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AIM

1. Canada's maritime helicopters must be capable of conducting Anti-Surface Warfare (ASuW) operations, not only to search and detect, but also to include attack if necessary. Without an Air-to-Surface weapon a maritime helicopter is unable fulfill this function. The aim of this service paper is to recommend that the CH-148 Cyclone maritime helicopter be fitted with a standoff, air launched, precision-guided ASuW weapon in addition to the already planned 7.62mm M240 general purpose machine gun.

INTRODUCTION

2. Over the past twenty years the Royal Canadian Navy (RCN) has seen a shift from open ocean operations to those in the littoral. Operations in Libya and the Gulf of Oman are just two of the more recent examples. As such, our maritime helicopters have also experienced a shift in operations to the littoral environment, albeit with no corresponding change in ASuW weapon capability. While the introduction of the CH-148 Cyclone will provide the RCN a maritime helicopter at the forefront of modern technology, with outstanding Anti-Submarine Warfare (ASW) capabilities and weapons, it will not provide any additional advanced ASuW offensive capabilities.

3. Maritime helicopters are integral to ship / Task Group (TG) operations in any environment. Their ability to travel further and faster than ships enhances overall situational awareness. They can increase the ship's detection range by 100-200 nautical miles in any direction. While they are capable of carrying out a wide variety of non-combat missions maritime helicopters are typically used to search for, localize, classify, identify and when

necessary, target and / or attack surface and subsurface vessels. They must be capable of quickly changing roles without having to reconfigure equipment, and as such, most Western maritime helicopters are fitted with an air launched precision-guided ASuW weapon system. This service paper will look at the some of the issues that necessitate the requirement for CH-148s to have a more capable ASuW weapon than the M240 machine gun. The future maritime operating environment, threat and available weapons systems will all be covered in the discussion portion of this service paper.

DISSCUSSION

4. *Horizon 2050: A Strategic Maritime Concept for the Canadian Forces* states that the Canadian Forces (CF) "… will contribute to the defence of the global system both at home and abroad, at sea and from the sea."[1] Global conflicts and political instability are unlikely to abate in the coming years. The CF Chief of Force Development's (CFD) publication *The Future Security Environment 2013-2040* indicates that "… the period out to 2040 is likely to be characterized by increasing attention to maritime-related diplomatic, commercial and security issues."[2] Given the events in the South China Sea and the world's increasing hunger for resources, one can easily conclude that the maritime domain will become increasingly contested, especially the littorals. This means RCN ships will continue to deploy around the world and the CH-148 Cyclone will deploy with them.

5. Most of the world's countries border a sea or ocean and almost 95 percent of its population lives in close proximity to a coast. Approximately 60 percent of the world's most significant urban areas are located within 90 kilometers of a coast and a majority of the world's

[1] Department of National Defence, *Horizon 2050: A Strategic Maritime Concept for the Canadian Forces* (Ottawa: Royal Canadian Navy, 2010), 11.

[2] Department of National Defence, *The Future Security Environment 2013-2040.* (Ottawa: DND Canada, 2014), 112.

capitals are in littoral regions.[3] 80 percent of the world's trade is transported by sea and all of this seaborne trade originates and ends up in littoral cities.[4]

6. The littoral, as defined by CFD, is "a coastal region consisting of the coastal sea areas and that portion of the land that is susceptible to influence or support from the sea."[5] Recent RCN deployments have typically been characterized by operations in the littorals and are likely to continue as such. Both CFD and Milan Vego, a professor in the Joint Military Operations Department at the U.S. Naval War College, recognize that the littorals present a unique and challenging environment to naval forces. *Horizon 2050* likens the littorals to urban warfare at sea in that "…shallow waters, straits and adjacent landmasses constrain movement at sea much like streets and alleys constrain movement of land forces."[6] Due to its proximity to land, the environment is often cluttered and sensors are unable to be used to optimal effect because of radio frequency, electromagnetic and electro-optical propagation issues.[7] These issues make it difficult to develop and maintain a clear Recognized Maritime Picture (RMP). In comparison to naval operations in the open ocean, shorter distances and higher speeds of modern platforms and weaponry reduce warnings and reactions times in littoral waters.[8] Closer ranges significantly reduce a commander's battle space and shorten the time to detect and engage possible threats.

7. In addition to conventional navies, the littorals are a theatre of operation for irregular, hybrid and non-state actors (some acting as state proxies) threats. *Horizon 2050* states "… maritime armed groups will have a growing capability to challenge advanced navies in the

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[3] Milan Vego, "On Littoral Warfare." *Naval War College Review* 68, no. 2 (Spring 2015), 31.
[4] Ibid, 31.
[5] Department of National Defence, *The Future Security Environment…*, 113.
[6] Department of National Defence, *Horizon 2050…*, 27.
[7] Richard Scott, "Surviving the Swarm: Navies Eye New Counters to the FIAC Threat", *Jane's Navy International* (March 2014), 21.
[8] Milan Vego, "On Littoral Warfare…, 41.

littorals."[9] These groups will likely employ asymmetric tactics that take advantage of the environment in order to hide and surprise opponents. Iran's Islamic Revolutionary Guards Corps Navy (IRGCN) has spent years developing tactics based on the principals of using small boats to counter the technological advantages of their adversaries.

8. Despite the warming of relations between Iran and the West, the IRGCN are still the greatest threat to Western navies operating in the Gulf of Oman or in the vicinity of the Straits of Hormuz. The IRGCN have developed 'swarm" tactics for the littorals utilizing fast inshore attack craft (FIAC) armed with small caliber weapons and rocket propelled grenades (RPG). These FIAC work in concert to overwhelm larger platform defences using speed, mass, coordinated manoeuvre, low radar signature and concealment.[10] In addition to FIAC, the IRGCN employ fast attack craft (FAC) armed with torpedoes, rockets and even anti-ship missiles. They have also been working on remote controlled waterborne improvised explosive devices (WBIED) meant to ram into larger naval vessels with devastating effects. IRGCN tactics involve the coordinated use of all of the aforementioned assets.

9. While the IRGCN threat remains extant, reports that non-state actors, other than pirates, are getting into the maritime asymmetric game are worrying. Leaked reports from Russian intelligence claim that a North African branch of Al Qaeda is seeking to extend its range to Europe by establishing a marine unit that will employ small, fast boats to engage in acts of sabotage and suicide missions using WBIEDs.[11] While non-state actors like Al Qaeda do not possess the capabilities to challenge modern navies head on, their foray into the maritime domain is disconcerting. As seen with the USS *Cole*, non-state actors with intent and an inexpensive

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[9] Department of National Defence, *Horizon 2050…*, 7.

[10] Richard Scott, "Surviving the Swarm…, 21.

[11] Seumas Milne and Ewen MacAskill. "Al-Qaida planning kamikaze attacks on ships in Mediterranean, cables claim," last accessed 2 February 2016, http://www.theguardian.com/world/2015/feb/25/al-qaida-planning-kamikaze-attacks-ships-mediterranean-russian-cables

WBIED can cost lives and millions of dollars of damage.

10. One of the issues of dealing with the IRGCN or any other irregular and non-state actors operating in the littoral waters is that they often blend in with civilian shipping. Fishing boats, Boston whalers, speed-boats and other civilian patterned vessels laden with explosives could easily be used against modern navies. Determining which vessels are a threat and which are not is a challenge in the littoral environment. Rules of engagement (ROE) for Western navies require command teams to determine intent of vessels before taking offensive / defensive measures. Ascertaining intent of an unknown surface vessel at a range sufficient to take defensive measures is another challenge faced in the littoral environment.

11. Western navies, Canada included, have been wrestling with how to mitigate the threat posed by FIAC / FAC in the littoral environment for some time. As part of the NATO TG operating off the coast of Libya, HMCS *Charlottetown* experienced the threat of FIAC attack (FIAC were engaged by attack helicopters from a nearby amphibious TG).[12] Countering the FIAC threat was an agenda item at the Five-Eyes Maritime Warfare Centre Conference in both 2013 and 2014. Better picture compilation tools, enhanced sensors and remotely operated small and medium caliber weapons systems have been developed to bolster ship protection. Despite the advances in shipboard technology, a maritime helicopter armed with standoff, air launched precision guided ASuW weapons is still the best tool available to ships and TGs operating in the littorals to mitigate the threat of small boats. They enhance the concept of layered defence and allow for threats to be identified and dealt with at range.

12. A maritime helicopter with ASuW standoff, precision air launched weapons is critical in littoral waters where traffic congestion, the requirement for positive visual identification and

[12] Scott Bishop, "Libya and the Lessons of Naval Power", *Canadian Naval Review* Vol 8 (Winter 2013), 17.

land obstacles or proximity to shore may not allow for the use of ship's main armaments. Expending a ship's multi-million dollar missiles on a FAC or FIAC does not make sense when their maritime helicopter (which can reload upon its return to ship) is capable of employing its own ASuW weapon against the threat. Possessing a capable standoff ASuW weapon also allows helicopters to conduct autonomous operations. It reduces the line-of-sight positive control requirements and extends the range at which a helicopter can operate from the ship, thereby increasing the overall surveillance area. It also provides the TG Commander or Sea Combat Commander (SCC) with an offensive platform that is able to conduct unescorted strikes in the littoral (or open ocean) environment.

13. Operating in a littoral environment requires close cooperation between military services. The proximity to land and sea, coupled with conventional and non-conventional threats, requires joint cooperation. It also requires close collaboration with allied nations. CFD's Future Security Environment documents states "…even on missions where armed conflict is improbable navies will require offensive and defensive capabilities to signal intent to allies and adversaries alike."[13] Given the lean size of the RCN there is a requirement for multirole platforms that can complete more than one mission.

14. Having a maritime helicopter with a capable offensive anti-surface weapons system would allow the RCN to better integrate in an allied or joint environment. If special forces operators needed to be transported ashore in a high threat environment, a helicopter fitted with a robust offensive capability would be a better option than one without. Maritime helicopter standoff weapon systems could be used to support ground troops by engaging targets ashore. *Horizon 2050* recognizes that for the CF to contribute to international security, specifically in the littorals, maritime forces "…must be able to contribute to decisive maritime and joint action both

[13] Department of National Defence, *The Future Security Environment…*, 113.

at sea and ashore."[14] Given that the RCN is reticent to use its Harpoon missiles for shore attack and that the ship's main armament is not effective for naval fire support, a CH-148 with standoff offensive capabilities would allow the RCN to contribute to joint action both at sea and ashore.

15. Canada is one of the few Western nations that does not have a maritime helicopter armed with capable ASuW standoff, precision, air launched weapons. Even New Zealand's maritime helicopter fleet is equipped with Maverick air-to-surface missiles in addition to their 7.62mm machine gun. The CH-148 Cyclone will not be armed with anything more than a small caliber machine gun for ASuW despite RCAF doctrine, which states "Aerospace assets armed with standoff precision weapons (particularly…maritime-specific weapons) are ideally suited for the ASuW role."[15] Multiple trials by Canada and it allies have demonstrated that door mounted, non-stabilized machine guns are not the most effective weapons against fast moving small boats. The relatively short range of small arms can also leave helicopters vulnerable to the threat of shoulder launched, man-portable, infrared guided missiles (MANPADS).

16. Other Western nations, specifically the United States and Britain, have long embraced the development of guided weapons solutions that offer a standoff capability to their maritime helicopters. The Royal Navy (RN) was employing Sea Skua missiles, in the late 1970s, from their Lynx helicopters to engage small warships. Today's solutions vary from 30mm guns to light weight missiles, guided rockets and even adapted anti-armour land munitions such as Hellfire and Brimstone missiles. Several navies have also seen the utility in improving range and target discrimination abilities in these weapons systems so as to take on the more traditional

[14] Department of National Defence. *Horizon 2050…*, 29

[15] Department of National Defence, B-GA-403-000/FP-001, *Canadian Forces Aerospace Shape Doctrine* (Winnipeg: 17 Wing Winnipeg Publishing Office, 2014), 49.

surface threats in addition to those of an asymmetrical nature.[16]

17. The USN has placed considerable emphasis on developing capabilities to counter the potential threats (FIAC) in the littoral environment. Even with the development of shipboard enhanced close in weapons systems, lasers and directed energy weapons, maritime helicopters still factor heavily in the planning of USN TGs and Carrier Strike Groups operations to counter littoral threats. Both variants of their primary maritime helicopter, the MH-60 Romeo and Sierras, carry standoff precision guided ASuW weapons systems. The MH-60 R/S can carry up to eight AGM-114B Hellfire II, missiles which have a range of up to eight kilometers.

18. In 2014, an urgent operational needs statement saw USN MH-60S receive the LAU-61 G/A Digital Rocket Launcher (DLR) along with the APKWS II guided rockets. APKWS II is a semi-active, laser-guided system "…with 70mm rockets to, deliver precision, low collateral effect against soft and lightly armoured targets."[17] The DLR system is being fitted onto the MH-60R as well. APKWS is low cost, requires minimal integration and enables helicopters to carry a load of 19 individually selectable, mixed rockets with a variety of warheads. The system has a range of up to five kilometers and is highly effective against FIAC. With a mix of AGM-114Bs and APKWS the MH-60R is a highly capable anti-surface platform.

19. The UK has been working with France to develop the Future Anti-Surface Guided Weapon (FASGW) to defeat conventional and asymmetric threats. Thales lightweight multi-role missile (LMM), will be employed by the new RN Wildcat maritime helicopter as a replacement for Sea Skua. LMM is a low-cost, laser-guided missile that can engage a wide range of air, land, and sea targets out to ranges of about eight kilometers. It is envisioned that the Wildcat will be armed with two five-cell launchers that can easily be replenished on ship.

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[16] Mrityunjoy Mazumdar and Richard Scott. "Find, Fix and Strike: Delivering the Proportional Punch", *Jane's Navy International,* Vol.117 no.6 (July/August 2012), 24.

[17] Ibid, 24.

20. The Australian's recently purchased the MH-60Rs and with them the AGM-114B. They have the option to arm their MH-60Rs with DLR and APKWS and will likely do so in the near future. New Zealand (NZ) will be upgrading the missile on its new maritime helicopter with the Kongsberg Penguin anti-ship missile. While the Penguin is not ideal for dealing with FIAC it provides NZ's maritime helicopters with a potent ASuW capability that Canada does not possess.

CONCLUSION

21. If Canada is committed to global security the CF will continue to deploy around the world. Undoubtedly the RCN will end up operating in the littoral environment. The CH-148 Cyclone maritime helicopter will be an integral component of any future RCN deployments. The requirement for the CH-148 to be equipped a standoff air launched precision-guided ASuW weapon system is key to enabling it to conduct autonomous operations and bring a joint effect to CF missions. This requirement will only increase as the maritime domain evolves and new threats emerge.

RECOMMENDATION

22. The CF should investigate the feasibility of equipping the CH-148 Cyclone with either BAE's DLR / APKWS or Thales LMM standoff, air launched, precision-guided weapon systems.

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