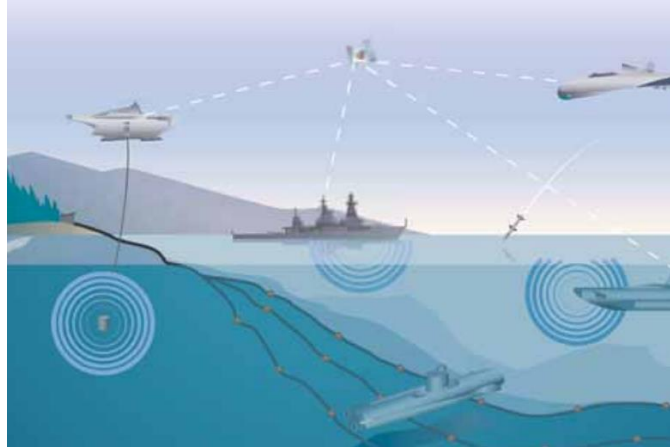
Commanders at all levels of the joint force, whether at sea or ashore, will continue to rely heavily on tailored fusion of all sources of data and information of a given region (signals, communications, electronic and human intelligence) collected from a range of classified and open sources. Maritime operations in the littorals will particularly depend on a dynamic understanding of the topographical, hydrographical, oceanographic and meteorological conditions of a given area of operations, as well as of space-based phenomena and their effect on weapons, sensors and communications.

Much of this fusion and analysis will become increasingly automated in joint centres ashore. The result will be fed to commanders at sea within a joint and combined intelligence architecture that is likely to see a significant evolution in structures, processes and capabilities over the initial FD period.

As new long-range weapons and intelligence collection systems are progressively introduced into our maritime forces, the highly integrated nature of joint operations in the littorals will require dedicated intelligence personnel and operators at sea with the knowledge and experience to support the commander's immediate tactical and operational level intelligence needs. These include the coordination of reconnaissance and surveillance collection plans; the planning and coordination of joint lethal and non-lethal fires; post-engagement battle assessment; and information management of tactical and operational-level intelligence systems.

⁶³ As a founding member of NATO's Maritime Theatre Missile Defence Forum, Canada and its partners are evolving a set of concepts, operations and systems architectures and related capabilities associated with Integrated Air-Missile Defence. For example, an at-sea demonstration conducted in 2015 involving the modernized frigate HMCS *Montreal* presented a multinational task group with realistic anti-ship and ballistic missile threats in an operationally representative scenario, designed to record and measure the performance of sensors, weapons and networks. The purpose of the exercise was to inform future requirements and develop advanced protocols for the exchange of tactical data and the integration of a single integrated "air picture". The data derived as a result of this single experiment represented several years of effort if it had been undertaken by Canada alone. It has informed the ongoing *Halifax*-class modernization project, as well as requirements for the Canadian Surface Combatant.

Integrated Command and Control. The need to coordinate the actions of the joint force with a wide range of government and non-governmental agencies, including elements of civil society, will become an increasingly important part of the command function at the operational level. At the tactical level, the command function will be dominated by the need to address the increasing intensity and rapidity of naval warfare.



Achieving unity of effort across the joint force will continue to require commanders to synchronize their actions at the tactical and operational levels. Each “node” in the joint force, from major platforms through unmanned and autonomous vehicles, down even to the level of individual munitions once launched, will need to “plug into” the operational network. The network itself will also need to become increasingly robust, resilient and redundant in the face of emerging cyber and physical threats. Space-based communications will remain vital to all maritime warfare disciplines, but their vulnerabilities likewise will need to be mitigated.

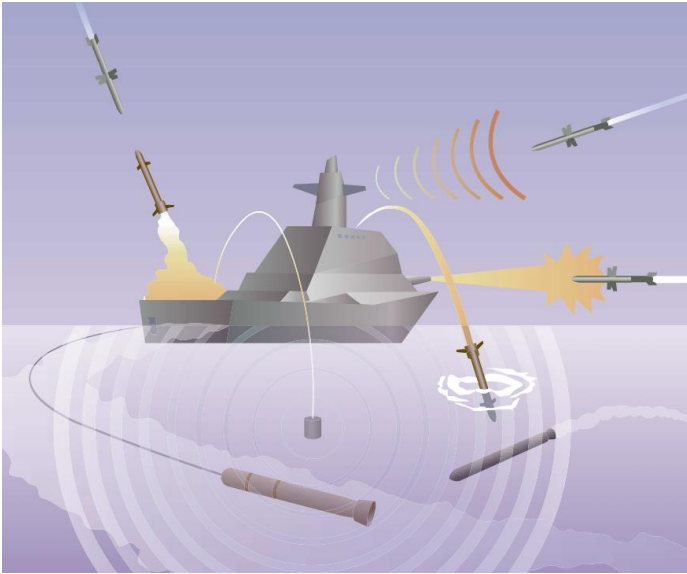
At sea, new techniques in command management systems can be anticipated, including new ways to visualize the battlespace to deal with the highly cluttered littoral environment. New techniques such as neural networks and learning algorithms may be developed that, for example, could be used to detect from subtle changes in background patterns of activity the presence of adversaries that will undoubtedly be using clutter and congestion to mask their location, movement and intent.

Commanders at the tactical level will need greater levels of decision support to deal with the rapidity of naval combat in the littoral environment. Automated detection, localization, tracking and targeting will remain key requirements, as will the ability to automatically engage when so desired by the commander.

Notwithstanding the fact that command management systems will continue to be highly automated, naval command and control will be exercised through doctrine and procedures that leverage distributed and collaborative planning. This will be coupled with the tightly controlled application of force in situations below the threshold of hostilities and highly decentralized decision-making when that threshold has been crossed.

Interoperability will remain a key driver, as will the development of leaders at all echelons who are able to exploit opportunities and seek advantage in the face of chronic ambiguity and uncertainty. Indeed the human component is likely to be decisive in the littorals, compensating for the gaps in situational awareness through an understanding of adversaries, their abilities, motivations and culture of decision-making.

Protection of the Maritime and Joint Force. A multi-dimensional and layered approach to the defence of maritime forces will be required. This begins with a need for extensive preparations of an area of operations through intelligence, surveillance and reconnaissance, as well as environmental and tactical analysis.



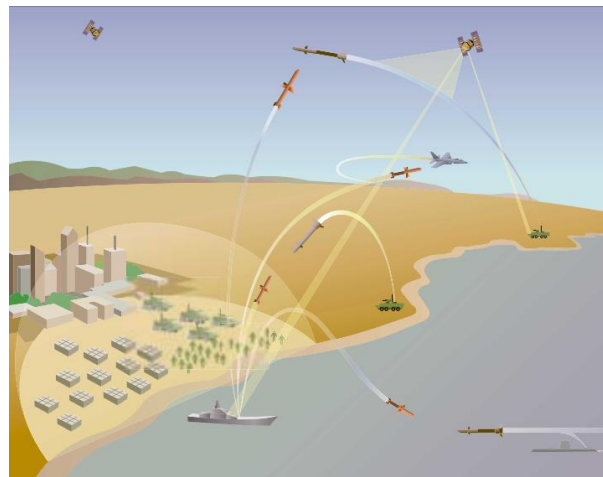
Future combatants will be equipped for self-defence in all maritime dimensions. They will use complementary and integrated active and passive systems to counter an adversary's ability to attack at every stage of the so-called "kill chain", from initial detection, tracking and identification through engagement decision, weapons launch, flight trajectory and terminal homing. This includes stealth measures to reduce their electromagnetic and acoustic signatures. Combatants will also require an ability to

operate for limited periods within a contaminated (nuclear, chemical or biological) environment without risk to personnel. Lastly, they must be designed not only to survive battle damage but also to remain operational having taken damage. This will require systems that can be automatically activated to isolate and contain the effects of battle damage, decision support for damage control teams, and combat, propulsion and power systems that can be rapidly and automatically reconfigured.

At the level of the task group, an umbrella of force-level capabilities will permit the task group to operate independently in a complex and multi-dimensional environment to defend itself, as well as to extend its defensive umbrella to adjacent forces at sea or ashore. Inherent in force-level capabilities is the capacity for long-range offensive action at sea and from the sea. They must include highly integrated architectures for intelligence, surveillance and reconnaissance, as well as for command and control. Additional needs include an operational network that will permit any joint sensor to link to any joint shooter, the capacity to direct theatre-level assets that are assigned in support and the capacity for effective leadership of maritime operations. This includes tactical-level leadership within specific medium- to high-intensity naval warfare disciplines.

Clearly, protection in the cyber domain will become as vital as protection in the physical domain, requiring measures that assure the integrity and performance of our operational networks in the face of physical or cyber attacks.

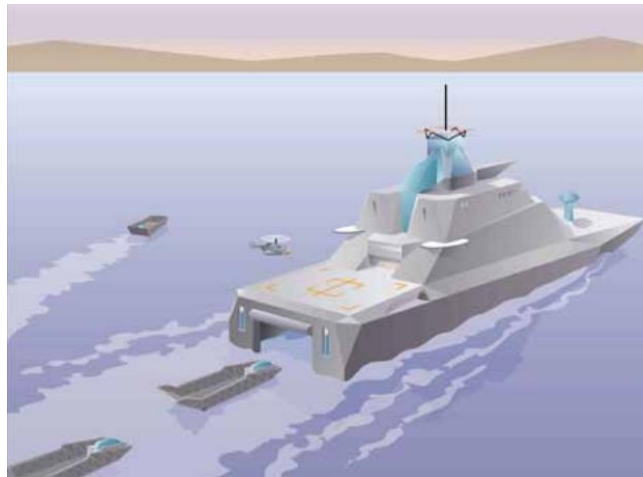
Weapons and sensors considered for introduction in tomorrow's fleet will permit our maritime forces to play an increasingly direct role in contributing to operations ashore. These range from sea-based reconnaissance and surveillance assets to precise covering lethal and non-lethal fires and missile defence. Eventually, the development of



force-level capabilities may also permit our maritime forces to extend their protection to forces and populations ashore.

Sustainment of Forces at Sea and Ashore. The combat logistics requirements of the future task group will be met at sea by the *Queenston*-class support ship and its eventual successor. In addition to its capabilities for underway replenishment of fuel, munitions and consumable goods, it will provide a second-line maintenance capability for the helicopters of the task group, an appropriate level of medical and dental services to task group personnel and a modest ability to support forces ashore.

Sustainment will become increasingly information-enabled, in order to improve the management of at-sea combat logistics, from warehousing and inventory control to the distribution of materiel across the joint force. Unmanned vehicles appear well-suited for vertical replenishment of low payload but mission-critical spare parts. Incremental improvements may also be expected for underway replenishment between ships at sea, both to improve the efficiency of such operations as well as to reduce the crew requirements associated with them. The introduction of new manufacturing techniques, such as “3D printing”, may fundamentally transform the nature of such logistics. Finally, the inability to readily replenish or replace weapons at sea that are housed in vertical launch systems remains a potential vulnerability, viewed against the demands of high-intensity naval combat. This will need to be addressed.



The capacity to sustain the operations of a force ashore will require a dedicated platform with an ability to operate a range of waterborne and aerial ship-shore connectors. Such a capability would not be designed for assault operations (operations from the sea against prepared adversary positions) but rather for employment in a range of more permissive environments. Nonetheless, the challenges inherent in this force-level capability will require a range of new Canadian Armed Forces competencies, as well as associated doctrine and tactics.

Sustaining the operational pace of potentially widely dispersed land forces in certain circumstances would be exceptionally demanding, even in the relatively permissive situations envisaged. To this end, new technologies that support the transfer of materiel to forces ashore, including, for example, hybrid lighter-than-air vehicles for vertical lift, will need to be examined closely.

Pursuing Tomorrow's Naval Capabilities

The job of force developers requires them to translate the concepts and ideas presented in *Leadmark 2050* into hard naval requirements. In so doing, they must assess and identify, by balancing available resources against risks, the capabilities that the RCN will pursue and eventually acquire, and those capabilities it must set aside, regardless of how desirable they may be. In this context, *Leadmark 2050* is intended to inspire and align

thinking about future requirements, while giving the broader Canadian public insight into the “front end” of the force development business.

As *Leadmark 2050* has described, the nation will continue to require a fleet of sufficient size to operate in Canada’s three oceans and deploy abroad on an ongoing basis, while retaining the ability to respond to a major international contingency. Canada will continue to need a navy that can act with sovereign independence to defend Canada’s territory but that is highly interoperable with the U.S., to help defend North America. Canada will continue to need a navy that can contribute effectively to major international operations.

To meet defence and security challenges in the coming decades, Canada’s maritime forces will need to become better equipped for Arctic operations. They will need to become better equipped to conduct peace-support operations, including rendering humanitarian assistance and relieving distress from the sea. They will also need the ability to sustain joint operations from the sea and to contribute to joint action ashore.

This calls for a **blue-water navy** that is:

- **Balanced**—with an appropriate mix of ships, submarines, aircraft and unmanned vehicles, in sufficient numbers to meet commitments at home and abroad while also retaining a naval task group at high readiness.
- **Combat-effective**—capable of combat at sea across all naval warfare disciplines, crewed for sustained high-intensity operations, able to contribute to operations ashore and highly interoperable with Canada’s allies and defence partners.
- **Multi-purpose**—across the spectrum of operations at sea and from the sea, able to work effectively with a wide range of national and international defence and security partners across government and civil society.
- **Arctic-capable**—able to conduct sustained operations in each of Canada’s three oceans.
- **Globally deployable**—with ships and submarines capable of independent ocean crossing, but enabled by support ships to operate together for the duration of any assigned mission, anywhere in the world.
- **Forward-postured**—a fleet operated and sustained in a manner that allows our ships and submarines to be deployed on an ongoing basis to regions of Canadian strategic interest.
- **Survivable**—with platforms that are designed for all physical and operating environments, able to take and recovery from significant damage.
- **Adaptable and agile**—an institution imbued with the ethos to excel and the values to make Canadians proud, whose men and women are well-prepared for the complexities and ambiguities of future operations in the skills and knowledge they possess.

The publication of a strategic concept such as *Leadmark 2050* is an important event in the life of any military service. Nonetheless it is one step—however important—in the highly iterative and self-challenging process we call force development. Many of the ideas that *Leadmark 2050* sets forth will be transformed into a set of capabilities that the RCN puts to sea. But a long road of rigorous analysis and pragmatic decision-making awaits, ensuring that we build the navy that Canada needs.

Blue-Water Navy Guiding Principles	Platforms	Capabilities	Key Characteristics	Effort ⁶⁴
<p>Balanced</p> <ul style="list-style-type: none"> ○ An optimal “fleet mix” of submarines, surface combatants, support ships, patrol ships, maritime aircraft and unmanned vehicles <p>Combat-effective</p> <ul style="list-style-type: none"> ○ Across all major naval warfare disciplines ○ Crewed for sustained combat operations ○ Able to contribute to operations ashore ○ Highly interoperable with allies and partners <p>Multi-purpose</p> <ul style="list-style-type: none"> ○ Employable across the spectrum of operations ○ Operable with whole-of-government and non-government organizations <p>Arctic-capable</p> <ul style="list-style-type: none"> ○ Platform(s) able to operate sustainably in Canada’s three oceans, including within the Arctic <p>Globally deployable</p> <ul style="list-style-type: none"> ○ Platforms capable of independent ocean crossing ○ Support ships for underway replenishment and integrated combat logistics at sea <p>Forward-postured</p> <ul style="list-style-type: none"> ○ Forward logistics sites for sustained deployments ○ Host nation arrangements/agreements for prolonged forward-basing of RCN assets <p>Survivable</p> <ul style="list-style-type: none"> ○ Designed to operate in all environments ○ Able to take and recover from significant battle damage <p>Adaptable and agile</p> <ul style="list-style-type: none"> ○ Professional cadre of personnel with ethos to excel and values to make Canadians proud ○ Prepared for future complexity and ambiguity 	<p>Before 2035</p> <ul style="list-style-type: none"> ○ Evolutionary approach to <i>Leadmark 2050</i> concepts, based on widely available technologies ○ Platform technologies based on contemporary designs ○ Incremental HA/DR capacity & capability introduced through hull & deck arrangements ○ Mission modules broadly adopted ○ Crewing practices optimized and modernized ○ Operational cycle optimized ○ Enhanced Naval Boarding Parties and other specialist capabilities leveraged for capacity building <hr/> <p>Platform investments</p> <ul style="list-style-type: none"> ○ Frigates modernized ○ AOPS, JSS and CSC delivered ○ Interim AOR leased ○ MCDVs life-extended ○ Replacement Canadian Coastal Patrol Ship acquired ○ Purpose-converted peace-support ship acquired ○ Unmanned vehicles adopted ○ Project to replace submarines begun ○ Project to replace Maritime Patrol Aircraft begun 	<p>Maritime & joint intelligence, surveillance and reconnaissance</p> <ul style="list-style-type: none"> ○ Networked, distributed, all-spectrum, all-source ○ Rapid & persistent real-time environmental analysis ○ Real-time prediction of weapons/sensor performance ○ Organically deployed unmanned vehicles and autonomous vehicles (air, surface and undersea) employed across all intelligence functions 	<ul style="list-style-type: none"> ○ Integrated, joint and combined ○ Distributed & collaborative planning ○ Highly controlled application of force ○ Massively decentralized execution ○ Scalable for command of forces ashore ○ Robust, redundant and adaptive in physical & cyberspace ○ Highly interoperable ○ Multi-level secure ○ Advanced battlespace visualization & decision support ○ Automated detection, classification, identification, tracking and targeting in littoral environments ○ Networked to link any joint sensor to any joint shooter 	↔
	<p>After 2035</p> <ul style="list-style-type: none"> ○ Many <i>Leadmark 2050</i> concepts implemented ○ Potentially broader mix of fleet assets ○ Potentially revolutionary implementation of new platform concepts & technologies <hr/> <p>Platform Investments</p> <ul style="list-style-type: none"> ○ New submarine capability introduced ○ Autonomous vehicles introduced ○ Projects underway to update/modernize/replace capabilities & platforms acquired prior to 2035 	<p>Maritime weapons and sensors for joint action</p> <ul style="list-style-type: none"> ○ Effects delivered at range and with great precision ○ Munitions capable of loitering/independent targeting ○ Capable of graduated/scalable response ○ Lethal and non-lethal means ○ Distributed sensing 	<ul style="list-style-type: none"> ○ Information-enabled integrated combat logistics ○ Unmanned vehicles for replenishment ○ Sea-based sustainment of a force ashore ○ Capable of limited strategic and theatre sealift 	↗
		<p>Sustainment of forces at sea and ashore</p>	<ul style="list-style-type: none"> ○ Layered, multidimensional and integrated ○ Stealth inherent in platform design & complemented through tactical signature suppression systems ○ Countermeasures to disrupt/defeat hostile action ○ Complementary passive and active defence systems ○ Effective in contaminated NBC environments ○ Protection extended to forces and populations ashore ○ Capable of defending a sea base 	↑
		<p>Protection of the maritime and joint force</p>		↑

Principles, Concepts and Characteristics of a Blue-Water Navy

⁶⁴ In relation to today’s capabilities, ↔ denotes a comparable requirement, ↗ denotes an incremental increase in requirement and ↑ denotes a substantially increased requirement.

AFTERWORD

“Governments cannot live forever, for governments are born to grow and die as well as men... but mark my words, whoever may take over the reins of power [in Canada] will have to have a navy, as every nation with a seashore must have and has had in the past.”

—Sir Wilfrid Laurier, November 10, 1910.

Presiding at the birth of the Royal Canadian Navy 106 years ago, Prime Minister Sir Wilfrid Laurier spoke these words against a backdrop of Canadian debate about the shape of Canada’s nascent naval service. The need for a navy was not in dispute. Echoing the views of policy makers of his time the world over, he understood a navy to be an essential element of a sovereign state. It remains so today.

Warships have always been among the great technical achievements of their era. Likewise, building a modern fleet is possible only through a sustained national will. Faced with the costs inherent in maintaining a fleet, there will always be some who question the need for a navy. Paradoxically, a navy that succeeds in one of its most fundamental strategic tasks—preventing conflict—may perpetuate such views. Even those Canadians who support the need for a modern navy might reasonably question the substantial investment that they and their fellow citizens, through their government, are asked to make. *Leadmark 2050* provides the answers.

Leadmark 2050 explains to Canadians what their navy does and why. It distils our enduring defence missions and tasks into a simple expression of fundamental purpose, the RCN’s unique contribution to national security and prosperity:

To defend the global system at sea and from the sea, both at home and abroad.

We live in an era of unprecedented and complex interdependency and hence great uncertainty. *Leadmark 2050* offers a coherent design for the strategic application of 21st century Canadian seapower. In the coming decades, the RCN will:

- **Protect Canada by exercising Canadian sovereignty in our home waters, securing the maritime approaches to North America and contributing to maritime peace and good order abroad.**
- **Prevent conflict by strengthening partnerships and deploying forward to promote global stability and deter conflict.**
- **Project Canadian power to shape and, when necessary, restore order to the global system.**

Leadmark 2050 has described how changes in our wider world are likely to alter the global maritime domain in the coming decades. Powerful and globally coupled forces are working to make the world’s littorals contested by a more diverse and comprehensive range of maritime threats and challenges than ever before.

Leadmark 2050 has underscored the need to embrace a broader way of thinking about, and organizing for, the demands of future maritime and joint operations—to ensure that

the RCN remains “Ready, Aye Ready” to continue serving Canada well into the middle decades of this increasing maritime 21st century.

To this end, this is the RCN’s vision for long-term institutional renewal, our new navigational Leadmark toward 2050:

- **A strategically agile and adaptive RCN that anticipates how future conflict is likely to evolve to drive forward the changes in how we prepare, train, equip and organize naval forces for future operations.**
- **Sailors and officers prepared as warriors and mariners for the complexities and challenges of future operations, equipped as leaders and managers to guide the future RCN/Canadian Armed Forces at the tactical, operational and strategic levels.**
- **A broadly balanced, combat-effective fleet, capable of independent action at sea and able to contribute substantially to operations ashore.**

Navies exist, in the final analysis, so that states may pursue their national interests in peace and war. Navies are also important symbols of the state, projected onto a global stage. They are not just instruments of policy and hence national resolve, but, through the actions of their crews, of our values in action.

The RCN, as part of the broader Canadian Armed Forces, is an expression of Canada’s ambition to make a difference in our wider world, not merely to adjust to the realities of the emerging defence and security environment, but rather, with likeminded allies and partners, to remake them. This is the navy that Canada needs.

GLOSSARY OF KEY TERMS

Term	Definition
Adversary	A party acknowledged as potentially hostile to a friendly party and against which the use of force may be envisaged.
Anti-access and Area Denial (A2/AD)	Modern terms referring to sea denial maritime strategies focused on preventing an opponent from operating military forces near, into or within a contested region. Often discussed in terms of the technologies need to achieve these ends. (LM2050)
Asymmetric Threat	A threat emanating from the potential use of dissimilar means or methods to circumvent or negate an opponent's strengths while exploiting his weaknesses to obtain a disproportionate result.
Battlespace	The environment, factors and conditions that must be understood to apply combat power, protect a force or complete a mission successfully. Note: It includes the land, maritime, air and space environments; the enemy and friendly forces present therein; facilities; terrestrial and space weather; health hazards; terrain; the electromagnetic spectrum; and the information environment in the joint operations area and other areas of interest.
Blue Water	A descriptive term that defines the key characteristics of a fleet, not in terms of where it operates in relation to the available depth of water and proximity to land, but rather in terms of capabilities it will require across the spectrum of operations. (LM2050)
Campaign	A set of military operations planned and conducted to achieve a strategic objective within a given time and geographical area, which normally involve maritime, land and air forces.
Capability	Capability is a function of the ability of a force to plan a mission and its capacity to do so. It is generally a function of force structure (organization and equipment) plus training and logistic support. (LM2020)
Combat Effective	The state of a force structure and associated equipment that reflects the ability to execute a combat mission.
Combat Logistics	The logistics required to support and sustain the combat operations of a task group, delivered at sea by an Auxiliary Oiler Replenishment (AOR) ship. (LM2050)
Combat Power	The total means of destructive and/or disruptive force which a military unit/formation can apply against the opponent at a given time
Combatant	<p>(Major) A warship designed for combat, able to defend itself against threats in all three naval warfare dimensions (air / surface / subsurface). (LM2050)</p> <p>(Minor) A warship that is designed for a specific naval warfare function, such as mine-countermeasures, but which is not capable of combat operations against an adversary's naval forces. (LM2050)</p> <p>(Non-) A warship that has a combat support role, such as underway replenishment, but that depends on an escorting force for its defence. (LM2050)</p> <p>All commissioned vessels in the RCN are considered warships and are accorded unique legal status under international law. See <i>warship</i>.</p>
Constabulary Role	The use of military force to uphold a national or international law, mandate or regime in a manner in which minimum violence is only used in enforcement as a last resort and after evidence of a breach or intent to defy has been established beyond a reasonable doubt. The level and type of violence that is permitted will frequently be specified in the law, mandate, or regime that is being enforced. Also called policing. (BR1806)

Term	Definition
Deterrence	The convincing of a potential aggressor that the consequences of coercion or armed conflict would outweigh the potential gains. This requires the maintenance of a credible military capability and strategy with the clear political will to act.
Diplomatic Role	The use of maritime forces in support of national policy objectives short of conflict. (LM2050)
Disaster Relief	Activities undertaken by military forces, in cooperation with civil authorities, to provide aid in the wake of a natural or manmade disaster such as a hurricane, flood, earthquake, forest fire, chemical spill, or nuclear accident. See Humanitarian Assistance.
Doctrine	Fundamental principles by which military forces guide their actions in support of (national) objectives. It is authoritative but requires judgement in application.
Global Commons	Those domains, physical or otherwise, that are not sovereign to any state. (LM2050)
Global Engagement	Also called defence diplomacy, global engagement denotes the peaceful application of defence resources to achieve positive outcomes in the development of a country's bilateral and multilateral relationships.
Global System	A term to describe the hyper-connected and massively interdependent contemporary world order, but also meant to convey the idea that many contemporary societal, political, economic, climatological and security challenges are essentially global in scope, multi-dimensional in connecting across multiple policy domains, and borderless in relation to national and international governance. (LM2050)
Home waters	A descriptive term that encompasses a coastal state's internal, territorial, contiguous and archipelagic waters (where applicable), as well as its exclusive economic zone, as specified in UNCLOS. (LM2050)
Humanitarian Assistance	As part of an operation, the use of available military resources to assist or complement the efforts of responsible civil actors in the operational area or specialized civil humanitarian organizations in fulfilling their primary responsibility to alleviate human suffering. See Disaster Relief.
Humanitarian operation	An operation specifically mounted to alleviate human suffering in an area where the civil actors normally responsible for so doing are unable or unwilling adequately to support a population.
Intelligence	The product resulting from the directed collection and processing of information regarding the environment and the capabilities and intentions of actors, in order to identify threats and offer opportunities for exploitation by decision-makers
Interdiction	An action to divert, disrupt, delay, or destroy the enemy's military surface capability before it can be used effectively against friendly forces, or to otherwise achieve objectives. In support of law enforcement, activities conducted to divert, disrupt, delay, intercept, board, detain, or destroy, as appropriate, vessels, vehicles, aircraft, people, and cargo. (JP 1-02)
Interoperability	The ability to act together coherently, effectively and efficiently to achieve tactical, operational and strategic objectives.
Joint	Adjective used to describe activities, operations and organizations in which elements of at least two services participate (see combined).
Joint Fires	Fires applied during the employment of forces from two or more components, in coordinated action toward a common objective.

Term	Definition
Littoral	<p>Militaries have adopted an operational view of the term littoral, rather than a strictly geographic one.</p> <p>The littoral comprises two segments of the operating environment: seaward, the area from the open ocean to the shore that must be controlled to support operations ashore; and landward, the area inland from the shore that can be supported and defended directly from the sea. (US Joint Pub 1-02)</p> <p>In naval operations, that portion of the world's land masses adjacent to the oceans within direct control of and vulnerable to the striking power of sea-based forces. (NDP 1)</p>
Manoeuvre	<p>(Tactical) A movement to place ships or aircraft in a position of advantage over the enemy.</p> <p>(Operational) Employment of forces in the operational area through movement in combination with fires, or fire potential, to achieve a position of advantage in respect to the enemy in order to accomplish the mission.</p>
Maritime Armed Group	Organizations capable of maritime action that are party to an armed conflict, but that do not answer to, and are not commanded by, one of more states. (LM2050)
Maritime Chokepoint	Generally a relatively narrow stretches of water that connects two significant bodies of water, but specifically those chokepoints along the major routes of international maritime commerce whose volume of traffic and location imbue them with economic and strategic value. (LM2050)
Maritime Domain	All areas and things of, on, under, relating to, adjacent to, or bordering on a sea, ocean, or other navigable waterway, including all maritime-related activities, infrastructure, people, cargo, and vessels and other conveyances. (International Maritime Organization)
Maritime Domain Awareness (MDA)	The effective understanding of anything associated with the maritime domain that could impact the security, safety, economy, or environment. (International Maritime Organization)
Maritime Forces	Forces whose primary purposes are to conduct military operations at and from the sea. The expression includes warships and submarines, auxiliaries, organic aircraft, fixed seabed installations, fixed shore installations (such as batteries) for the defence of seaways, shore based maritime aircraft and other shore based aircraft assigned to maritime tasks.
Maritime Interdiction Operations (MIO)	An operation conducted to enforce prohibition on the maritime movement of specified persons or material within a defined geographic area.
Maritime Operation	An action performed by forces on, under, or over the sea to gain or exploit control of the sea or to deny its use to the enemy.
Maritime Peace and Good Order	A condition in which the high seas are kept safe and free for all to use lawfully, without infringing upon a coastal state's rights to protect its maritime resources, enforce its territorial integrity and regulate its home waters through domestic and international law. See <i>home waters</i> . (LM2050)
Maritime Security Operations (MSO)	Those operations to protect maritime sovereignty and resources and to counter maritime-related terrorism, weapons proliferation, transnational crime, piracy, environmental destruction, and illegal seaborne immigration. (NDP 1)
Military Strategy	That component of national or multinational strategy, presenting the manner in which military power should be developed and applied to achieve national objectives or those of a group of nations.
Multinational, or Combined	Adjective used to describe activities, operations and organizations, in which elements of more than one nation participate. See also <i>joint</i> .
Ocean Politics	Ocean politics deal with the struggle for values, resources and power in relation to the ocean. (LM2050)

Term	Definition
Oceans Management	The broader regimen of inter-departmental and inter-agency measures, official and otherwise, undertaken within both domestic and international contexts, with the aim of ensuring the regulation of activities on, under and above the sea. (LM2020)
Operational Level	The operational level of conflict is concerned with producing and sequencing the campaign which synchronises military and other resources to achieve the desired end state and military strategic objectives. Military actions at the operational level are usually joint and often combined.
Peace Support	Efforts conducted impartially to restore or maintain peace. Note: Peace-support efforts can include conflict prevention, peacemaking, peace enforcement, peacekeeping and peacebuilding.
Permissive Environment	An environment in which friendly forces anticipate no obstructions to, or interference with, operations. Note: A permissive environment does not necessarily imply absence of threat.
Presence	The exercise of naval diplomacy in a general way involving deployments, port visits, exercising, and routine operating in areas of interest to declare interest, reassure friends and allies and to deter. (BR 1806)
Reconnaissance	A mission undertaken to obtain, by visual observation or other detection methods, information about the activities and resources of an enemy or potential enemy, or to secure data concerning the meteorological, hydrographic, or geographic characteristics of a particular area
Sea Base, seabasing	Literally “a base at sea” from which operations ashore are supported and sustained from the sea, ranging from an individual ship to a larger formation of ships. (LM2050)
Sea Control	<p>The condition that exists when one has freedom of action within an area of the sea for one's own purposes for a period of time in the subsurface, surface and above water environments.</p> <p>The capacity of maritime forces to control events at sea through the latent or actual use of force. It is analogous to a land force's capacity to take and hold ground or an air force's ability to control the skies. Sea control is not absolute: it is always considered in relation to an adversary, and it is usually limited in both time and space. It is a <i>condition</i>, created by the action of maritime forces, which permits the sea to be used for one's own purpose. (LM2050)</p>
Sea Denial	Preventing an adversary from controlling a maritime area without being able to control that area oneself.
Seapower	The means by which a nation extends its military power onto the seas. Measured in terms of a nation's capacity to use the seas in relation to its competitors, seapower depends upon such factors as its geographical position, extent of coastline, number and quality of harbours, size of population soundness of economy, as well as the character of national government.
Sovereignty	A complex concept, relating to the state's monopoly on the use of force within its territory and tied to the recognition of a political body as a state. Implicit within the concept of sovereignty is the ability of the state to be aware of and control activity within its borders. In a simple sense, sovereignty stems from the state's position as final authority over matters within its territory. (LM2020)
Strategic Level (Military)	The military strategic level is concerned with determining the military strategic objectives and desired end state, outlining military action needed, allocating resources and applying constraints directed by political leaders.
Strategic Level (National)	The level where the nature and quantity of a country's resources dedicated to achieving objectives critical to the national security interest is determined by the political leadership of the country.

Term	Definition
Surveillance	The systematic observation of aerospace, surface or subsurface areas, places, persons, or things, by visual, aural, electronic, photographic, or other means in order to build up and maintain a comprehensive picture of deployment patterns, movements and/or operational activity at sea.
Sustainment	The requirement for a military force to maintain its operational capability for the duration required to achieve its objectives. Sustainment consists of the continued supply of consumables, and the replacement of combat losses and non-combat attrition of equipment and personnel.
Tactical Level	The tactical level is concerned with planning and directing military resources in battles, engagements and/or activities with a sequence of major operations to achieve operational objectives. The main focus of this level is combat operations, but the same logic is applicable to military operations other than combat.
United Nations Convention on the Law of the Sea	Specifically the Third Convention that was signed in 1982 and which came into force in November 1994.
Warship	<p>A ship belonging to the armed forces of a nation bearing the external markings distinguishing the character and nationality of such ships, under the command of an officer duly commissioned by the government of that nation and whose name appears in the appropriate service list of officers, and manned by a crew which is under regular armed forces discipline. (UNCLOS).</p> <p>In Canada, ships designated “HMCS” are warships as defined by international law.</p>
Whole of Government	Denotes public service agencies working across portfolio boundaries to achieve a shared goal and an integrated government response to particular issues. (LM2050)

Source Documents

Abbreviation	Name
AAP 6	NATO Glossary of Terms and Definitions. The source definition unless specified otherwise.
BR 1806	British Maritime Doctrine (RN)
JP 1-02	Department of Defence Dictionary of Military and Associated Terms (US DoD)
NDP 1	Naval Doctrine Publication 1, Naval Warfare (USN)
LM2020	Leadmark: The Navy's Strategy for 2020 (RCN)
LM2050	Leadmark 2050: Canada in a New Maritime World (RCN)