Uncrewed Technology in the RCN

Uncrewed systems have, for many years, had the potential to reshape the conduct of naval operations and naval warfare. With the burgeoning interest in the technology producing rapid developments in the past decades, militaries across the world have increasingly been incorporating and adopting unmanned systems into their forces. Regular reports of new exercises and tests seeking to evaluate and assess the utility of unmanned aerial vehicles (UAVs), unmanned underwater vessels (UUVs), and unmanned surface vessels (USVs) speak to the growing integration of such systems into the suite of war technologies available for enhancing defence and waging war. This trend was radically accelerated by the war in Ukraine. In the Black Sea, the Ukrainian employment of these systems has (as of 2024) effectively driven the Russian surface fleet from the sea. Having sunk several major vessels and repeatedly attacked the anchorage at Sevastopol, the Russian Navy has hunkered down in port in the eastern Black Sea, far from the critical shipping lanes.

In Canada, these developments have had an impact and the Canadian Armed Forces (CAF) have directed new attention to the role such unmanned systems might play in supplementing its military capabilities. Unmanned aerial vehicles have been a component of the CAF's toolbox for several years. The War in Afghanistan, for instance, saw the CAF testing various unarmed models, including the CU-161 Sperwer, which the CU-170 Heron and ScanEagle later replaced. Today, the CAF deploys such UAVs to fulfil various functions, ranging from conducting long-range targeting and surveillance to performing ground attacks, with their value as surveillance tools eliciting particular attention and recognition. However, although much of the CAF's focus for UAVs has concentrated on their utility for air and ground forces, such systems also offer significant benefits and value for maritime forces.

For the RCN, the surveillance capacities of such systems are particularly attractive, given their ability to facilitate long-range surveillance and extend a vessel's situational awareness far beyond the range allowed by its onboard sensors alone. Historically, such an expanded situational awareness and surveillance range would have required helicopters departing from warships or planes flying from aircraft carriers, both of which are far more expensive and less sustainable alternatives compared to the modern UAV. Moreover, the diversity of UAVs available today allow for their dispersal across a fleet in accordance with the vessels' individual capacities, with larger ships able to carry several sizeable UAV systems, while smaller ships can still benefit from the provision and use of lighter and smaller UAVs. UAVs thus offer not only enhanced surveillance and situational awareness capabilities for vessels of the RCN, but their availability in an array of models and classes enables significant flexibility for their deployment among the fleet.

However, as much as UAVs offer benefits over helicopters or planes as platforms for extending surveillance capabilities and situational awareness, they also suffer from several of the same limitations. Inevitably, their use is restricted to the availability of personnel to operate and maintain the systems. Since vessels are not always able to accommodate additional crewmembers

specifically for the operation of UAV systems, existing crewmembers may necessarily be required to assume the further tasks and responsibilities associated with their operations. Similarly, UAV operations are dependent upon sea and weather conditions, with small UAVs being particularly susceptible to winds. Deconflicting air traffic in the region of operations is another consideration. It is imperative for RCN vessels utilizing UAVs to be cognizant of civilian air traffic and other maritime military air assets in the operational theatre, to ensure that their systems are not interfering with such traffic. This can restrict their utility for certain RCN vessels not equipped with the ability to conduct air traffic management.

Still, despite these limitations, the RCN has been incorporating UAVs into the fleet for several years. Since its trial deployment from 2012 to 2014, the ScanEagle system has been operated from the RCN's frigates, augmenting the vessels' surveillance capabilities and therefore allowing for the interception of several suspicious vessels, as well as the seizure of prohibited drugs while participating in counter-drug operations. The Snyper micro-UAV has also proven valuable for the RCN in simulating attacks on naval vessels, to train personnel to confront and respond to assaults from singular or several UAVs. The RCN has similarly been utilizing the Puma Maritime Miniature Unmanned Aircraft System (MMUAS) on its Kingston-class vessels since 2019, making it the first unmanned aerial system (UAS) project to be operated and maintained as the RCN's own capability.[1] Able to remain airborne for around two hours and fly at a maximum altitude of 3,200 metres (10,500 feet), with a 20-kilometre range, the Puma is able to supplement a vessel's over-the-horizon surveillance and intelligence capabilities and, as such, has been trialed in HMCS *Harry DeWolf*, the first of the RCN's new Arctic and Offshore Patrol Ships. There are, moreover, plans underway for the inclusion of other UAV systems into the RCN's fleet. Through the unmanned system program, led by the Director of Naval Requirements, the RCN is currently seeking to procure a family of systems able to be operated from all naval warships, to offer near real-time intelligence, surveillance, target acquisition, and reconnaissance (ISTAR) data.[2] The navy entered into a contract in 2018 with the company Qinetiq to acquire an ISTAR UAV capability based on a Skeldar platform. This project was in the definition stage in 2021, with the plan being to procure a remotely piloted tactical aircraft system for the Halifax-class vessels. A Request for Proposals was issued for such a system in August 2022, with a March 31, 2023, closing date. Evidently, there is considerable interest in the RCN in broadening its UAV capabilities.

In addition to such UAVs, the RCN has also been steadily integrating unmanned surface vessels (USVs) and unmanned underwater vessels (UUVs) into its fleet. Though their operation requires caution to coordinate and deconflict such surface and sub-surface unmanned vessels with other military and civilian vessels on or in the water, the benefits of such unmanned systems for a naval fleet are clear. The Hammerhead unmanned target system, for instance, is a Canadian-made USV that has long been in use by the RCN to practice defending against an attack. Capable of high speeds, and equivalent in size to a small motorboat, the Hammerhead is particularly notable for its value in training naval personnel to react to rapidly moving attack craft and – when multiple Hammerheads are deployed in a swarm – to respond to a coordinated assault involving several vessels. This training is especially relevant given the proclivity in contemporary maritime warfare to deploy similarly small and fast craft, brimming with explosives, in attacks on vessels. Vessels such as these have been used to great effect by the Ukrainians for instance.

Furthermore, the RCN is also actively examining the potential to employ USVs and UUVs in high-risk and high-danger undertakings like minehunting. USVs capable of detecting and disarming sea

mines already exist, and today's UUVs can conduct mapping, surveillance, and even anti-submarine warfare by detecting and confronting sub-surface threats. In 2018, the Department of National Defence (DND) launched the Remote Minehunting and Disposal System (RMDS) project, aiming to equip the RCN with the systems needed to perform diverse naval minehunting operations and enhance underwater domain awareness.[3] Utilizing a combination of government- and commercial-developed technologies to identify, detect, and eliminate underwater explosive devices and sea mines, the RMDS systems will be comprised of modular sub-systems that are both deployable and portable.[4]

Moreover, the RCN is similarly according increasing attention to the development and incorporation of unmanned underwater vessels. For instance, in July 2022, representatives from the RCN, as well as from Australia, welcomed a demonstration from Cellula Robotics of its Solus-LR hydrogen fuel cell-powered AUV, or Autonomous Underwater Vessel, off the coast of British Columbia. During the demonstration, the vessel – whilst underway and submerged – autonomously launched a micro-AUV, thus illustrating the AUV's ability to launch its own AUV. The demonstration also featured the Solus-LR surfacing to convey a status message over satellite. Given the difficulties typically associated with underwater communications between an unmanned vessel and a ship or shore facility, the vessel's clear ability to communicate established its prospective utility for the RCN in the development and enhancement of situational awareness. Indeed, the Solus-LR showed great promise in its ability to both collect and transmit data, testifying to its potential to allow for the compilation and communication of real-time, over-the-horizon information from a submerged UUV/AUV.

The aforementioned UAVs, USVs, and UUVs represent but a handful of the unmanned systems currently either in use or in development by the RCN. The expanding advancement and utilization of these systems, however, will require the RCN, CAF, and Canada generally to contemplate – and indeed regulate – not only how and when such unmanned systems will be utilized but also whether they will be armed and, in the event they are, who will assume responsibility for their control. Such questions surrounding the control and use of these systems will only become more pertinent as developments in and the incorporation of advanced data analytics and Artificial Intelligence make the systems increasingly more autonomous. Moreover, though the systems are unmanned, their operation and maintenance still require human personnel, making it imperative for the RCN to train or recruit personnel with the expertise needed to ensure the systems' full and complete integration into the RCN's vessels and fleet. The importance of these considerations will only be amplified as the RCN joins the numerous other maritime forces around the world that are progressively turning to unmanned systems as a capability enabler. Indeed, the RCN's adoption of unmanned systems can only be expected to increase given their potential to facilitate a variety of RCN missions, including the surveillance of Canada's maritime approaches, the charting of its Arctic waters, and the Navy's – and nation's – adaptation to the ever-evolving suite of contemporary challenges and threats.

References

[1] Government of Canada, "RCN joins NATO initiative to learn from allies' unmanned systems," February 4, 2021, https://www.canada.ca/en/department-national-defence/maple-leaf/rcn/2021/02/rcn-joins-nato-initiative-to-learn-from-allies-unmanned-systems.html.
[2] *Ibid*.
[3] Acknowledging that NATO members profit from learning from each other, Canada began participating in the NATO Maritime Unmanned Systems Initiative (MUSI) in 2021. *Ibid*.
[4] Government of Canada, Department of National Defence, "Remote Minehunting and Disposal System," modified December 1, 2018, https://apps.forces.gc.ca/en/defence-capabilities-blueprint/project-details.asp?id=1642.