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EXERCISE NEW HORIZONS

Advancing Littoral Operations – Transport Connectors for the Standing Contingency Force

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ABSTRACT

The 2005 Defence Policy Statement (DPS) directed the Canadian Forces (CF) undergo an operational transformation and become more effective in responding to crises and become better equipped to manoeuvre in the global littorals. Emanating from this transformation is the plan for a Standing Contingency Force (SCF). An enhanced joint package, the SCF concept requires an amphibious ship, a landing force and robust transport connectors - helicopters and landing craft. Like the nascent nature of the SCF, requirements for the transport connectors have not been fully explored. In this paper the author provides a brief analysis of the variables that impact on connectors in the littorals. Then he examines the current CF holdings of potential air and naval connectors. This analysis reveals that the CF requires only a modest investment in transport connectors in order to establish the initial SCF construct.

Although the SCF concept is being delayed, this paper notes that through unity of purpose, effort and training, CF connector capabilities can be advanced to support the development of an achievable SCF construct.

INTRODUCTION

The 2005 Defence Policy Statement (DPS) indicated that the CF would undergo an operational transformation to become more effective, relevant and responsive to both national and international demands. Concomitant with this transformation is the requirement to foster greater collaboration with other government departments and interoperability with Allies. The DPS specified a requirement for new concepts and an investment in capabilities to provide "a fully integrated and unified approach to operations."[1] Prominent with Canadian Forces (CF) transformation, is the concept of a joint and fast deployment capability through a Standing Contingency Force (SCF). The SCF's operating construct would be as follows:

> A Standing Contingency Task Force will be established to respond rapidly to emerging crises. This high readiness task force will be made up of existing, designated maritime, land, air and special operations elements, and organized under a single integrated command structure. It will be ready to deploy with 10 days' notice, and provide an initial CF presence to work with security partners to stabilize the situation or facilitate the deployment of larger, follow-on forces should circumstances warrant.[2]

Canada will continue to respond to a myriad of external commitments because of national interests - such as contributing to international security, protecting Canadians and promoting Canadian values.[3] With 80 percent of the world's population living within 100 miles of the littorals,[4, 5] these coastal areas will be in constant play for Canada.

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[1] Department of National Defence, Canada's International Policy Statement, *A Role of Pride and Influence in the World*, *Defence* (Ottawa, Ontario: Dept of Foreign Affairs and International Trade, 2005), 11/12, [journal on-line]; available from http://www.forces.gc.ca/site/reports/dps/main/toc_e.asp; Internet; accessed 28 March 2007.

[2] *Ibid*., 11/12.

[3] *Ibid*., 1.

[4] Department of National Defence, *Securing Canada's Ocean Frontiers – Charting the course from Leadmark,* (Ottawa, Chief of the Maritime Staff, 2005), 26-28.

[5] Allied Joint Publication – *AJP 3.1 Allied Joint Maritime Operations, (*NATO-Unclassified*,* 2004), Glossary-6. Littoral - in military operations, the littoral is a coastal region consisting of the seaward area from the open ocean to the shore that must be controlled to support operations ashore, and the landward area inland from the shore that can be supported and defended directly from the sea.

For the CF, Canadian commitments equates to potential involvement with eleven operational scenarios, from disaster and humanitarian relief, evacuations, to peace support and collective defence operations.[6] Each of these scenarios could arise in the littorals, an area that demands an amphibious capability for effective operations.

The SCF would be an enhanced joint package, focused on projecting a global reach to initiate action against crises that are in Canada's interests. Centred on an amphibious platform, the package would be greater than the sum of its component capabilities, consisting of ships, landing craft and helicopters. To force-generate this construct, the CF requires assets whose specifications have been neither fully examined nor stated in the DPS. However, an examination of military assets in countries with developed amphibiosity reveals that, at a minimum, the SCF will require an amphibious ship and robust transport connectors - integral helicopters and naval craft.

There is currently no collective will to acquire an amphibious ship. This stance, coupled with the protracted procurement processes, signals that an amphibious ship could be a long-term proposition. Nevertheless, leveraging the component parts in the near-term, particularly the required connectors, is the means to grow an amphibious foundation. Yet, like the nascent nature of the SCF, the concept of transport connectors has not been fully explored. This paper will examine the connector requirements with the objective of determining the capabilities required to make the SCF a workable concept. Specifically, it will be revealed that the CF will shortly have the principal transport connectors and requires only a modest incremental investment in helicopters and landing craft, to establish and grow an initial SCF construct.

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[6] Department of National Defence, "The Defence Portfolio," http://www.dnd.ca/menu/consult/current_policy/defence_portfolio/section_6_e.asp; Internet: accessed 20 April 2007.

In order to narrow the scope on the SCF connectors, the key variables will be outlined: the potential amphibious platform, the Landing Force (LF) construct and the amphibious operating parameters. A successive analysis of the specific SCF air and naval connectors will be presented, including an examination of current and future CF connector holdings. The analysis will culminate with a discussion on how the connector capabilities can be advanced.

THE SCF AMPHIBIOUS FRAMEWORK

In order to achieve the DPS intentions for the SCF, Canada will eventually require an amphibious ship.[7] Although previous studies have examined the merits of the SCF and potential amphibious platforms for it, the fact remains that Canada is the only G8 Nation that has not embraced amphibious capabilities for conducting overseas missions.[8]

For Canada, several amphibious variants are available amongst North Atlantic Treaty Organization (NATO) countries (see Table 1). These include: Landing Platforms, Dock (LPD) and Helicopter (LPH), and a Dock Landing Ship (LSD).[9] Common across these platforms is not just an amphibious capability but also the potential to be the SCF centrepiece. However, the budgetary and personnel constraints currently faced by the CF, which will not soon subside, demand that a capability suppressant be accepted. Large platforms like the LHD, with their concomitant high acquisition and operating costs, are simply too resource intensive for the CF.

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[7] Les Mader, Major, "Reviving the Princes – Some thoughts on a Canadian Standing Contingency Task Force," *Canadian Military Journal*, Vol 7, No. 2, (Summer 2006) 57 [journal on-line]; available from http://www.journal.dnd.ca/engraph/Vol7/no2/11-Mader_e.asp; Internet; accessed 21 March 2007.

[8] Eric Lerhe, "Taking Joint Capability Seriously," *Canadian Naval Review*, Vol. 1, No. 2 (Summer 2005), 10. Eric Lerhe is a retired Canadian Commodore who led a Task Group in the Arabian Gulf during the war on terror.

[9] Virginia Beaton, "Arrival of USS GUNSTON HALL launches ITEE", *Trident – The Newspaper of Maritime Forces Atlantic*, Vol 40, Issue 23, 13 Nov 2006, 3. During the initial exploration into the SCF's requirements through an Integrated Tactical Effects Experiment (ITEE), in November 2006, an LSD ship was used - the USS GUNSTON HALL, from the USN WHIDBEY ISLAND amphibious class.

Table 1 - NATO Amphibious ships

Class Name	Country	Type	Tonnage (Full load)	Max Speed (kts)	Crew	Normal Troop Lift	Helicopter Capability	Landing Craft
San Antonio	USA	LPD	25,300	22	362	720	4 x Medium	2 x LCAC or 1 x LCU
Albion	UK	LPD	19,560	20	325	305	Platform only – 3 x Med	4 x LCVP / 4 x LCU or 2 x LCAC
Galicia	Spain	LPD	13,815	20	115	543	Platform only – 4 x Med	6 x LCVP or 4 x LCM / 1 x LCU + 1 x LCVP
Rotterdam	Netherlands	LPD	16,680	19	146	547	6 x Med. Hangar space provided	6 x LCVP or 4 x LCU or 4 x LCM
Ocean	UK	LPH	20,700	18	491	784	12 x Med + 6 x Attack	No dock. 4 x LCVP + 2 x hovercraft
Wasp	USA	LHD						

and the maximum weight they can transfer is between 7,000 to 10,000 kgs.[12] Before examining transport helicopters and sea craft, the LF composition will be addressed because its size will dictate the connector specifications required to move materiel across the littoral.

A LF has to provide sufficient troops onto the 'beach' in order to make a rapid contribution to a crisis situation. In examining the SCF 'infantry' requirements, one researcher noted that an embarked LF would have to include all the elements for undertaking a range of CF operational scenarios, such as humanitarian intervention and Non-combatant Evacuation Operations (NEO).[13] Furthermore, the draft Concept of Operations (ConOps) for the SCF, envisioned deploying a LF to establish a forward presence before handing off operations to a larger and more robust Mission-Specific Task Force (MSTF).[14] From varied analyses on its composition,[15] a reasonable deduction is that the LF would consist of four companies comprised of a HQ, core infantry and combat support functions.

In addition to a LF, the draft SCF ConOps noted that, depending on the mission, other government department (OGD) officials, such as representatives from Foreign Affairs (DFAIT) or the Canadian International Development Agency (CIDA), could complement the force ashore. Regardless of the mixture, the LF capability denotes a relatively small and agile force package.

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[12] Department of National Defence, B-GA-441-001/FP-001 *Tactical Level Aviation Doctrine* (Ottawa: Department of National Defence, 2000), B-8.

[13] Les Mader, Major, "Reviving the Princes …", 59.

[14] Department of National Defence, Standing Contingency Task Force, *Concept of Operations, Version 3*, 7/21, available from http://navy.dwan.dnd.ca/SCF/Documents/CONOPS/SCTF%20CONOPS%20V3.pdf; Intranet; accessed 28 March 2007.

[15] Gary Harold Rice, Col Ret'd, "Making Canadian Amhibiosity a Reality, Conference of Defence Associations, 2006, 5-6 [journal online]; available from http://www.cda-cdai.ca/pdf/SCTFALR.pdf; Internet; accessed 22 February 2007; and Robert D. Bradford, Major, "The Army Landing Force and Standing Contingency Task…", 59; and Les Mader, Major, "Reviving the Princes …", 58-59. Possessing a Canadian Army background, these three authors noted that a LF would need to be based around an infantry core coupled with combat support (engineer/ reconnaissance), and that it would range in size from 600-800 personnel.

Table 2 - Ashore Re-supply Requirements aboard SCF Ships

Serial	Group / Number	# Days	Food (tons)	Water (tons)	Fuel (tons)	Ammo (tons)	Other Cargo (tons)	Total (tons)	Cargo Cube (cubic ft)
1	Individual w/water	1	0.002	0.027	0.026	0.0056	0.0039	0.0645	
2	BG HQ- 106 w/o water	1	0.212		2.756	0.593	0.413	3.974	
3	BG – 671 w/o water	1	1.342		17.446	3.756	2.616	25.162	
4	BG HQ & BG – 771 w/o water	1	1.554		20.202	4.351	3.03	29.137	
5	BG HQ & BG – 771 w/o water	7	10.878		141.414	30.457	21.21	203.959	7,240
6	BG HQ & BG – 771 w/o water	15	23.310		303.03	65.265	45.45	437.055	15,514
7	BG HQ & BG – 771 w/o water	30	46.620		606.06	130.512	90.90	874.110	31,020

Source: Gary Harold Rice, Col Ret'd, "Making Canadian Amphibiosity a Reality…, 18.

Concomitant with any LF is the requirement to provide immediate access, once ashore, to equipment such as Light Armoured Vehicles (LAV IIIs), weighing 16, 300 kilograms,[16] and a variety of other combat materiel.[17] An American National Research Council study concerning operational manoeuvre from the sea (OMFTS) indicated that one light infantry company would require approximately nine tons of daily combat supplies (food, water, fuel, ammunition, and other cargo).[18] Furthermore, Harold Rice, in a paper written for the Conference of Defence Associations (see Table 2), calculated that a LF of 777 personnel would require approximately 29 tons daily.[19] Logistically, transferring a LF and its basic supply-chain requirements across the littoral demands connectors with effective transport capacity.

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[16] Canadian Armed Forces, Army, Director Armoured Vehicle Project Management, "*LAV III*," http://dglepm.ottawa-hull.mil.ca/davpm/pmo%20LAV/laviiifeatures_e.htm; Intranet; accessed 7 April 2007.

[17] Les Mader, Major, "Reviving the Princes…", 59.

[18] National Research Council, United States, Committee on Naval Expeditionary Logistics, Naval Studies Board, *Naval Expeditionary Logistics – Enabling Operational Maneuver From the Sea* (Washington, D.C: National Academy Press, 1999), 5 and 38.

[19] Gary Harold Rice, Col Ret'd, "Making Canadian Amphibiosity a Reality…, 18.

CONNECTOR OPERATING PARAMETERS

Following an overview of the potential amphibious platform and the LF composition, attention can now be focused on the operating parameters involved in manoeuvring a LF across the littoral. The DPS highlighted that the SCF would undertake a variety of operational roles, whether in peacetime, crisis, or conflict. From this policy intention, the draft SCF ConOps denoted a requirement of not only transferring a LF ashore, but also of projecting it to multiple objectives ashore in benign, low-threat situations.[20] As such, a flexible mix of connectors is preferable. Flexibility over air and sea connectors would facilitate decisions concerning the timing and disembarkation site for a LF. Moreover, it would also provide alternate options where poor, non-existent or over-burdened sea ports of disembarkation (SPODs) or airports of disembarkation (APODs) exist.[21] If available before deploying, a tailored-mix of connectors would provide enhanced beaching options for a LF.

In addition, connector operations will be impacted by the stand-off distance and the duration an amphibious force maintains on station. The American OMFTS study noted that as the stand-off distance increases, connector requirements for speed, weather durability and cargo-lift capacity all need to be augmented to safely sustain a LF. The study also noted that the logistics throughput for connectors can be shortened only if a SPOD becomes available.[22] Although the draft SCF ConOps does not specify a stand-off distance, the SCF Commander would decide one as required, based on the threats and environmental conditions in the littoral.

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[20] Department of National Defence, Standing Contingency Task Force, *Concept of Operations* …, 18/21.

[21] Greg Aikens, "Beyond ALSC: We Need to Get Amphibious and Joint to Stay Relevant," *Maritime Affairs* (Winter 2001), pp 12-13. Canadian Forces College, "Maritime Operational Logistics" (Command and Staff Course 33 C/DS 531/MCC/DI-4, 2007).

[22] National Research Council, United States, Committee on Naval Expeditionary Logistics, Naval Studies Board, *Naval Expeditionary Logistics …,* 21.

From previous operations - such as those conducted off Somalia, East Timor and in the Gulf of Mexico - the CF tends to participate in the lower limit of the littorals (territorial waters) and seeks to maximize opportunities to shorten stand-off distances. Even over short distances, a robust mix of air and sea connectors is required to have sufficient flexibility to properly transport materiel ashore. This assessment is supported by the *Report of the Somalia Commission of Inquiry* concerning the events of Operation Deliverance. During that Operation, *HMCS PRESERVER's* two landing craft and three helicopters assisted a 900-strong LF from an anchorage off the port. Overall, the report noted that the sustainment was challenging and constrained by the availability of resources.[23]

SCF AIR CONNECTORS

Modern amphibious platforms are designed to operate with helicopters. It is important to emphasize that for the CF, air connectors constitute a critical component for constructing the SCF. Transport helicopters are the preferred connector for landing troops ashore, as they provide the medium to move a LF across any littoral - with speed, precision and, most importantly, the element of surprise.[24] The American OMFTS study noted that a dominant role exists for tactical airlift, especially in areas where road networks are unworkable. Without helicopters, a LF would be constrained in landing options and would be exposed to greater landing risks.[25] By maximizing helicopter usage, the SCF can quicken the tempo of operations in any littoral

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[23] Department of National Defence, *Report of the Somalia Commission of Inquiry* [Report on-line]; available from www.forces.gc.ca/somalia/vol3/v3c25de.htm#472; Internet; accessed 6 April 07. Operation Deliverance was Canada's support to the Somalia crisis in 1992/193.

[24] Les Mader, Major, "Reviving the Princes …", 59.

[25] National Research Council, United States, Committee on Naval Expeditionary Logistics, Naval Studies Board, *Naval Expeditionary Logistics …,* 7.

environment. In addressing this core capability, the draft SCF ConOps noted an integral requirement for an Air Expeditionary Unit (AEU), equipped with medium-lift helicopters.[26]

NATO countries with amphibious ships have leveraged the use of medium-lift helicopters for crossing the littorals. Onboard the *ROTTERDAM* class, for example, a varied mix of medium-lift aircraft has been certified for flight-deck operations. The *ROTTERDAM* can operate with a full load of six medium-lift helicopters. Alternatively, it can employ an optimum-load mix of three small medium-helicopters, the *Lynx,* and two heavy medium-lift helicopters, the *Chinook*.[27] From this construct, current and planned CF helicopter acquisitions can be assessed to determine what, if any, air connector gaps exist and how the required SCF requirements can be achieved.

CF Helicopters

The CF is currently limited in its capacity to undertake maritime airlift. Its only maritime helicopter, the Sikorsky *CH-124* (*Sea King*), has been in service since 1963 and is not a troop carrier. Despite being a dependable platform, the fleet of 27 *Sea Kings* has limited carrying capacity because of the Anti-Submarine Warfare (ASW) kits onboard. Five *Sea Kings* were converted to provide increased seating for the SCF's Integrated Tactical Effects Experiment (TEE)[28] and, although increased seating for 13 troops was achieved, the available load capacity still limits its suitability as an air connector.

However, the Maritime Helicopter Project will replace the aging *Sea Kings* with 28 *CH-148 Cyclones.* The project acquisition is valued at $1.8 billion coupled with a $3.2 billion

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[26] Department of National Defence, Standing Contingency Task Force, *Concept of Operations* …, 15/21.

[27] Patrick Allen, *Air Assault from the Sea* (Annapolis, Maryland: Naval Institute Press, 2000), 51.

[28] James F. Cottingham, Colonel, CO of the CF Airforce Warfare Centre conversation with author, 13 December 2006.

contract for 20 years of in-service maintenance.[29] The 28 medium-lift helicopters are variants of the Sikorsky *H-92* now widely used by navies around the world,[30] they will enter service in late 2008 and operate from the 15 major warships and the three planned Joint Support Ships (JSS).[31] Principally an ASW craft, the *Cyclone* will have a modular design so that it can switch roles quickly, enabling the ASW kit to be removed and seating for 20 troops to be installed.[32]

The CF also recently acquired 15 *CF-149 Cormorants*. These Augusta-Westland utility helicopters, entered service in 2002 and are principally designed for Search and Rescue (SAR) operations. This medium-lift platform offers unique characteristics that could be deployed for a tailored SCF mission. For example, it can carry 12 stretchers and has an integrated ice protection system for operating in continuous icing conditions.[33]

In addition, the Canadian Government announced in 2006 that it intends to acquire 16 *Chinook* helicopters, at a cost of $4.9 billion over 20 years.[34] Earmarked to fulfill the Army's tactical airlift requirements, the medium-lift *Chinooks* will be staged at CF bases inland and will

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[29] Sharon Hobson, "Wind of change: Cyclones bring Canada up to date", *Jane's Navy International* (July/August 2005), 28; [journal on-line]; available from http://www.sikorsky.com/file/popup/0,3038,1500,00.pdf; Internet; accessed 28 March 2007.

[30] Sikorsky, "Sikorsky H-92 Superhawk Helicopters," http://www.sikorsky.com/details/0,9602,CLI1_DIV69_ETI1583,00.html; Internet; accessed 30 March 2007.

[31] Sarah Gilmour, "JSS and amphibious ships working together: The Navy plans for future additions," *The Maple Leaf*, Vol. 8 no. 40, (November 16, 2005), 10 [magazine online]; available from http://www.forces.gc.ca/site/community/MapleLeaf/vol_8/vol8_40/840_10.pdf; Internet; accessed 12 April 2006. In April 2004, federal Government announced the $2.1 billion acquisition of three Joint Support Ships (JSS) to replace the three 35-year-old Auxiliary Oiler Replenishments (AOR) ships. The JSS will have roughly 85 percent of the AOR's capabilities and possess 15 percent in additional joint capabilities.

[32] Sharon Hobson, "Wind of change: Cyclones bring Canada up to date"…, 28-31.

[33] Canadian Armed Forces, Air Force, "CH-149 Cormorant," http://www.airforce.forces.gc.ca/equip/ch-124/intro_e.asp; Internet; accessed 31 March 2007.

[34] Sharon Hobson, "Canadian Industry looks to set to benefit from government defence reappraisal," *Jane's International Defence Review,* Vol. 39 (September 2006), 46.

enter service in 2010.[35] Tactically, the *Chinook* is a significant force multiplier because each can carry up to 40 troops. In recent operations, variants similar to the proposed CF *Chinook* have operated from the flight decks of the *ROTTERDAM* and *HMS OCEAN.*[36] The new CF *Chinooks* could be similarly leveraged as a SCF transportation enabler. Although maritime operating requirements would have to be mitigated in order for the *Chinooks* to work from an amphibious ship, the transport concept is achievable as other NATO nations have demonstrated.

Table 3 - CF Helicopters

Helicopter	Name	Troop utility load	Sling load (kgs)
CH-124	Sea King	6 primary (13 troops in 5 reconfigured Helos)	5,000
CH-148	Cyclone	20 troops	5,000
CH-149	Cormorant	4 primary role / 30 troops utility mode (In rescue operations can carry 4 pax, requires time to change to utility mode)	4,436
CH-47F	Chinook	40 troops	10,000

Source: CF Airforce websites

Helicopter Assessment

To assess the suitability of the new CF helicopters (see Table 3) to be SCF air transport connectors, stand-off distances, operating capabilities and fleet size requires examination. Although issues, like self-protection and maritime environment operability would have to be addressed before helicopters could operate on a naval platform, this paper focuses solely on the transportation construct.

The American OMFTS study researched the transport limits of re-supplying a LF by air. They concluded that as the stand-off distance increases a switch from rotary-wing and tilt-rotor

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[35] Canadian Armed Forces, Air Force, "Equipment and Capabilities of the Air Force," http://www.airforce.forces.gc.ca/newsroom/crew/02-07/03_e.asp; Internet; accessed 31 March 2007.

[36] Patrick Allen, *Air Assault from the Sea,* 19.

aircraft to short take-off and landing (STOL) aircraft is required to increase the payload.[37] For the SCF, an investment in STOL aircraft is required only if the force was stationed long distances (100 kilometres and beyond) from the shore. Since the CF tends to minimize stand-off distances, medium-lift helicopters will provide the necessary range and lift capacity.

Concerning operational requirements, the draft SCF ConOps indicated that a LF and its integral materiel would be landed within a single period of darkness.[38] This requirement demands an effective air-lift capacity for personnel and cargo, a night-flight mode and tactical specifications to handle a variety of environmental and meteorological conditions. All of the new CF helicopters are durable craft that possess the necessary specifications to operate over land and sea littoral areas as well as from amphibious platforms. In addition, the *Cormorant's* ice capabilities could be an enabler for cold-climate operations, like those in the Arctic, and thereby lend support to the intra-government collaboration sought by the DPS. Regarding lift, each of the new medium-lift helicopters possess rear-load entry which facilitates the expeditious loading and off-loading of personnel and cargo. Of tactical importance is that, the *Cyclones'* load capacity for 20 troops, combined with the *Chinooks*' for 40, would enable an infantry company to be landed in one rotation, provided that these helicopters were employed with a force mix of three *Cyclones* and two *Chinooks*. The SCF construct also demands sizeable load slings for moving heavy equipment ashore. Overall, the carrying capacity, load sling and durability of the new CF helicopter types are sufficient to quickly offload and retrieve a LF and its light materiel over the littorals.

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[37] National Research Council, United States, Committee on Naval Expeditionary Logistics, Naval Studies Board, *Naval Expeditionary Logistics …,* 7.

[38] Department of National Defence, Standing Contingency Task Force, *Concept of Operations* …, 18/21.

Based on design specifications, the *Cyclones* and *Chinooks* are the initial answer to a flexible mix of medium-lift helicopters for the SCF. One must then ask how many more of these aircraft the CF would require. The important point is, if only one amphibious ship like the *ROTTERDAM* is acquired with just medium-lift helicopters employed on it, then a maximum of six *Cyclones* could operate from the flight-deck. However, potential SCF missions will undoubtedly demand flexibility for thrusting a LF ashore. This denotes a preferred mix for three medium and two heavy medium-lift helicopters. This connector mix creates a base requirement for three *Cyclones* per amphibious ship. Although the *Cyclone* distribution could be 'squeezed' to force generate three of them for a particular SCF mission, such an ad hoc planning arrangement is not preferable. A 10-day reaction time to crises demands that a *Cyclone* base be assigned directly to the amphibious ship and that additional helicopters be pulled only to fill the maximum "6-pack" load-out.

Based on the current *Cyclone* unit cost of $178 million, each package of three additional helicopters would require an incremental 20-year investment of approximately $530M. In contrast, with the *Chinooks* no additional investment is foreseen. The LF would be comprised from existing Army resources and, as a result, the LF contingent could embark on SCF ships with their integral tactical-lift helicopters.

SEA CONNECTORS

Medium-lift helicopters have constraints in handling personnel loads and in lifting heavy items like tanks and LAVs. This reality necessitates a complementary role for tactical sea transport. Moreover, the SCF Commander requires flexibility with connectors, especially sea craft, in order to generate the best beaching option when concerns such as weather, air routes, load capacity and force protection issues arise.[39] While the draft SCF ConOps did not specify the types of required naval craft, it did identify the requirement for a Maritime Amphibious Unit (MAU) containing integral sea connectors to conduct ship-to-shore transfer, beach entry, and possibly riverine patrols.[40]

Countries with amphibious ships have arranged for a variety of landing craft to operate from them in either of two configurations: in a well-deck or lowered to the sea from a davit. For example, the well-deck onboard the *ROTTERDAM* employs a mix of the following Landing Craft: Vehicle and Personnel (LCVP), Utility (LCU) and Mechanized (LCM).[41] From this construct, current CF naval craft can be examined to determine what, if any, sea connector gaps exist and how the required SCF capabilities can be achieved.

CF Sea Craft

The CF employs a number of small boats. These widely used assets can be divided into two classes based on their propulsion: small craft using outboard motors and large boats with installed diesel engines. Small craft like inflatable zodiac boats and Rigid Hull Inflatable Boats (RHIBs) are employed across a wide spectrum of CF operations and units - Army Engineering Squadrons to warships, Diving Units and Port Security Units. The larger diesel propelled craft are the RHIBs onboard major warships.[42] These boats are davit lowered to the sea and have been used for rescue operations in advanced sea states. Overall, the small boats are valuable

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[39] Les Mader, Major, "Reviving the Princes …", 60.

[40] Department of National Defence, Standing Contingency Task Force, *Concept of Operations* …, 18/21.

[41] Patrick Allen, *Air Assault from the Sea,* 49.

[42] Department of National Defence, B-GN-181-105/FP-E00 *CFCD 105 Seamanship Rigging and Procedures Manual* Version 1.0, (Ottawa: Chief of Maritime Staff, 1997) 11.11.1; [document on-line]; available from http://maritime.mil.ca/ english/dgmpr/dmpor/Pubs/cfcd%202015/bos_ pdfs_ final/Boschp11.pdf; Intranet; accessed 26 March 2007.

enablers to various waterborne undertakings and are ideally suited for conducting operations closely adjacent to shoreline areas, in river ways or in low sea conditions. However, these boats lack the capacity to transport large weights and troop contingents across littoral waters.

There is only one type of landing craft in CF use, the LCVP that operates from the two naval replenishment ships. Davit lowered to the sea, this little-used craft, lacks the lift capability to transport tanks or large personnel loads.[43]

Table 4 - Naval Craft

Type (with model)	Length (feet)	Beam (feet)	Speed (knots)	Range (nautical mile)	Crew	Cargo Lift (kilograms / metric tons)	Pax Lift (number)
Zodiac (Inflatable boat)	15.4	6.2	15	60	1	1,100 kg	10
RHIBs (MCDVs)	18.3	7.0	40	40	2	1,030 kg	9
RHIB (CF Warship)	23.9	9.8	30	100	2	3,420 kg	18
LCVP (AOR)	35.7	10.5	11	130	3	3,674 kg	40
AAV (Amphibious assault vehicle)	29.8	10.5	20	65	3	2,268 kg	17
LCM (Spanish 1E)	76.5	21.0	14	160	3	100 tons	100
LCU (US - 1600)	135.0	29.0	11	1,200	11	180 tons	400
LCU (UK - MK10)	97.8	24.3	12	600	7	100 tons	120
LCU (Dutch - MKIX)	89.6	21.8	9	400	5	100 tons	130
LCAC (USMC)	88.0	47.0	40	200	5	60-75 tons	24
LCAC (Cdn Coast Guard, AP1-88 Dash19.0)	93.5	39.4	45	250	4	25 tons	24

Sources: 1. Department of National Defence, CFCD 105 Rigging and Procedures Manual;
2. Conversation with Canadian Forces Operations School staff in Halifax;
3. Chief Maritime Staff, SCTF MWG, Minutes of 3rd Maritime Working Group, held 16 Jan 06; and
4. Canadian Coast Guard website.

Potential Landing Craft

Since the CF's inventory of boats and LCVPs (see Table 4) lack the carrying capacity to support the expeditious transfer of a LF and its equipment, the SCF has to acquire larger craft to provide more effective littoral transport. The Maritime Working Group (MWG), organized to

[43] Department of National Defence, CFCD 105 Rigging and Procedures Manual …, 11.13.1.

address naval SCF requirements, identified several types of NATO landing craft (see Table 4) that could potentially fill this role, depending on the amphibious ship acquired. Warranting consideration were - LCMs, LCUs and the versatile Landing Craft, Air Cushion (LCAC). LCMs are designed like a small LCU and carry double the payload of the CF's LCVP. For example, the Spanish *1E LCM* is davit lowered but can lift 100 tons.[44] With LCUs, the MWG identified three suitable variants: the large American *LCU-1600*, the medium-sized British *LCU-MK10* and the small Dutch *LCU-MKIX.* The US and British LCUs operate solely from a well-deck, whereas the Dutch model requires either a well-deck or a davit-lowering system.[45] Each of the three LCU variants examined here possesses the requisite combination of endurance, troop carrying capacity and load flexibility to support the quick insertion of an infantry company.

Finally, LCACs operate on an air cushion and provide considerable manoeuvrability, because they can navigate water, sand and even ice areas. Versions in use by the US Marine Corps have speeds as high as 50 knots, enabling them to quickly deliver materiel across most littorals.[46] Interestingly, the Canadian Coast Guard employs four LCACs for Search and Rescue (SAR), fisheries enforcement and ice-breaking duties.[47]

During the Operation UNISON humanitarian mission, an *LCU-1600* from the *USS BATAAN* ferried sailors ashore because the three Canadian warships were equipped with only small boats. The transport lift of the small boats was unsuitable to the operations' stand-off

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[44] Canadian Armed Forces, Chief Maritime Staff, SCTF MWG, Minutes of 3rd Maritime Working Group, held 16 Jan 06, [report on-line]; available from http://navy.dwan.dnd.ca/english/dgmfd/dmarstrat/sctf_mwg.asp; Intranet: accessed 7 April 2007.

[45] Patrick Allen, *Air Assault from the Sea,* 49.

[46] Norman Polmar and Peter B. Mersky, *Amphibious warfare – an illustrated history (*New York: Blandford Press, 1988), 174-175.

[47] Canadian Coast Guard, "Pacific Region," http://www.pacific.ccg-gcc.gc.ca/fleet-flotte/fleetinfo/siyay_e.htm; Internet; accessed 18 April 2007.

distance, and even a LCVP would have experienced lift constraints.[48] As a result, Operation UNISON emphasized the need for landing craft with a large load capacity for conducting littoral transport operations.

Landing Craft Assessment

Assessing the suitability of the NATO craft to meet the SCF's sea transport requirements, stand-off distances, operating capabilities and acquisition costs requires examination. From this analysis the number of landing-craft required will be identified. With respect to stand-off distance, the American OMFTS study reported that if an amphibious ship can close to a port (territorial waters) early in an operation, then slower landing craft is adequate. However, the study also noted that as the sea distance increases, alternate capabilities, such as the speed of LCACs need to be explored, in order to generate a more effective turn-around time.[49] Since the SCF tends to operate in the territorial waters of the littorals, the quantity of craft available is more important than their relative speeds.

With high speed discounted for the SCF, the important operating capabilities become carriage capacity, seaworthiness and size.[50] Landing craft must maximize load capacity, especially the ability to transport tanks, LAVs and trucks. The higher the tonnage a craft can transport the greater the operational flexibility it will provide the SCF. For seaworthiness, it is best to employ craft that operate from a well-deck, rather than those that require lowering into

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[48] Richard Decker, Lt(N), "Joint Task Force Atlantic's Debut – Operation Unison," *Canadian Naval Review*, Vol. 1 No. 4 (Winter 2006), 50 [journal on-line]; available from http://naval.review.cfps.dal.ca/pdf/winter2006excerpt.pdf; Internet; accessed 7 April 2007. Operation Unison was the Canadian assistance to the Hurricane Katrina clean-up in the Gulf of Mexico in 2005. During that Operation, a Task Group consisting of three Canadian warships and the CGS Sir William Alexander provided support.

[49] National Research Council, United States, Committee on Naval Expeditionary Logistics, Naval Studies Board, *Naval Expeditionary Logistics …,* 6.

[50] Les Mader, Major, "Reviving the Princes …, 62.

the sea. Well-deck operations facilitate load-out and the lift-cycling of materiel across the littoral waters, whereas lowering boats and items into the sea increases the risk of damage to materiel. In addition, load capacity has to be balanced against craft size because space availability is always a constraint onboard ship. Smaller craft tend to optimize spacing and increase resource availability and flexibility. Finally, CF capital expenditures have to be prudently apportioned to maximize capabilities while minimizing life-cycle demands.

An examination of the aforementioned NATO craft against this framework uncovered a clear connector direction for the SCF namely, the Dutch *LCU-MKIX*. In comparing the potential variants, it was noted that not only are LCACs expensive but, with a beam twice that of LCUs, they also consume a large amount of well-deck space. Furthermore, unlike diesel craft, the gas-turbine powered LCACs require increased maintenance and specialized operator skills.[51] The combination of these factors, especially since speed is not critical, makes them an unsuitable SCF investment. Although LCMs are half the width of LCACs, they have reduced load capacity and are less seaworthy than LCUs. Finally, amongst the three LCUs examined (see Table 4), the smaller Dutch *LCU-MKIX* offers the best combination of range, load lift and seaworthiness for transporting a LF across littoral waters.

To determine the required quantity of LCUs, the *ROTTERDAM* class reveals that they can carry the following maximum number of craft: six LCVPs, four LCUs or four LCMs. This denotes a base requirement of four LCUs for the SCF. The Dutch Navy acquired five of the *LCU-MKIX* in 1998, at a cost of US$12 million.[52] Factoring in inflation and the US exchange rate, this equates to a current Canadian program cost of C$17million and a unit cost of C$3.4

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[51] Norman Polmar and Peter B. Mersky, *Amphibious warfare…,* 174-175.

[52] Netherlands Navy, "Netherlands - *ROTTERDAM* Class landing Platform, Dock (LPD)," http://www.amiinter.com/samples/netherlands/NL3301.html; Internet; accessed 19 April 2007.

million.[53] Of note, a 2005 financial estimate by the Directorate of Maritime Ship Support staff calculated that a *ROTTERDAM* type ship and four LCUs would cost $1.32 billion, for both acquisition and 30 years of maintenance.[54] Amortized, this equates to $44 million annually.

The ideal sea transport arrangement is for a high-low mix of landing craft, one type capable of carrying large equipment and smaller ones more suited to manoeuvrability.[55] A tailored well-deck mix could be constructed dependant on the SCF mission by using the current inventory of LCVPs to supplement LCUs. Since the future JSS is designed to carry two LCVPs,[56] using LCVPs already in service would minimize the number of craft models in operation and, thereby, reduce both training and maintenance costs.

One critic of the SCF argued that lavish defence spending would be required if the CF were to obtain the necessary landing craft and helicopters to support the SCF.[57] However, as noted in this analysis, a modest investment of only $508 million will procure and maintain the air and sea connectors, to generate the SCF's littoral transport requirements. A conservative amortization over 20 years, denotes a small capital investment of $25.4 million per year.

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[53] Inflation has averaged two percent over the past nine years and the current US exchange rate as of March 2007, is 1.15.

[54] Canadian Forces, Directorate of Maritime Ship Support, Report Number: DMSS-2-3-2005-008, *Budget Year Costing of a Preliminary Options Analysis of Canadian Forces Amphibious, AOR and SeaLift Capability* (Ottawa: Department of National Defence, 2005), 16.

[55] Robert D. Bradford, Major, "An Amphibious Task Group for the SCTF," *Canadian Naval Review*, Vol 2, No 2 (Summer 2006), 16.

[56] Les Mader, Major, "Reviving the Princes …, 62.

[57] Brian K. Wentzell, Col Ret'd, "Reflections on the Canadian Amphibious Task Force," *Canadian Naval Review*, Vol 2, No 4 (Winter 2007), 15/16 [journal on-line]; available from http://naval.review.cfps.dal.ca/current.php; Internet; accessed 9 April 2007.

GROWING THE CONNECTOR CAPABILITY

> A military service may be viewed as consisting of a strategic concept which defines the role of the service in national policy, policy 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.[58]

The CF presently has little doctrine or pooled resources to undertake amphibious operations. This issue demands attention because amphibious landings are an inherent part of general operations that could be undertaken at any point on the scale of conflict in which NATO or Canadian interests are at stake - from humanitarian crises to war.[59] While debate rages on concerning the SCF and the acquisition of an amphibious platform, initiating efforts now to grow the connector capabilities will build the foundation for an achievable SCF construct.

The importance of the SCF and its integral transport connectors to future littoral missions must be collectively communicated and pursued by senior officers across all environments. History reveals that lead times to crises cannot be guaranteed and in the future, the global littorals are increasingly expected to become the location of military operations. Thus, the CF needs to acquire, and maintain at high readiness, the capabilities to respond in any littoral environment.[60] Unity of purpose is essential amongst the environments, if the CF is to succeed in securing the necessary resources to augment the varied connector assets.

Augmented connector capabilities will ultimately provide the Government of Canada with added flexibility for planning and reacting to future force employment scenarios. However, CF acquisitions continue to be constrained by limited defence funds. The Chief of the Defence

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[58] Marine Corps Warfighting Laboratory, *Marine Corps Operating Concepts for a Changing Security Environment* (United States Marine Corps, March 2006), 73.

[59] Robert Bradford, Major, "Reconsidering Amphibiosity – A Canadian Construct" *The Army Doctrine and Training Bulletin*, National Defence, Vol 2, No 1 (February 199), 40/41.

Staff (CDS), General Hillier, recently remarked to a reporter that to accomplish everything, "would require extra money and personnel for training, something the CF does not have."[61] Thus, unity of effort is required to maximize connector capabilities in the face of budgetary pressures. The CF can ill afford for new projects to be developed in isolation because new capabilities have to deliver the maximum amount of collective capability. The traditional environment culture compartmentalizes requirements and this cultural burden requires a paradigm shift from one of isolationism to one of compromise. Each environment must seek to answer the important question about how it can support the other services with its connector assets.

Finally, there is the issue of unity of training. Maximizing collective training and incorporating increased use of connector assets into CF training will ultimately improve resource usage and enhance development towards the SCF. During the initial SCF ITEE, the officer who commanded it observed four training weaknesses, namely: command and control of joint elements, developing a common operating picture, staff and Naval Task group interaction, and the skills training of all involved.[62] Collective training will address these SCF concerns by facilitating interoperability and the ability to work together in complex situations.[63] Since

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[60] Department of National Defence, *Securing Canada's Ocean Frontiers – Charting the course* …, 13.

[61] David Pugliese, "Military shelves plans for expansion," *The Ottawa Citizen*, Wednesday March 07, 2007; [newspaper on-line]; available from http://www.canada.com/ottawacitizen/news/story.html?id+ofcdc2f-32c5-4522-98cd-a745a; Internet accessed 10 March 2007.

[62] Paul Maddison, Cmdre, "Standing Contingency Force – Integrated Tactical Effects Experiment (SCF/ITEE)" (lecture, Canadian Forces College, Toronto, ON, 1 December 2006), with permission. Cmdre Maddison commanded the components that participated in the ITEE.

[63] Peter T. Haydon, *Sea Power and Maritime Strategy in the 21st Century: A 'Medium' Power Perspective,* Maritime Security Occasional paper No. 10 (Centre for Foreign Policy Studies: Dalhousie University, 2000), 116.

NATO countries like the UK and the Netherlands have already combined training efforts during amphibious exercises,[64] it is obvious that this is not only a Canadian issue.

Training exercises need to be planned to incorporate supported and supporting roles for the three services. Moreover, by exercising SCF components with NATO countries, particularly the US, interoperability, amphibious skills and the ability to execute command and control will undoubtedly improve. Opportunities exist as the US and Canadian Navy regularly participate in large training exercises. In addition, inter-departmental collaboration and mission-specific activities can be explored by conducting more training with the Canadian Coast Guard and by incorporating their assets, like LCACs, into training scenarios.

Canada already has the air and sea assets that could transport a LF and its equipment across the littorals. However, without being exercised or utilized in a joint fashion, those assets will remain solely an environmental resource. Opportunities need to be maximized in order to grow CF assets into functional and workable transport connectors.

CONCLUSION

To address potential crises that could impact Canadian interests, the Government of Canada will continue to encourage the CF to transform and become more effective, relevant and responsive to both national and international demands. Moreover, future force employment scenarios require a mitigation of resource constraints across environments and a generation of capabilities that project a global reach. To achieve this objective, attention has to be focused on advancing littoral operations through a feasible SCF construct. Ideally, this capability will be centred on a LPD amphibious platform, with a LF of four companies, and a flexible mix of air and sea transport connectors.

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[64] Patrick Allen, *Air Assault from the Sea,* 51.

Since Canada will tend to work within the territorial waters of the littorals, medium-lift helicopters are the ideal air connectors. That means the planned CF acquisition of *Cyclones* and *Chinooks* can fulfill the initial SCF air transport requirements. When this operating analysis is applied to the sea transport, it results in an SCF requirement for LCUs to provide added sealift. In order to initially optimize the SCF construct, a small capital investment, estimated at $508 million over 20 years, would enable the CF to acquire the necessary additional assets, three additional *Cyclones* and four LCUs.

While a full reporting of the connector complexities are beyond this essay's scope, it is clear that effective transport connectors are critical to growing the SCF construct. By projecting a unity of purpose, effort and training, the CF can leverage opportunities to acquire the connector and SCF capabilities to respond to future littoral crises. Although transport capabilities exist amongst the Airforce and the Navy to move a LF, and other capabilities are in the acquisition stages, those enablers will become true 'connectors' only if there is a continued transformation towards joint doctrine, joint training and joint operations.

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